THE GEOMORPHOLOGICAL AND ZONATIONAL DEVELOPMENT OF MANGROVE SWAMPS IN THE TOWNSVILLE AREA, NORTH QUEENSLAND

VOLUME II

APPENDICES
MAPS
DIAGRAMS
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PLATES

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APPENDIX 1

CHEMICAL ANALYSES

Preparation of 1:5, soil:water extract

Weigh 20gm of 2mm soil into a suitable bottle, add 100ml of distilled water and shake mechanically (or intermittently by hand) at about 20°C for 30mins. Time, temperature and manner of shaking are not critical. Allow to stand for 15min. to let bulk of sample settle. Centrifuge or filter supernatant liquid.

(Hesse, 1971; Metson, 1971)

Water soluble Carbonate and Bicarbonate

Principle

Soluble carbonates are not usually present in soils until pH exceeds pH 9.5; bicarbonates may be present at much lower pH values. Estimation of carbonate and bicarbonate in admixture is usually made by titrating with acid to the bicarbonate stage (pH = 8.3) with phenolphthalein as indicator, and then continuing to the carbolic acid stage (pH - 3.8) with methyl orange. The reactions may be represented as

$$Na_2CO_3 + HCl = NaHCO_3 + NaCl \quad (pH = 8.3)$$
$$NaHCO_3 + HCl = H_2CO_c + NaCL \quad (pH = 3.8)$$

Reagents

Sulphuric acid 0.005M accurately standardized.

Phenolphthalein solution 1% w/v in 50% ethanol.

Methyl orange 0.05% w/v of free acid in water.

Procedure

Pipette a suitable aliquot of extract into a white porcelain basin and add a few drops of phenolphthalein solution. Titrate with standard sulphuric acid until pink colour disappears and note titre (y c.c.). Add 3-4 drops of methyl orange solution and continue the titration until the indicator turns red. Note the titre (z c.c.) and keep the titrated solution for determination of chloride.

Calculation

$$HCO_3^- \text{ m.e./l} = \frac{2\,(Z-2y) \times \text{conc. in mol. of acid}}{\text{ml in aliquot}} \times 1000$$

$$CO_3^- \text{ m.e./l} = \frac{4y \times \text{conc. in mol. of acid}}{\text{ml in aliquot}} \times 1000$$

Results can be converted to m.e./100gms soil.

(Hesse, 1971, p.83; Metson, 1971, p.153)

Water Soluble Chloride

Principle

Standard silver nitrate solution added to aliquot of chloride solution. After all chloride had been precipitated as silver chloride, the potassium chromate added as indicator forms a red precipitate on the addition of excess silver solution. The method tends to give high results because an appreciable amount of silver chromate must be formed before its red colour is perceptible on the silver chloride precipitate, partly owing to the slight solubility of silver chromate. Correction can be made but is generally ignored.

Reagents

Silver nitrate solution 0.02M 3.398gm/l $AgNO_3$ and stored in a brown glass bottle.

Potassium chromate solution 5gm $K_2Cr_2O_4$ dissolved in about 50ml of water. Add silver nitrate solution until a permanent red precipitate is formed; filter and dilute to 100ml.

Procedure

Titrate aliquot of extract used in carbonate determination with silver nitrate solution using 1ml of potassium chromate solution as indicator. If different aliquot extract is used it should be made neutral or slightly alkaline with sodium bicarbonate. The end point is indicated by a permanent reddish brown precipitate. A blank solution containing suspension of calcium carbonate and indicator assists in matching colours.

Calculation

$$Cl^- \text{ m.e./l} = \frac{\text{ml } 0.02\text{M } AgNO_3}{\text{ml aliquot}} \times 20$$

can be converted to m.e./100gm soil.

(Hesse, 1971, p.85; Metson, 1971, p.146)

Water Soluble Sulphate Determination

Colorimetric Method

Sulphate determinations depend on the insolubility of barium sulphate. By this method, barium sulphate is precipitated in acid conditions and barium chromate is precipitated when ammonia is added. The optical density measures the chromate left in solution and is proportional to the amount of sulphate present originally in solution. This can only be carried on clear camples. Samples containing matter should be filtered through a 0.47 micron millipore filter.

Reagents

Standard sulphate solution. This is prepared by dissolving 2.5677g $MgSO_4 7H_2O$ in 1 litre solution. This is equivalent to 1000ppm. sulphate and is diluted to appropriate standards.

Barium chromate. 10gm of barium chloride. ($BaCL_2.2H_2O$) is dissolved in water. 12.0gm of potassium dichromate is dissolved in water. Both solutions are boiled and mixed. The precipitate is filtered and washed, then boiled with 1% acetic acid, refiltered and washed. The treatment with acetic acid is repeated and the precipitate is dried at 105°C.

The solution is made up by dissolving 15gm of barium chromate in 1 litre of 0.5N hydrochloric acid.

$10^{-3}M H_2SO_4$ 5.5ml concentrated sulphuric acid is added to 600ml distilled water and the solution after cooling is made up to 1000ml. This is $10^{-1}M$ solution and is diluted 1 part in 100 to make up $10^{-3}M$.

Concentrated Ammonia.

Method greater than 20ppm.

Standards are prepared to cover the range 10ppm. to 300ppm. The distilled water used in the dilution is used in the blank determination.

A 10ml aliquot of sample blank (distilled water) or standard is pipetted into a test tube. (If sample if expected to be over 300ppm. it is diluted to within this range.) 1ml of $10^{-3}M$ sulphuric acid is added to the sample, followed by 2ml of barium chromate solution. The contents are mixed thoroughly and allowed to stand for at least 20 min. 0.5ml of concentrated ammonia is added, the contents mixed, the rack is allowed to stand for one hour to unstick any precipitate

settled on the sides of the tube, and then allowed to stand over night. A 2ml sample of the supernatant liquid is diluted to 25ml in a high standard flask. If the colour is still high this solution can be further diluted 1 to 1 with distilled water. The optical density of the diluted solution is measured at 370nm in a 1cm quartz cell, using distilled water or zero concentration as the solvent blank. Plot optical density against standard concentrations to determine the concentrations in sample.

For Concentrations less than 25ppm.

Standards 2, 5, 10, 15, 20 and 25ppm. are used. 50ml of sample, blank or standard solutions are taken. 1ml 10^{-3}M sulphuric acid is added, followed by 2ml barium chromate. The contents are mixed, allowed to stand for one hour, 0.5ml concentrated ammonia is added as before and the solutions are allowed to stand over night. The absorbances are read on decanted solutions without further dilution.

Where samples cover a wide range, dilute to the lower values and only use this method.

(Dr W.D. Johnson, Univ. N.S.W., pers. comm., 1975)

Determination of Soluble Salts and Exchangeable Cations

Using 12.5gm soil

Transfer soil to 250ml beaker, add 50ml of 40% ethanol and allow to stand for 30min. with occasional stirring. Decant through a Whitman No.50 filter paper and transfer the soil to the paper. Drain completely and wash with 3 lots of 20ml of ethanol. Test filtrate for chlorides with $AgNO_3$. Continue with 20ml of ethanol until test is negative.

Determine soluble cations Ca, Mg, K, Na using Atomic Absorption Spectrophotometer (AAS).

Transfer soil to a 100ml polystyrene jar and add 50ml N Ammonium Chloride extractant. Stir and allow to equilibriate for 10min. and pour supernatant into a filter funnel containing Whatman No.50 filter paper. Collect filtrate into a 250ml volumetic flask. Repeat until volume collected is approximately 200ml., then transfer soil to filter paper with small amounts of NH_4Cl. Continue to extract soil with NH_4Cl until almost 250ml collected. Make up to volume with NH_4Cl.

Extract should have reached pH 7.0. If not leach with NH_4Cl

until such, then make up to a suitable volume.

Use extract to determine exchangeable cations Ca, Mg, K, Na.

Ca, Mg are determined by AAS using suitable dilutions of NH_4Cl extract. Dilution should contain 1000ppm. Strontium to suppress phosphate interference (6gm/l $SrCl_2$ $6H_2O$ = 2000 ppm. Sr).

Standards should contain the same amounts of Sr and NH_4Cl as diluted unknowns.

Na, K are determined by atomic emission using dilutions if necessary.

Caesium is used as a suppressor and standards should contain the same amounts of NH_4Cl and Cs as the unknowns (2.39gm/l CsCl = 2000ppm. Cs).

(G. Gilman, CSIRO, Div. Soils Research, Townsville, pers. comm., 1974)

APPENDIX 2

STATISTICAL ANALYTICAL TECHNIQUES

Discriminant Analysis

Discriminant analysis is a multivariate technique that is primarily used to study the relationships between several groups in terms of multiple measurements (Snedecor and Cochrane, 1967; Overall and Klett, 1972). Discriminant analysis has a number of basic underlying assumptions. These are:

(i) The groups being investigated are discrete and identifiable.

(ii) Each observation in each group can be described by a set of measurements on m characteristics or variables.

(iii) These m variables are assumed to have a multivariate normal distribution for each population. It has been found that if the population dispersions are unequal, then the standard tests for the equality of group means vectors are biased. However, results indicate that the distortions are likely to be greatest as the number of groups and their overlap increases (Eisenbeis and Avery, 1972). That is to say, the greater the dissimilarity the lesser the problem caused by unequal dispersion.

Essentially the technique is an extension of the uni-variate analysis of variance. Thus the method of multiple discriminant analysis results in a reduction of the multiple measurements to one or more weighted combinations having a maximum potential for distinguishing among members of different groups. The first discriminant function is the single weighted composite which of all possible weighted composites provides maximum average separation between the groups relative to variability within the groups. The second composite is made up in a similar fashion but using composites uncorrelated with the first discriminant function and so on. Thus the problem in multiple discriminant analysis is to choose a set of compounding coefficients that will define a function having a maximum variance between groups relative to the variance within

groups (Overall and Klett, 1972). The discriminant functions are in the form

$$D_i = d_{i1}Z_1 + d_{i2}Z_2 + \ldots + d_{ip}Z_p$$

where D_i is the score on discriminant function i

d's are the weighting coefficients

Z's are the standardized values on the m discriminating variables used in the analysis. (Klecka, 1975)

Multiple discriminant functions are computed as the vectors associated with the latent roots of the determinantal equation

$$|W^{-1}A - \lambda I| = 0$$

where I = identity matrix

W = the pooled within groups deviation scores cross products

A is derived in the following manner

$$A = T - W$$

where T = the total sample deviation score cross products of deviations of group from group means weighted by group sizes.

$$a_{ij} = \sum_{k=1}^{g} Ng\,(\bar{X}_{ik} - \bar{X}_i)\,(\bar{X}_{jk} - \bar{X}_j)$$

The matrix equation $(W^{-1}A - \lambda I)\ v = 0$ is derived from the partial derivatives of the ratio

$$\lambda_i = \frac{v_i{}^1Av_i}{v_i{}^1Wv_i} \qquad i = 1, 2, 3, \ldots. r$$

(Where r is the lesser of g-1 and m) which is to be maximized in order that the among groups sums of squares $v_i{}^1Av_i$ may be large relative to the within groups sums of squares $v_i{}^1WV_i$ on the discriminant functions represented by the roots λ_i (eigenvalues) and their associated vectors v_i (eigenvectors). The relative sizes of λ_i indicate the extent to which the associated discriminant functions distinguish among the groups (Cooley and Lohnes, 1963).

Eigenvalues and eigenvectors are determined in the following manner. Given a square matrix A and a vector v with as many rows as A has columns, then a solution is required to

$Av = \lambda v$ where λ = a scalar quantity (eigenvalue)

v = a vector quantity (eigenvector)

Therefore

$$Av - \lambda v = 0$$

This cannot be simplified to $(A-\lambda)v$ since it is not possible to take a number from the matrix A. However, no change occurs to a matrix or vector if it is pre- or post-multiplied by an identity matrix, I. Thus

$$Av - \lambda Iv = 0$$

$$(A - \lambda I)v = 0 \qquad (1)$$

This cannot be solved by itself but $(A-\lambda I)$ is a square matrix and has a determinant. It can be proven that any value λ that satisfies

$$|A-\lambda I| = 0$$

will also satisfy equation (1) (Williams, 1976).

Wilks' lambda criterion for the discriminating power of the test battery may be derived as a function of the roots of $W^{-1}A$

$$\Lambda = \prod_{i=1}^{r} \left[\frac{1}{1 + \lambda i}\right]$$

The percentage of the total discriminating power of the battery is contained in the ith discriminant function is

$$100 \left(\frac{\lambda_j}{\sum_{i=1}^{j} \lambda i}\right)$$

It is known that the sums of the roots $\sum_i \lambda_i$ is always equal to the trace of the matrix and the product of the roots $\prod_i \lambda i$ is always equal to the determinant of the matrix (Cooley and Lohnes, 1963; Williams, 1976). Subject to the restriction that the within groups variance is scaled to unity, $v^1Wv = 1$ the value of λ is the proportion of between groups variance (adjusted for within groups variance) accounted for by the simple best discriminating function.

Let $v^{(1)}$ contain the weighting coefficients defining the first discriminant function. Since the first discriminant function is defined in a manner to reflect maximum average differences between group means, it is possible that a meaningful separation of the groups does not initially appear. The second discriminant function is that weighted combination of m variables which of all possible weighted combinations independent of the first discriminant function accounts for a maximum of the remaining group difference. The second weighted composite is defined by vector $v^{(2)}$ associated with the largest remaining between groups variance, $\lambda 2$, after all variance

associated with the first discriminant function has been partialed out. Thus $\lambda 1$ and $\lambda 2$ are the two largest roots of the determinantal equation $|A - \lambda I|$. By definition vectors v^1 and v^2 associated different roots, define functions that are statistically independent. Thus

$$v^{(1)1}Wv^2 = v^{(2)1}Wv^2 = 1$$
$$v^{(1)1}Wv^2 = 0$$

Successive discriminant functions are defined as vectors associated with the remaining roots λ_3, λ_4, ... λr. Maximum number of roots are restricted to the number of variables or one less than the number of groups (Overall and Klett, 1972).

The stepwise discriminant analysis programme that was used was taken from the BMD manual (Dixon (ed.), 1975) programme MBD07M. The algorithm used in the computations is clearly set out in the manual. The principal features of the programme will be outlined. The data were read and the means of each variable, the group means for each variable and their standard deviations were computed. The within groups sums of squares; sum of the deviation sums of squares; within groups covariance and correlation matrices were subsequently computed.

A criterion was established to determine which variable is included at each step of the analysis. The variable selected had the greatest F value to enter. At each step the variables were divided into two disjoint sets, those included and those not. Suppose the first r variables had been included, within and cross product matrices were computed such that

$$W = \begin{bmatrix} W_{11} & W_{12} \\ W_{21} & W_{22} \end{bmatrix}$$

$$T = \begin{bmatrix} T_{11} & T_{12} \\ T_{21} & T_{11} \end{bmatrix}$$

W_{11} and T_{11} are r x r

Let

$$A = \begin{bmatrix} W_{11}^{-1} & W_{11}^{-1}W_{12} \\ W_{21}W_{11}^{-1} & W_{22} - W_{21}W_{11}^{-1}W_{12} \end{bmatrix} = \{a_{ij}\}$$

$$B = \begin{bmatrix} T_{11}^{-1} & T_{11}^{-1}T_{12} \\ T_{21}T_{11}^{-1} & T_{22} - T_{21}T_{11}^{-1}T_{12} \end{bmatrix} = \{b_{ij}\}$$

Coefficients and constant terms to the classificatory functions were then computed such that

$$C_{ki} = (n - g) \sum_{j=1}^{r} \bar{X}_{kj} a_{ij}$$

$$C_{ko} = -\frac{1}{2} \sum_{i=1}^{r} C_{ki} \bar{X}_{ki} + \log(P_k)$$

$i = 1....r$
$k = 1....g$
r = no variables included
g = no groups
$P = \Sigma$ no variables

Subsequently the square of the Mahalanobis distance between each pair of groups was calculated

$$D^2_{ml} = \sum_{i=1}^{r} (C_{mi} - C_{li})(\bar{X}_{mi} - \bar{X}_{li}) \quad m,l = 1....g$$

and the F value for testing differences between each pair of groups was found by

$$F_{ml} = \frac{(n-g-r+1)n_m n_l}{r(n-g)(n_m+n_l)} D^2_{ml}$$

with

r; $n-g-r+1$ degrees of freedom

F values for each variable entered and not entered were calculated. If variable j had been entered

$$F_j = \frac{a_{jj} - b_{jj}}{b_{jj}} \cdot \frac{n-r-g+1}{g-1}$$

with $g-1$; $n-r-g+1$ degrees of freedom

If variable j had not been entered

$$F = \frac{b_{jj} - a_{jj}}{a_{jj}} \cdot \frac{n-r-g}{g-1}$$

with $g-1$; $n-g-r$ degrees of freedom

The variable with the greatest F value is entered at each step in the computation.

Wilks' Λ to test equality of group means was determined

$$U = \mathrm{Det}(W_{11})/\mathrm{Det}(T_{11})$$

with $(r, g-1, n-g)$ degrees of freedom

An approximate F statistic was also computed to test the equality of group means

$$F = \frac{1 - U^{1/s}}{U^{1/s}} \cdot \frac{ms + 1 - rq/2}{rq}$$

where

$$s = \frac{r^2q^2 - 4}{r^2q^2 - 5} \quad \text{if } r^2 + q^2 = 5$$

$$s = 1 \quad \text{if } r^2 + q^2 = 5$$

$$m = n - \frac{r + q + 3}{2}$$

$$q = g - 1$$

Its degrees of freedom were rq; ms+1-rq/2. If either r or q is 1 or 2, the approximation is exact.

Once all variables were entered into the analysis, values of the classification function were worked out for each case in each group. Posterior probabilities were calculated to determine the probability that a case, k, should be classified according to the group, l, that it was in or another group, m. The square of the Mahalanobis distance for each case, k, in group m from group l was also calculated.

At this point let ρ denote the number of variables which were included after the last step and let W and T be their within and total sum of product matrices. Let B = T-W. The eigenvalue problem

$$Bu_i = \lambda_i Wu_i \qquad i = 1....\rho$$

is solved to find coefficients, u_i, of canonical variables and the amount of dispersion λi explained by each canonical variable. The vectors are normalized so that

$$u_i^{1}Wu_j = \delta_{ij}$$

The canonical correlations $\rho_1, \rho_2, ...\rho_p$ relative to the groups were then computed

$$\rho_i = (\lambda i/(1 + \lambda i))^{1/2}$$

Stepwise discriminant analysis was used primarily as a classification tool in this study. Thus each case or sample from each station was classified to determine whether or not the sample should 'belong' to that station or 'belong' to another. As such this gave an indication of the internal homogeneity of the data from each station. Thus once the discriminant functions were derived and the Mahalanobis distance squared between each group were calculated and subjected to a significance test, it was possible to see which groups were considered to be similar to each other on those particular discriminant functions.

Factor Analysis

This method is used to study the covariance structure of a set of interrelated variables. The basic model postulates that the variance of a variable is made up of three parts; the part which interacts with other variables and results in their correlation is known as the common variance or communality; a specific variance which possibly relates to factors which do not affect other observed variables; and an error variance (Mather and Openshaw, 1974). Further, it can be shown that the covariance of the common part score is equal to the correlation between the total scores (Overall and Klett, 1972).

Thus since the product moment correlations among pairs of variables are estimates of the covariances among common part scores, the communalities are an estimate of the variances of the common parts. Since only the common variance is being considered the diagonals of the correlation matrix are replaced by estimates of the communalities. The problem exists that, in practice, it is very difficult to determine an exact value of the communalities. Much depends on the chosen strategy and luck (Williams, 1976, p.61). Consequently factor analysis does not provide a simple, unique and unequivocal answer to any particular problem.

Factor analysis is used in this study to explain the underlying relationship among a number of correlated variables. From this a hypothesis could be set up to suggest the trends observed. The BMD08M programme (Dixon (ed.), 1975) is given in the manual. The procedure used was as follows. The means, covariances, standard deviations and correlations were calculated. The diagonal of the correlation matrix was replaced by the squared multiple correlations as a first estimate of the communalities. The modified correlation matrix was subsequently tri-diagonalized by the method of Householder and its eigenvalues obtained using Sturm sequences. The eigenvectors were found by a method of Wilkinson. When all the eigenvalues $\lambda_1, \ldots, \lambda r$ were obtained, the number r of eigenvectors $\upsilon_1, \ldots, \upsilon_r$ obtained is equal to the min $\{a, \max \{i : \lambda_1 > c\}\}$ where a and c are the maximum number of factors and the minimum eigenvalue specified by the user, 0.7. The extracted factors were rotated after being altered by the Kaiser normalization

$$\tilde{l}_{ij} = l_{ij}/h_i \qquad \begin{array}{l} l = \text{factor loading matrix} \\ h = \text{communality} \end{array}$$

which were applied to the loadings.

A varimax, orthogonal, rotation was performed such that the following expression is minimized

$$G((l_{ij})) = \sum_{a \neq b} \left(\sum_{i=1}^{\rho} l_{ia}^2 l_{ib}^2 - \frac{\gamma}{\rho} \left(\sum_{i=1}^{\rho} l_{ia}^2 \right) \left(\sum_{i=1}^{\rho} l_{ib}^2 \right) \right)$$

for the orthogonal, varimax, rotation $\gamma = 1$

Multiple Regression

Multiple regression is a technique with which it is possible to analyze the relationship between a dependent and an independent or set of independent or predictor variables (Overall and Klett, 1972). Multiple regression may be used as a descriptive or inferential tool. As a descriptive tool it may be used to

(i) find the best linear prediction equation and evaluate its prediction accuracy;

(ii) to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables;

(iii) to find the structural relations and provide explanations for seemingly complex multivariate relationships.

(Kim and Kahout, 1975)

Multiple regression can be performed on standardized or unstandardized data. Standardized data are used particularly when there are different measurements or different intervals between the variables. Thus all the data are transformed so that each variable has a mean of zero and a unit standard deviation. The general form of the unstandardized regression is

$$Y^1 = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n$$

where

Y^1 = the estimated value of Y

a = the Y intercept

b_1 = the regression coefficients (Kim and Kahout, 1975)

The problem is to define a set of coefficients such that the average discrepancy of Y^1 is a minimum. The principle of least squares is applied. Thus b_1 are chosen so that the sums of squares of the deviations of the actual from predicted is minimal, i.e., $\Sigma(Y - Y^1)^2$ is minimal. a and b are calculated from a series of differential equations derived from differentiating $\Sigma(Y - Y^1)^2$ and equating the partial derivatives to zero. Thus for two predictor variables

$$a + b_1\bar{X}_1 + b_2\bar{X}_2 = \bar{Y}$$

$$b_1(SS_r) + b_1(SP_{12}) = SP_{y1}$$

$$B_1(SP_{12}) + b_2(SS_2) = SP_{y2}$$

where

SS = sums of squares

SP = sums of products.

This can be solved giving values for b_1, b_2 and by substitution, a. Using standardized data the equations become

$$\beta_1 + \beta_2 r_{12} = r_{y1}$$

$$\beta_1 r_{12} + \beta_2 = r_{y1}$$

where

r_{12} = the Pearson correlation between X_1 and X_2

β (beta) = standardized regression coefficients of the independent variable X_1 etc.

The interpretation of the results is relatively simple. R, the simple correlation coefficient is the correlation between the dependent and an independent variable, the others remaining constant. R^2 is a measure of the proportion of the variance of the dependent variable that is explained by the independent variable. Multiple R is the intercorrelation of the dependent variable with all the independent variables. In multiple regression the F test is employed to test the goodness of fit of the regression equation. A null hypothesis, that the multiple correlation is zero in the population from which the sample is drawn, is generated. Overall this is

$$F = \frac{SS_{reg}/k}{SS_{res}/(N-k-1)}$$

$$= \frac{R^2/k}{(1-R^2)/(N-k-1)}$$

where

SS_{reg} = sum of squares explained by the entire regression equation

SS_{res} = residual (unexplained) sum of squares

k = number of independent variables in the equation

N = sample size

The F ratio is distributed approximately as the F distribution with degrees of freedom k and N-k-1.

The standard error is a measure of the absolute amount of explained or unexplained variation. If it is assumed that the actual values are normally distributed about the regression line then it is possible to calculate the proportion of cases that will lie within ±1, ±2, ±3 standard error of estimate units from the line. If b is estimated from a sample, values of b would vary between samples. An estimate of the standard error of b is

$$\sqrt{var(b)} = \sqrt{\frac{\Sigma(Y-Y^1)^2/N-2}{\Sigma(X-\bar{X})^2}}$$

$$= \sqrt{\frac{SS_{res}/N-2}{SS_x}}$$

The F test is used as a significance test

$$F = \frac{SS_{reg}/k}{SS_{res}/(N-k-1)}$$

(Kim and Kahout, 1975)

Figure 1.1 Holocoenotic Complex for the Sydney mangroves and salt marshes (after Clarke and Hannon, 1969).

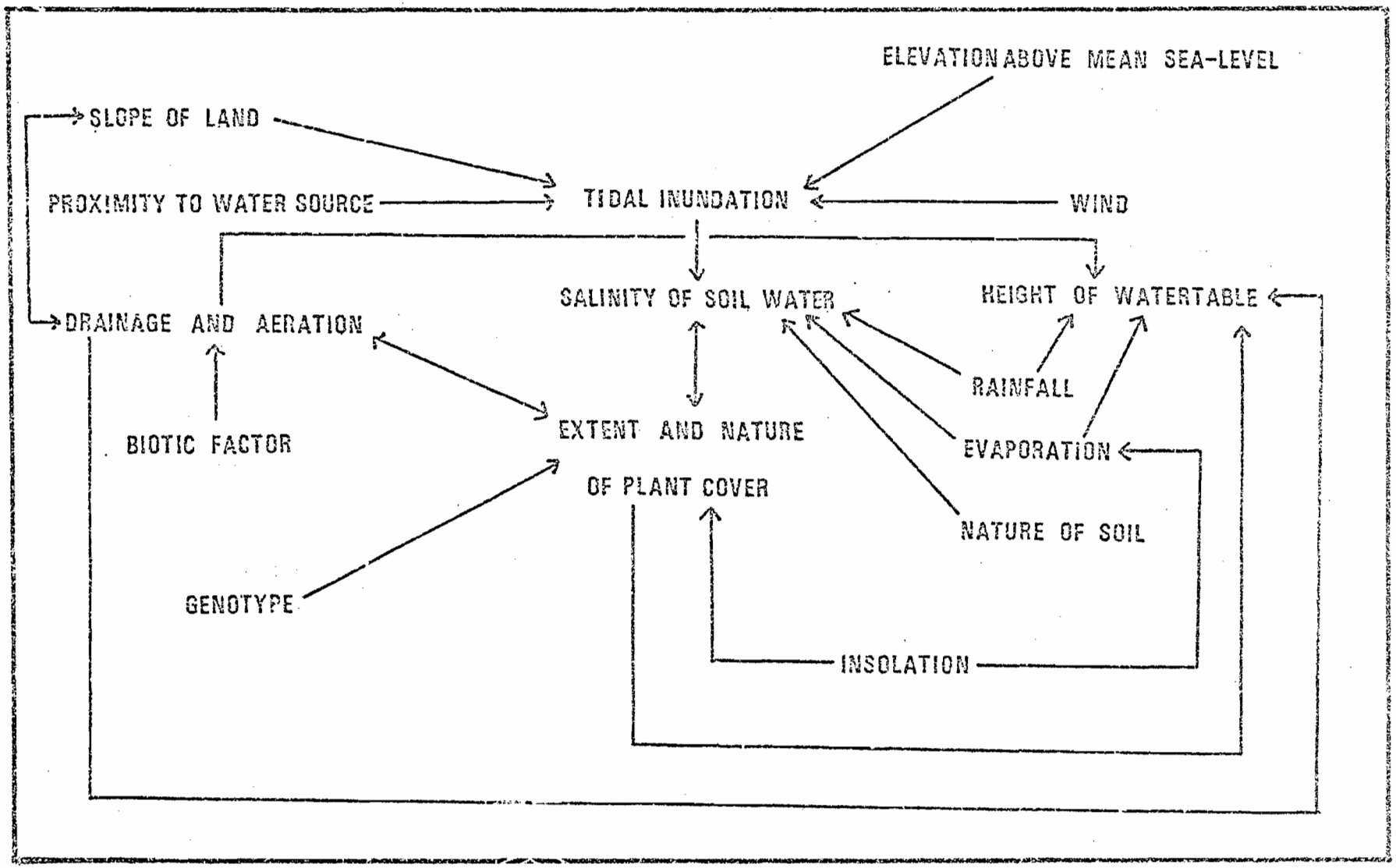


Figure 2.1 Location of Sites

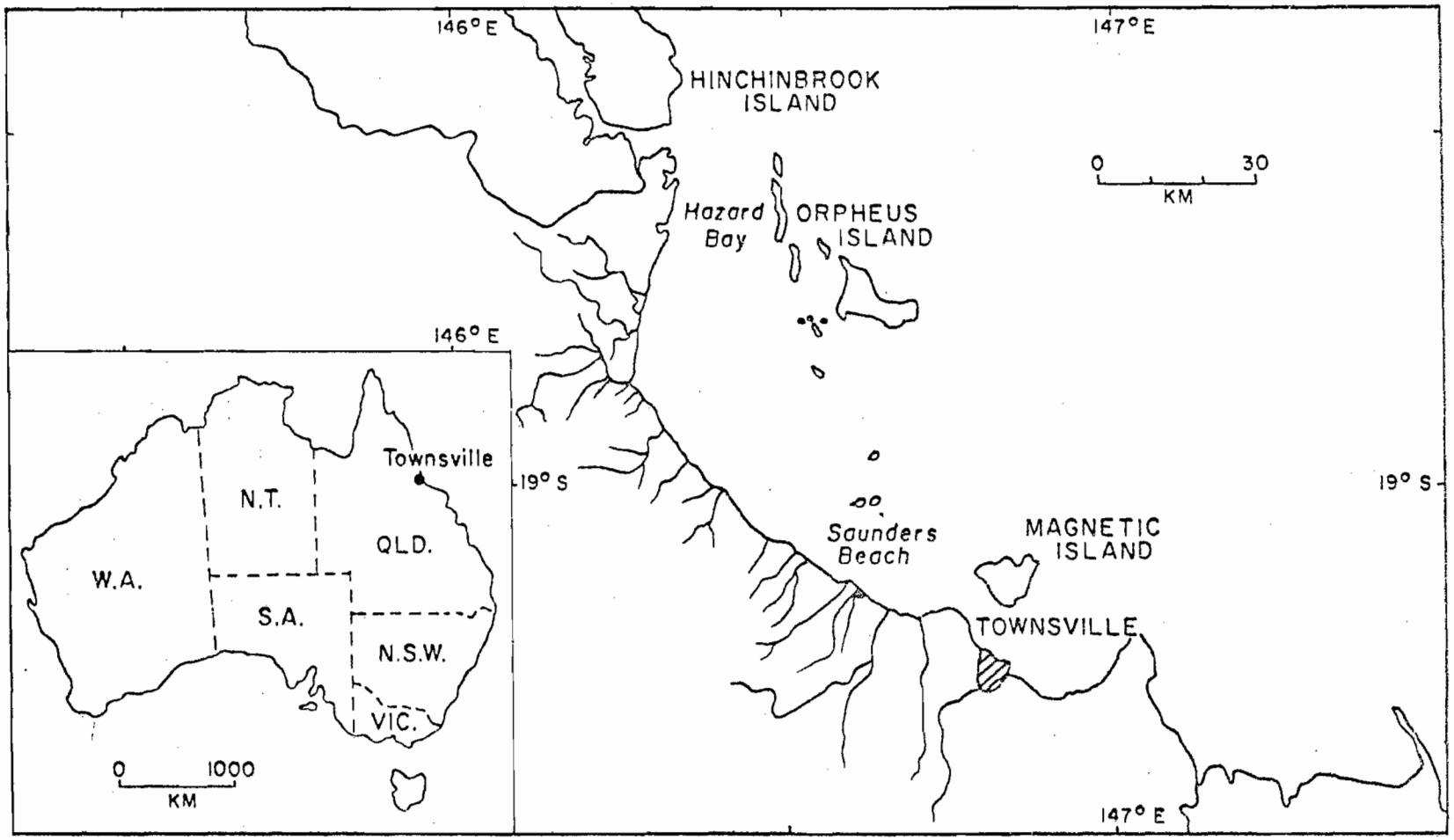
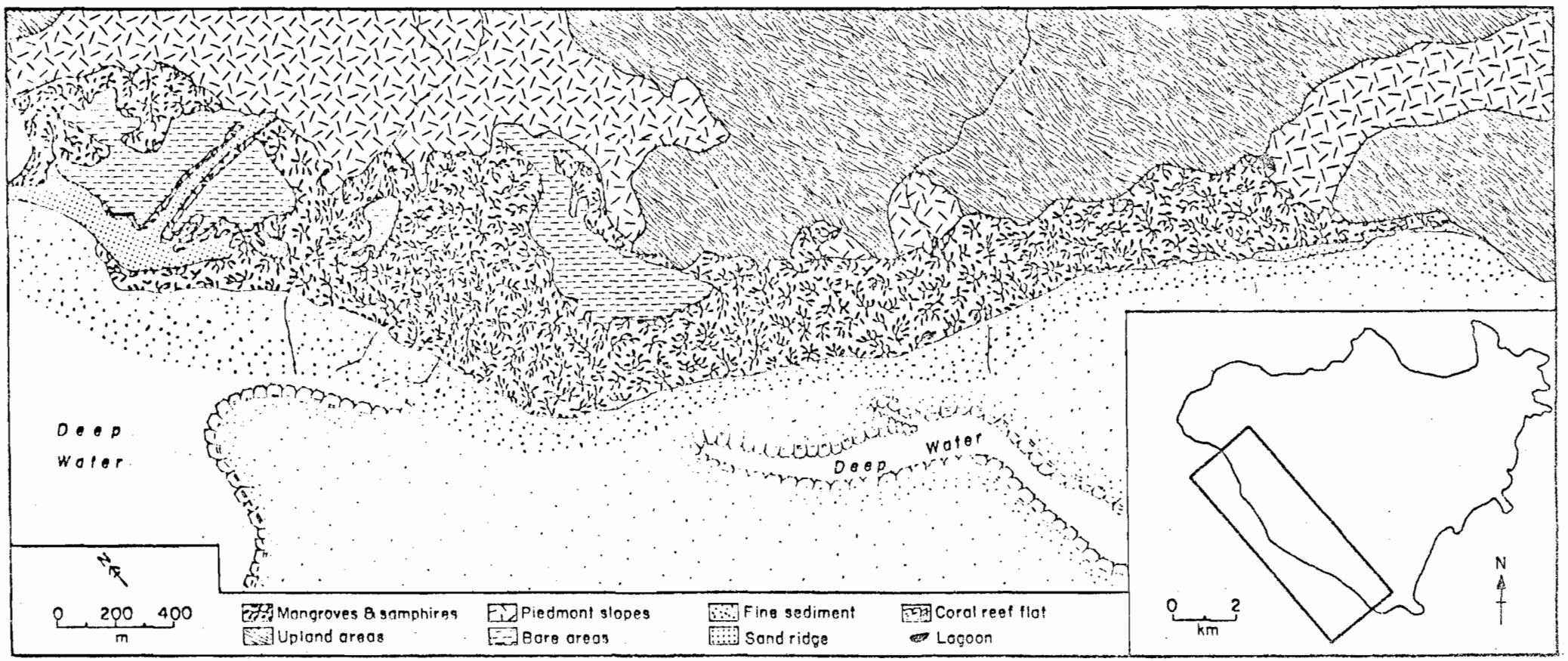


Figure 2.2 Geolorphological Map of Mangal on the West Coast of Magnetic Island



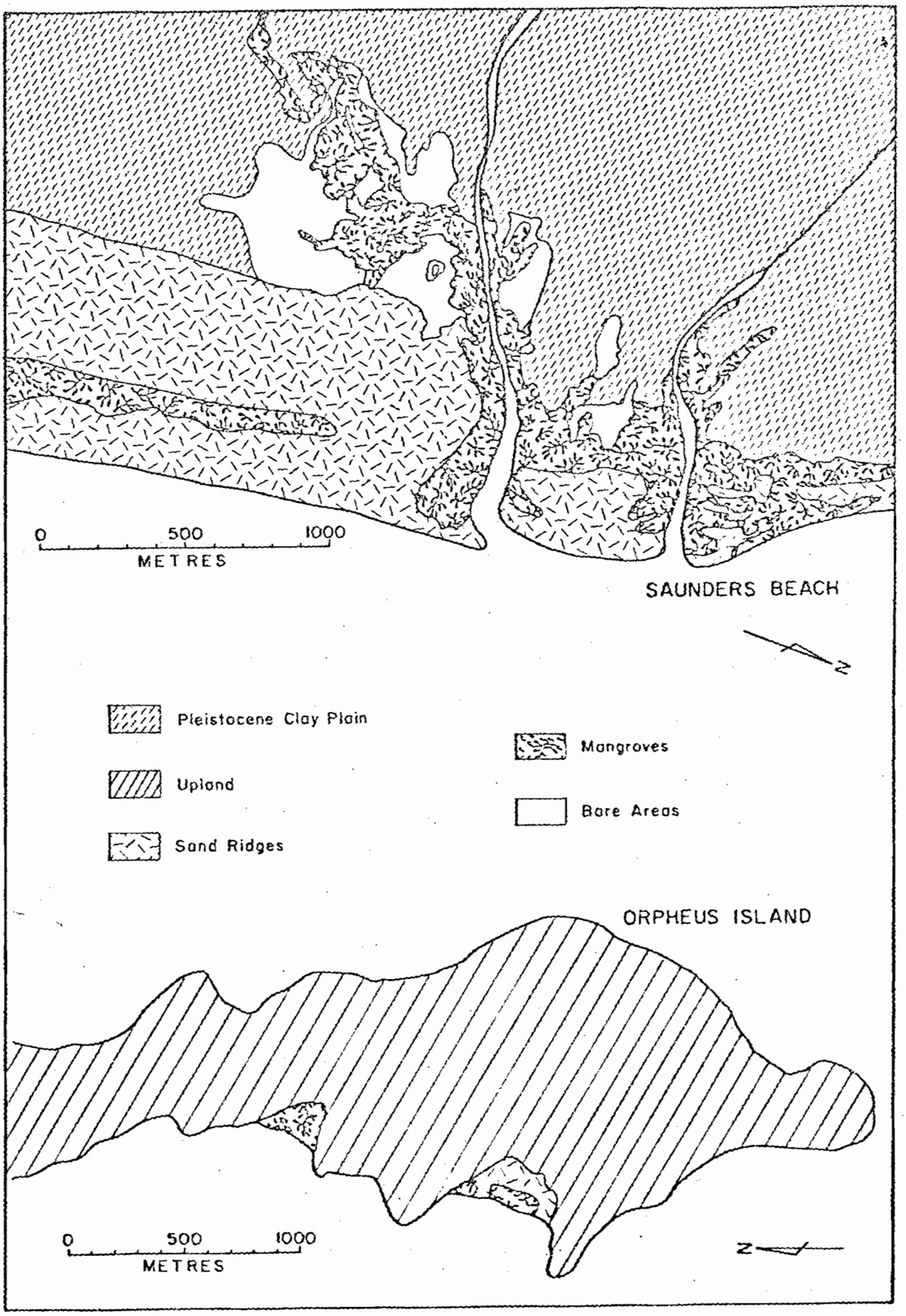


Figure 2.3 Geomorphological Map of Saunders Beach and Orpheus Island

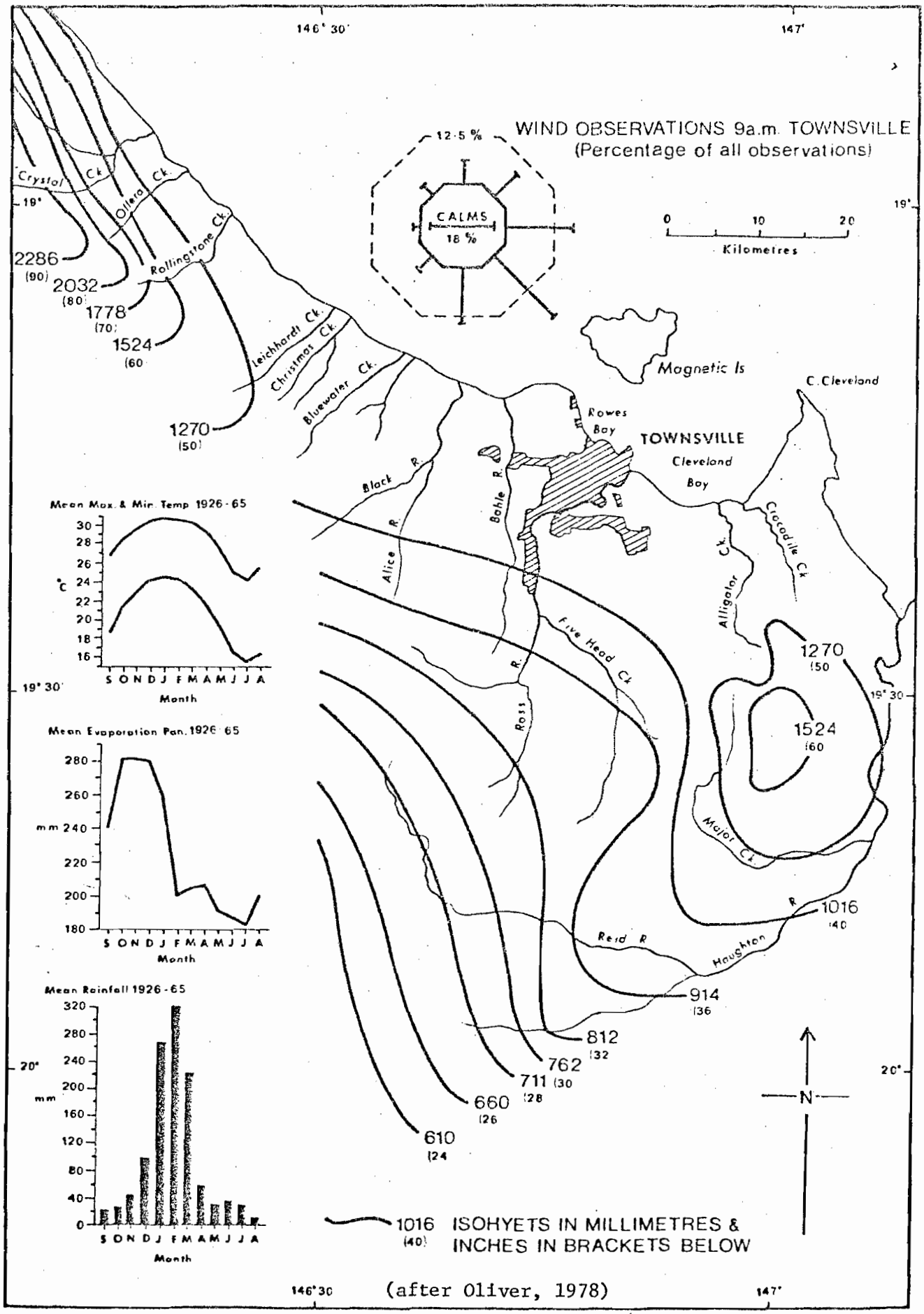


Figure 2.4 Climatic Data for the Townsville Region

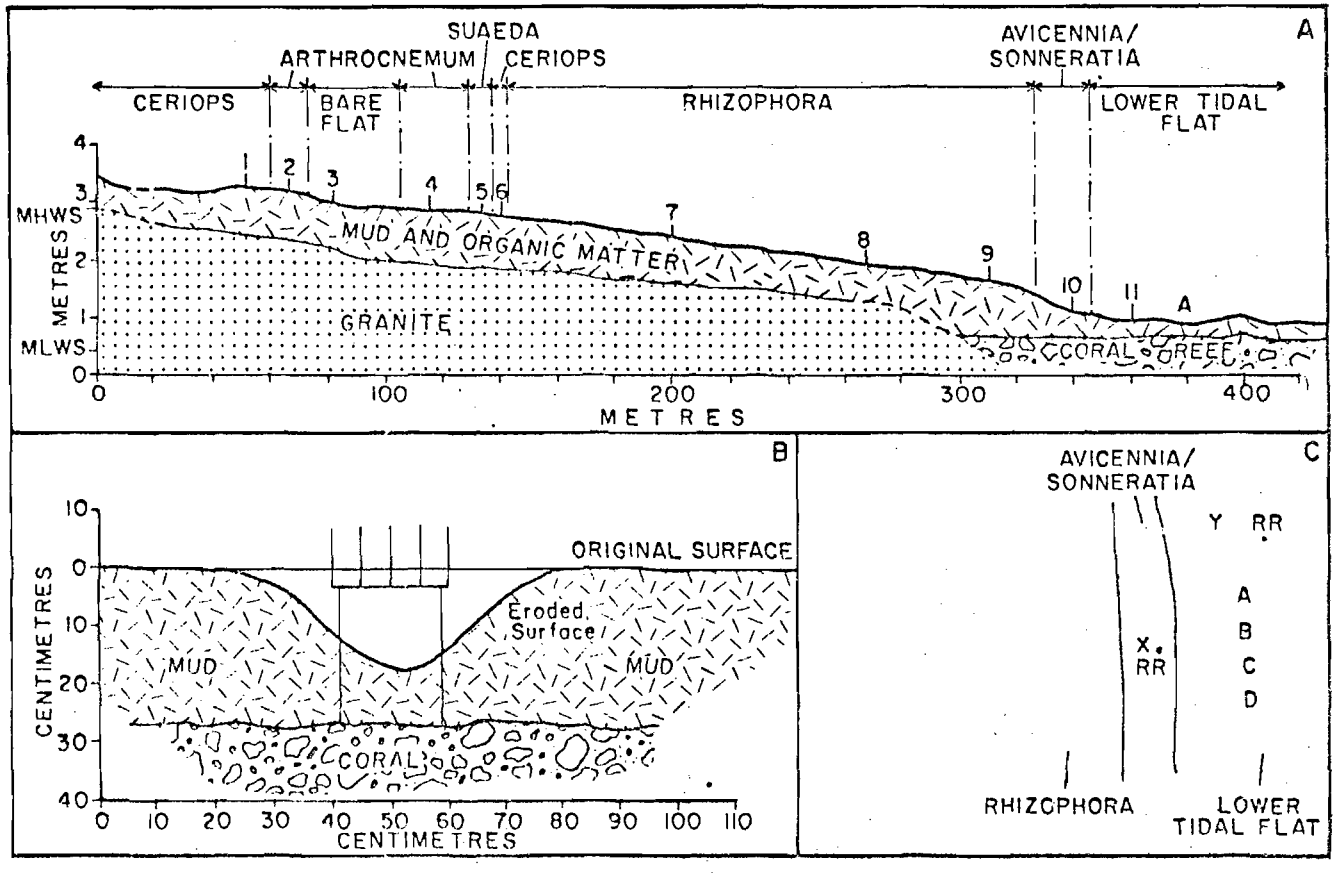


Figure 2.5 Zonation through the Mangal on Magnetic Island

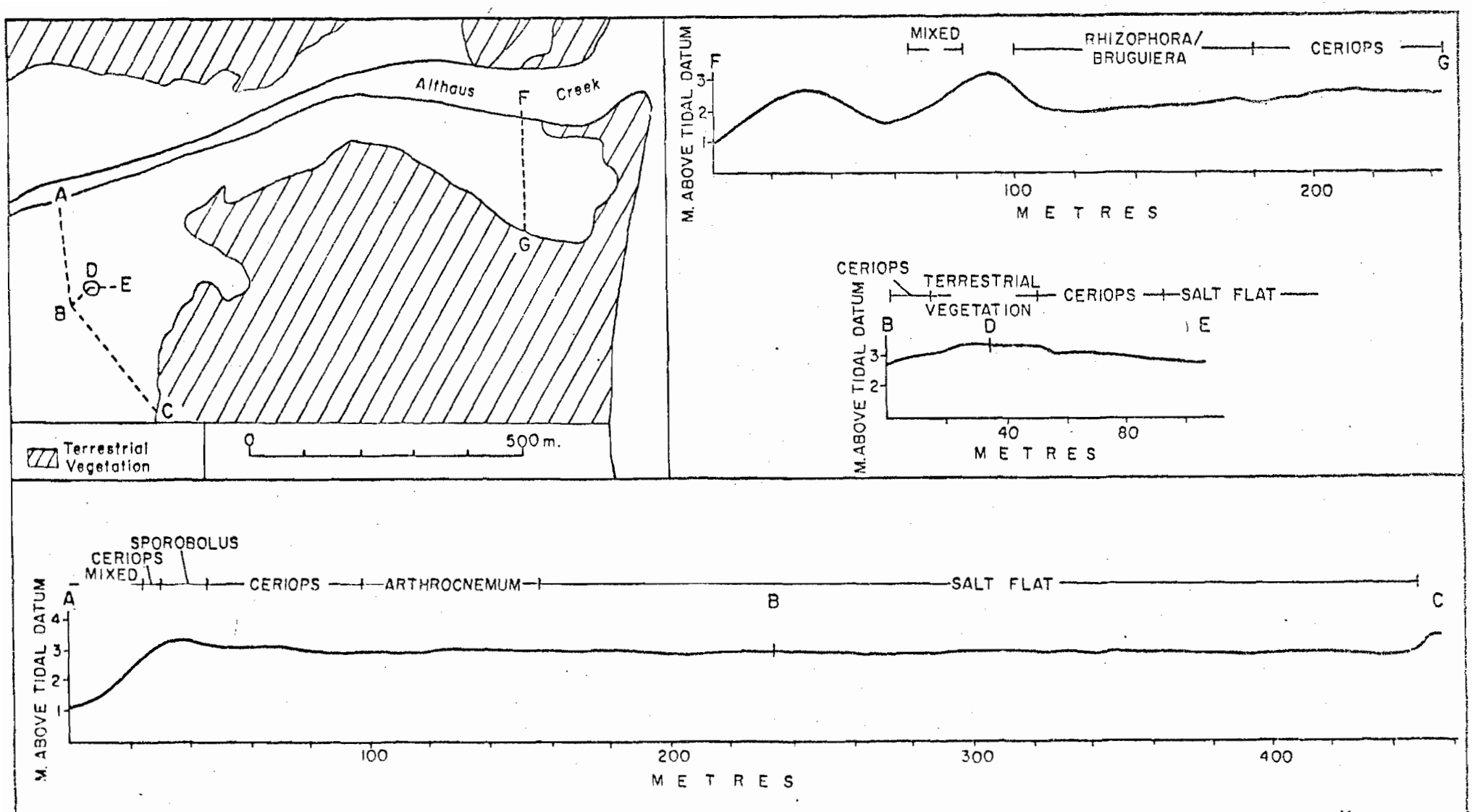


Figure 2.6 Zonation through the Mangal at Saunders Beach

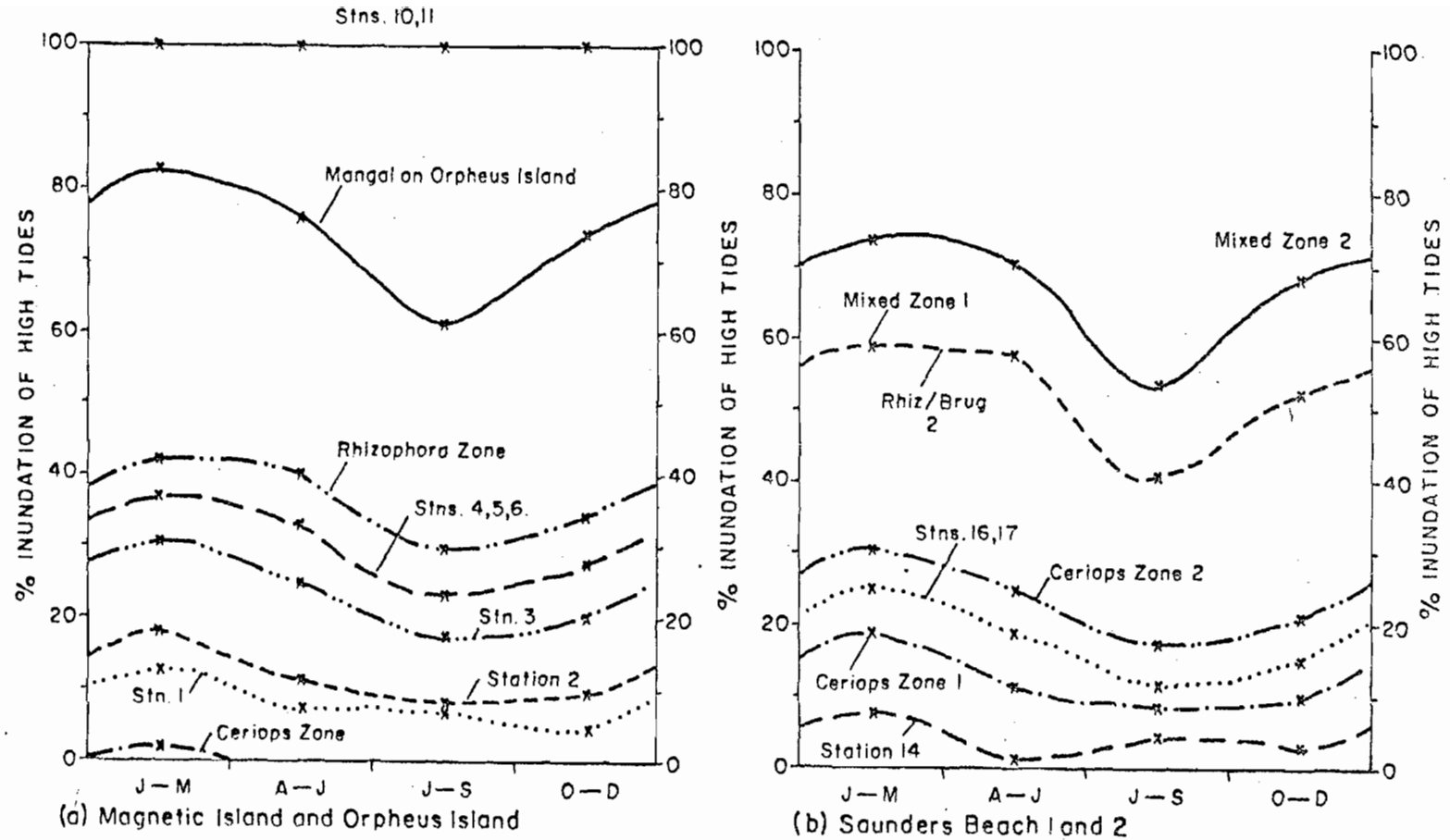
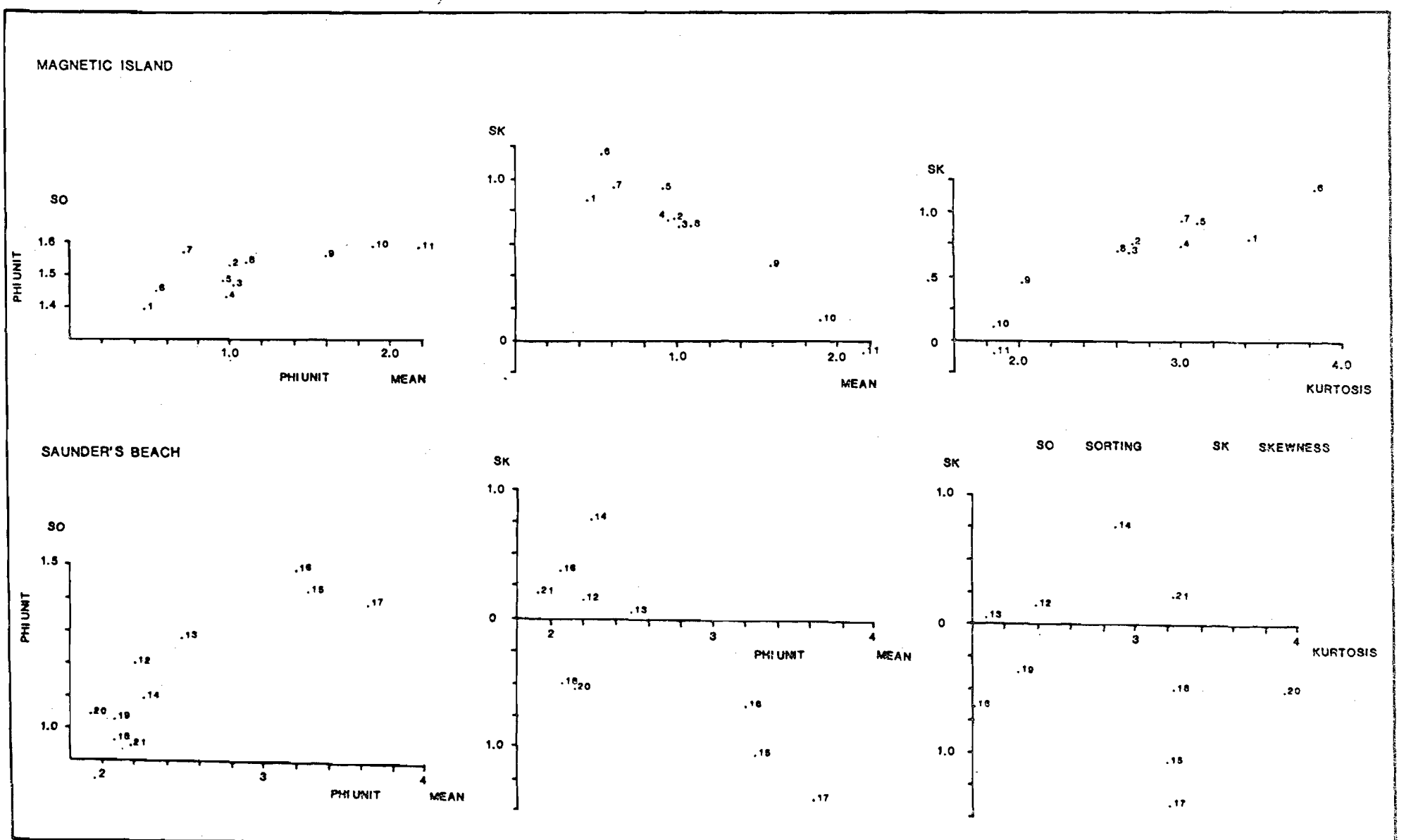


Figure 2.7 Tidal Inundation Curves for Vegetation Zones and their Associated Stations:
(a) Magnetic Island the Orpheus Island
(b) Saunders Beach 1 and 2

Figure 2.8 Plots of sorting v. mean, skewness v. mean and skewness v. kurtosis for samples from Magnetic Island and Saunders Beach.



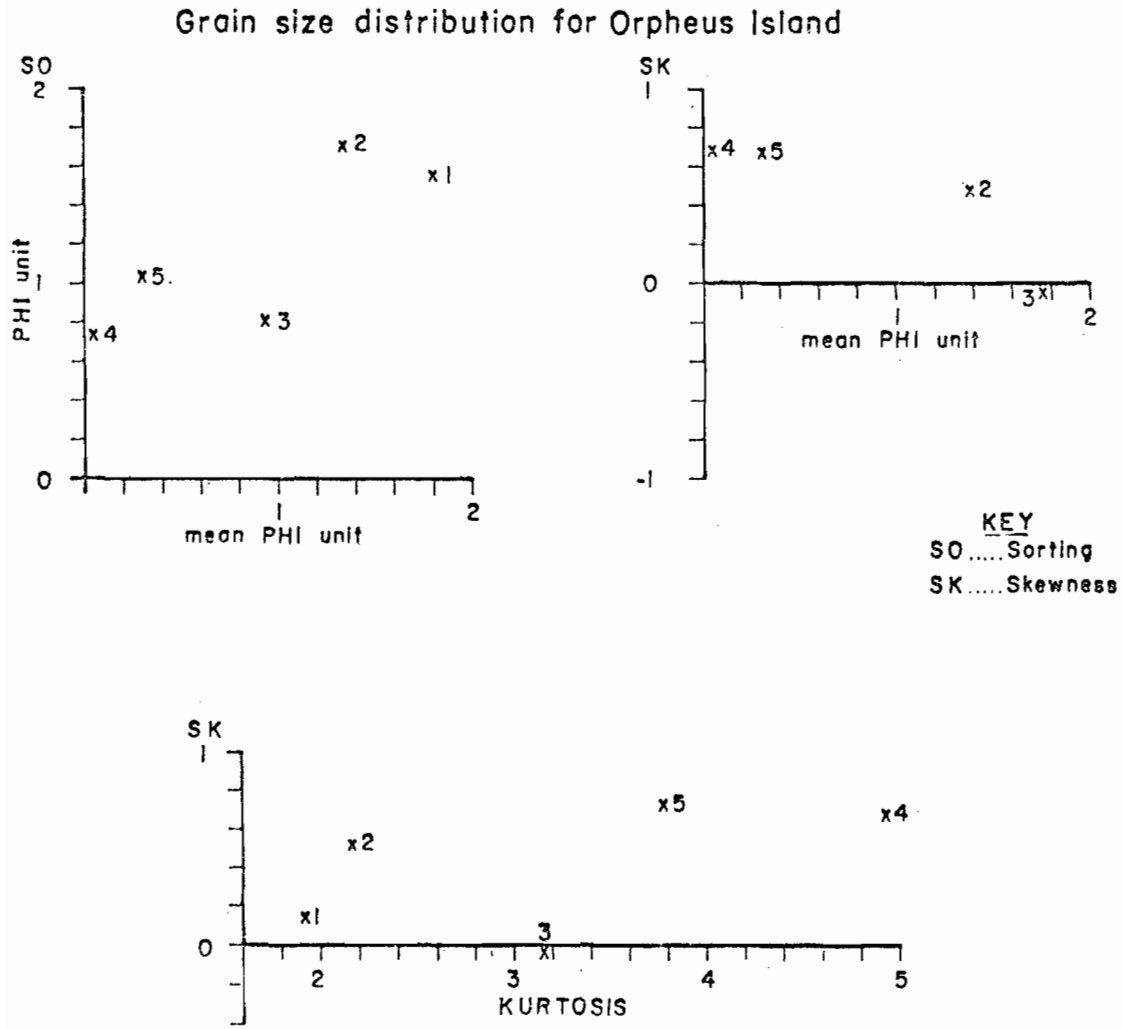


Figure 2.9 Grain Size Distribution for Orpheus Island

AVERAGE CHEMICAL DATA (± ONE STANDARD DEVIATION)

FOR THE MAGNETIC ISLAND STATIONS

Figure 3.1 to Figure 3.6

Average chemical data (± one standard deviation) for the Magnetic Island stations.

A - all data
B - surface layer
C - 10 centimentre layer
D - 30 centimetre layer

Figure 3.1 Magnetic Island pH (KCl) and pH (H_2O).

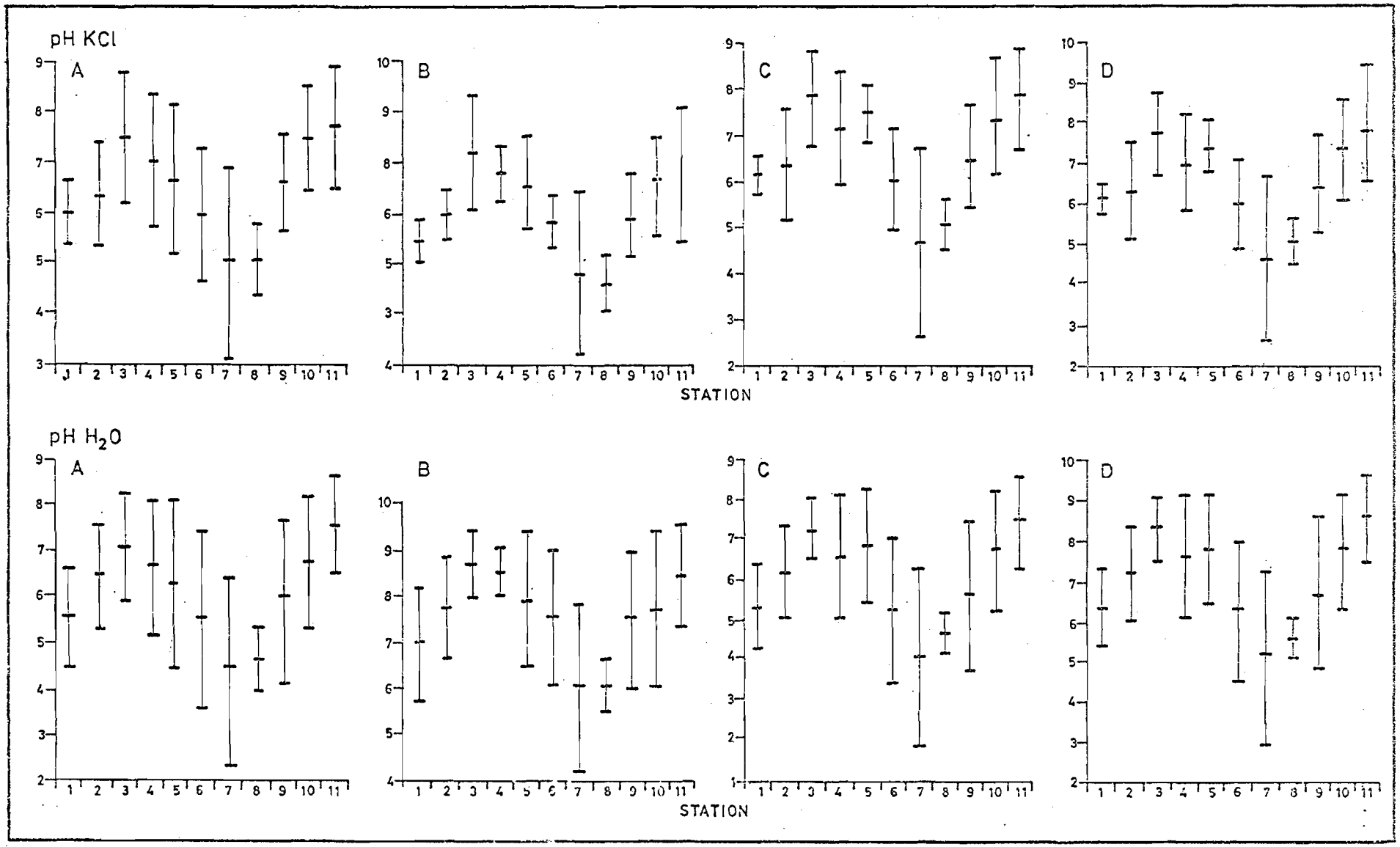


Figure 3.2 Magnetic Island WSCl and $WSSO_4$.

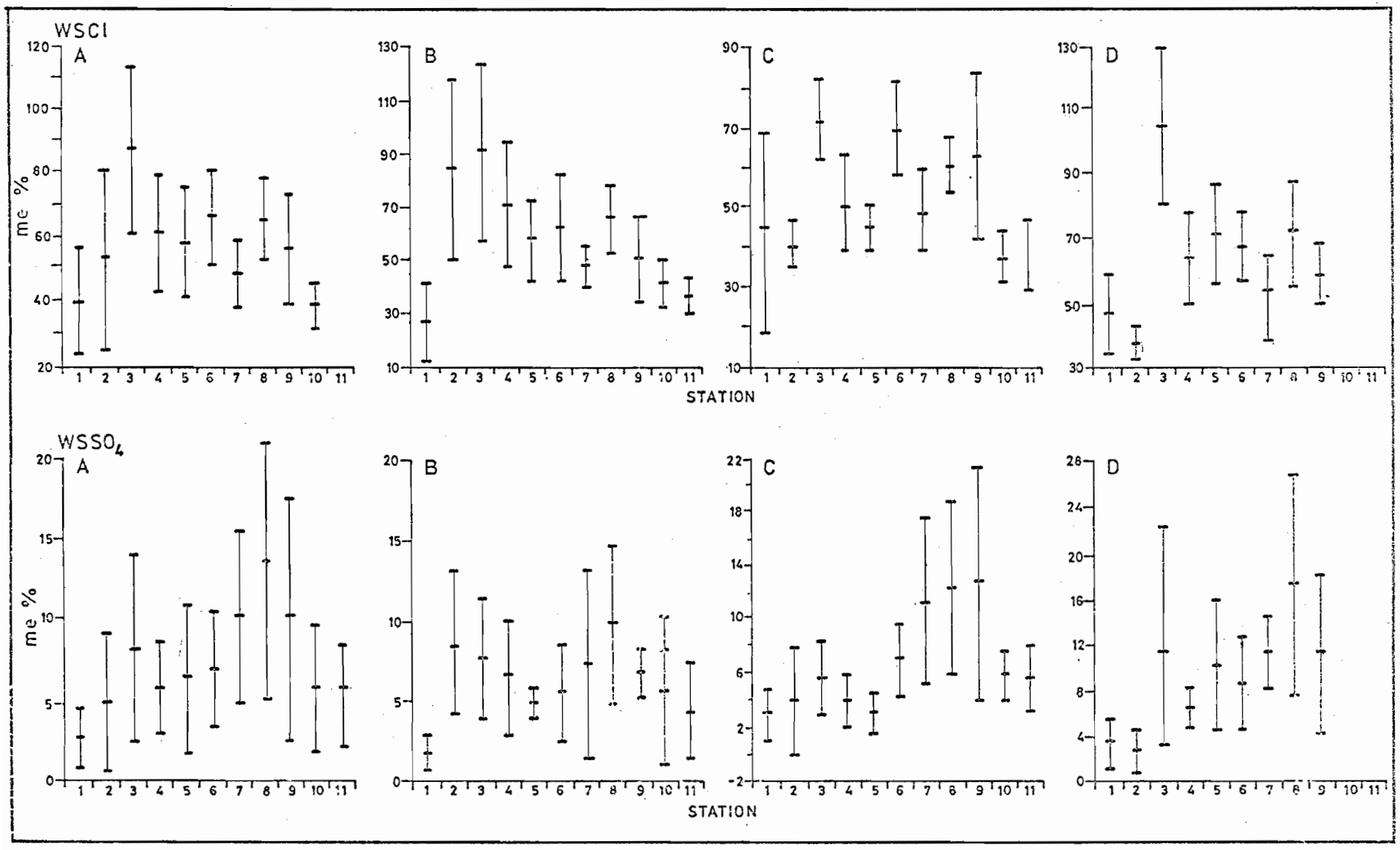


Figure 3.3 Magnetic Island Sol Na and Sol K.

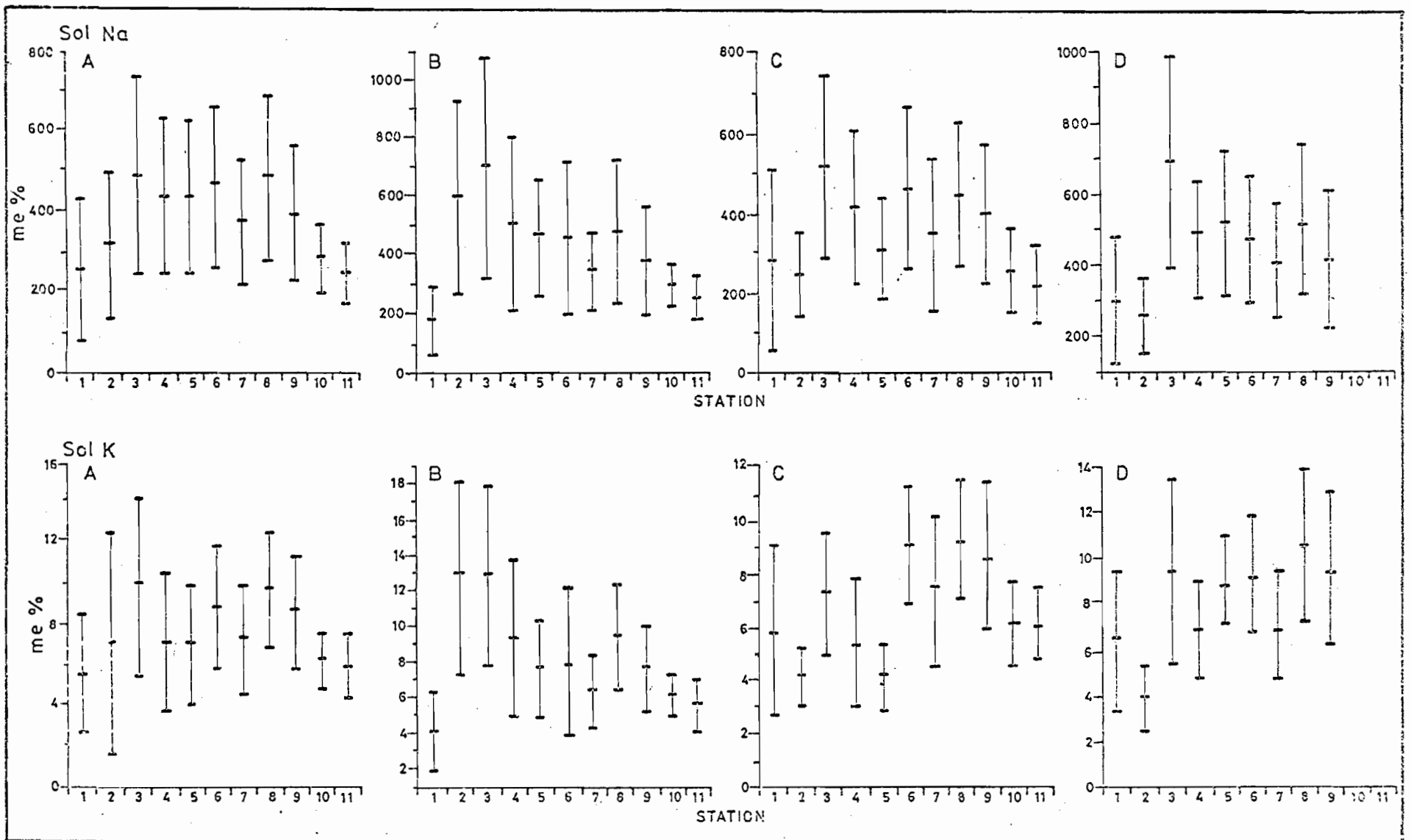


Figure 3.4 Magnetic Island Sol Ca and Sol Mg.

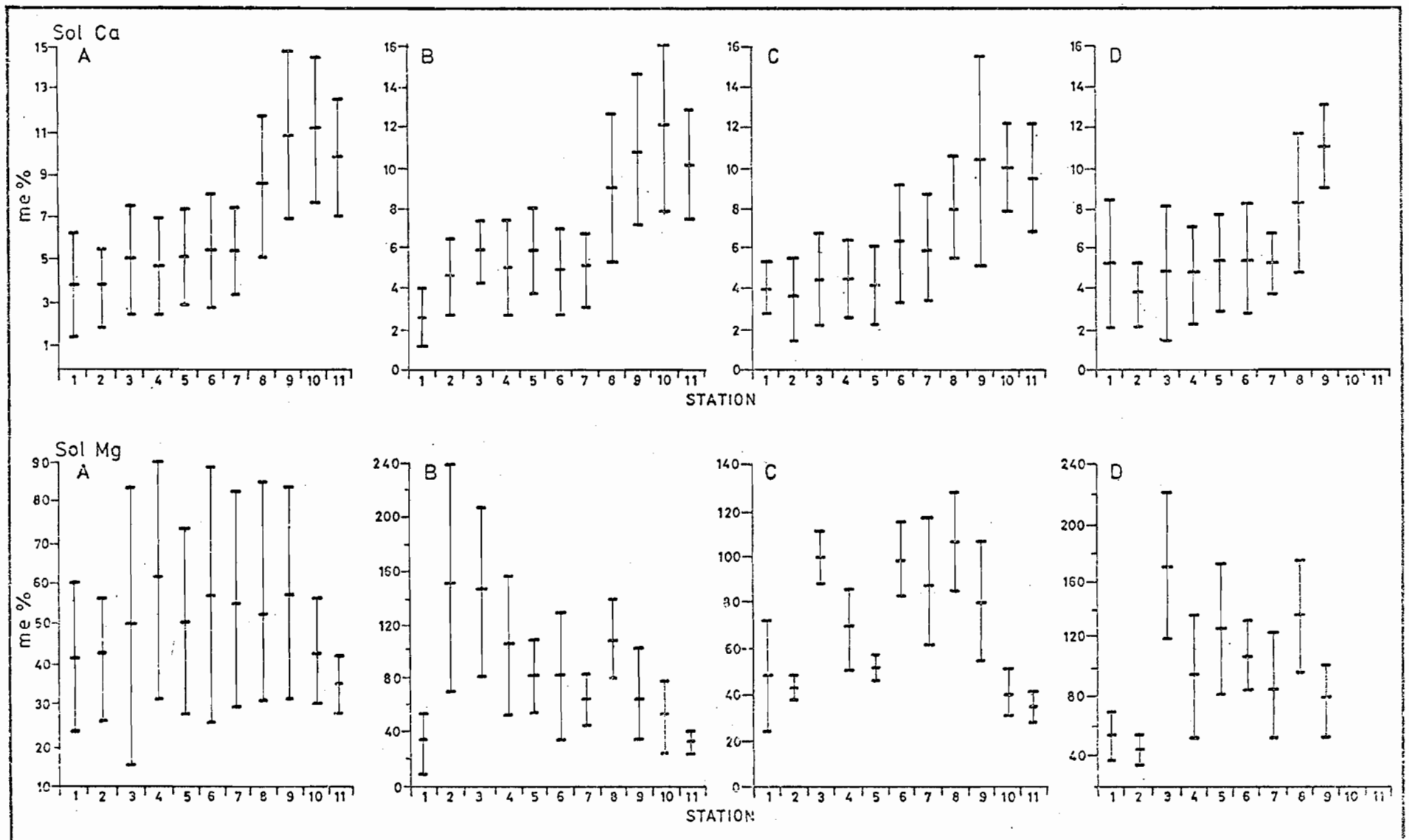


Figure 3.5 Magnetic Island Ex Na and Ex K.

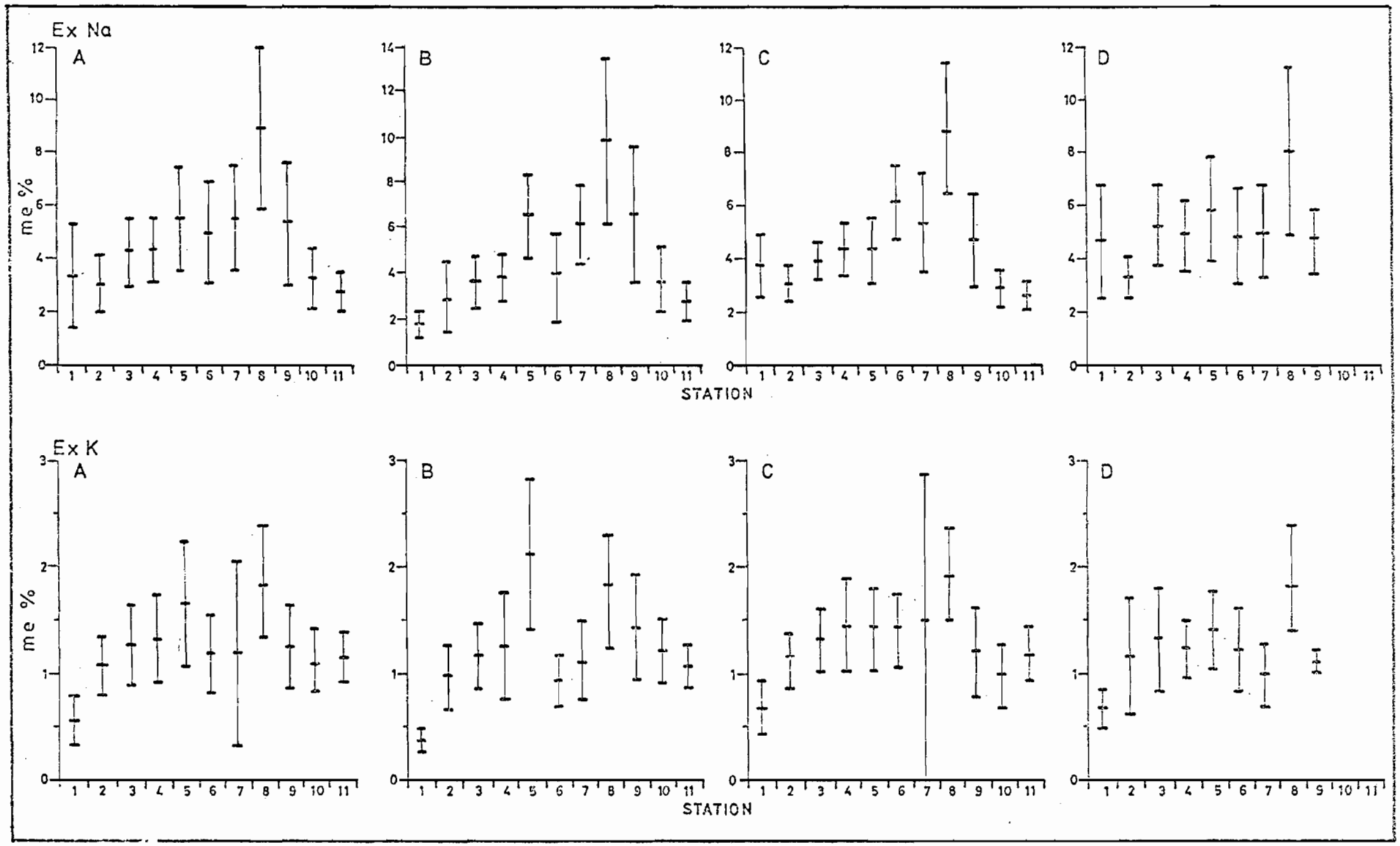
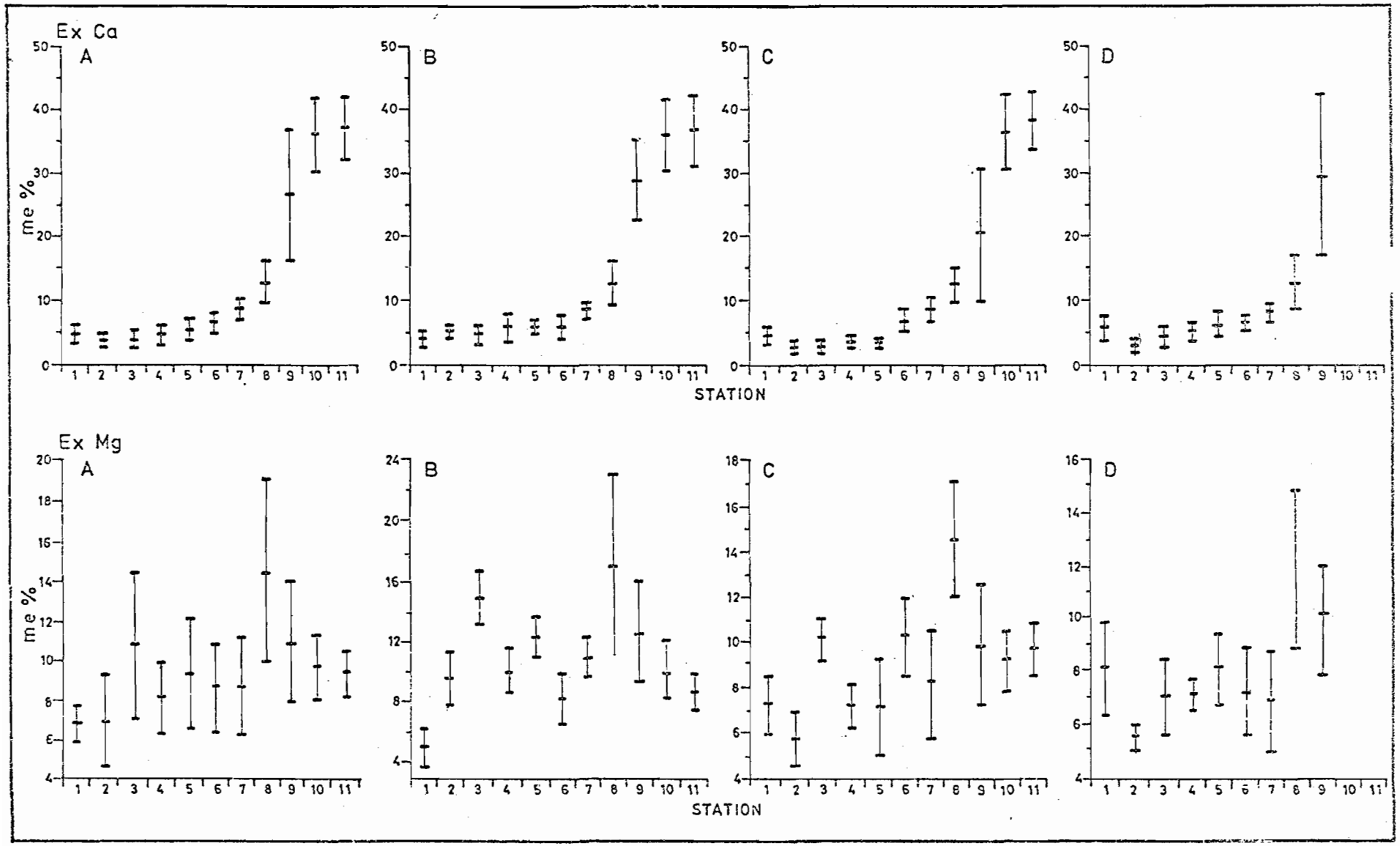


Figure 3.6 Magnetic Island Ex Ca and Ex Mg.



MAGNETIC ISLAND CHEMICAL DATA THROUGH TIME BY STATION

Figure 3.7 pH in KCl solution

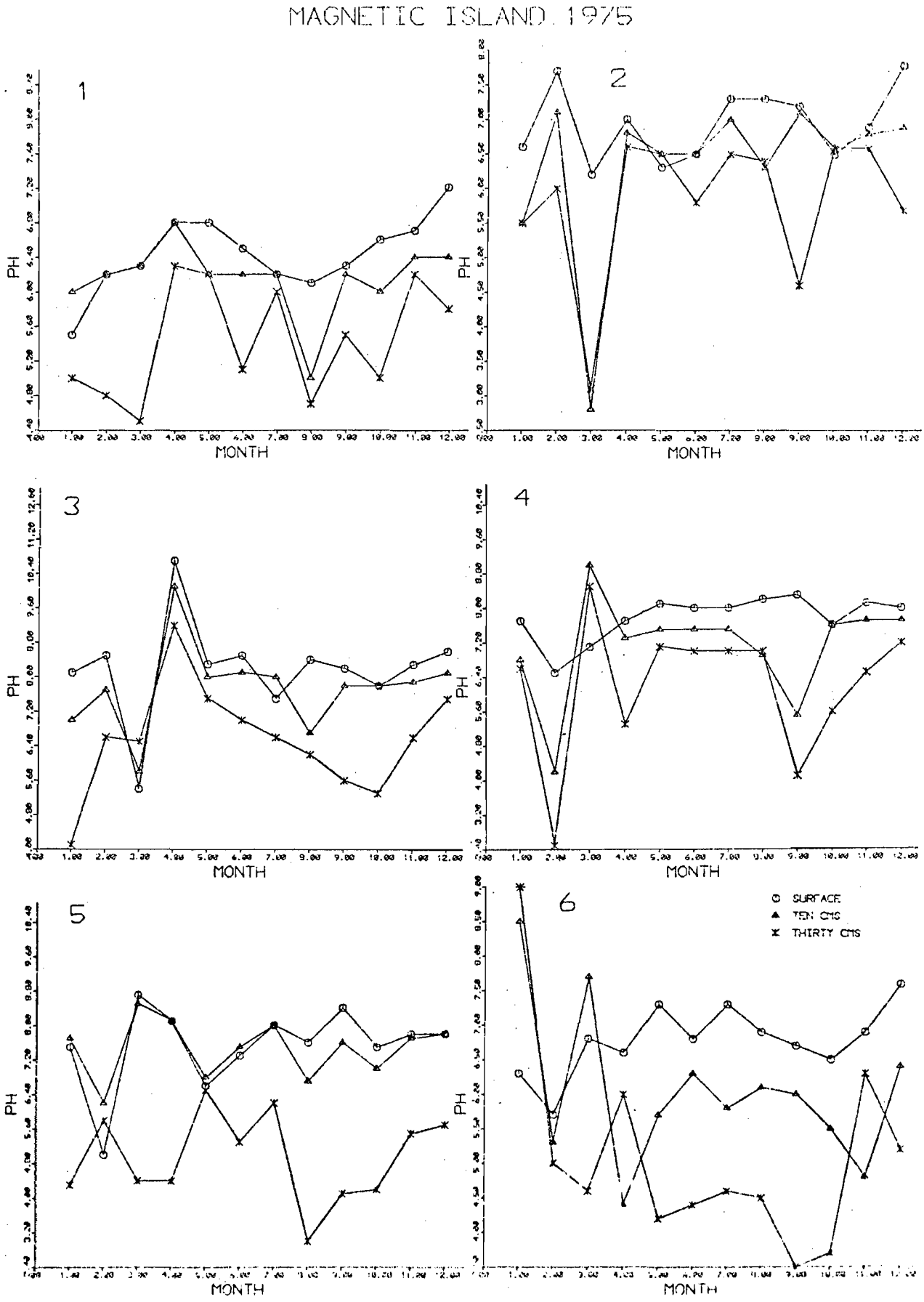


Figure 3.7 continued

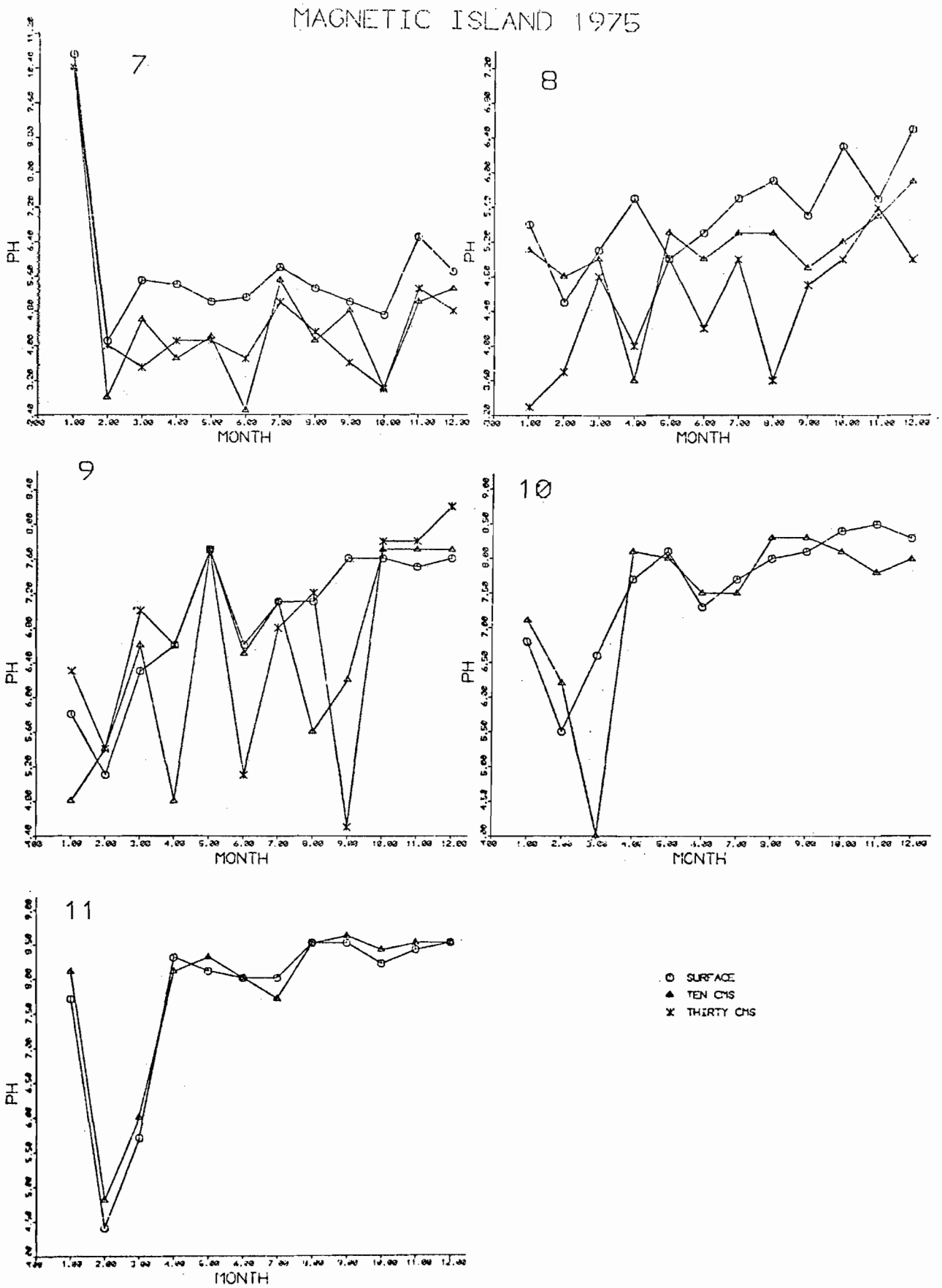


Figure 3.8 pH in distilled water

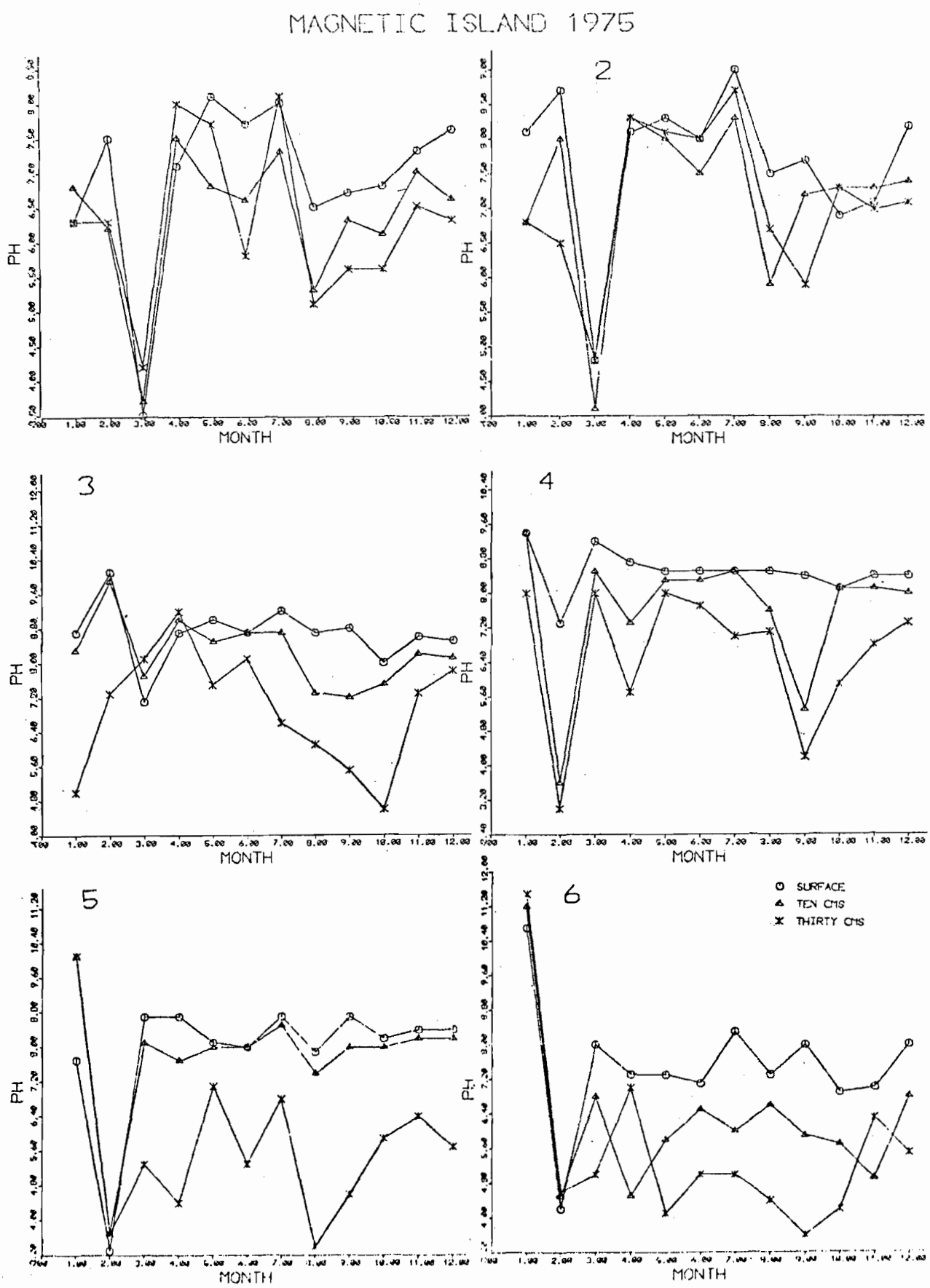


Figure 3.8 continued

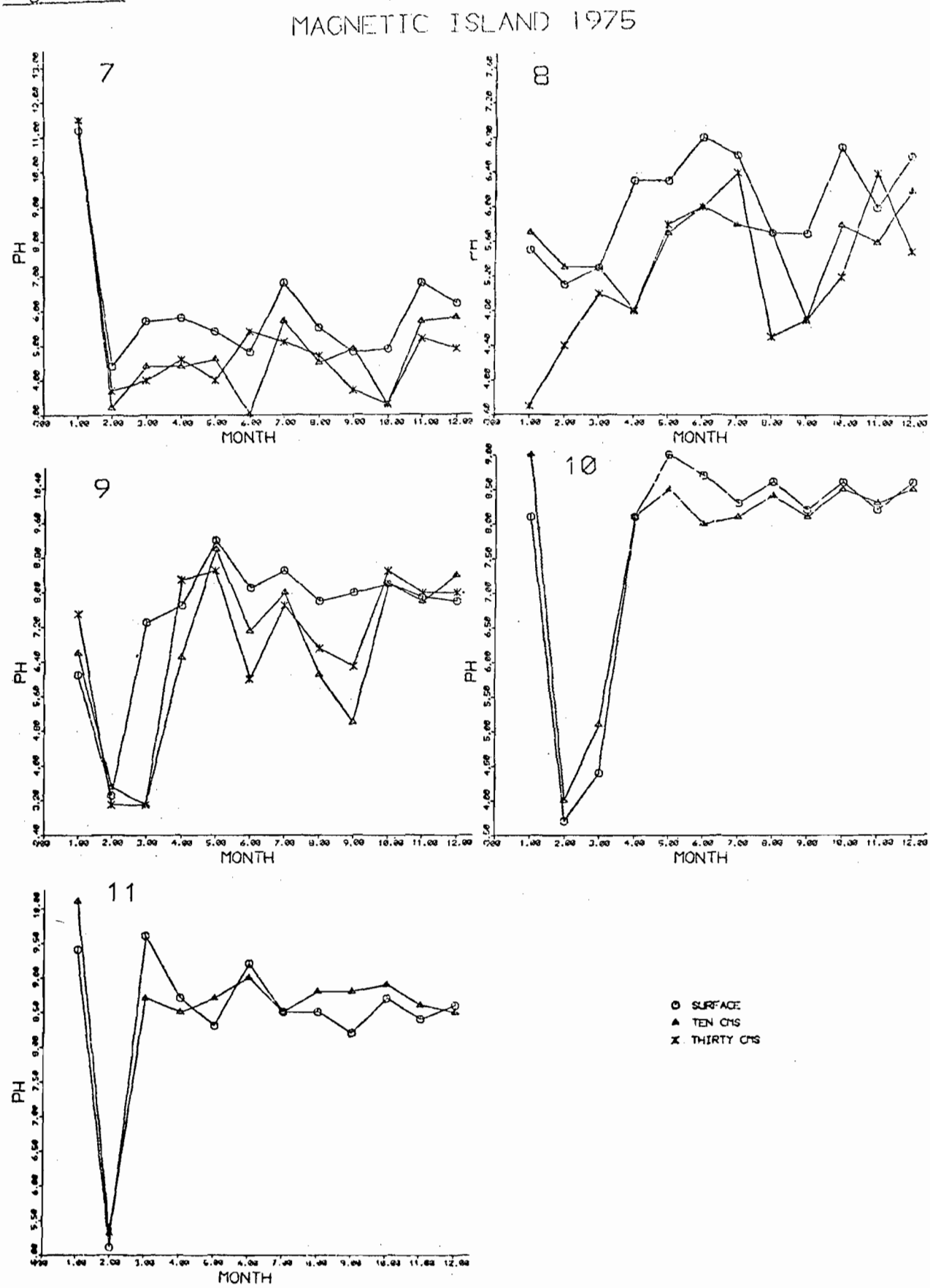


Figure 3.9 Water soluble Chloride

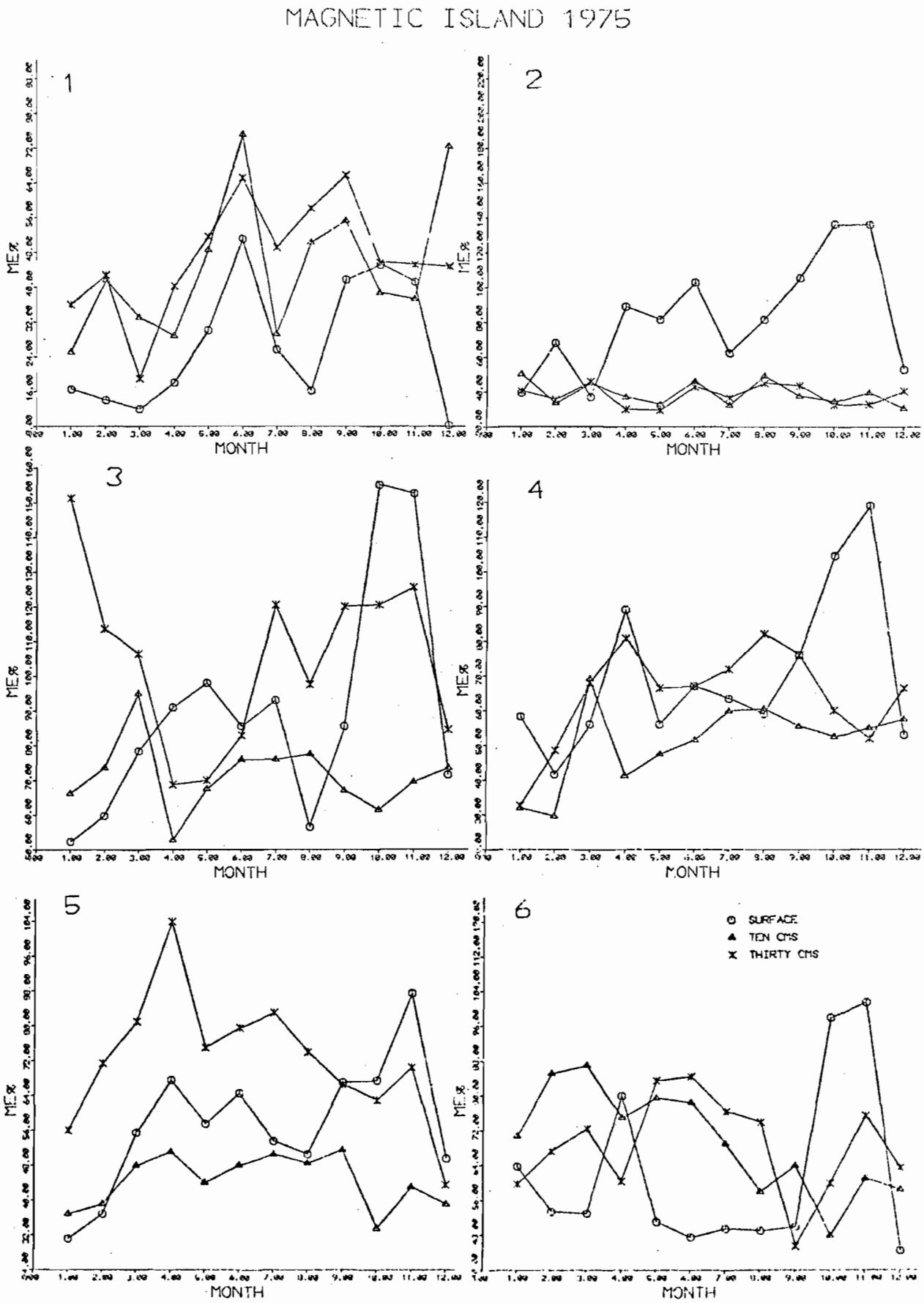


Figure 3.9 continued

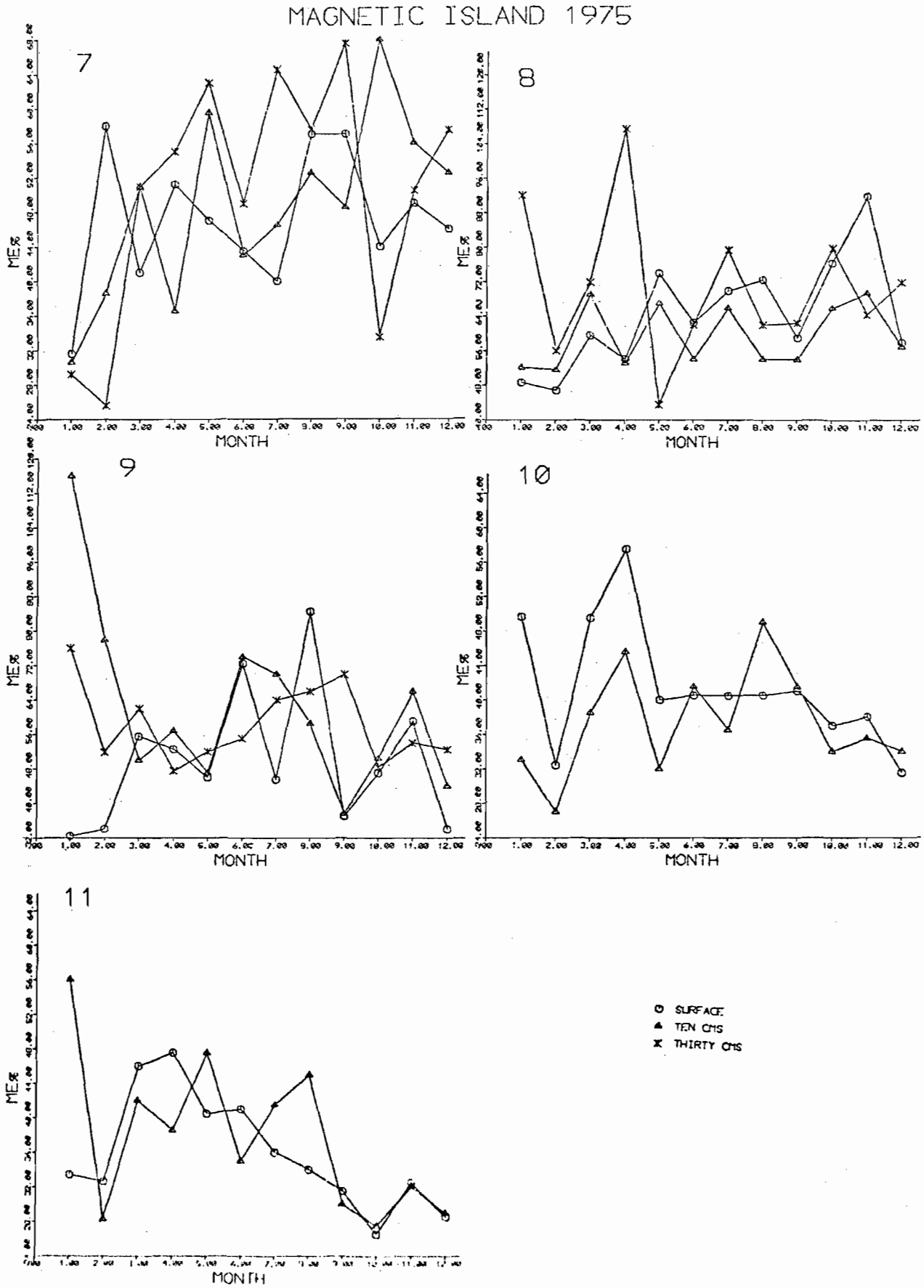


Figure 3.10 Water soluble Sulphate

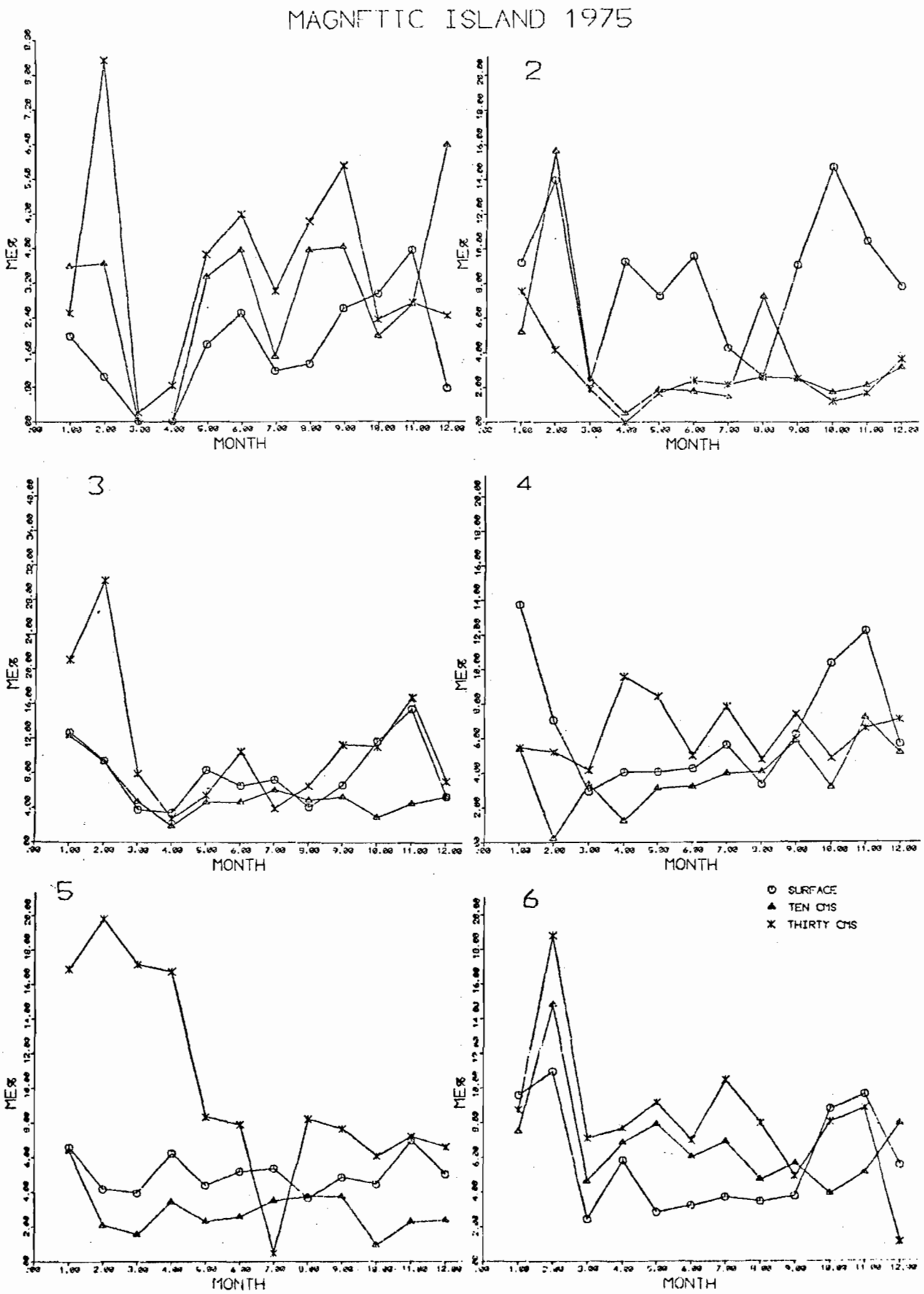


Figure 3.10 continued

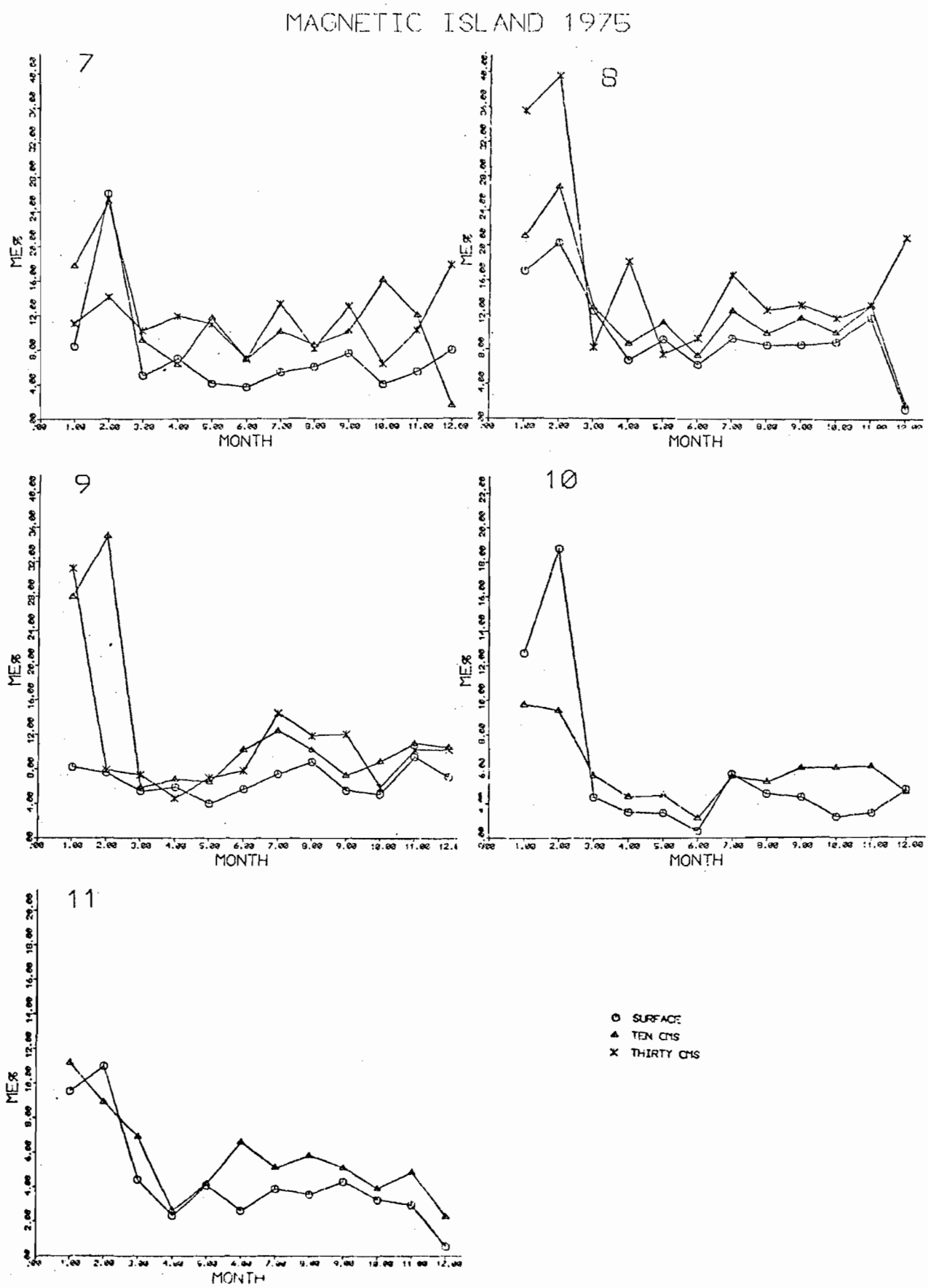


Figure 3.11 Soluble Sodium

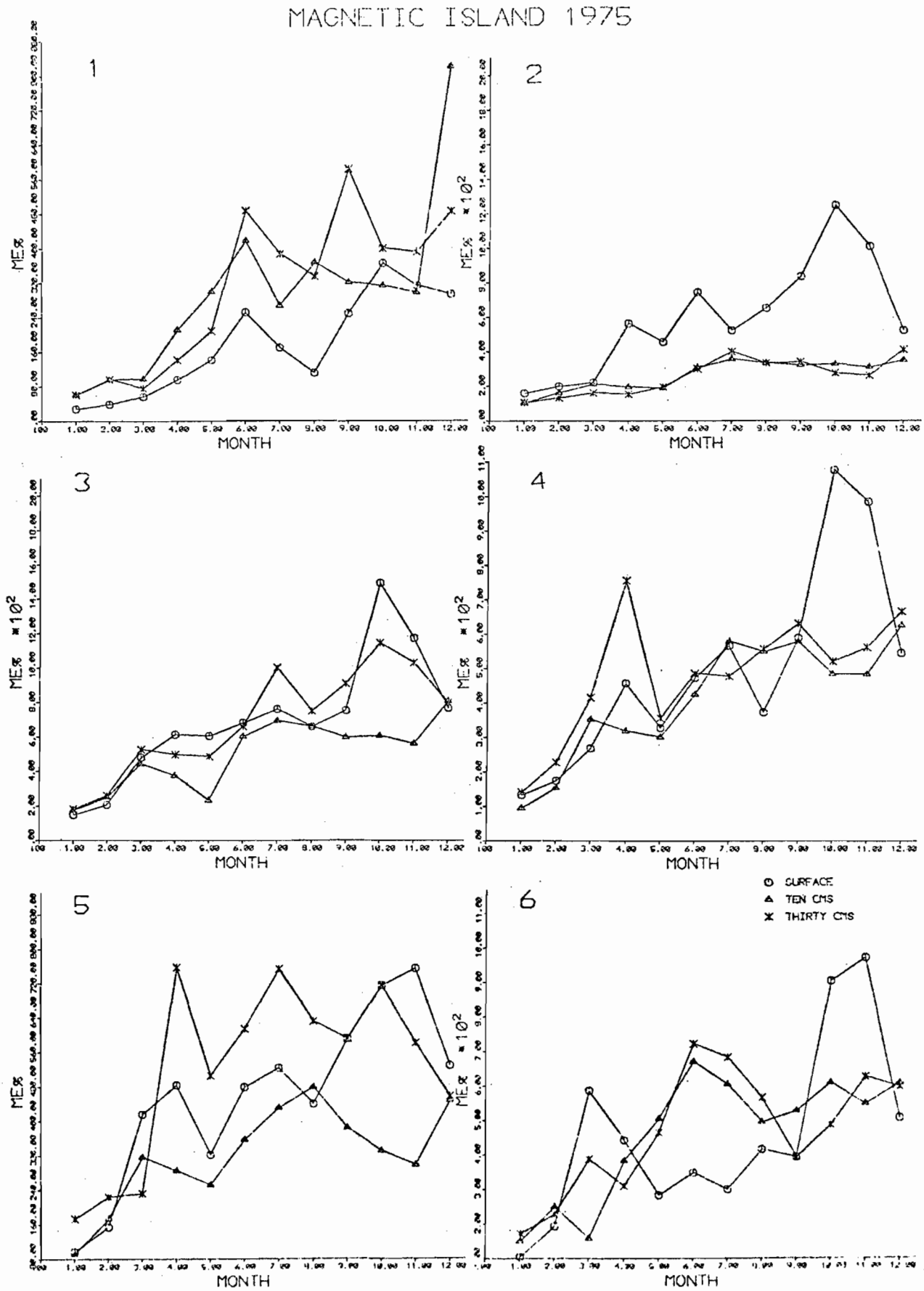


Figure 3.11 continued

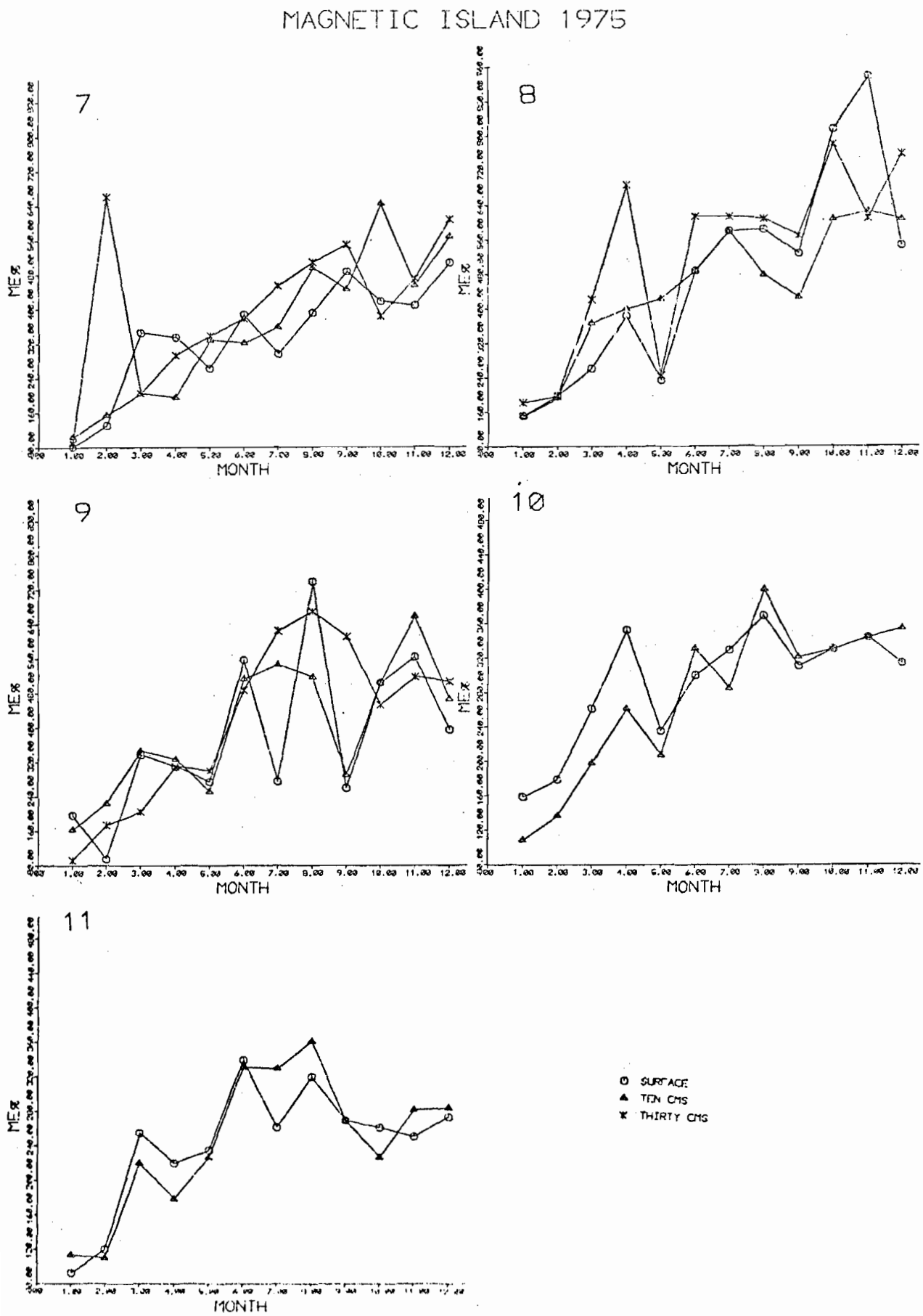


Figure 3.12 Soluble Potassium

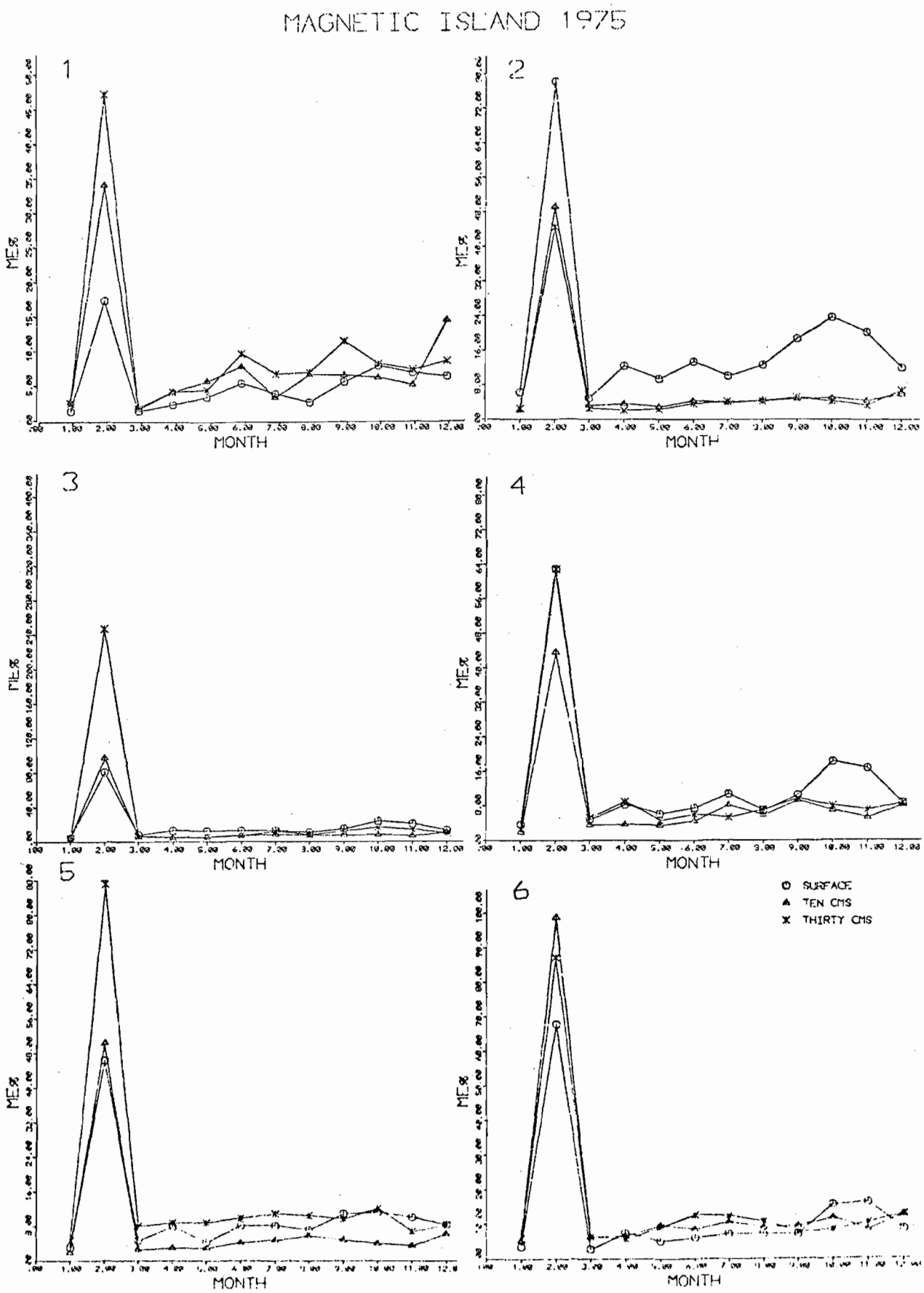


Figure 3.12 continued

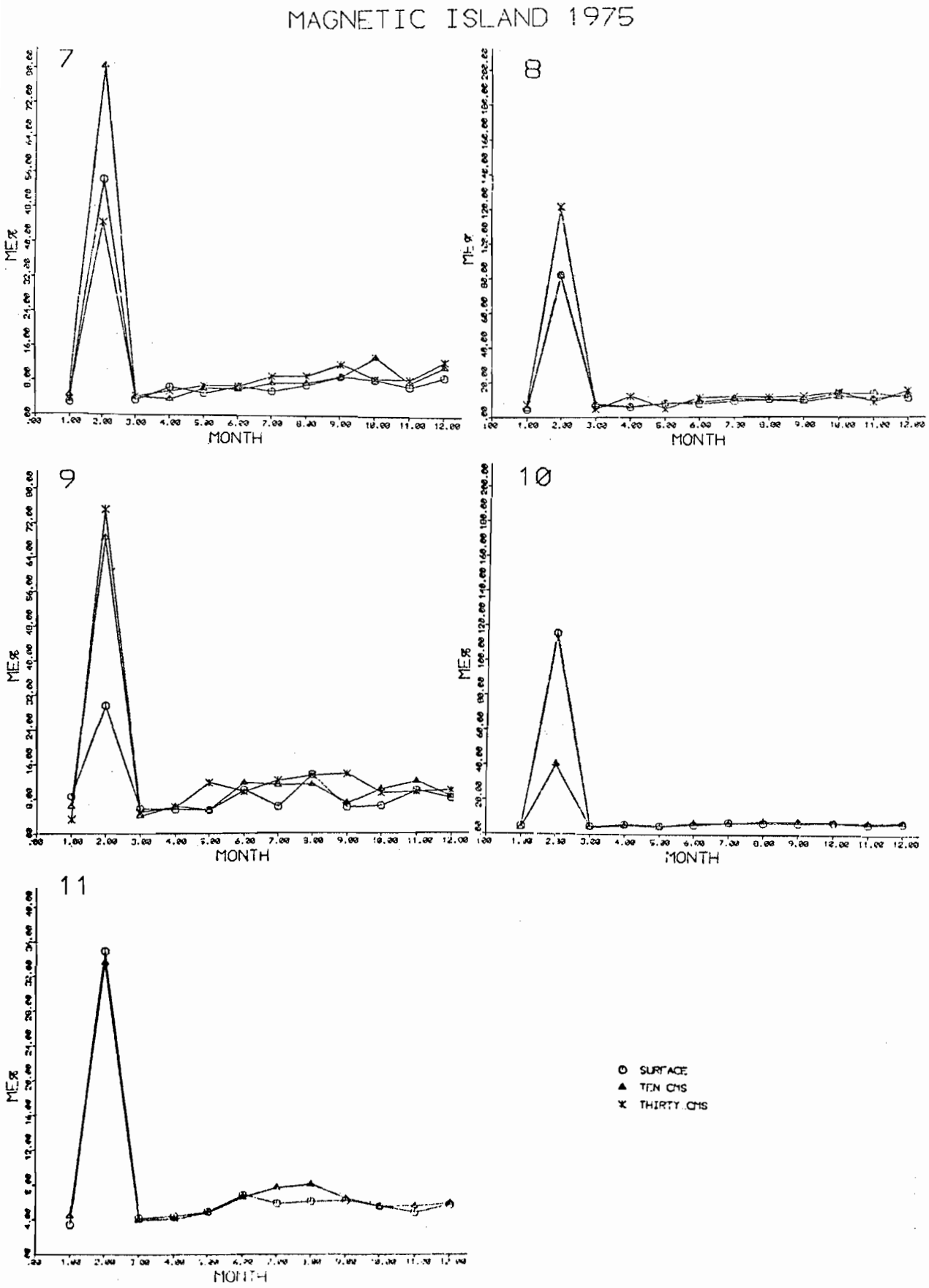


Figure 3.13 Soluble Calcium

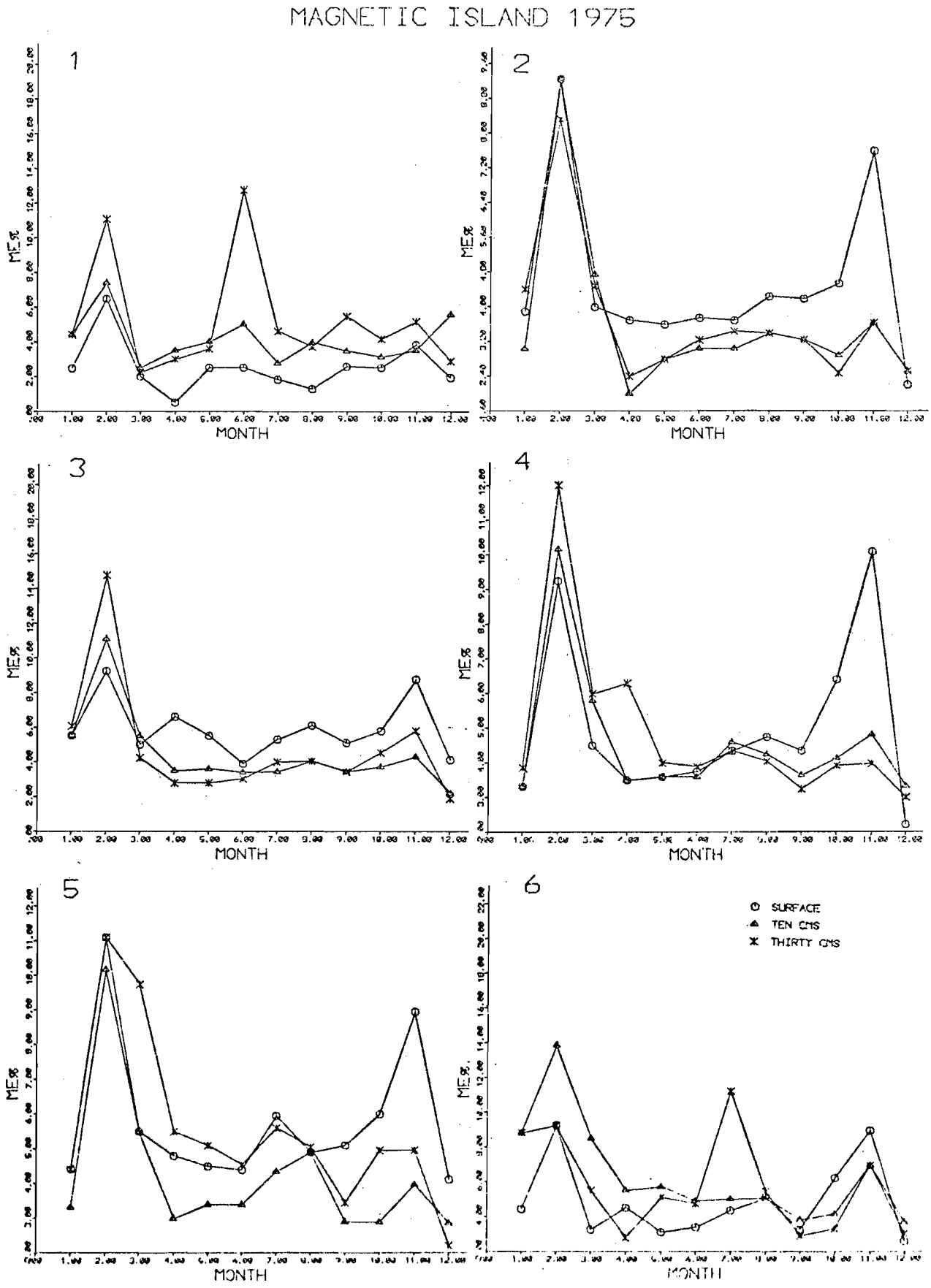


Figure 3.13 continued

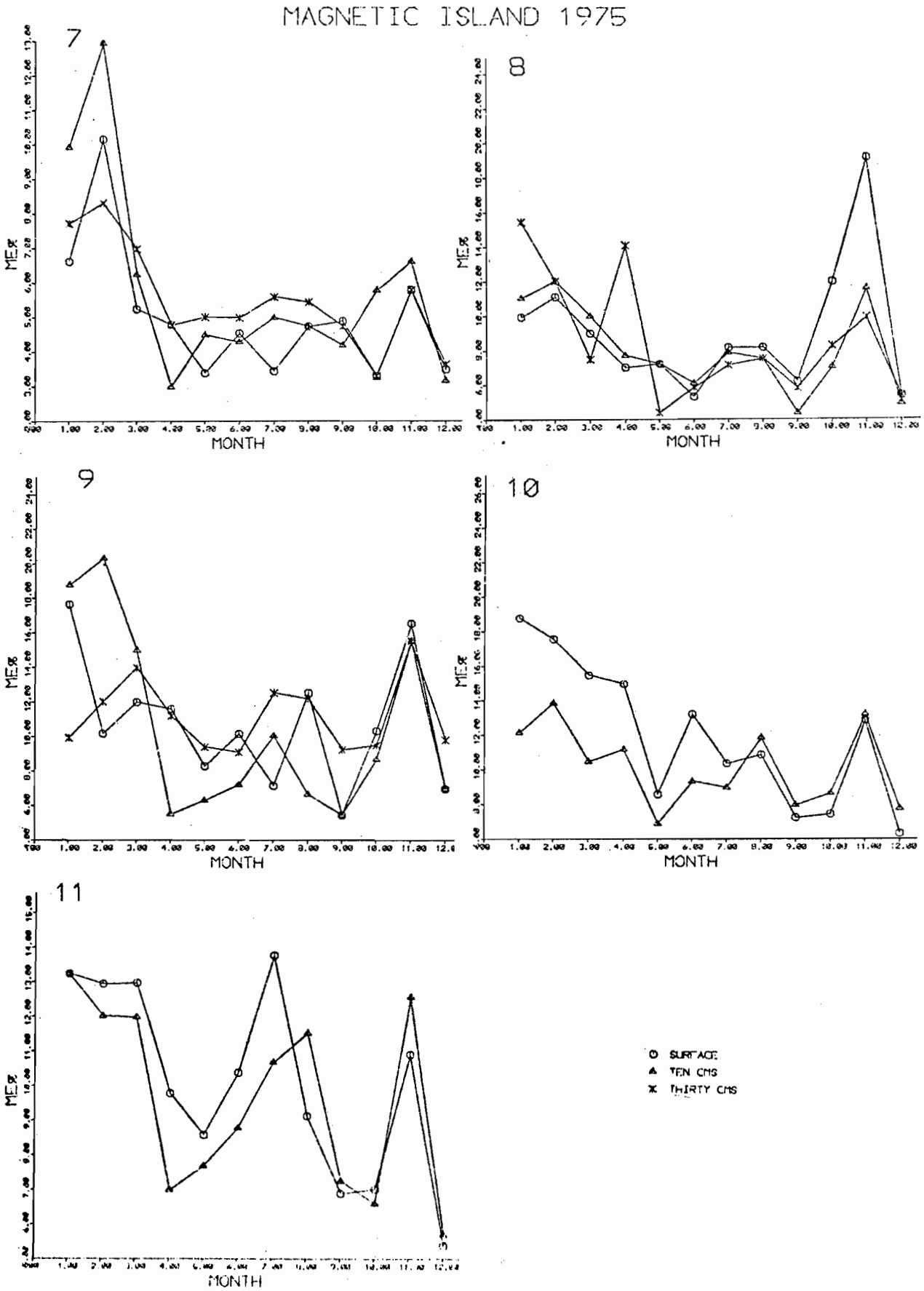


Figure 3.14 Soluble Magnesium

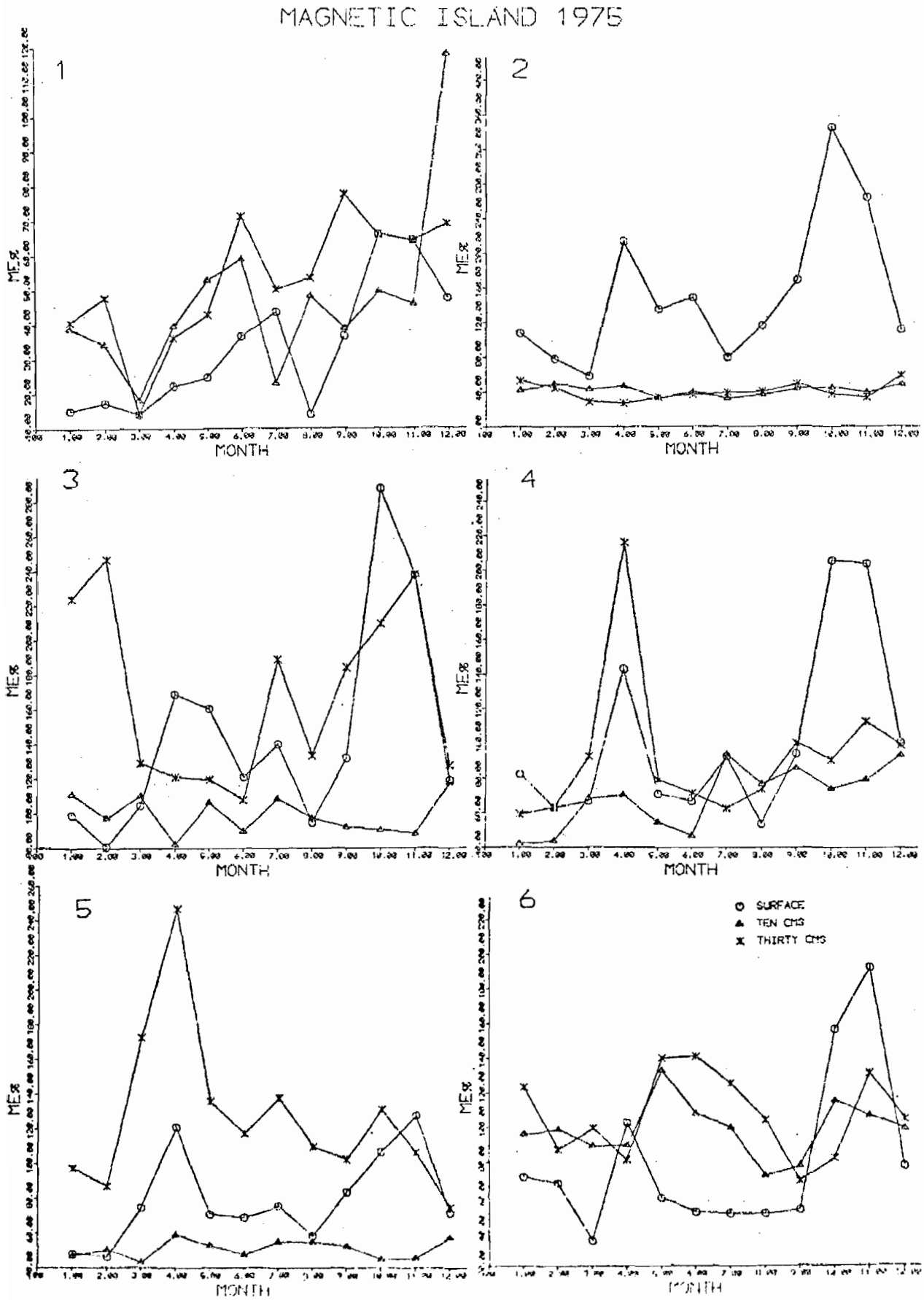


Figure 3.14 continued

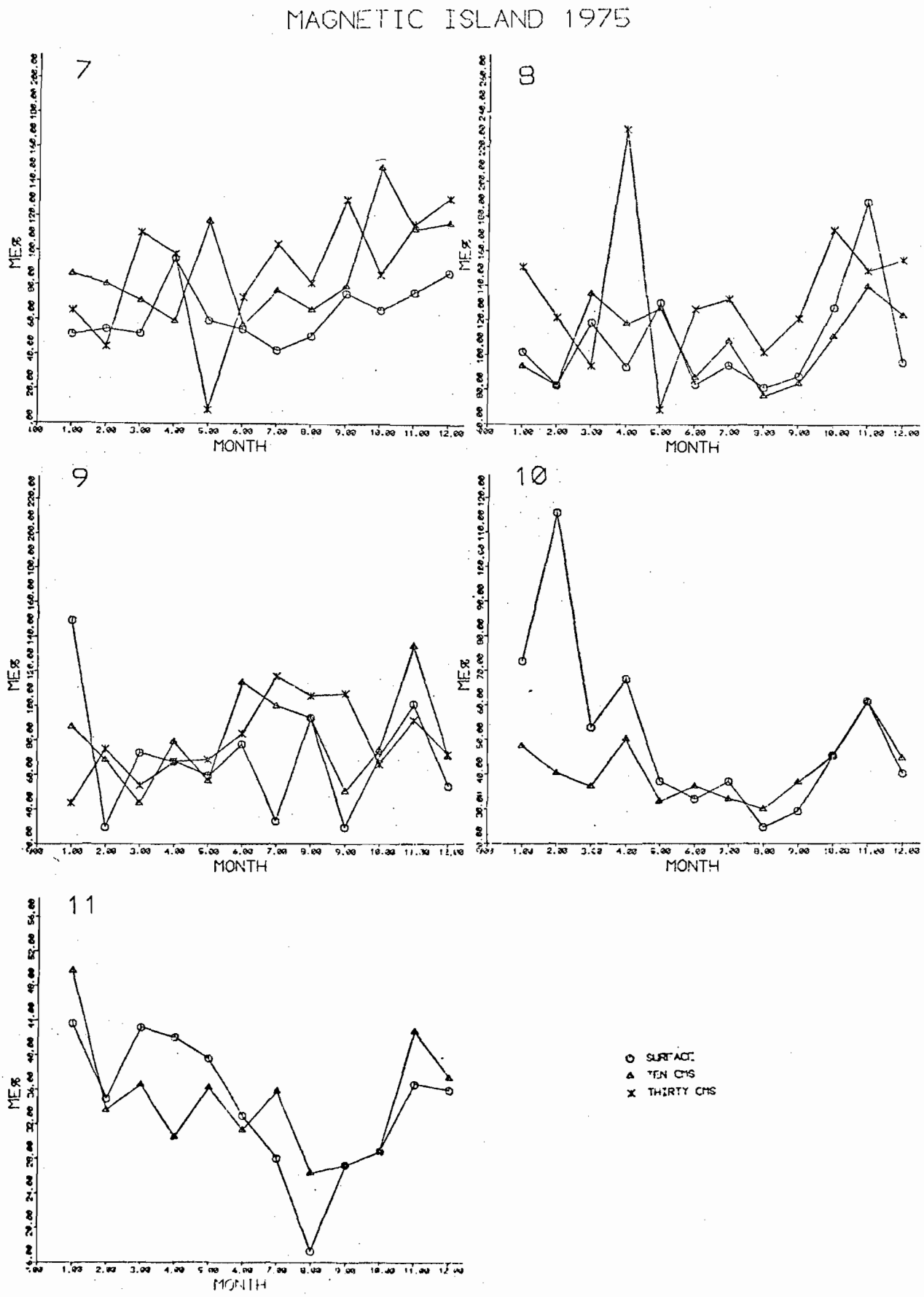


Figure 3.15 Exchangeable Sodium

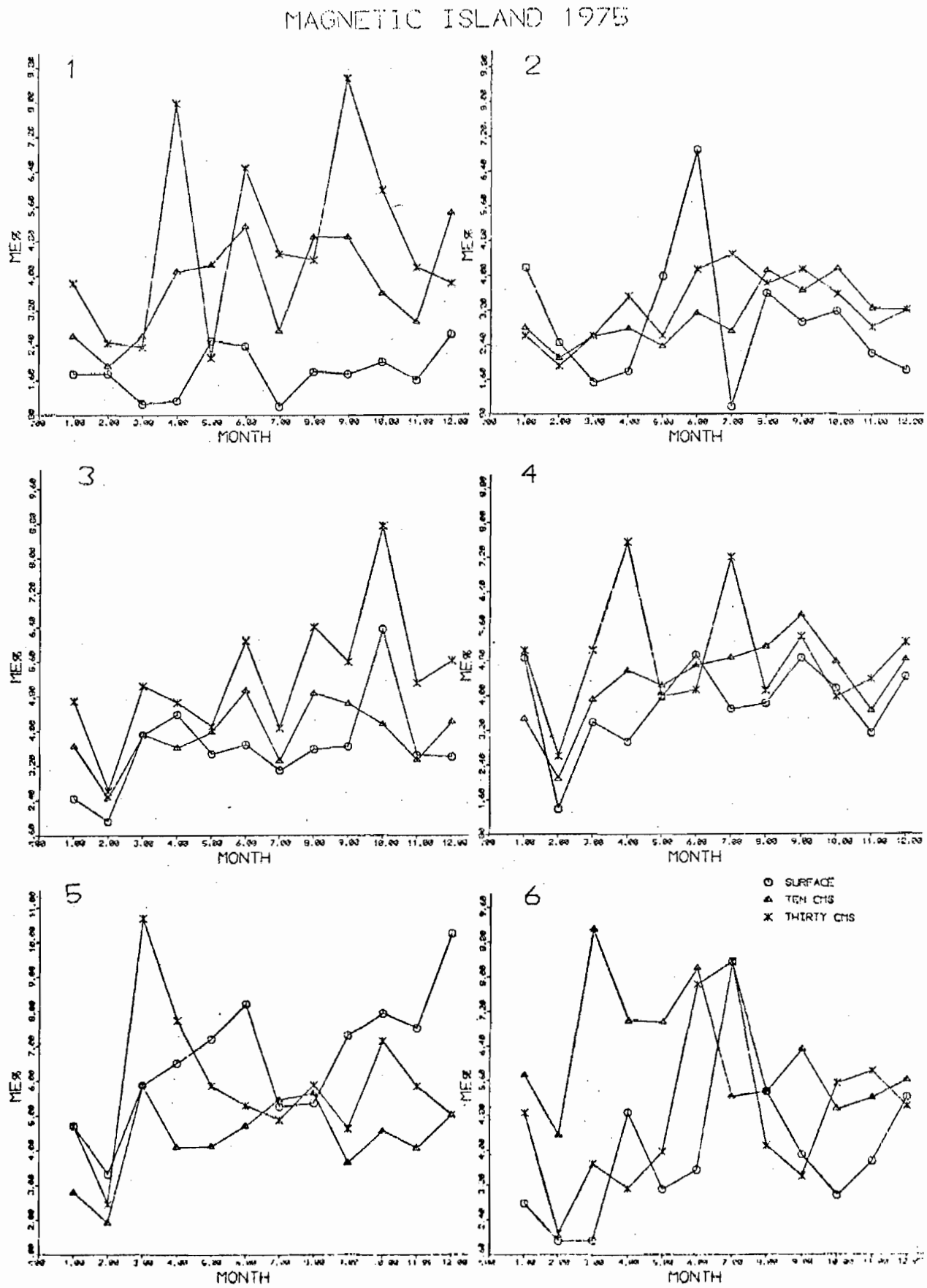


Figure 3.15 continued

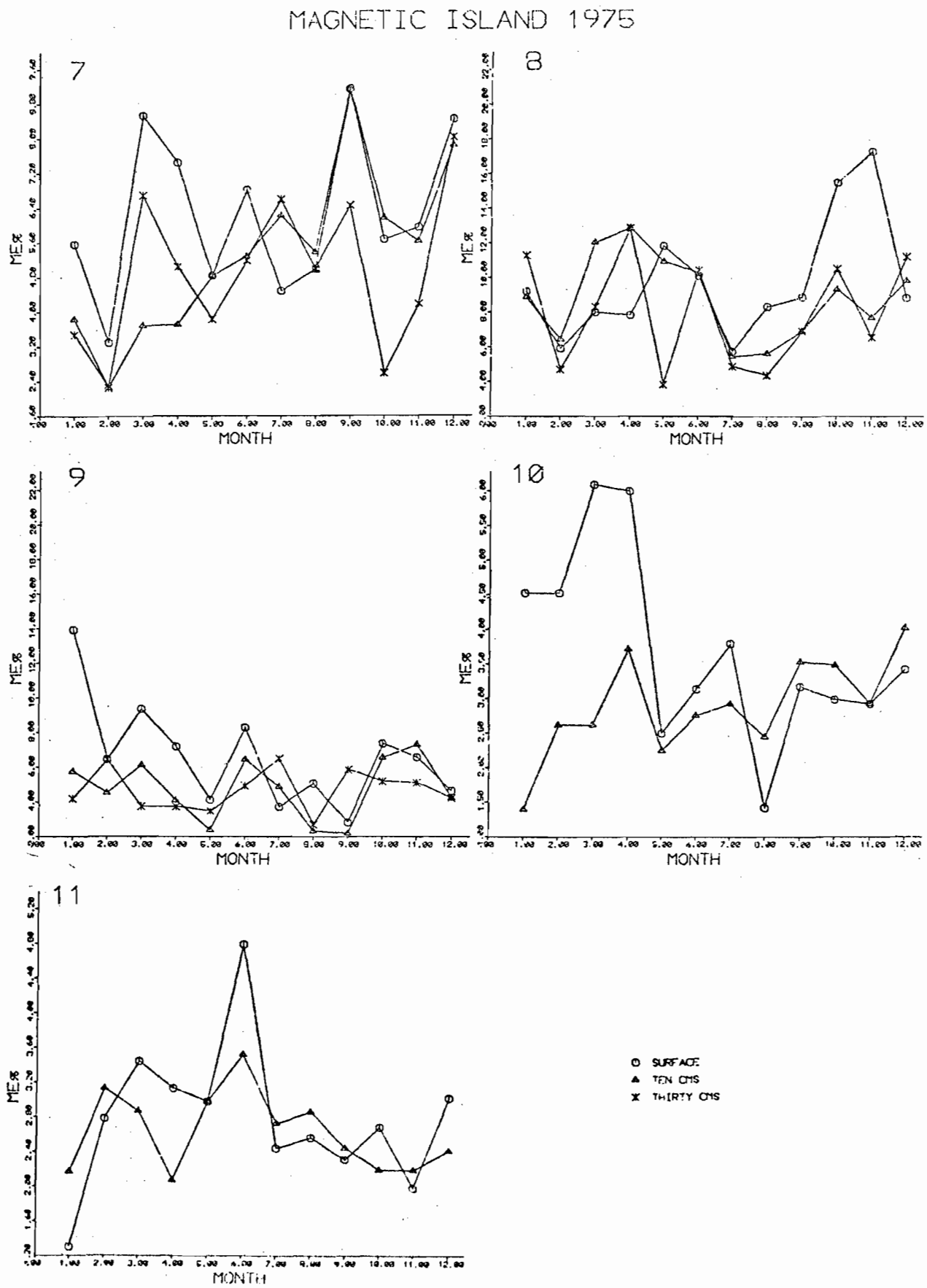


Figure 3.16 Exchangeable Potassium

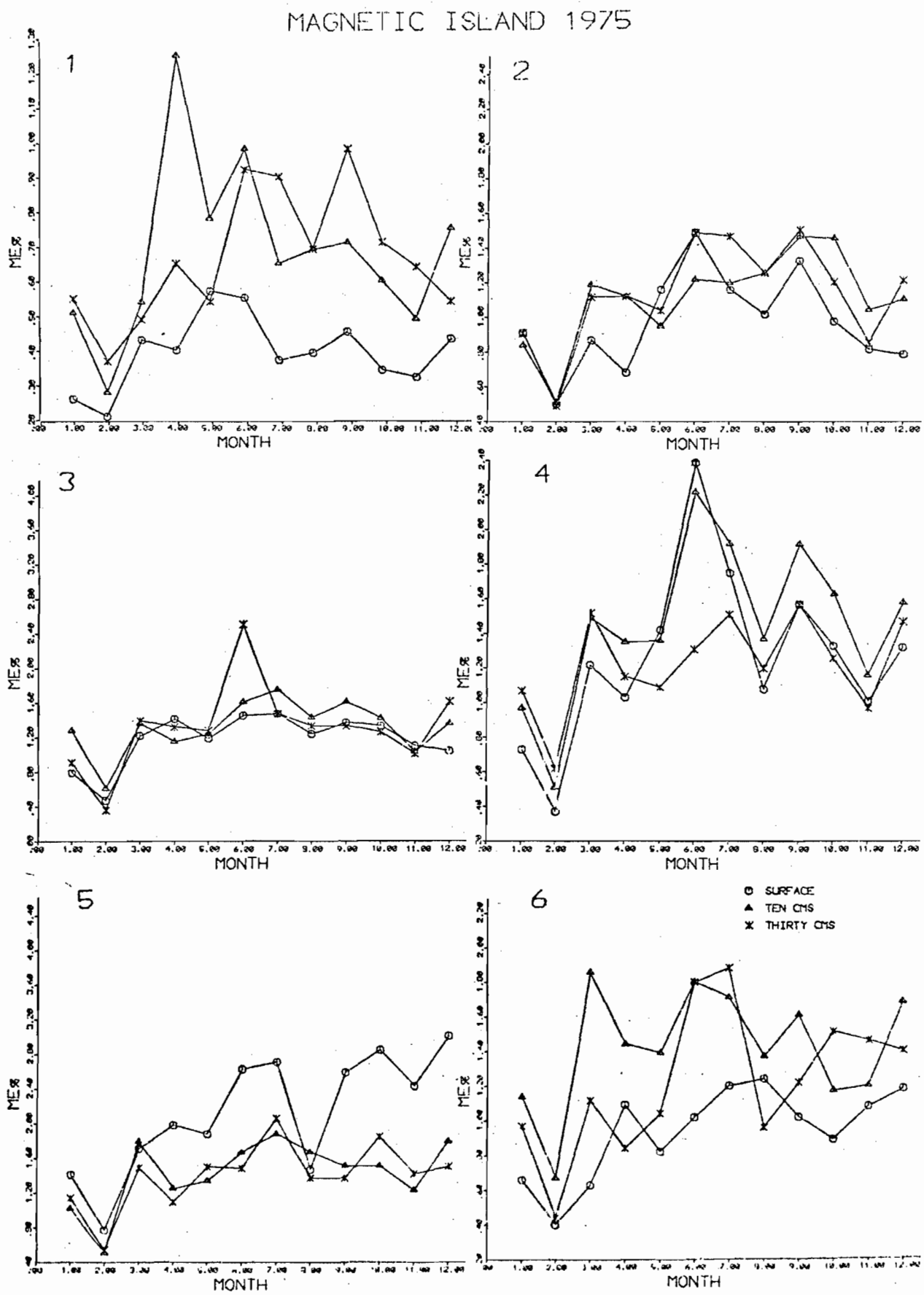


Figure 3.16 continued

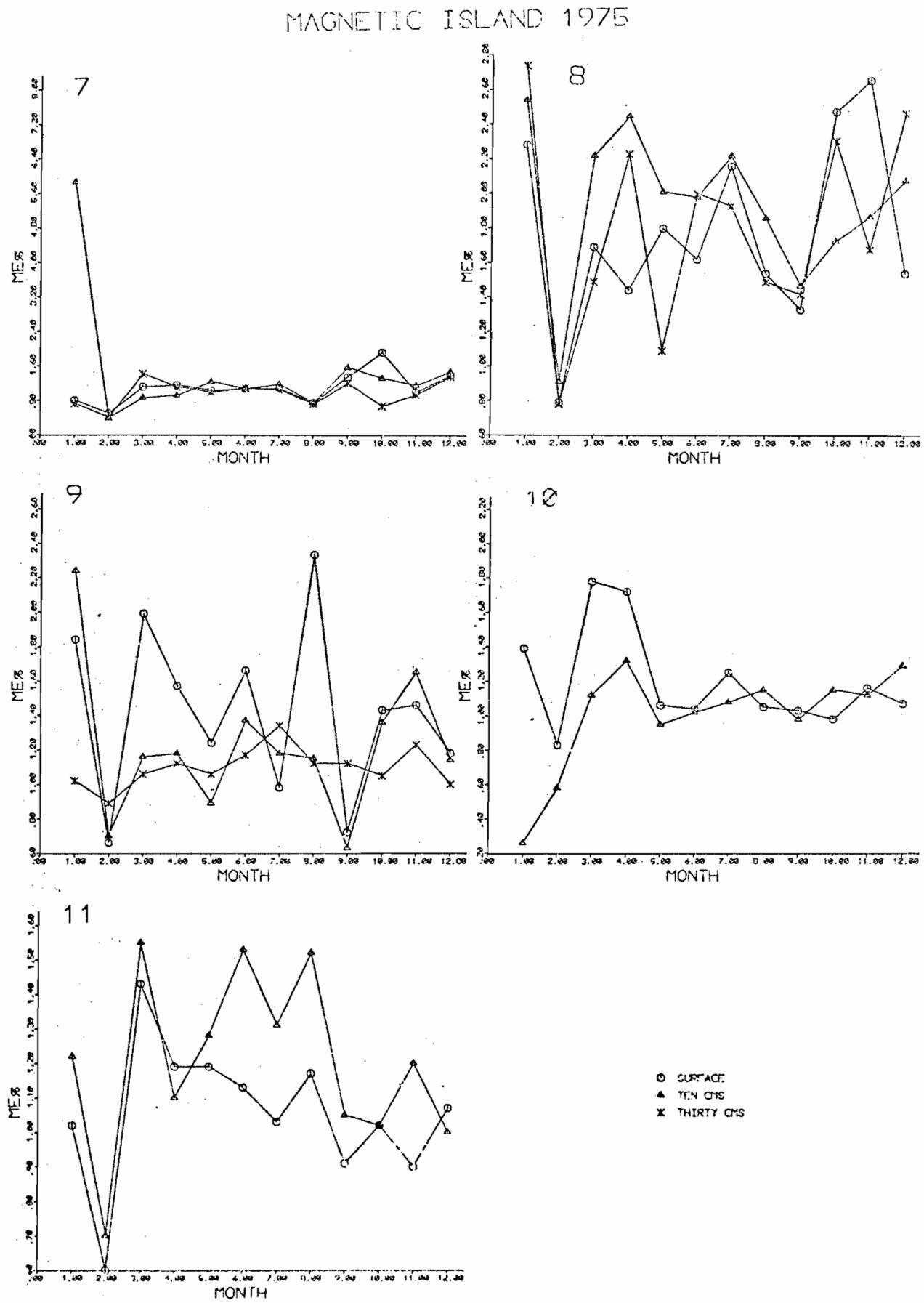


Figure 3.17 Exchangeable Calcium

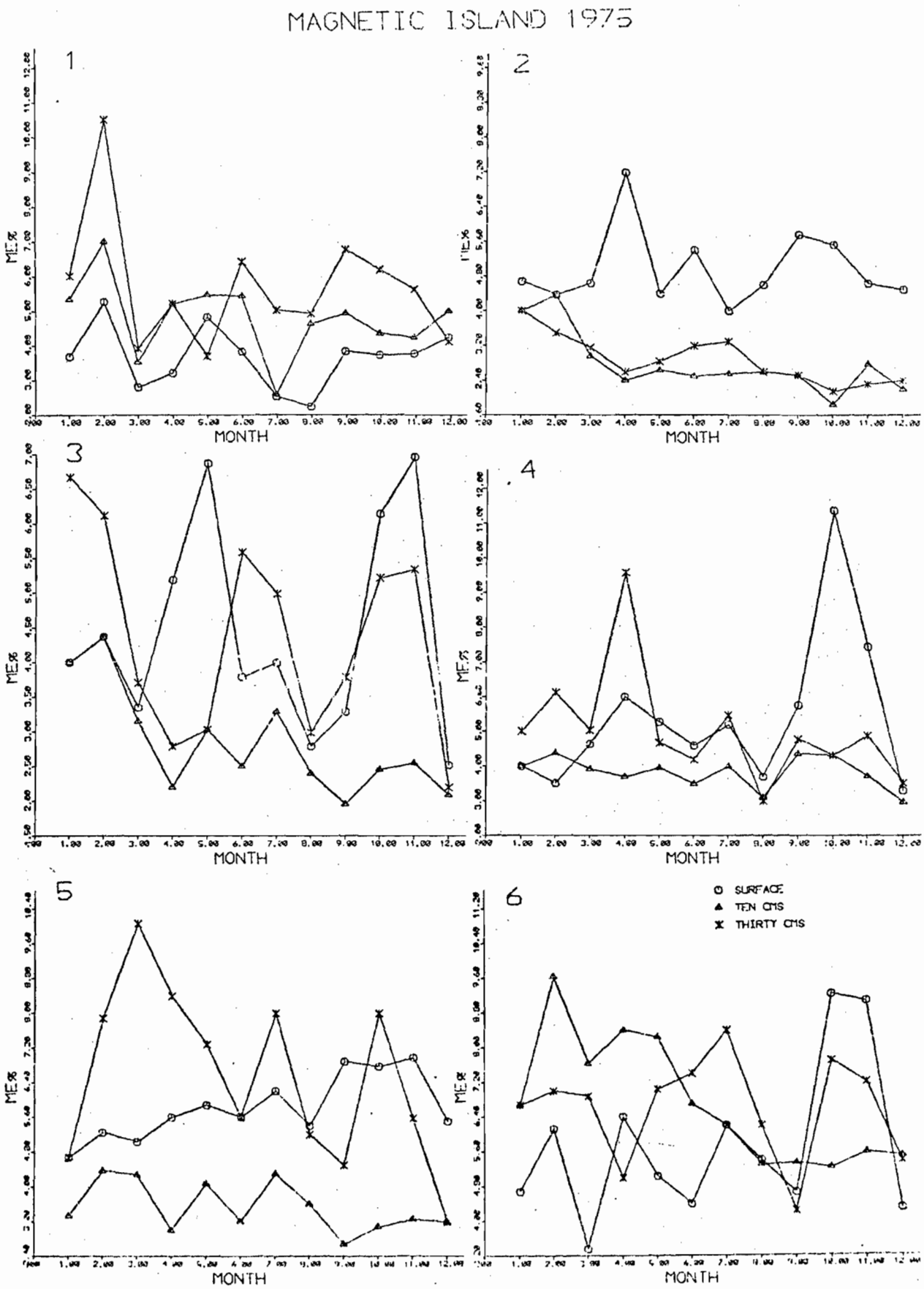


Figure 3.17 continued

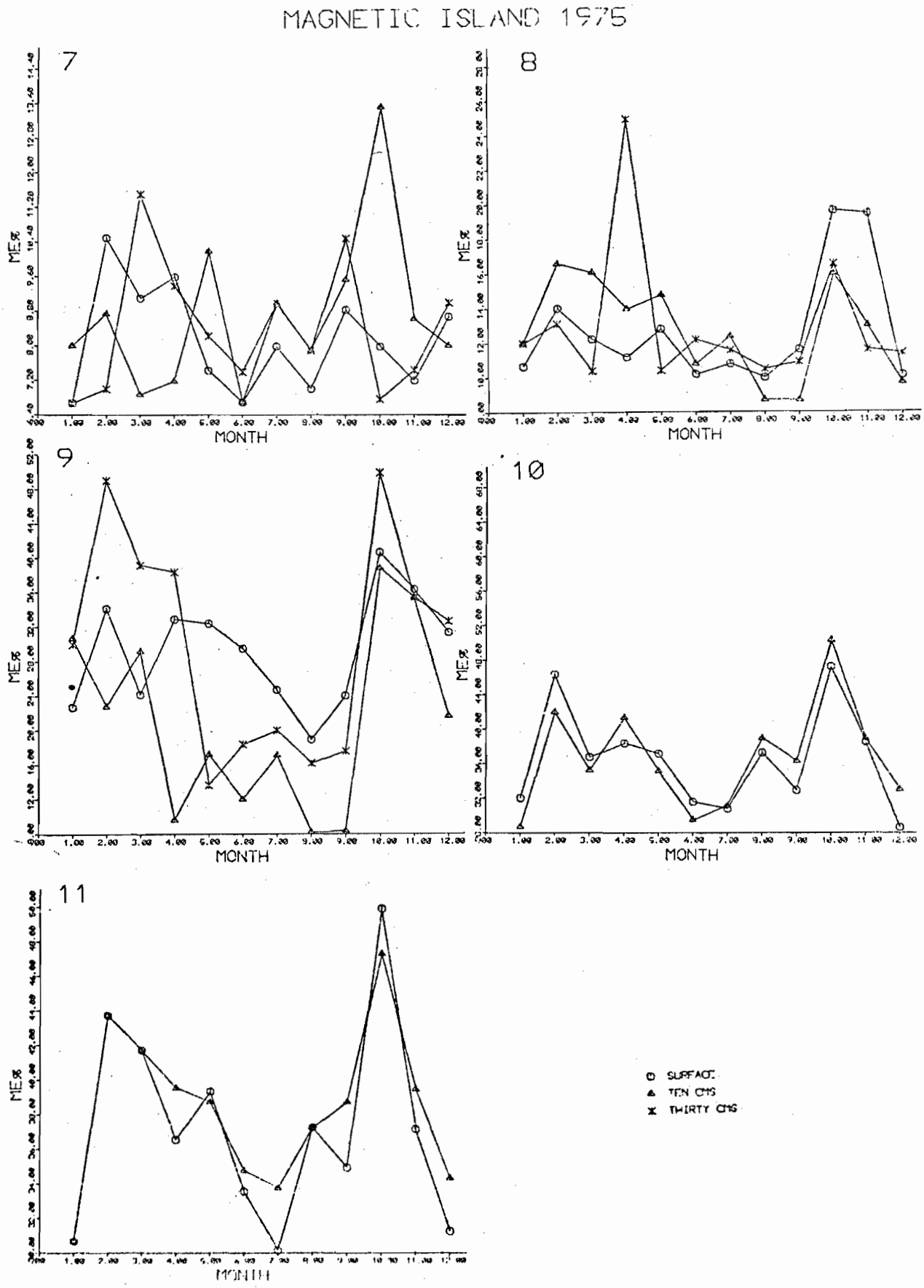


Figure 3.18 Exchangeable Magnesium

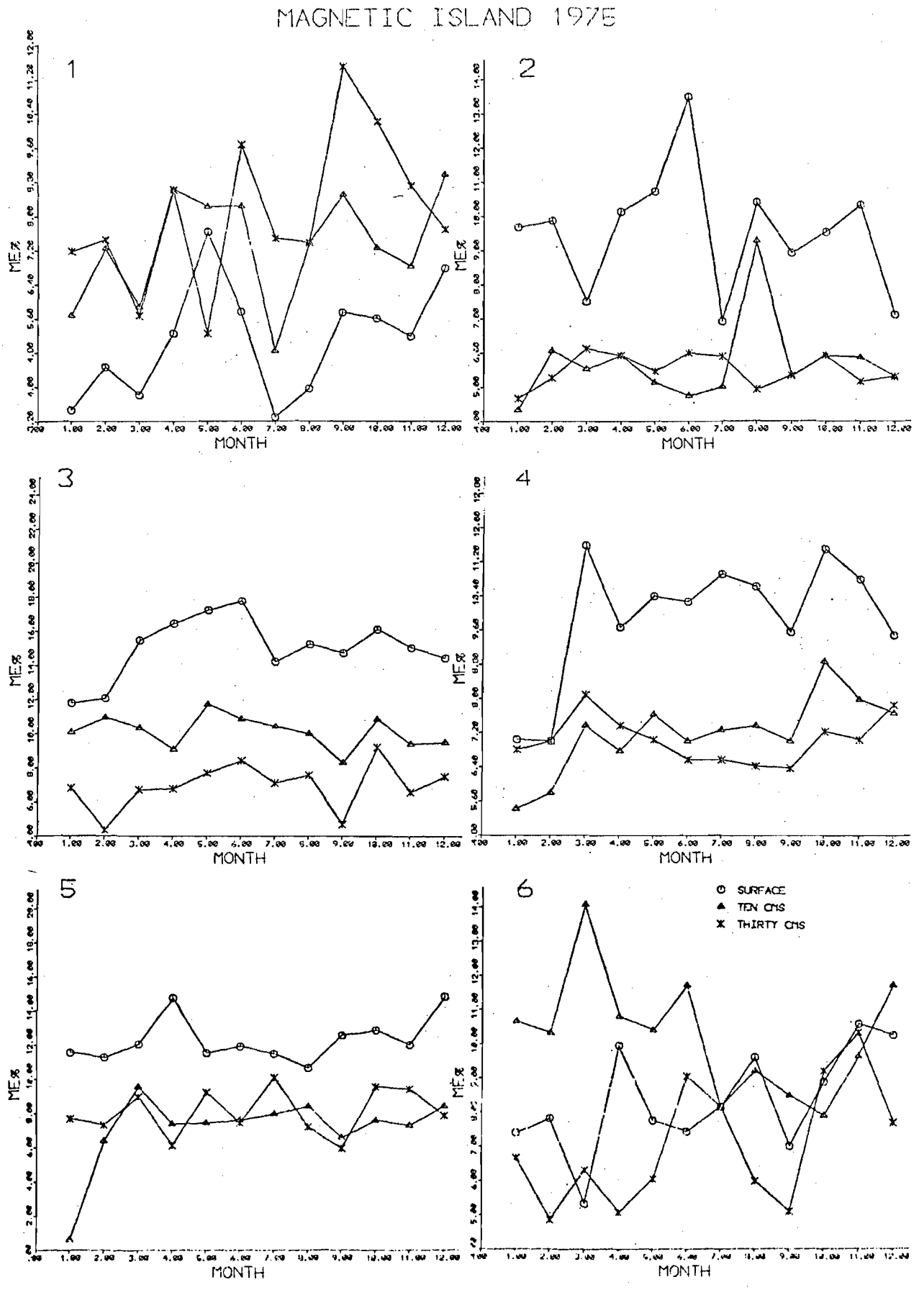
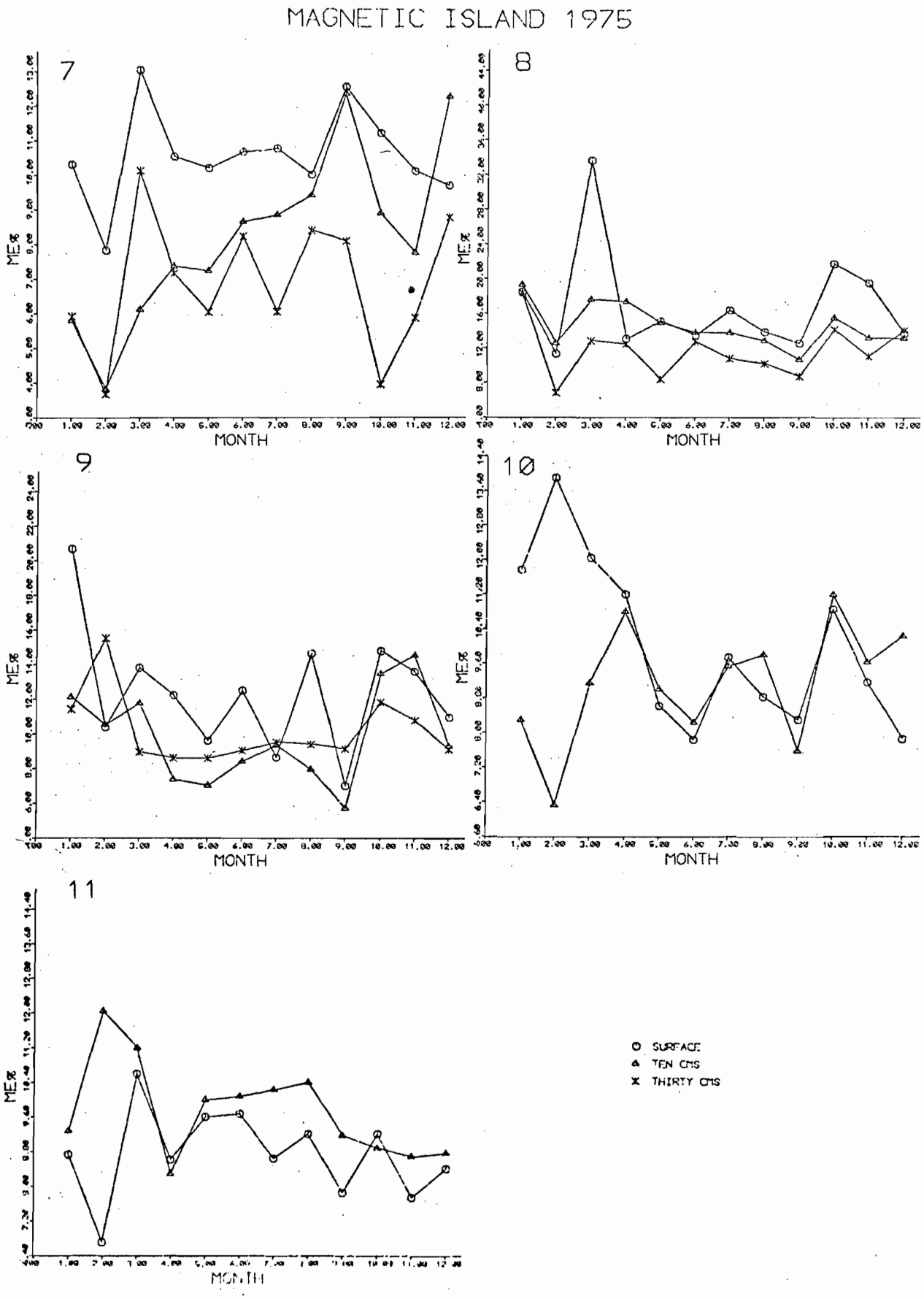


Figure 3.18 continued



MAGNETIC ISLAND CHEMICAL DATA IN SPACE BY TIME

Figure 3.19 pH in KCl solution

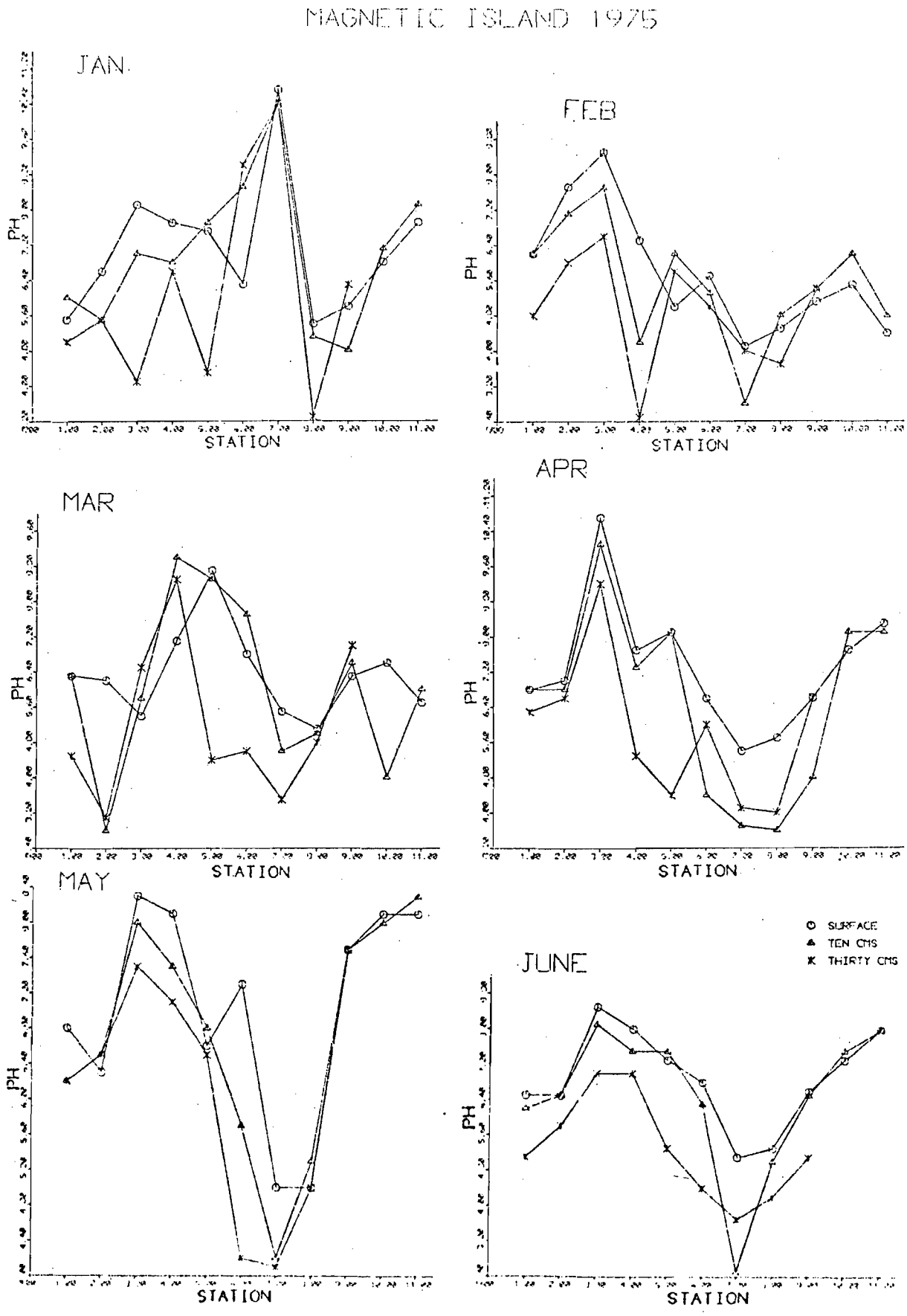


Figure 3.19 continued

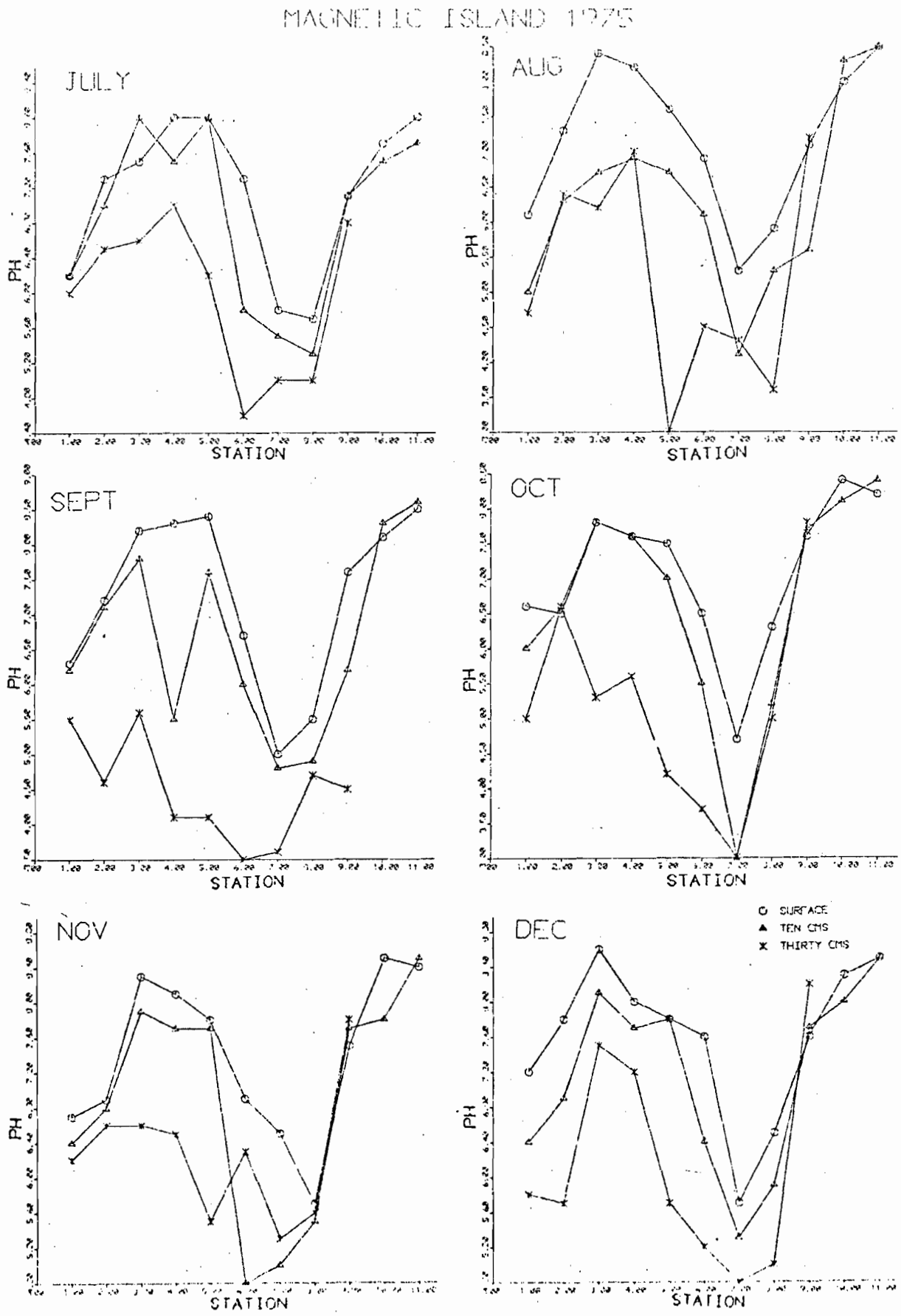


Figure 3.20 pH in distilled water

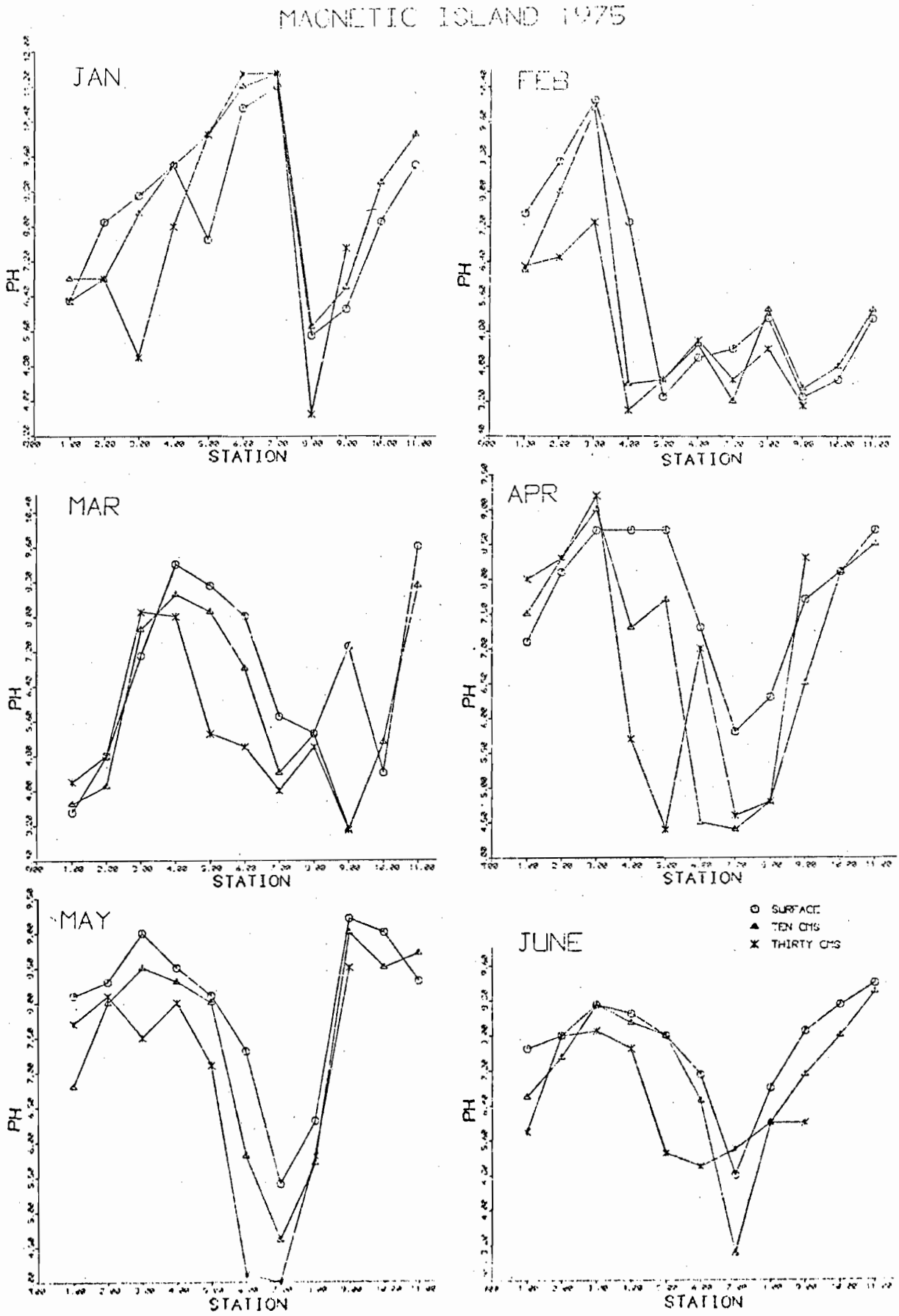


Figure 3.20 continued

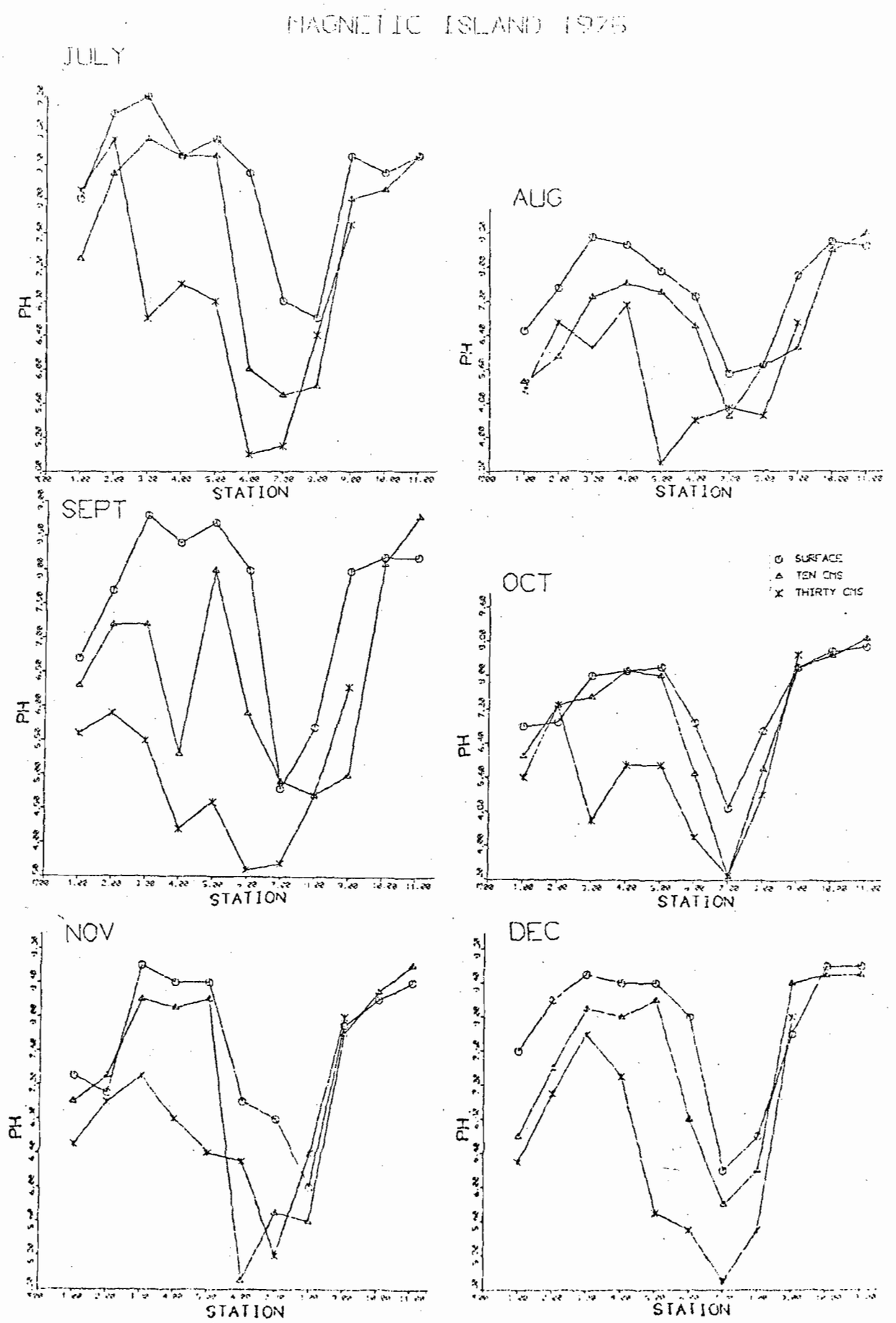


Figure 3.21 Water soluble Chloride

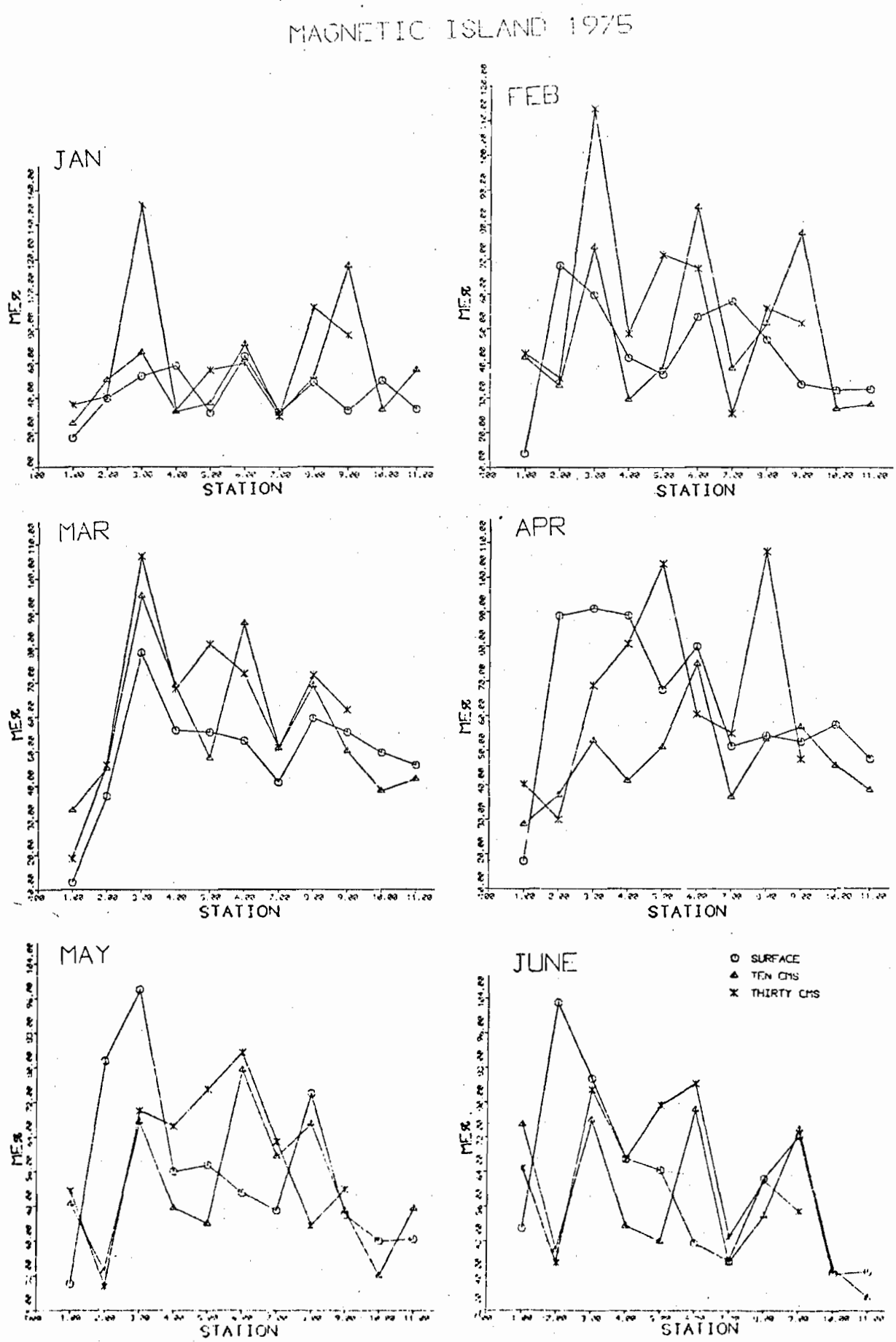


Figure 3.21 continued

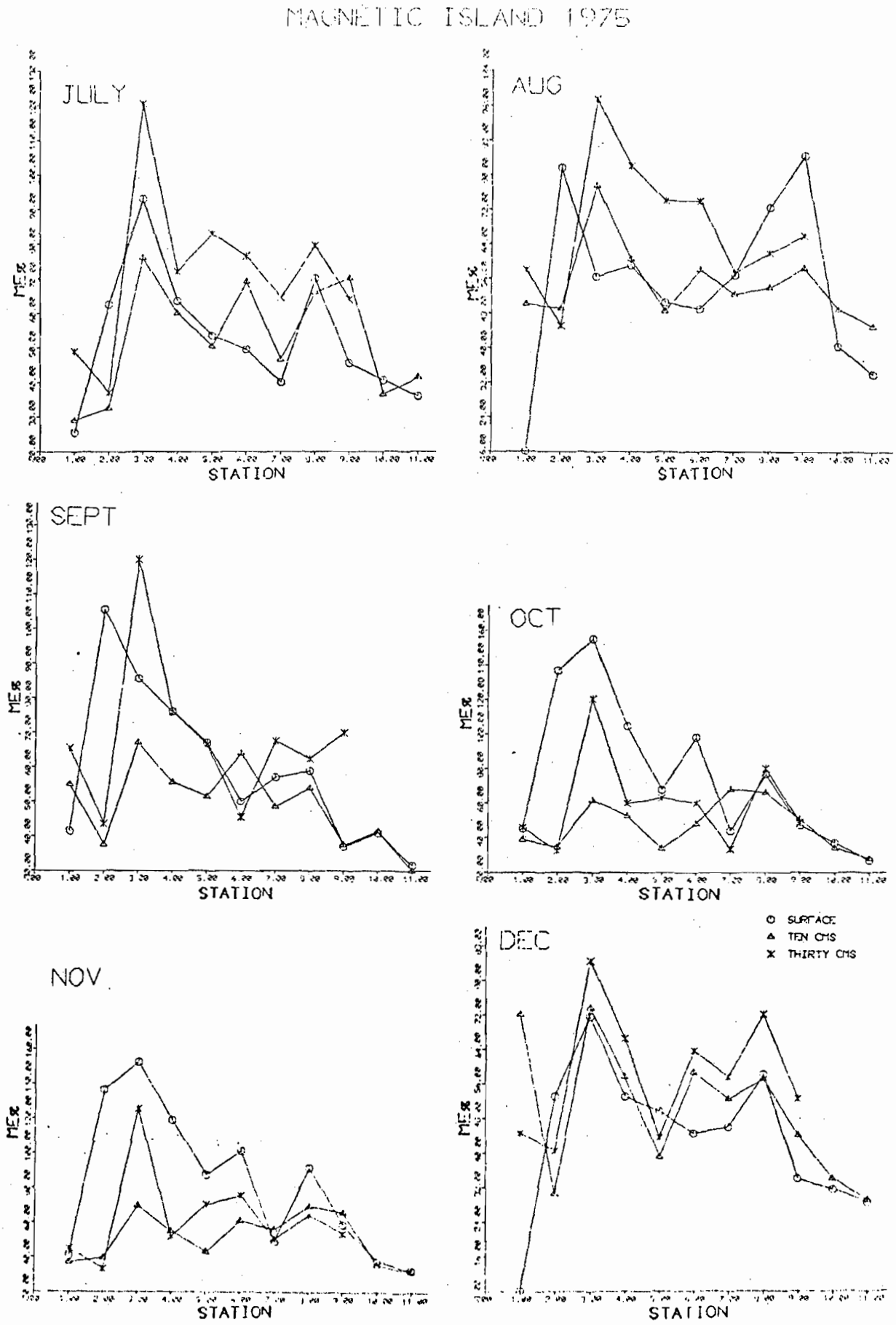


Figure 3.22 Water soluble Sulphate

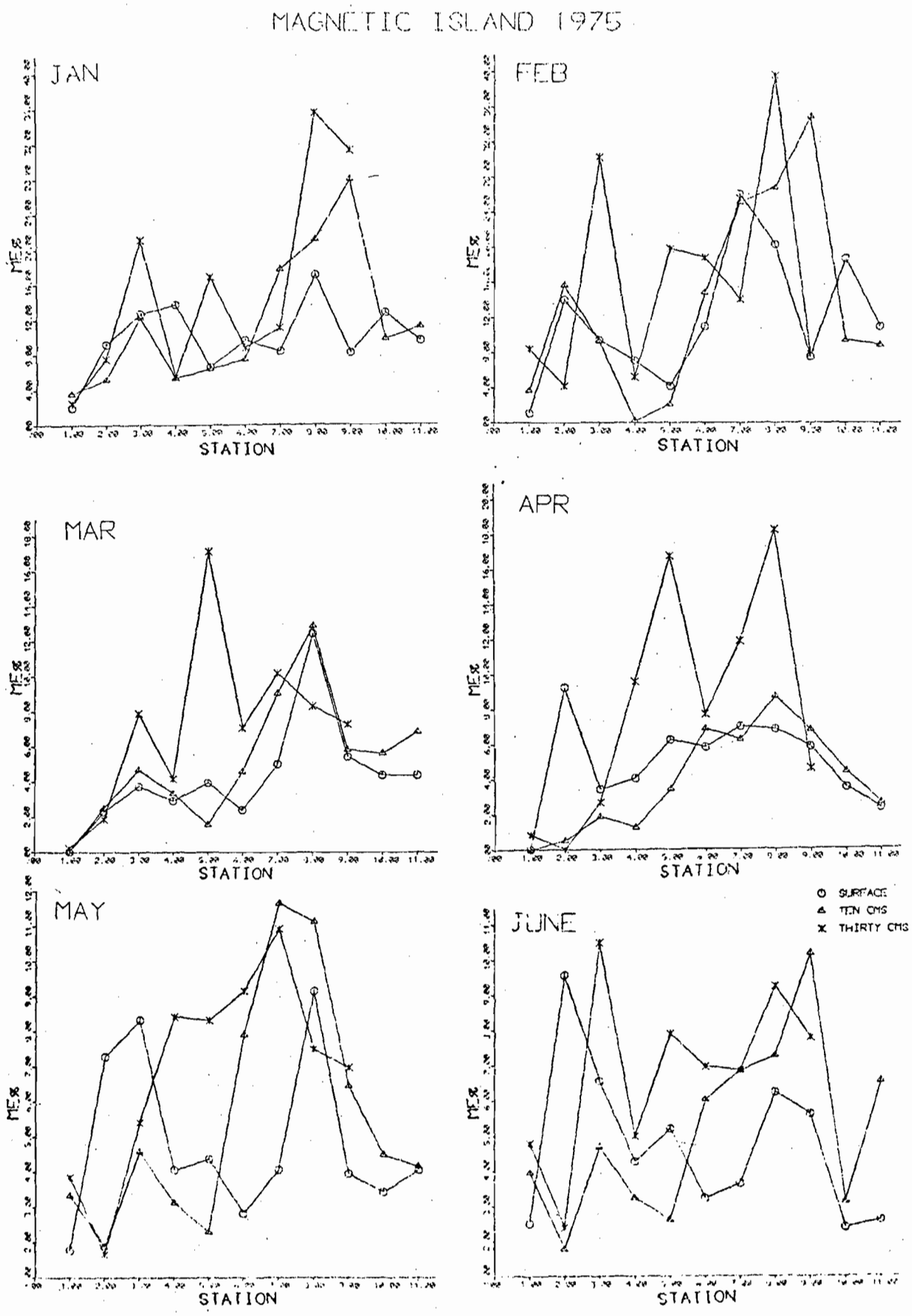


Figure 3.22 continued

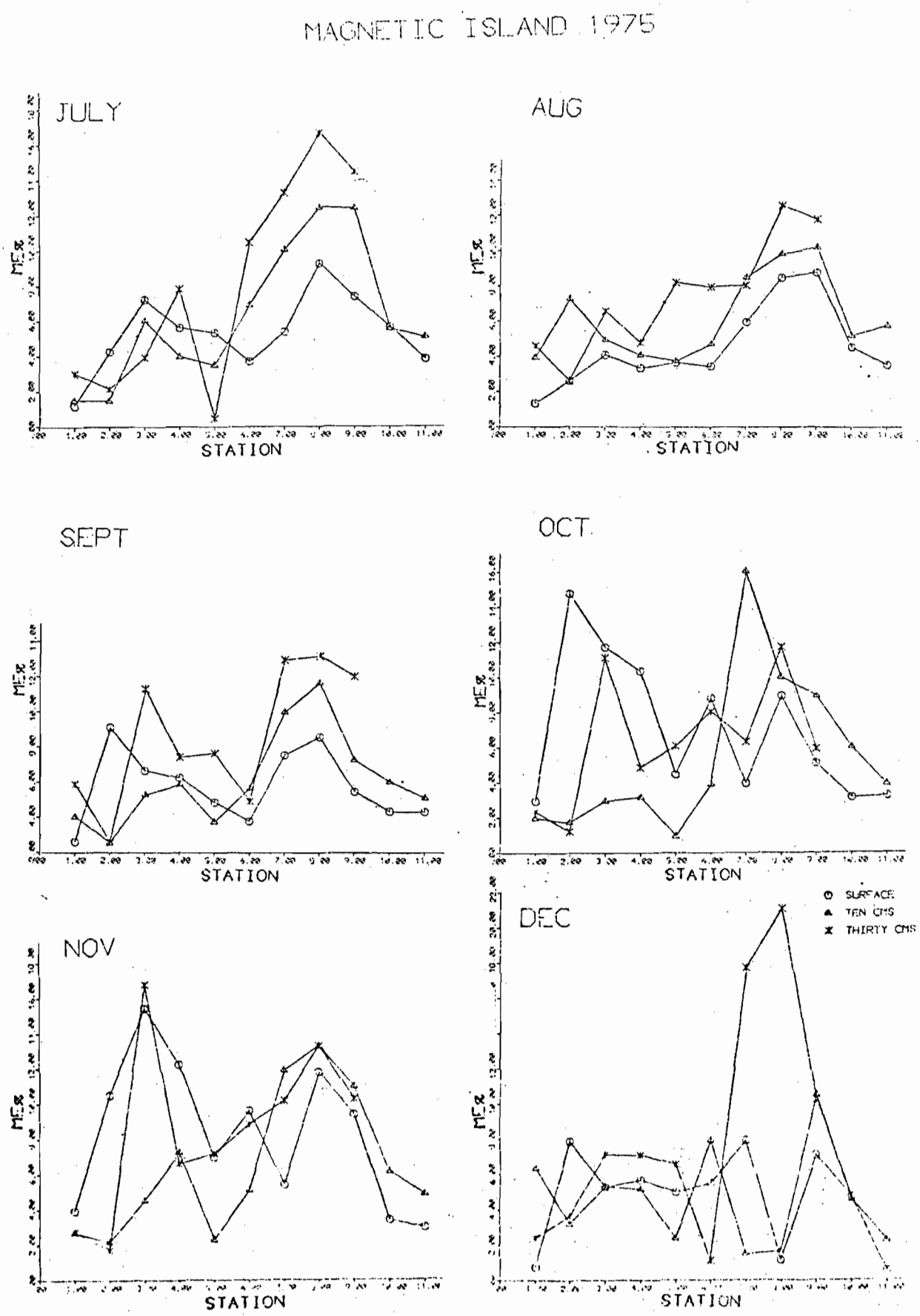


Figure 3.23 Soluble Sodium

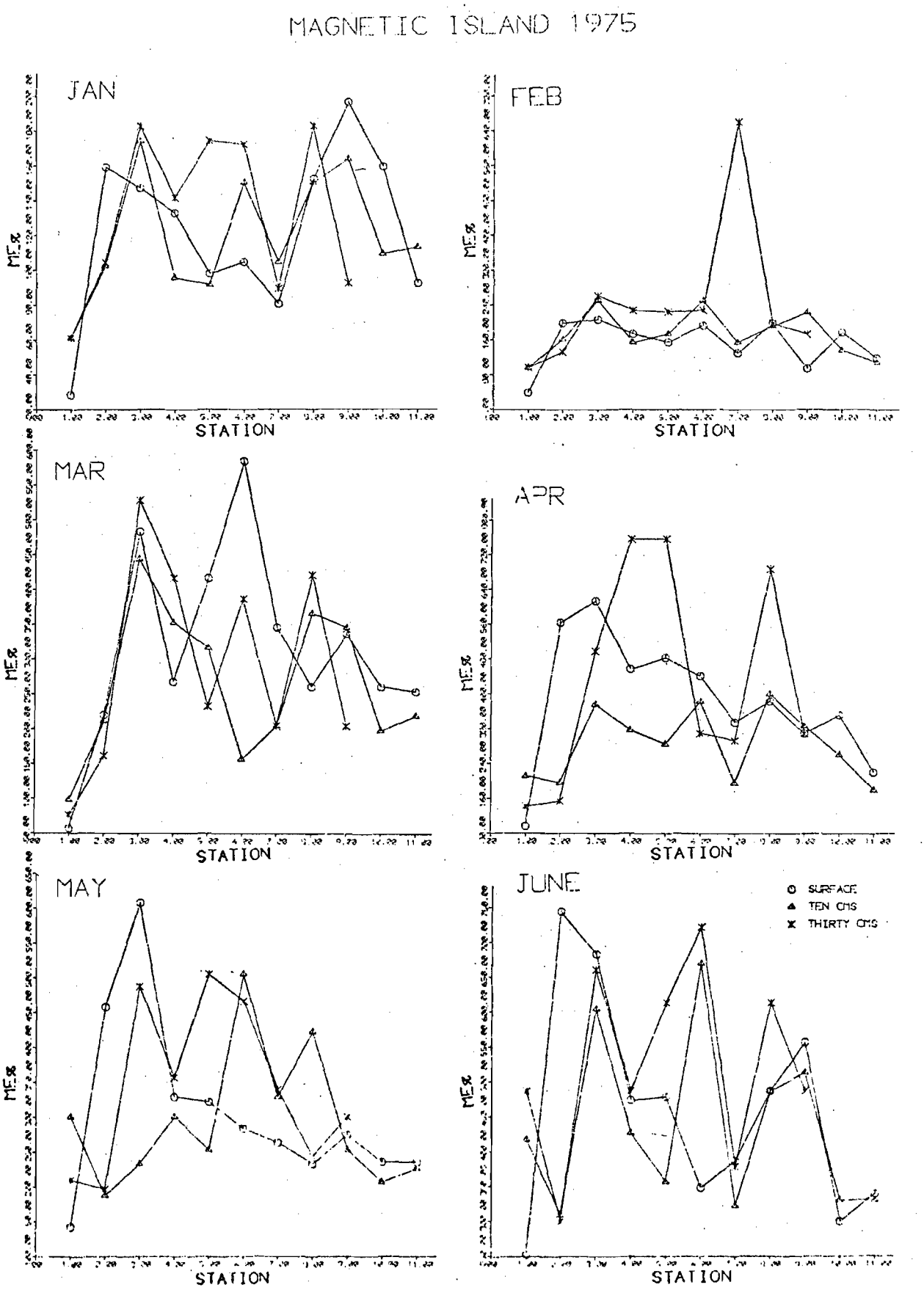


Figure 3.23 continued

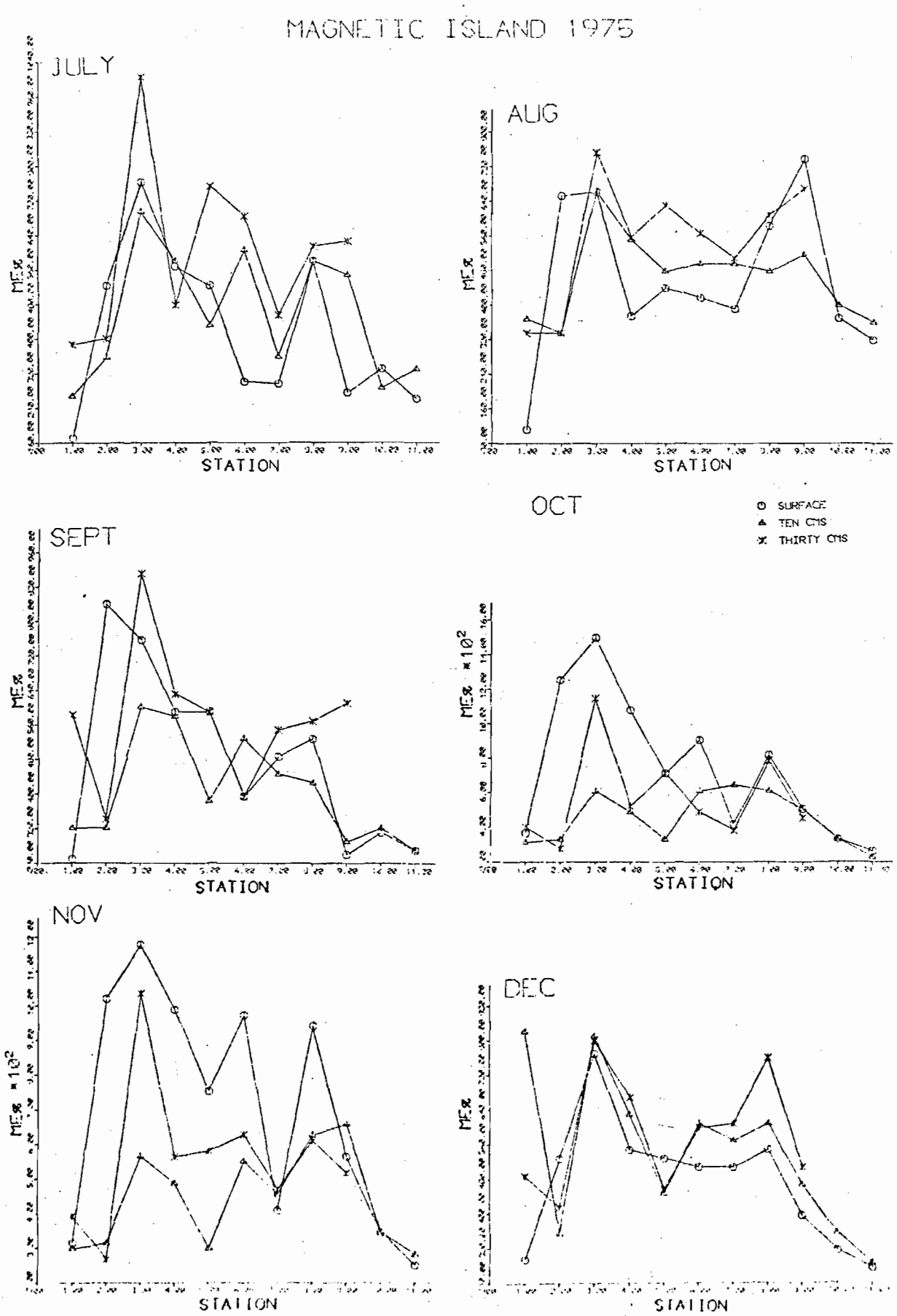


Figure 3.24 Soluble Potassium

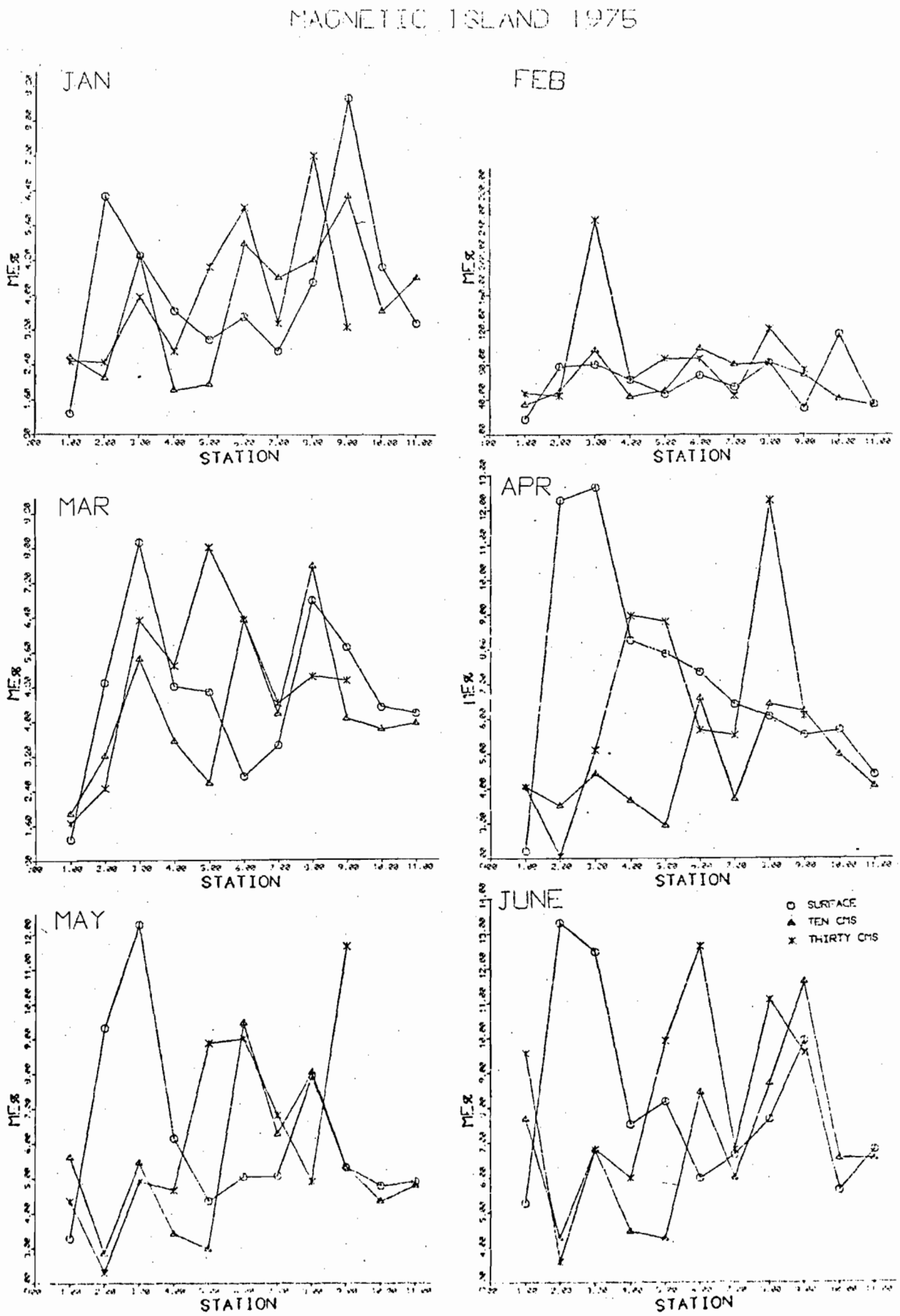


Figure 3.24 continued

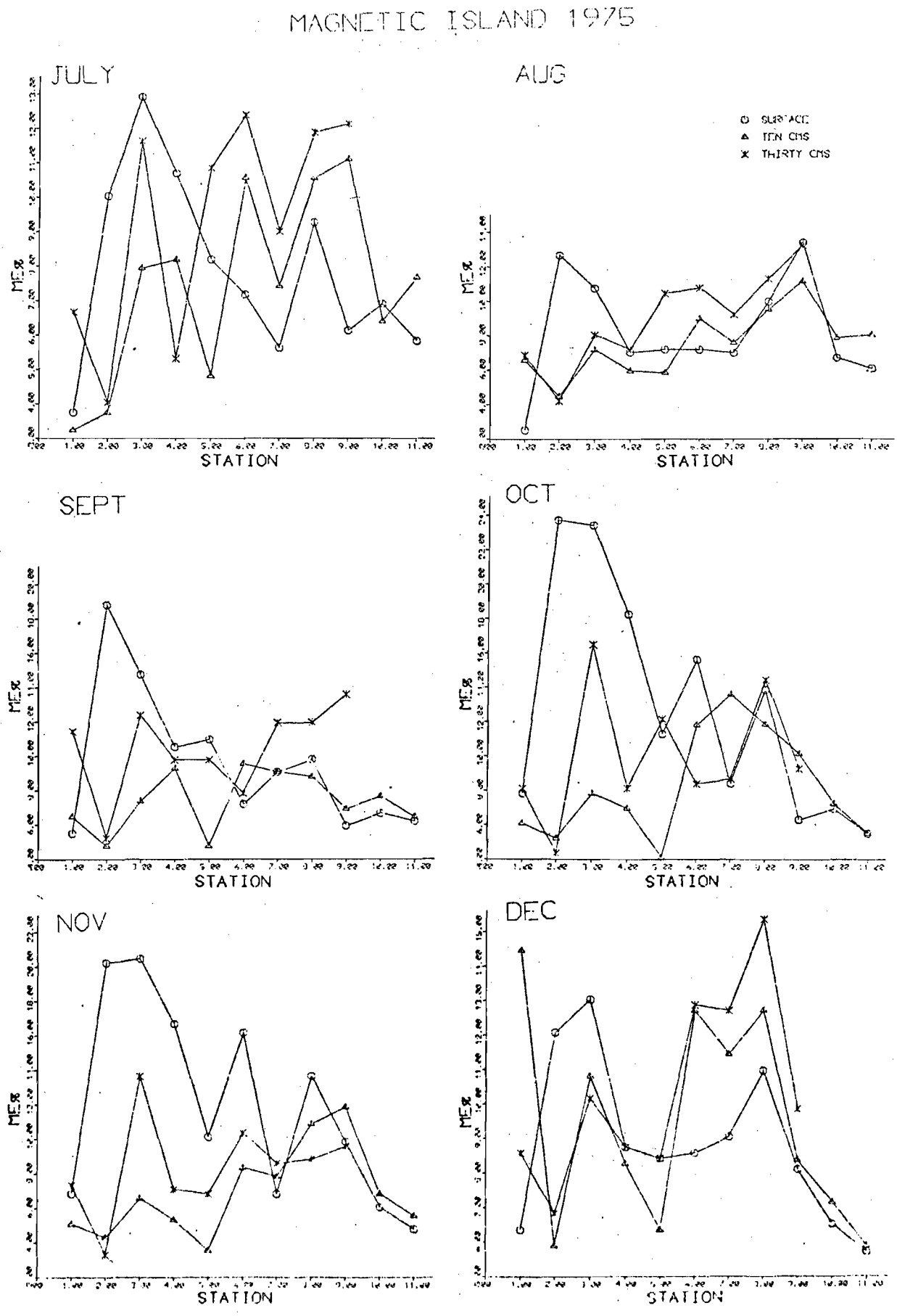


Figure 3.25 Soluble Calcium

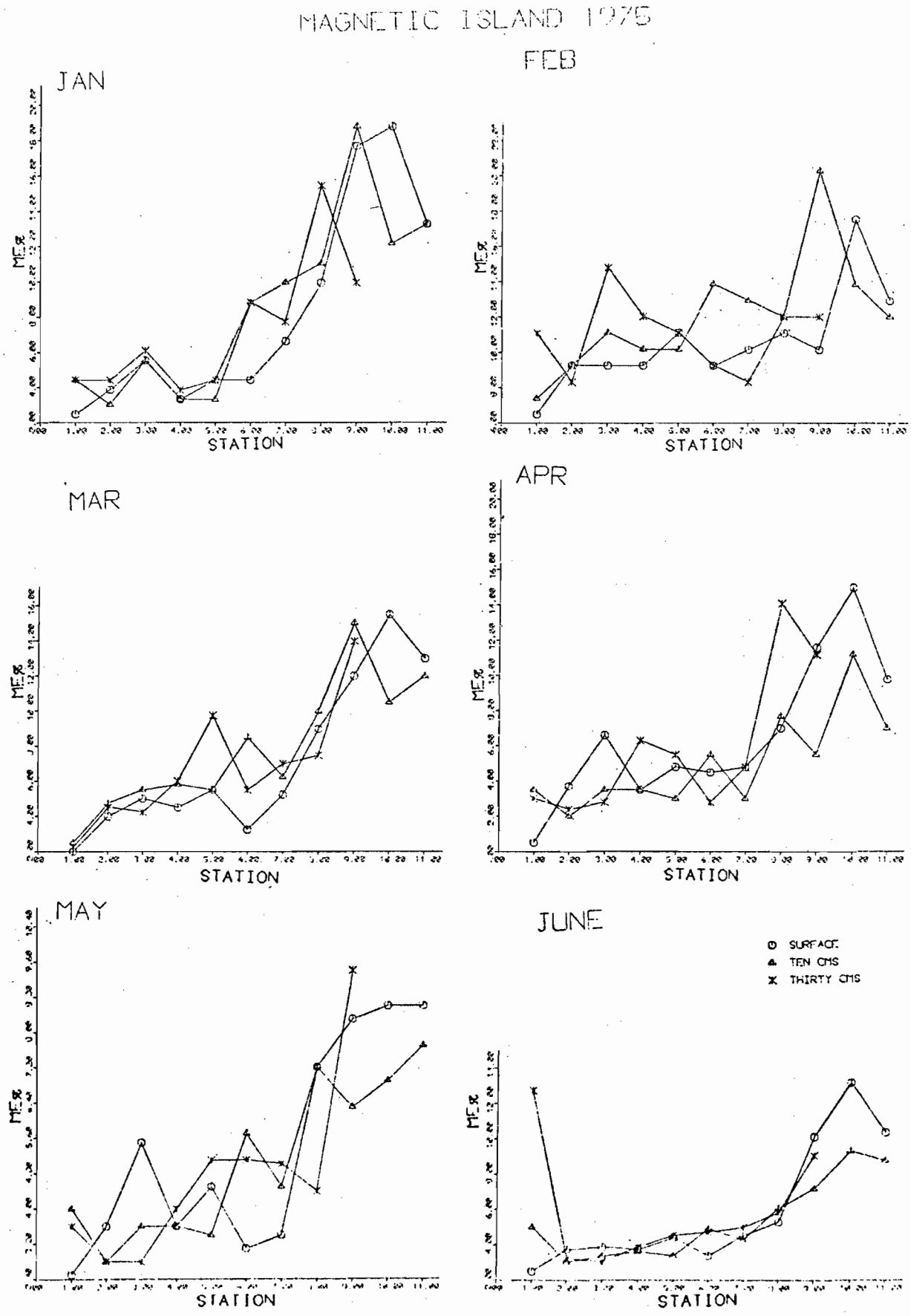


Figure 3.25 continued

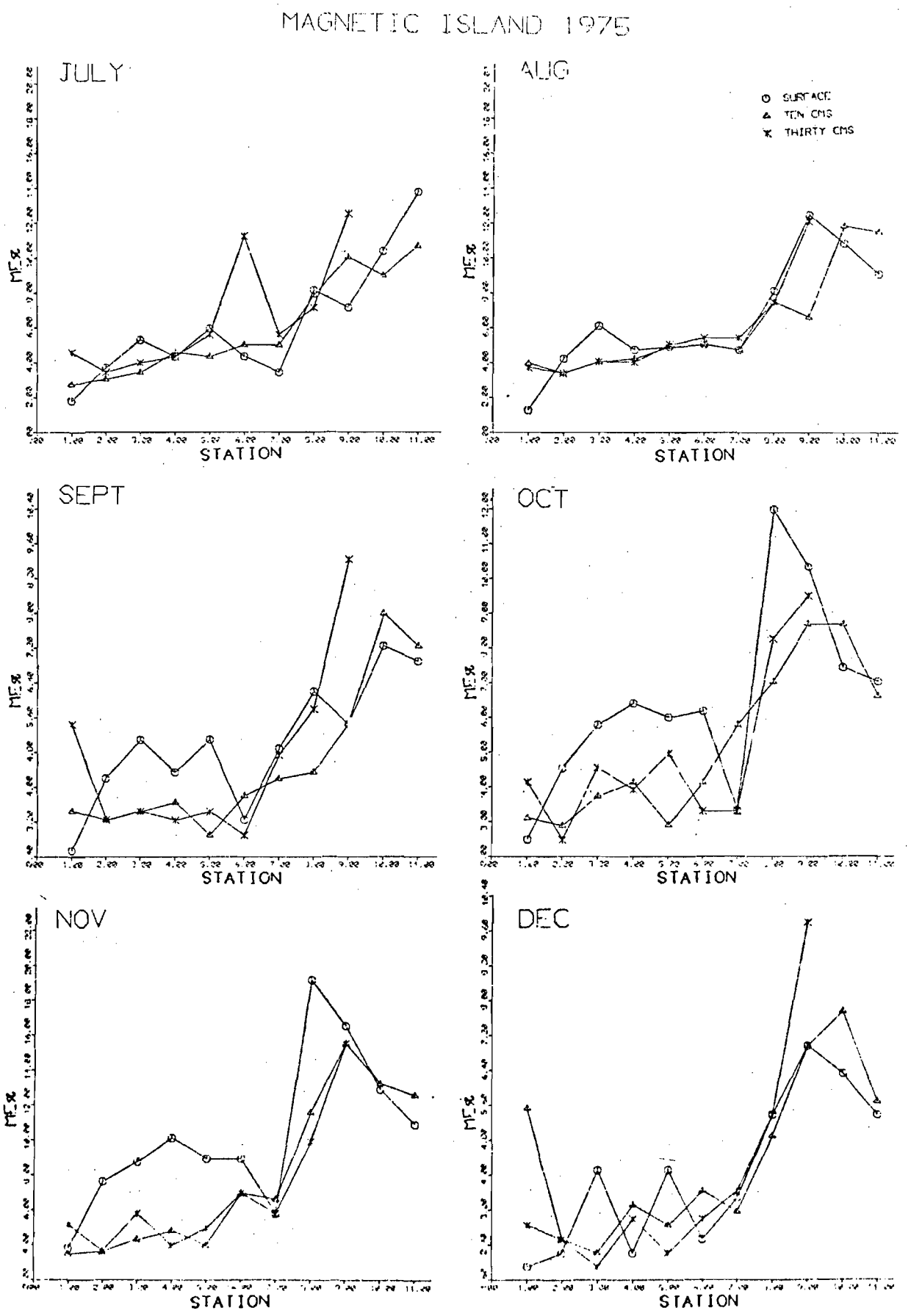


Figure 3.26 Soluble Magnesium

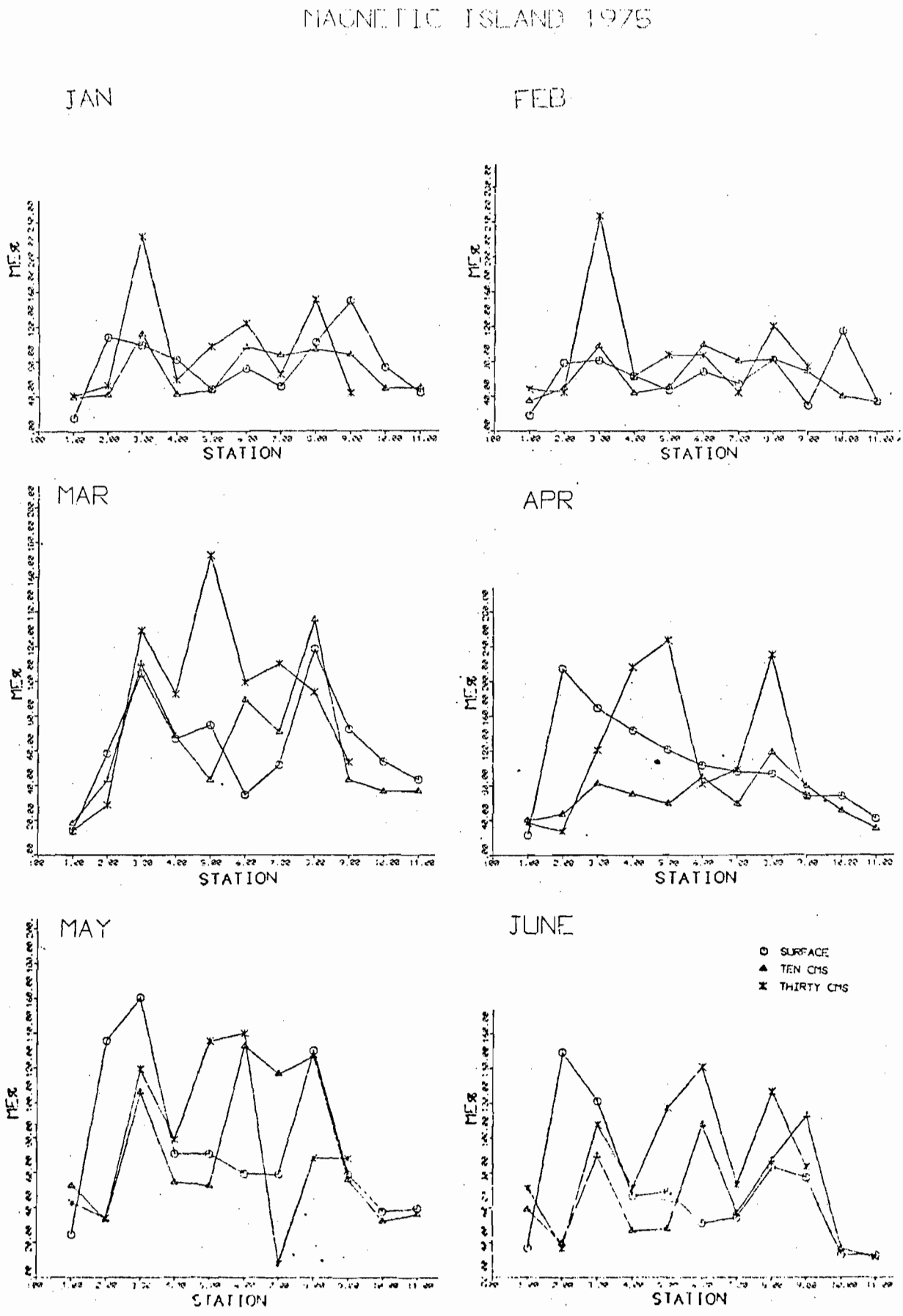


Figure 3.26 continued

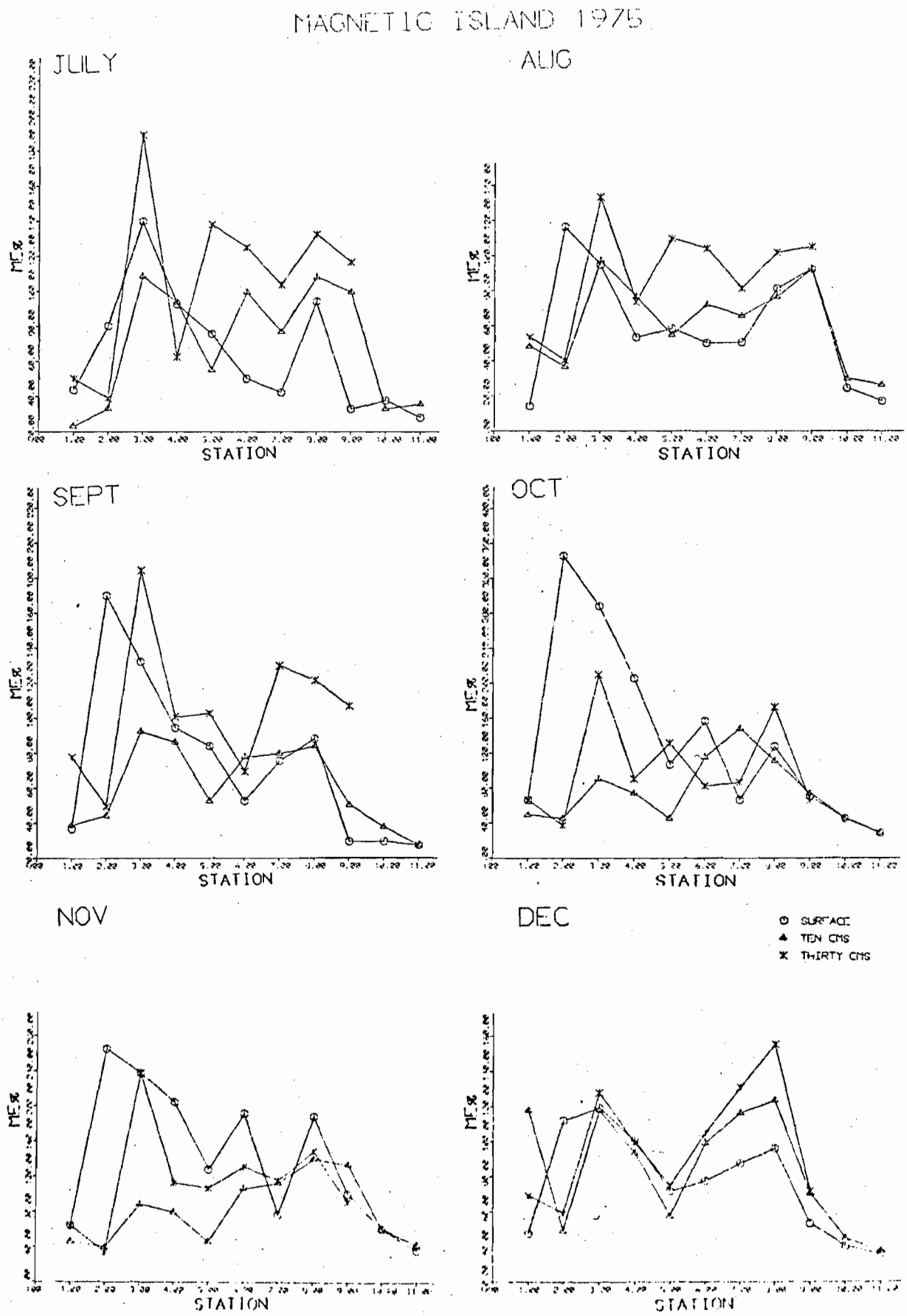


Figure 3.27 Exchangeable Sodium

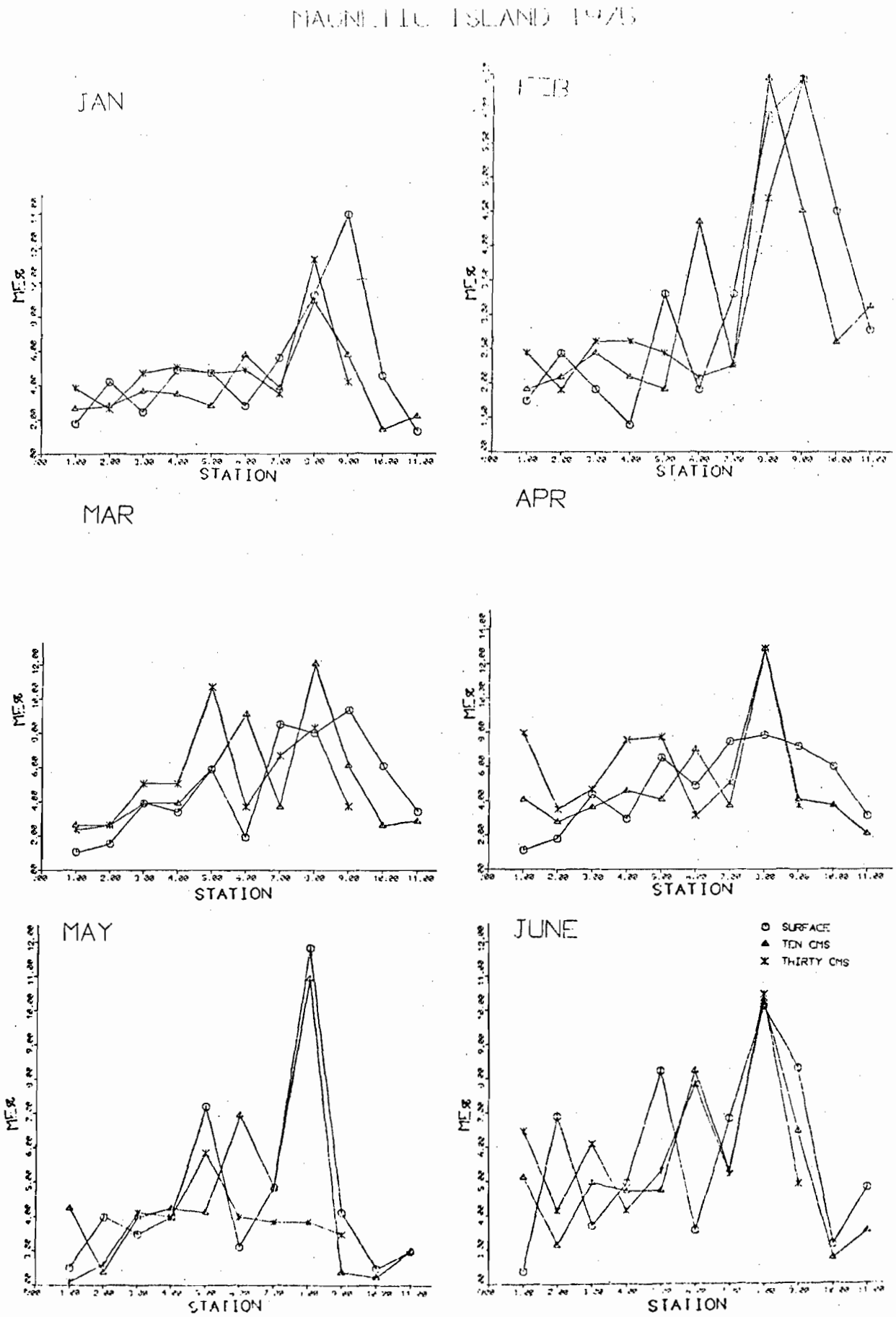


Figure 3.27 continued

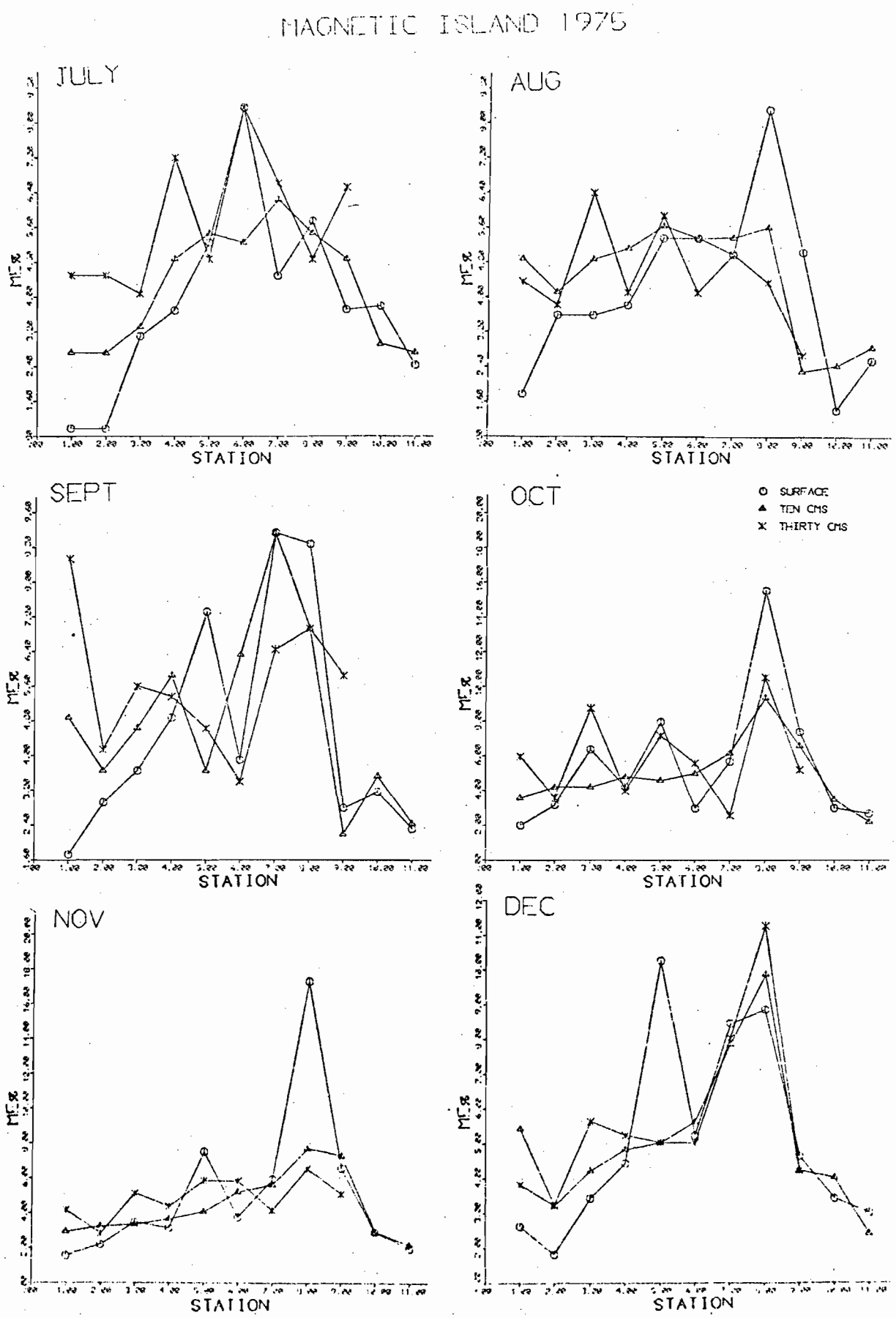


Figure 3.28 Exchangeable Potassium

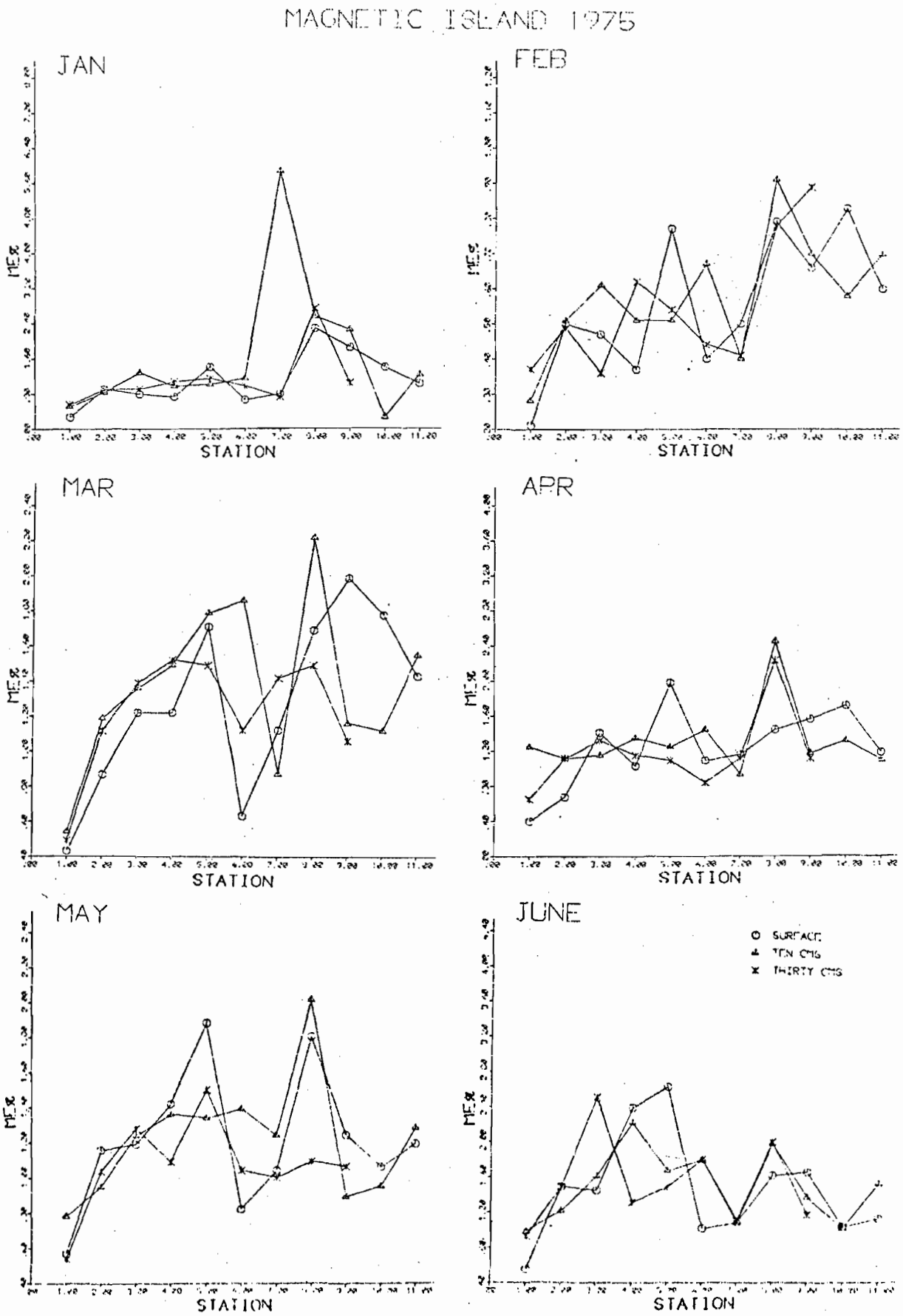


Figure 3.28 continued

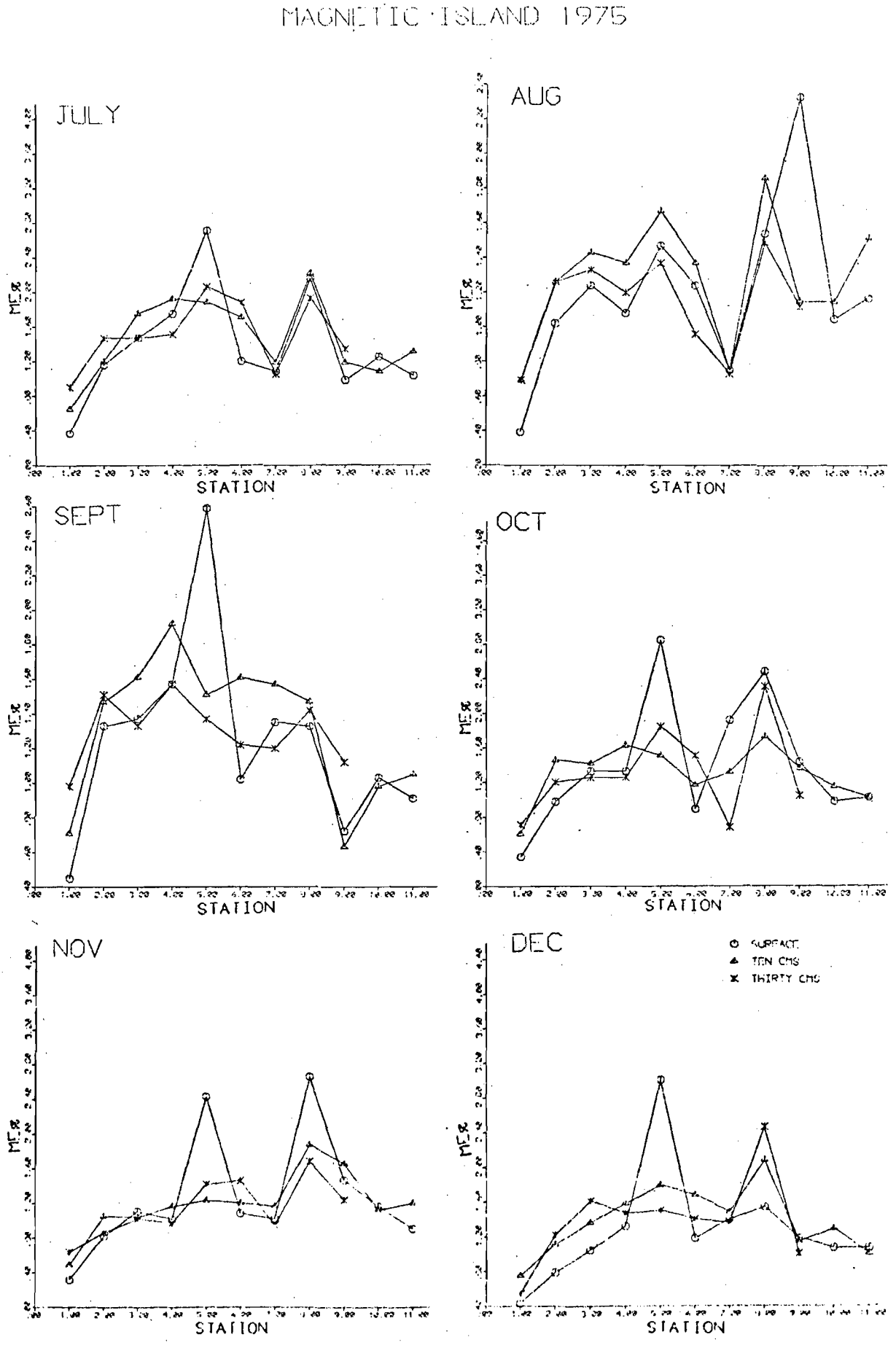


Figure 3.29 Exchangeable Calcium

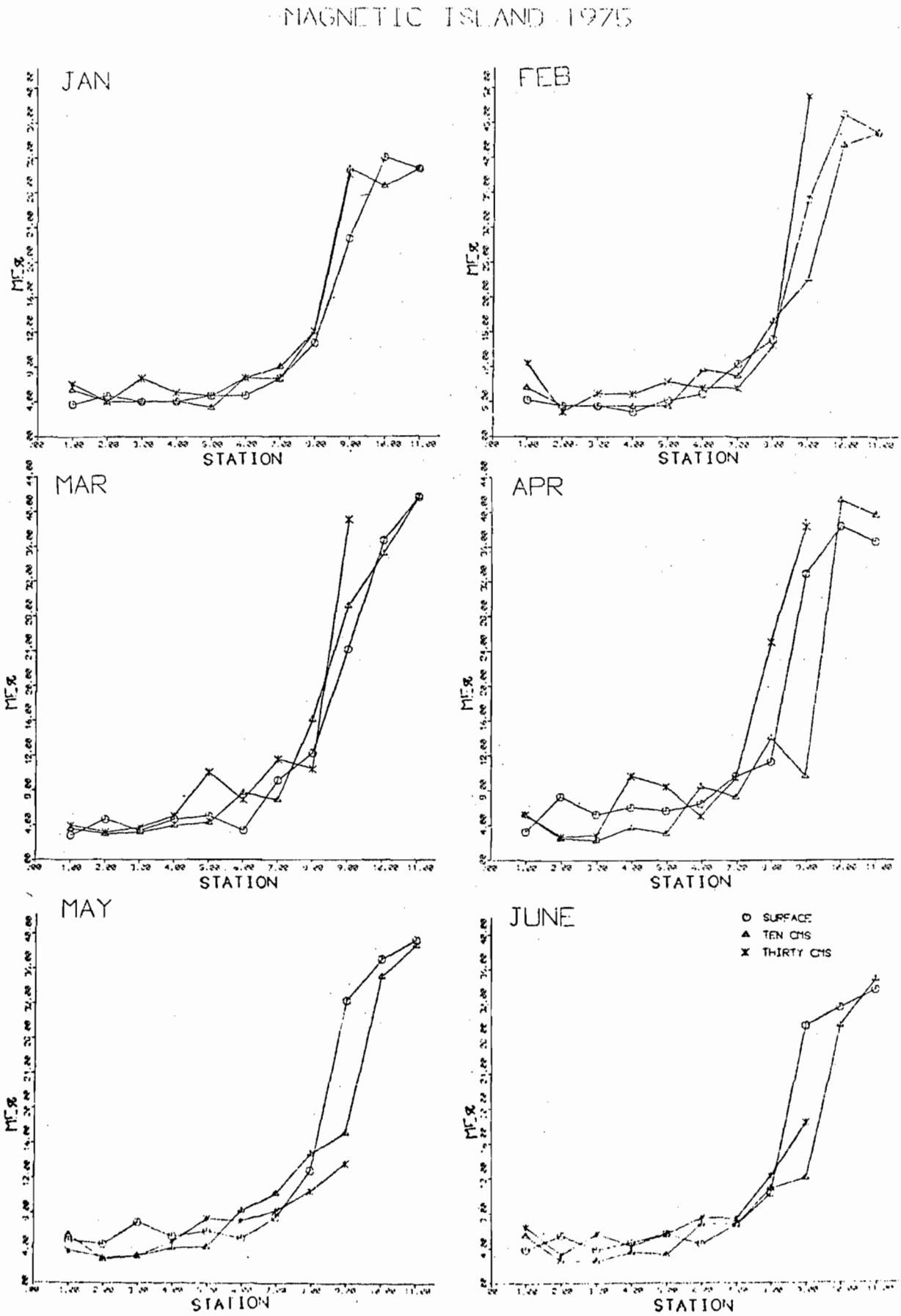


Figure 3.29 continued

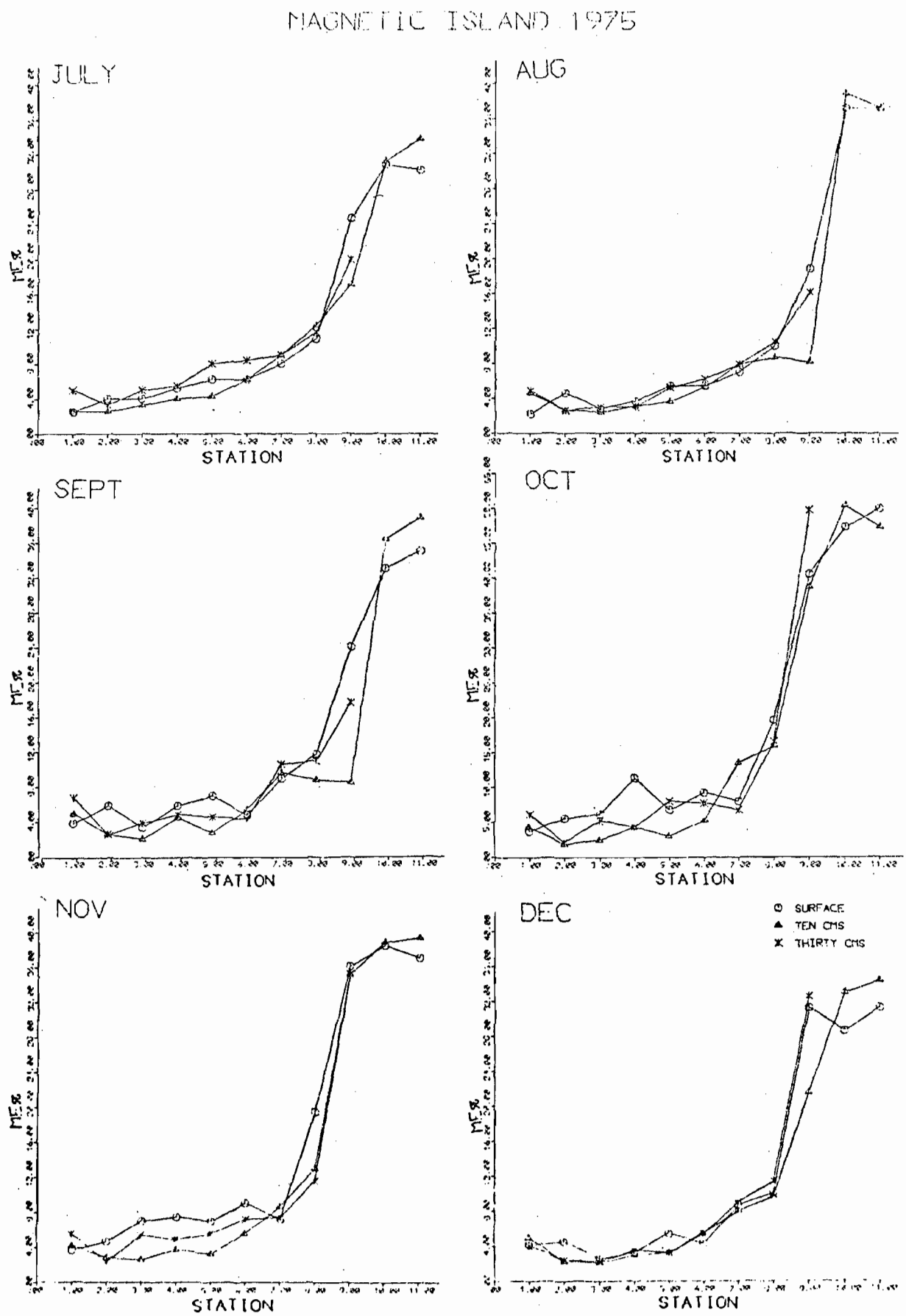


Figure 3.30 Exchangeable Magnesium

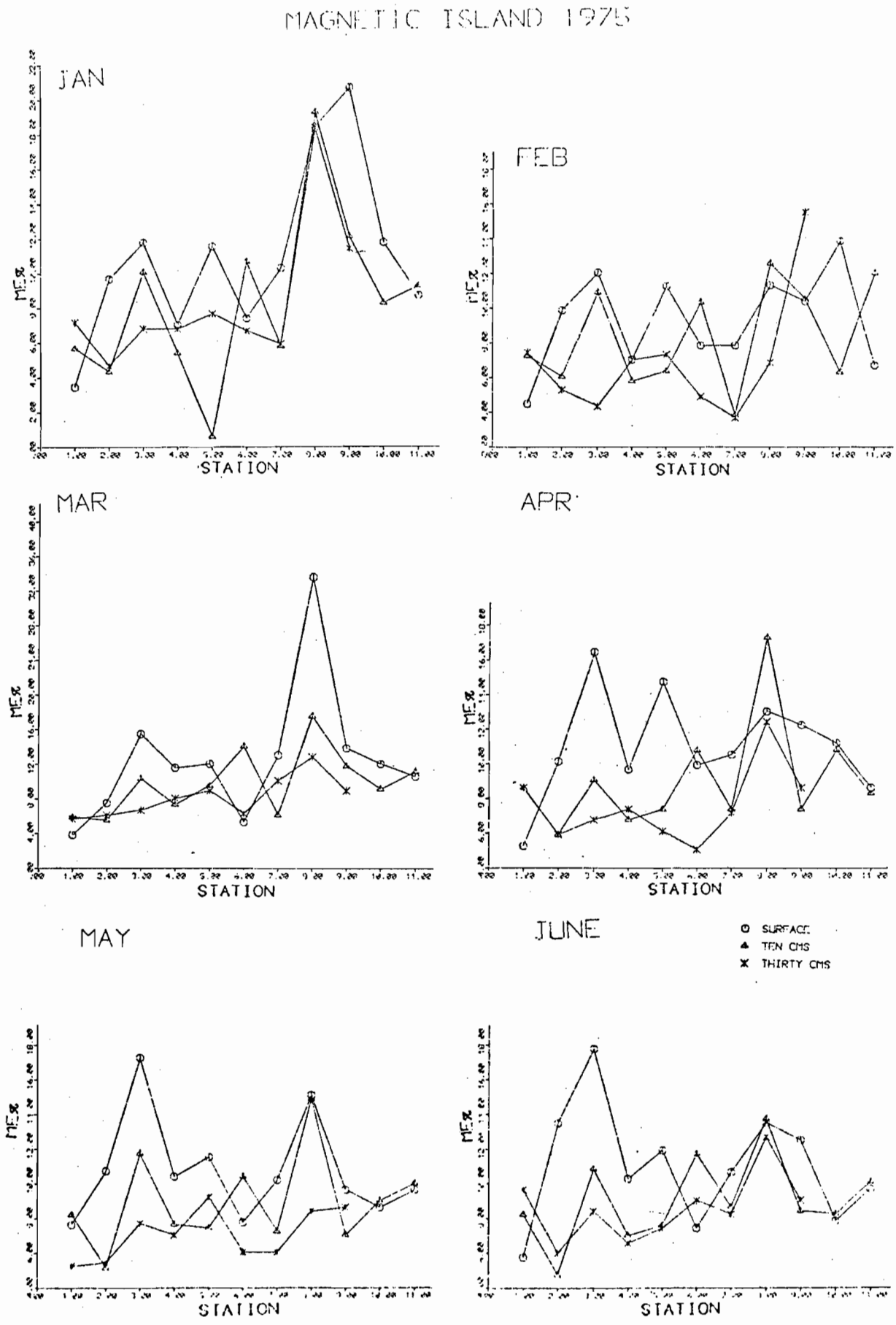
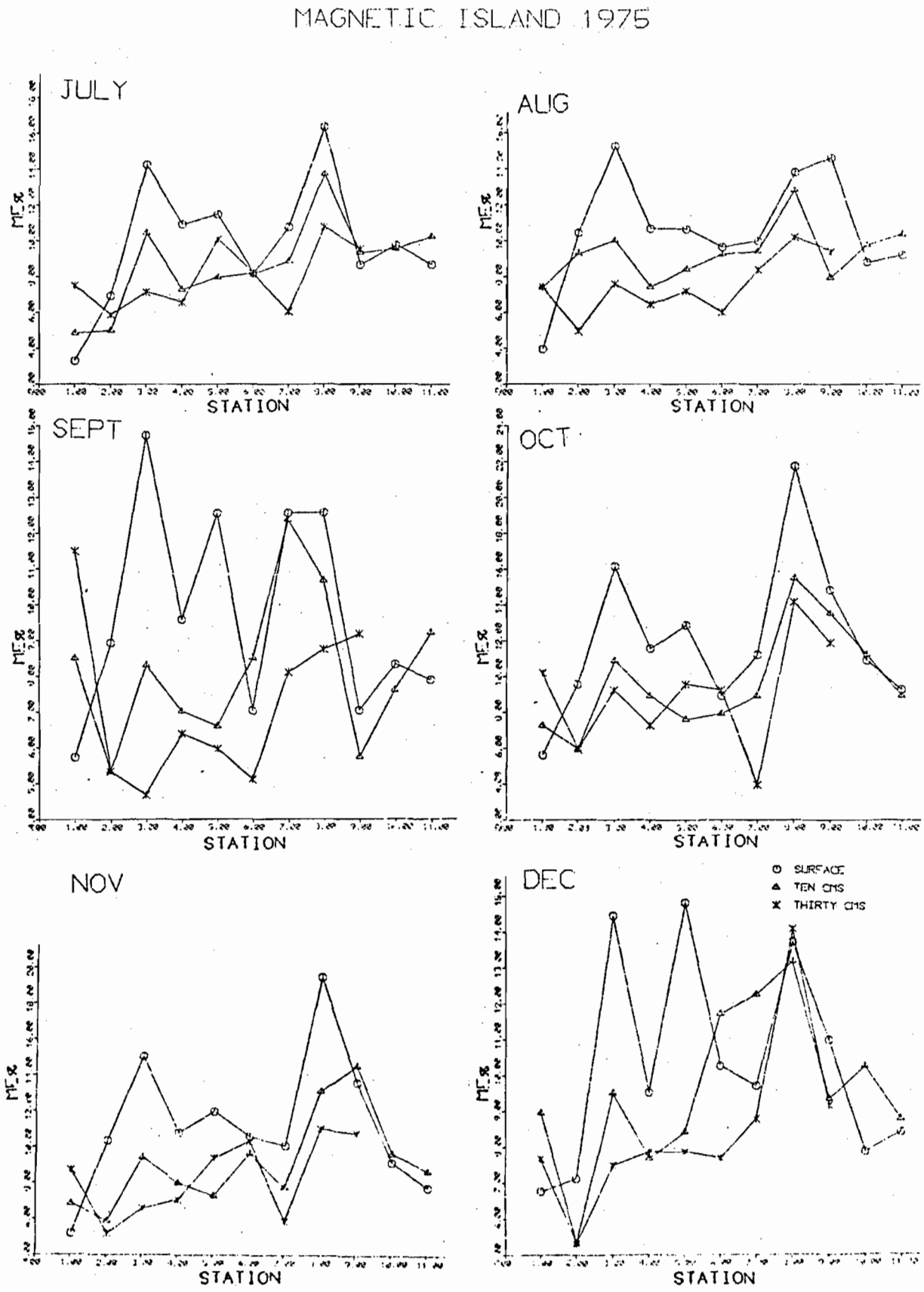


Figure 3.30 continued



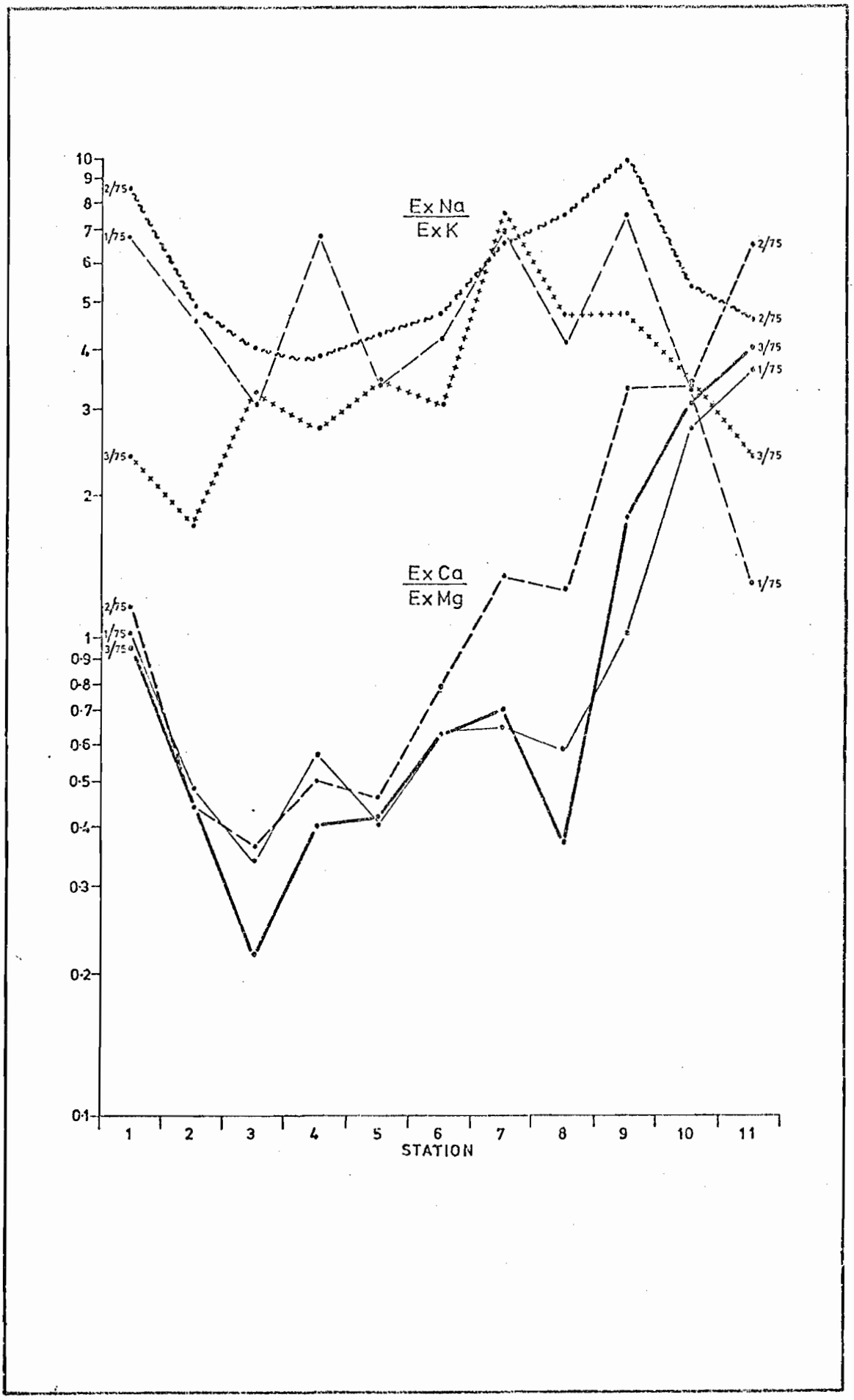


Figure 3.31 Ratio data ExNa/ExK; ExCa/ExMg for Magnetic Island.

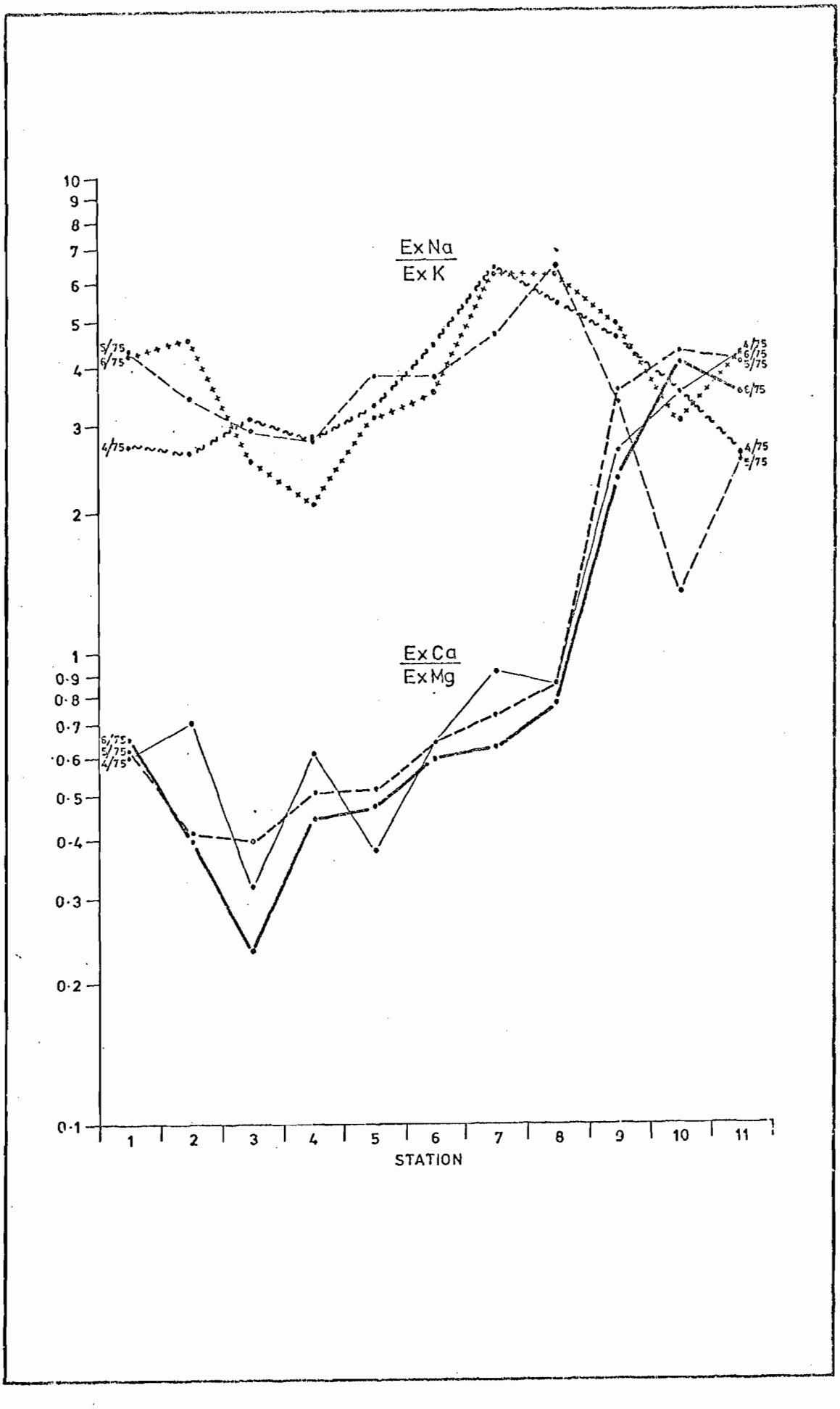


Figure 3.31 continued.

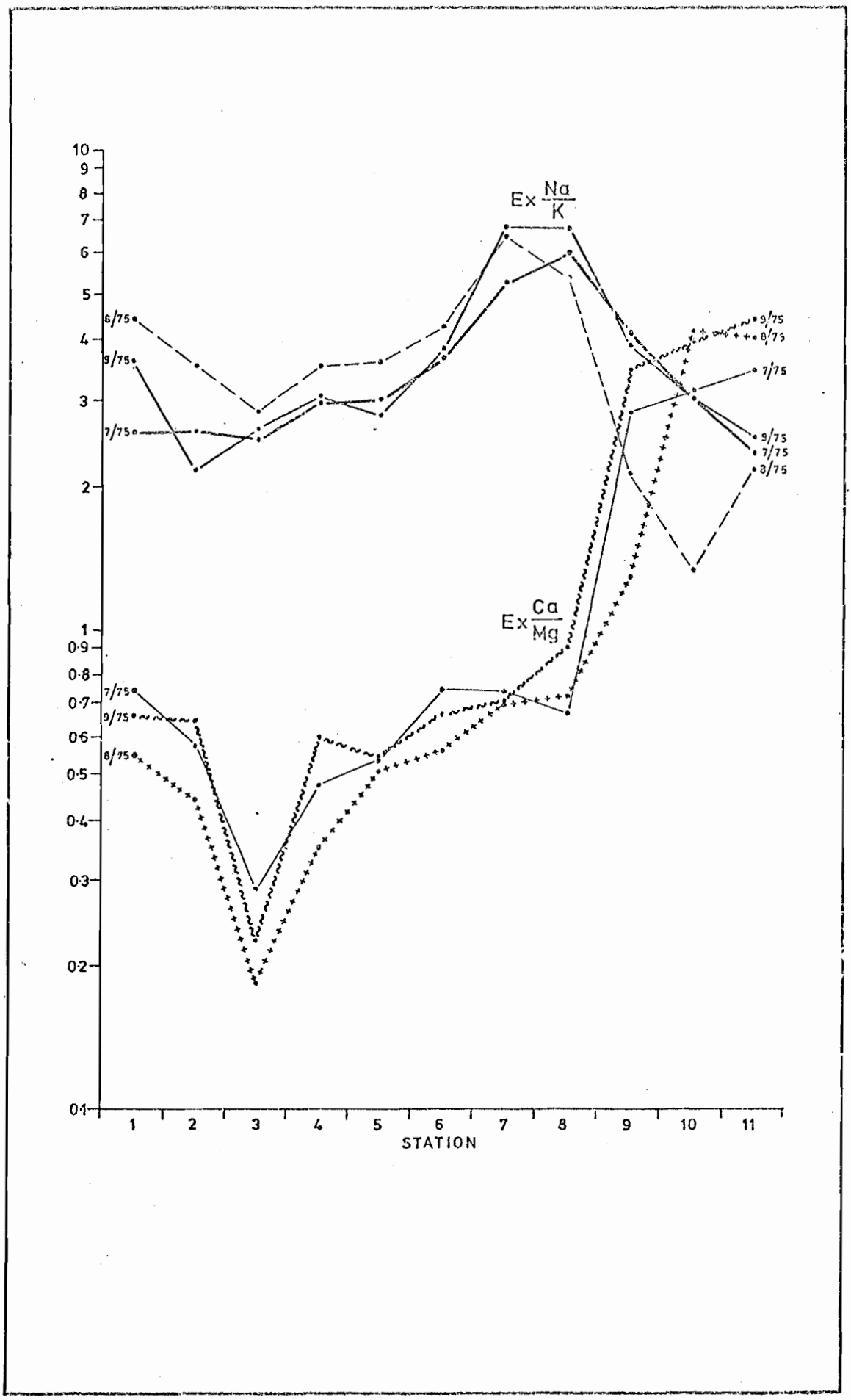


Figure 3.31 continued

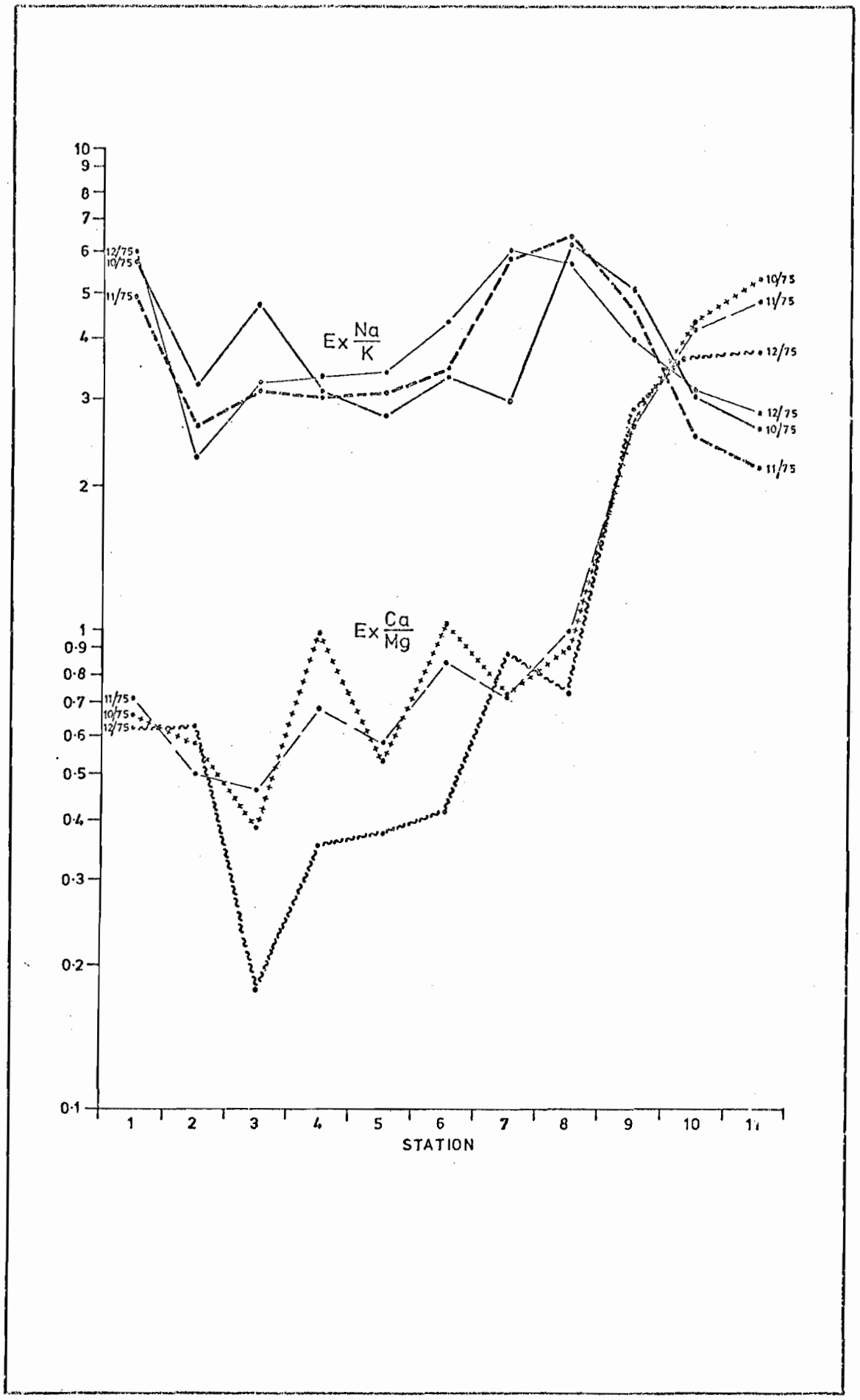
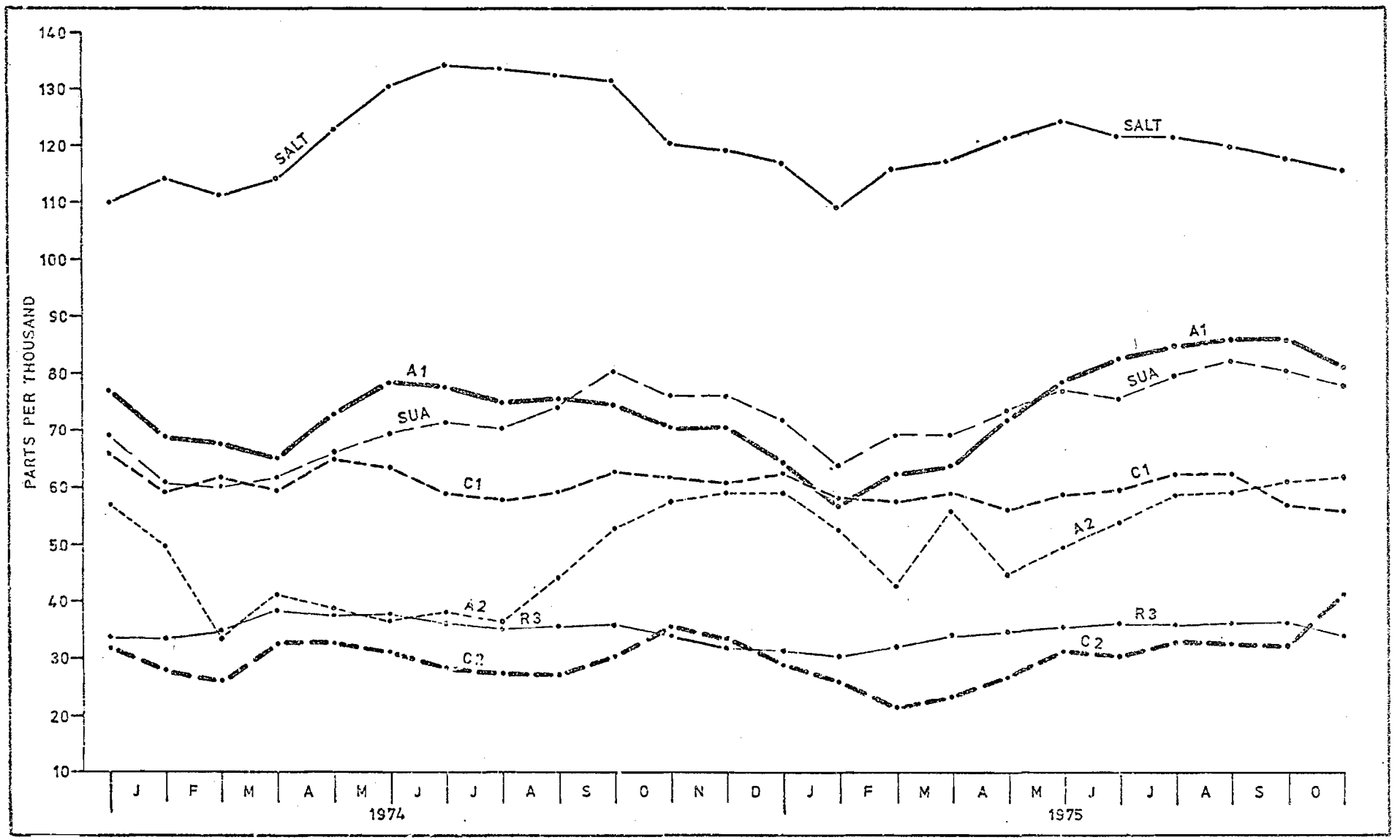


Figure 3 . 31 continued

Figure 3.32



Four monthly running means ground water salinity.

AVERAGE CHEMICAL DATA (± ONE STANDARD DEVIATION)

FOR THE SAUNDERS BEACH STATIONS

Figure 3.33 to Figure 3.38

Average chemical data (± one standard deviation) for the Saunders Beach stations.

A - all data

B - surface layer

C - 10 centimetre layer

D - 30 centimetre layer

Figure 3.33 Saunders Beach pH (KCl) and pH (H_2O).

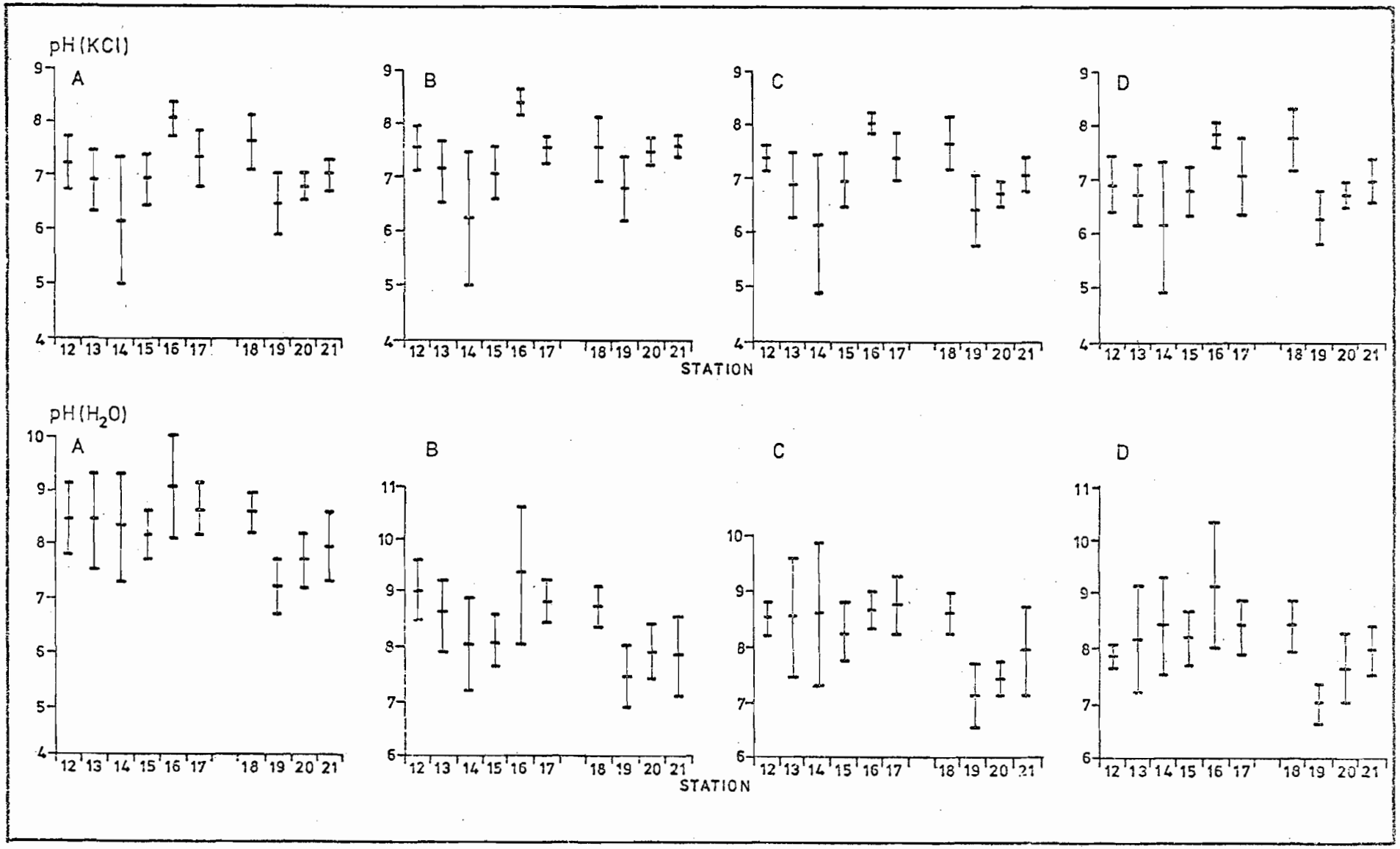


Figure 3.34 Saunders Beach WSCl and $WSSO_4$.

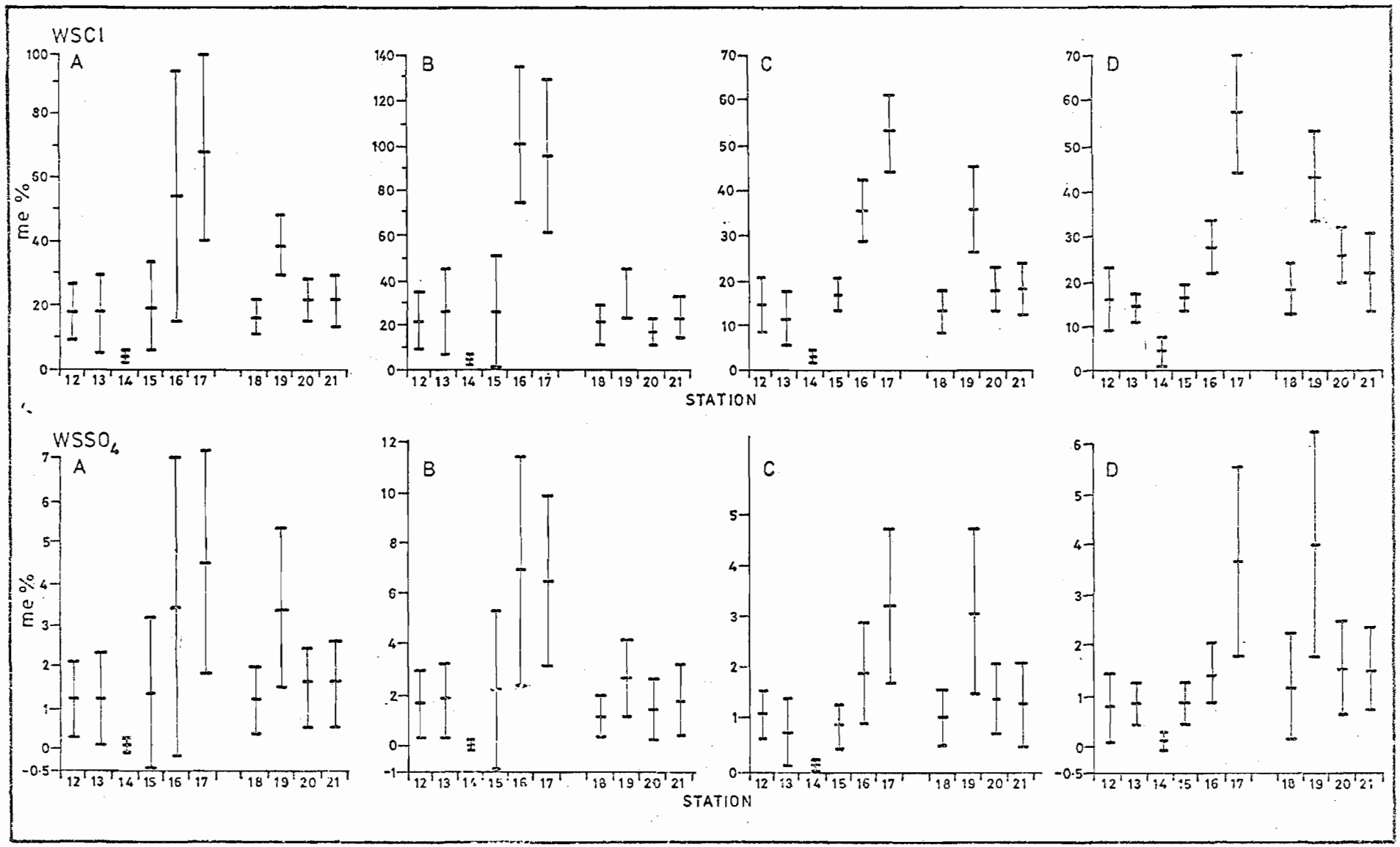


Figure 3.35 Saunders Beach Sol Na and Sol K.

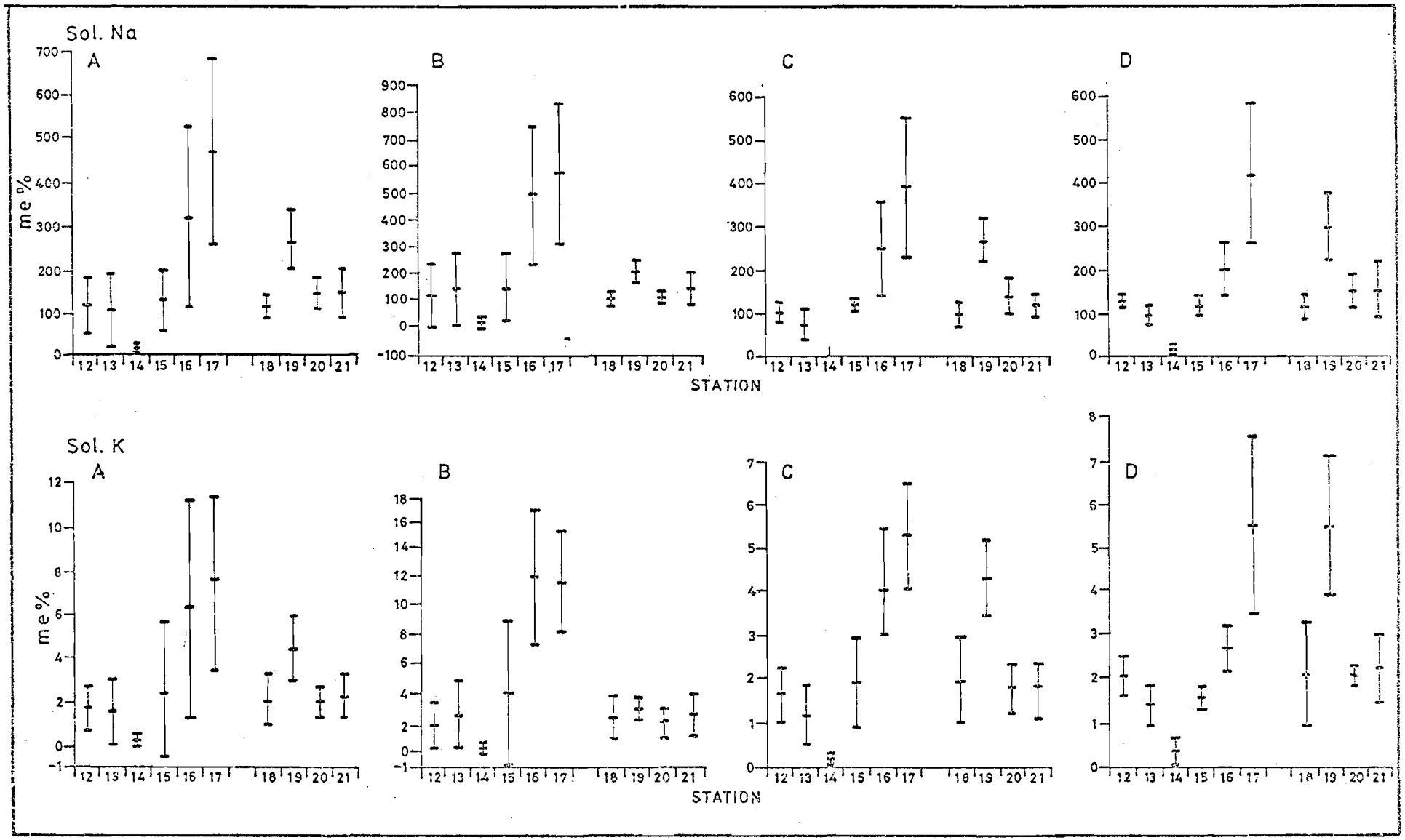


Figure 3.36 Saunders Beach Sol Ca and Sol Mg.

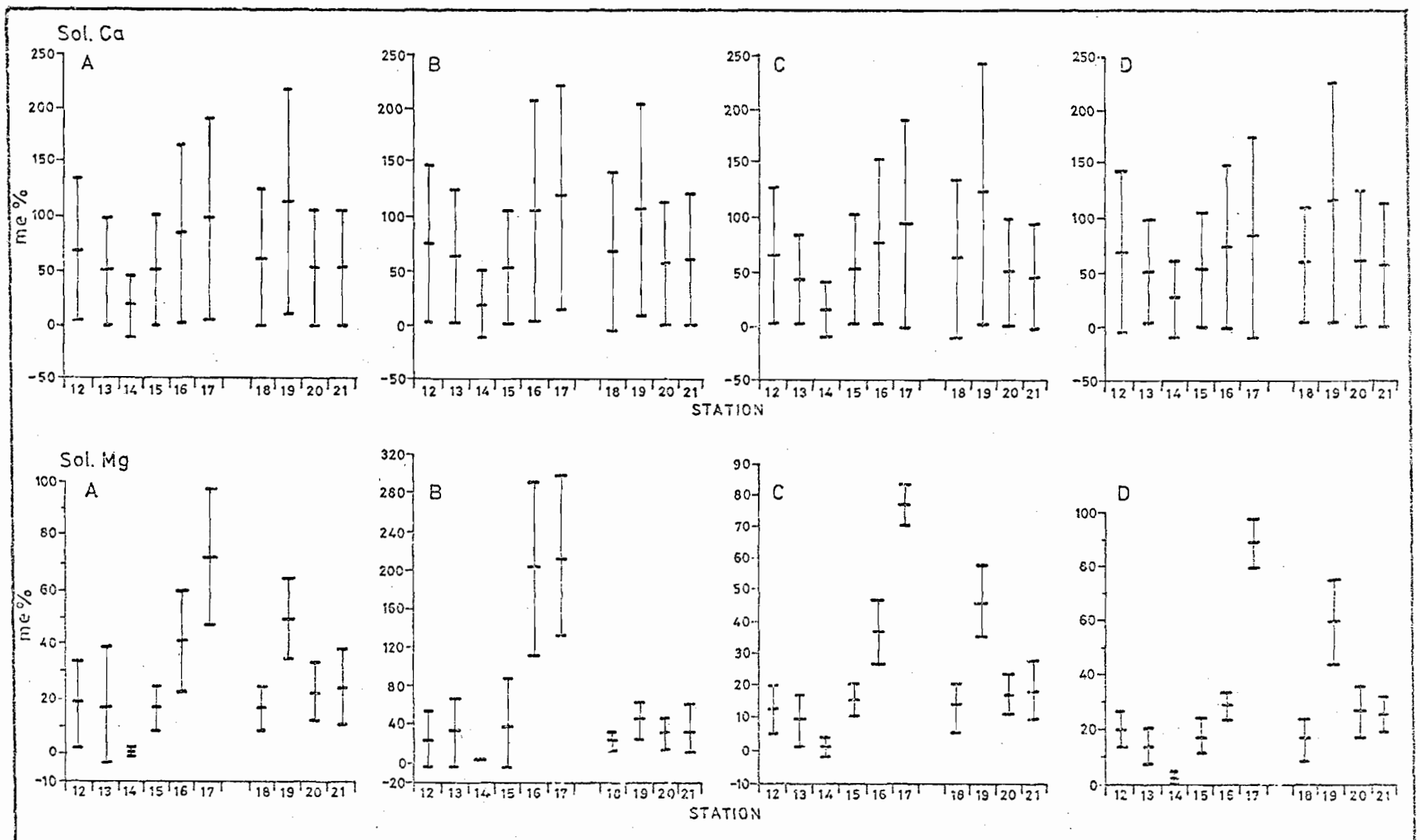


Figure 3.37 Saunders Beach Ex Na and Ex K.

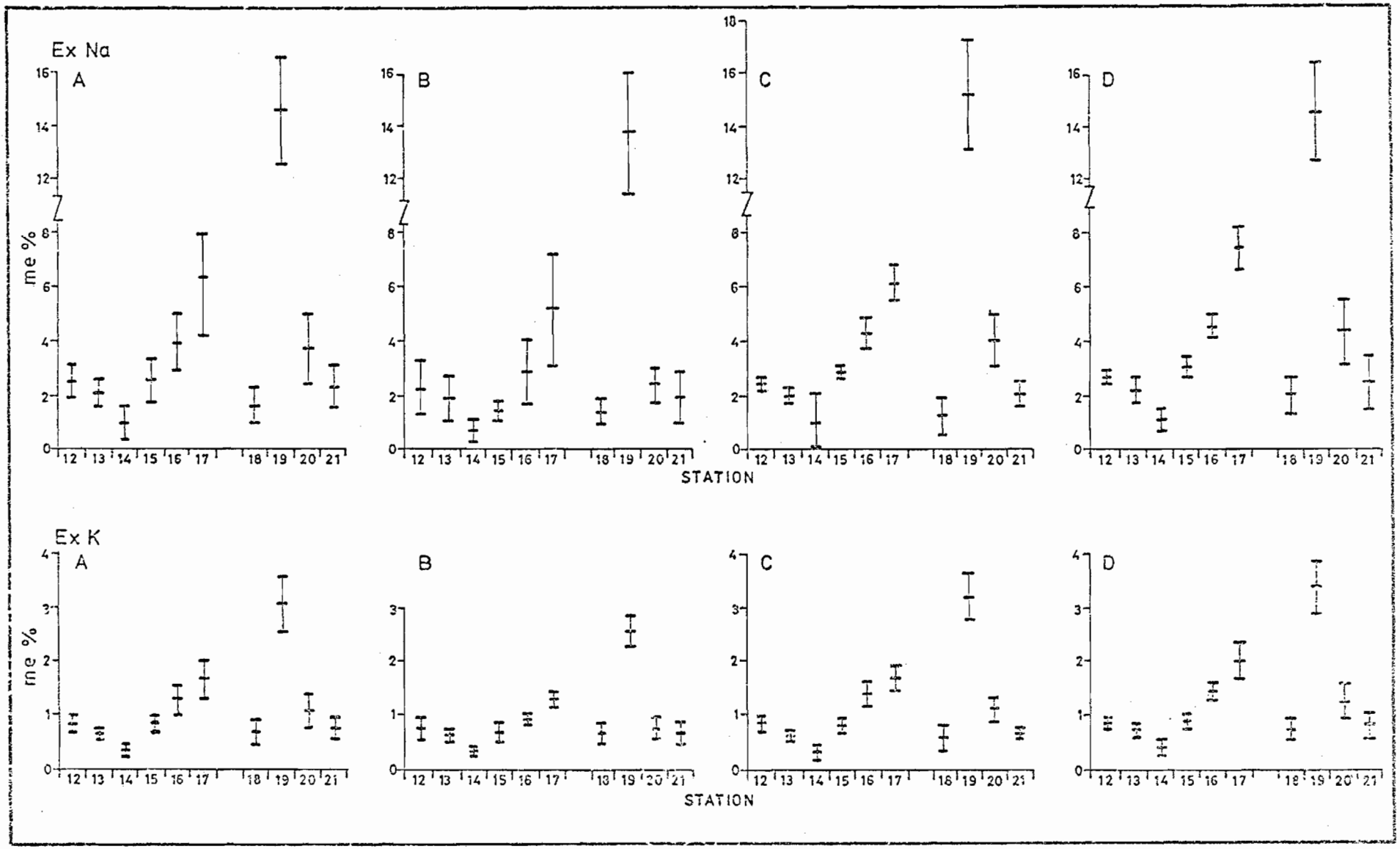
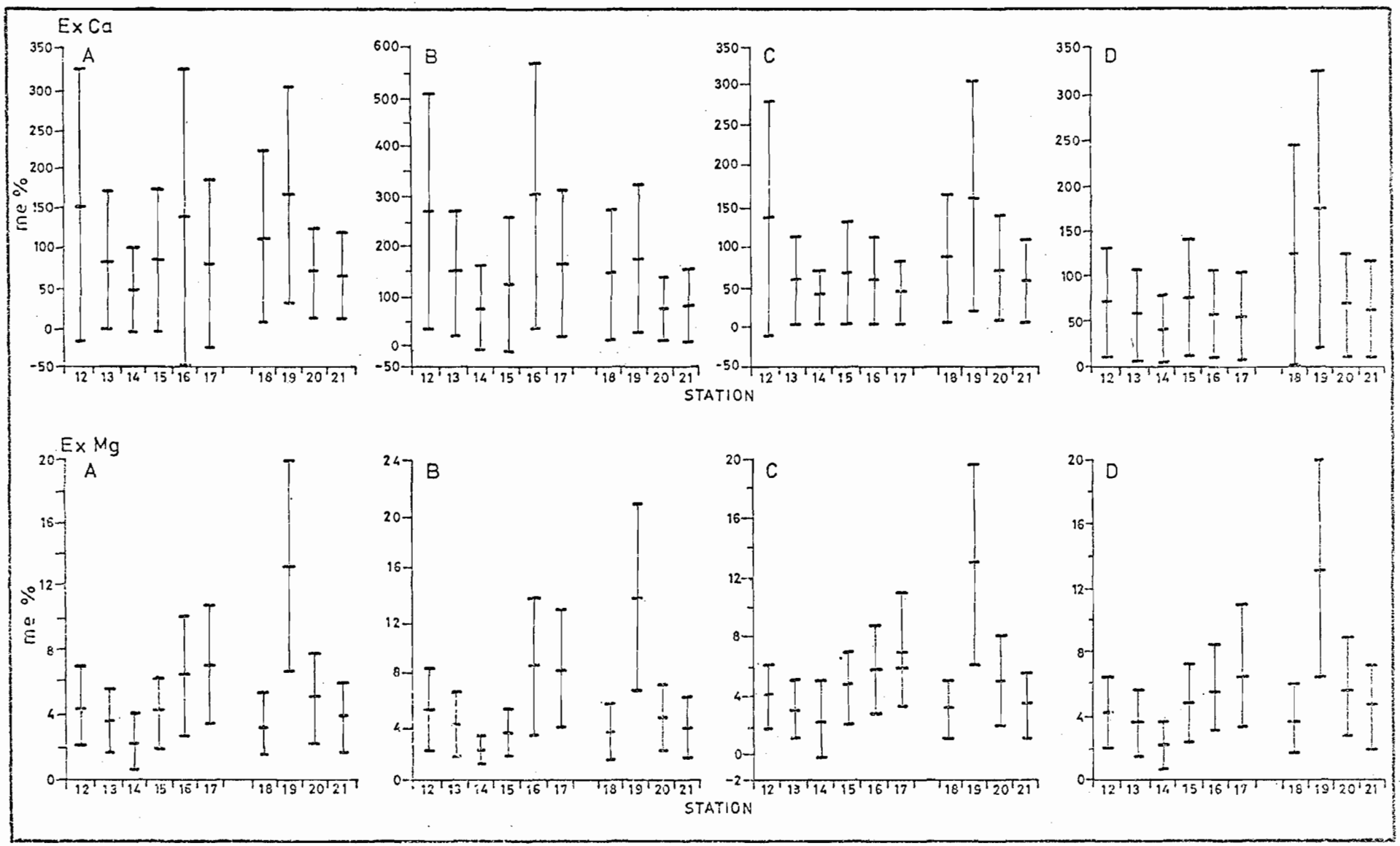


Figure 3.38 Saunders Beach Ex Ca and Ex Mg.



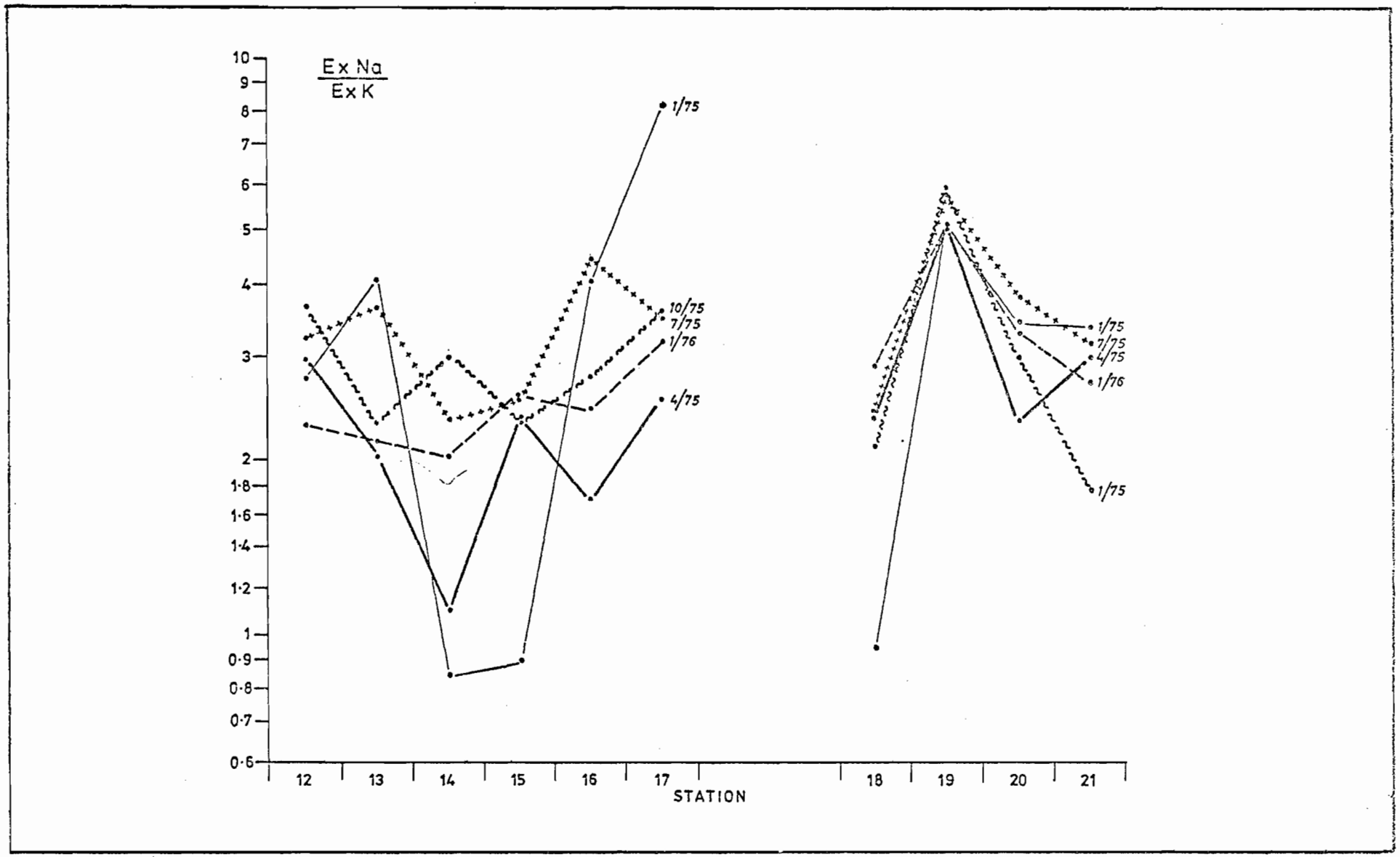


Figure 3.39 Ratio data ExNa/ExK; ExCa/ExMg for Saunders Beach.

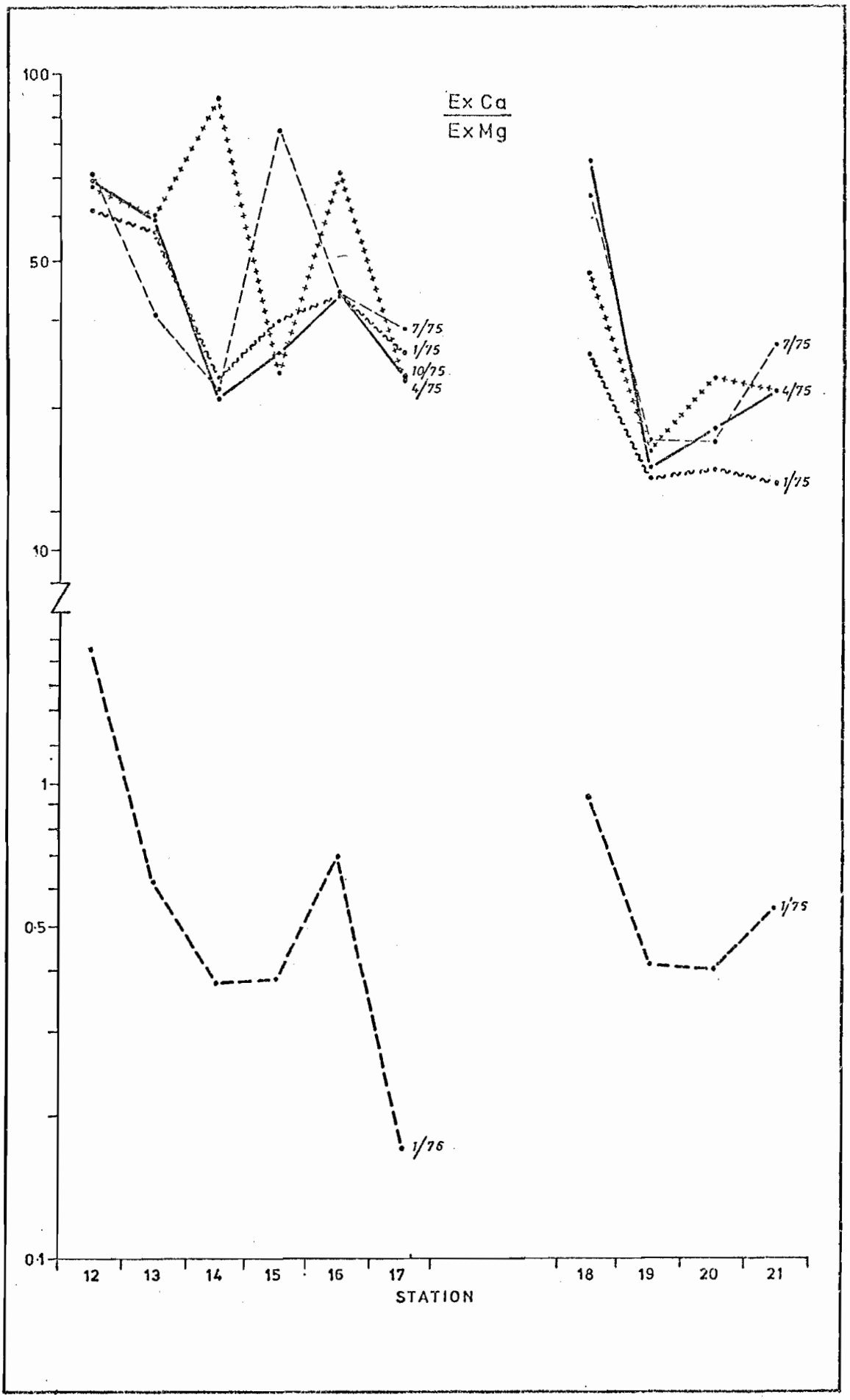


Figure 3.39 continued.

SAUNDERS BEACH CHEMICAL DATA THROUGH TIME BY STATION

Figure 3.40 pH in KCl solution

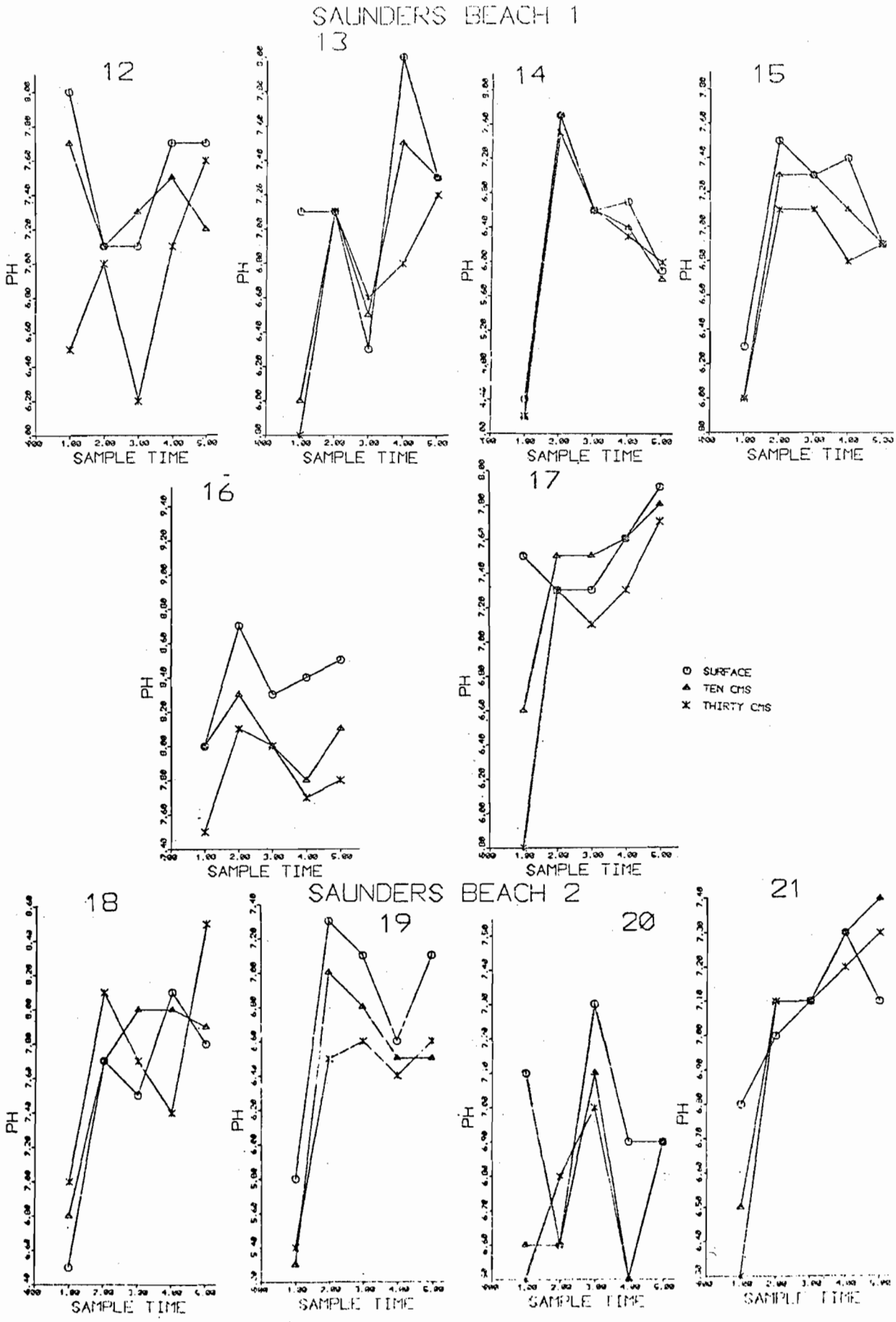


Figure 3.41 pH in distilled solution

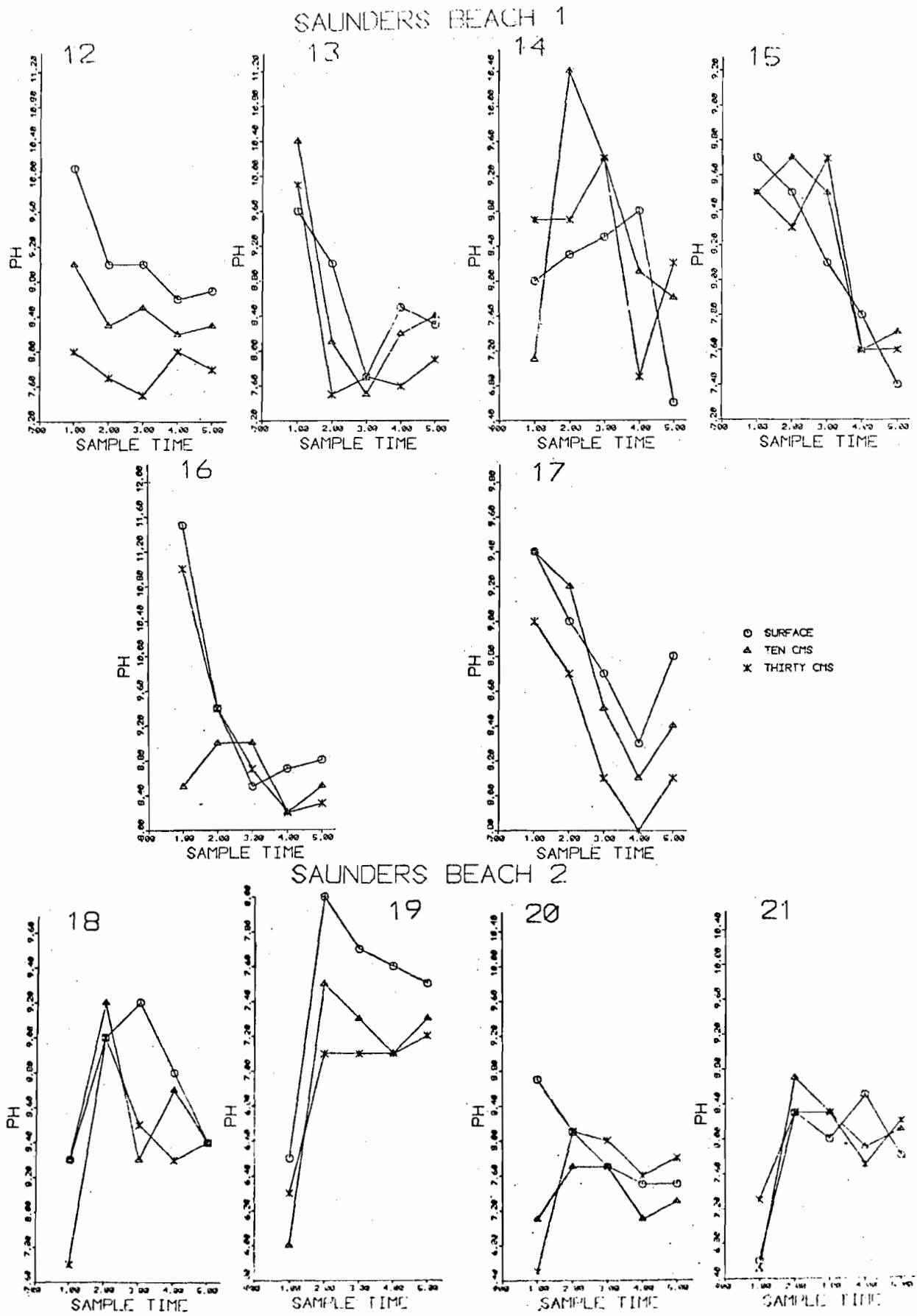


Figure 3.42 Water soluble Chloride

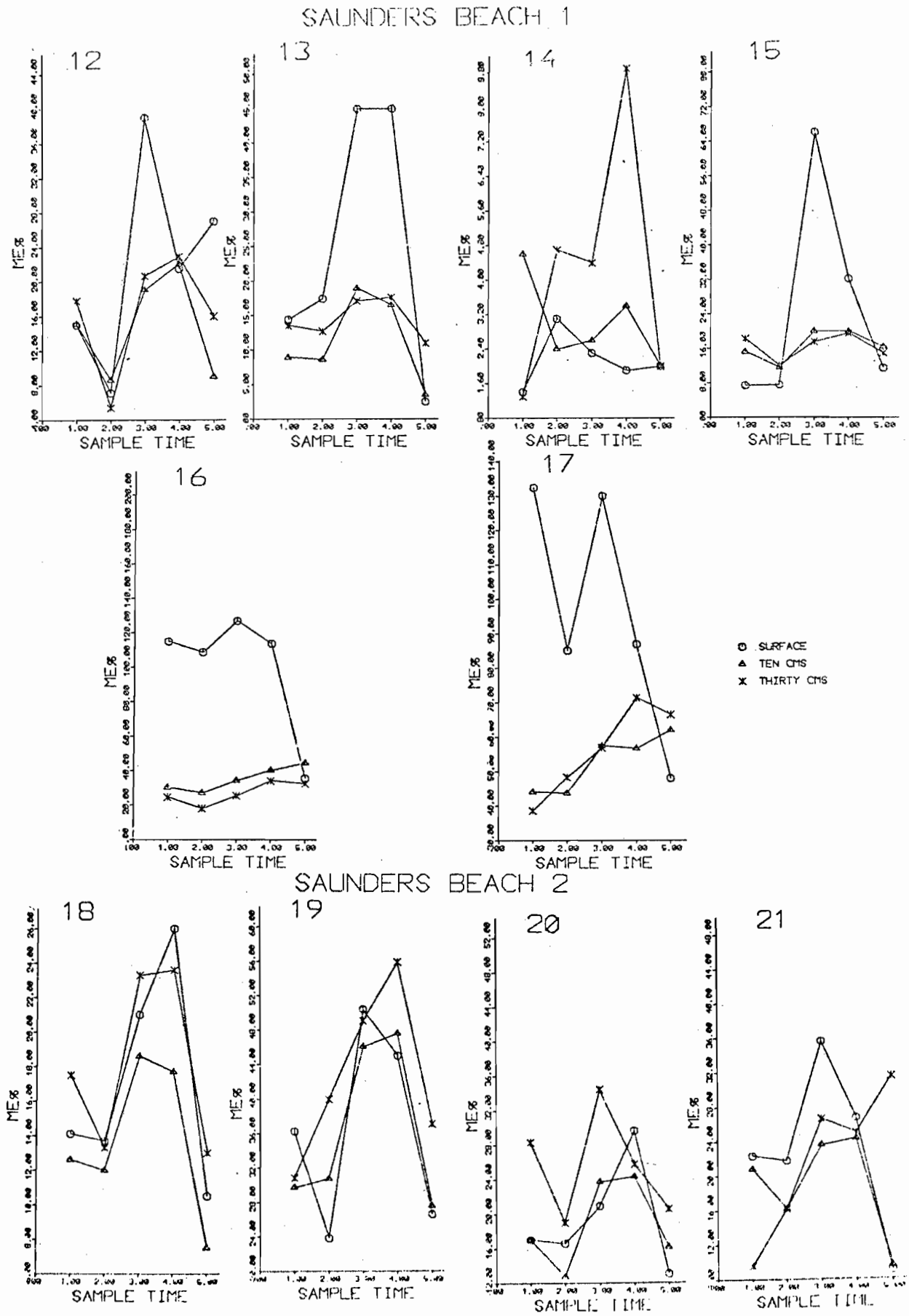


Figure 3.43 Water soluble Sulphate

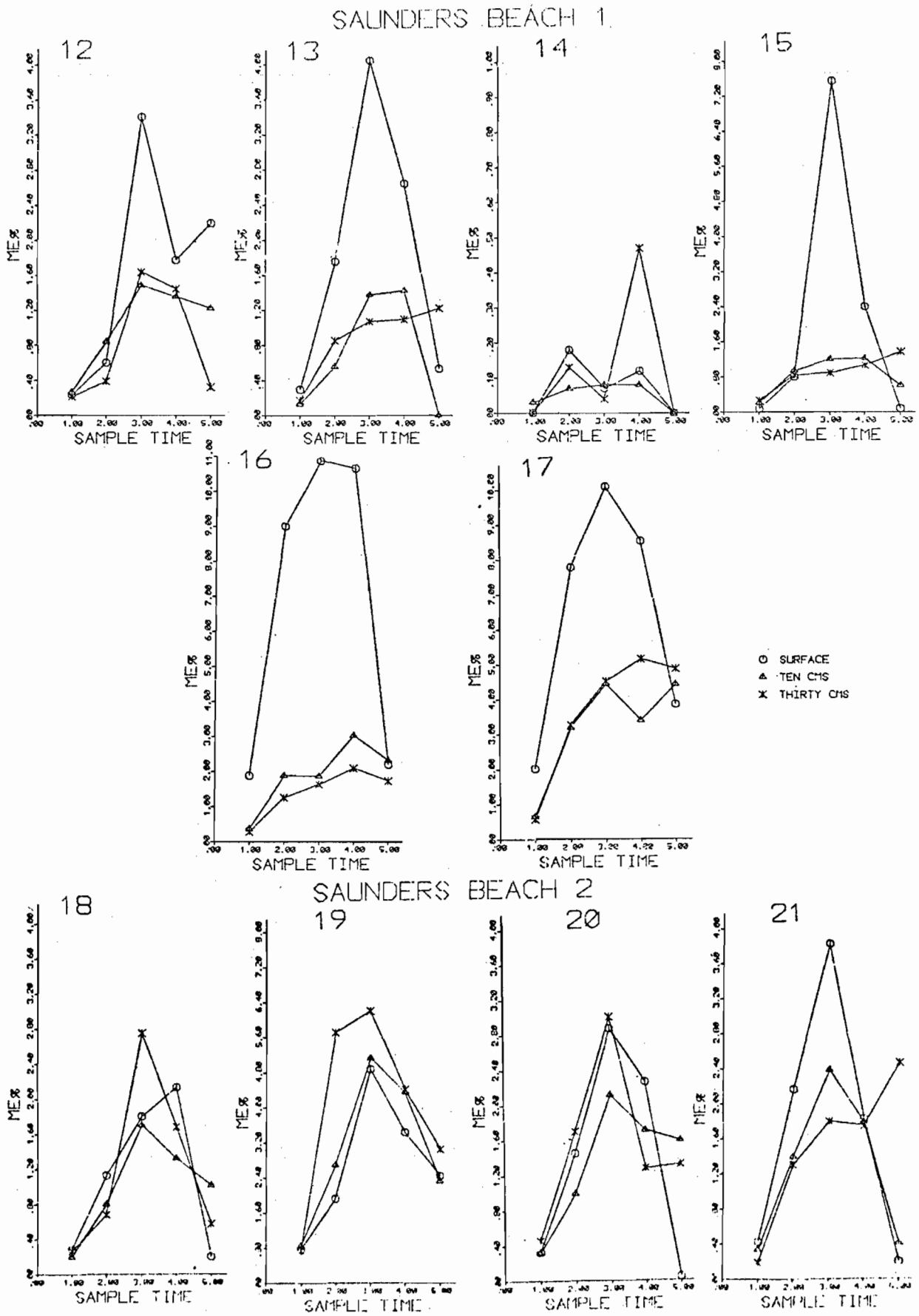


Figure 3.44 Soluble Sodium

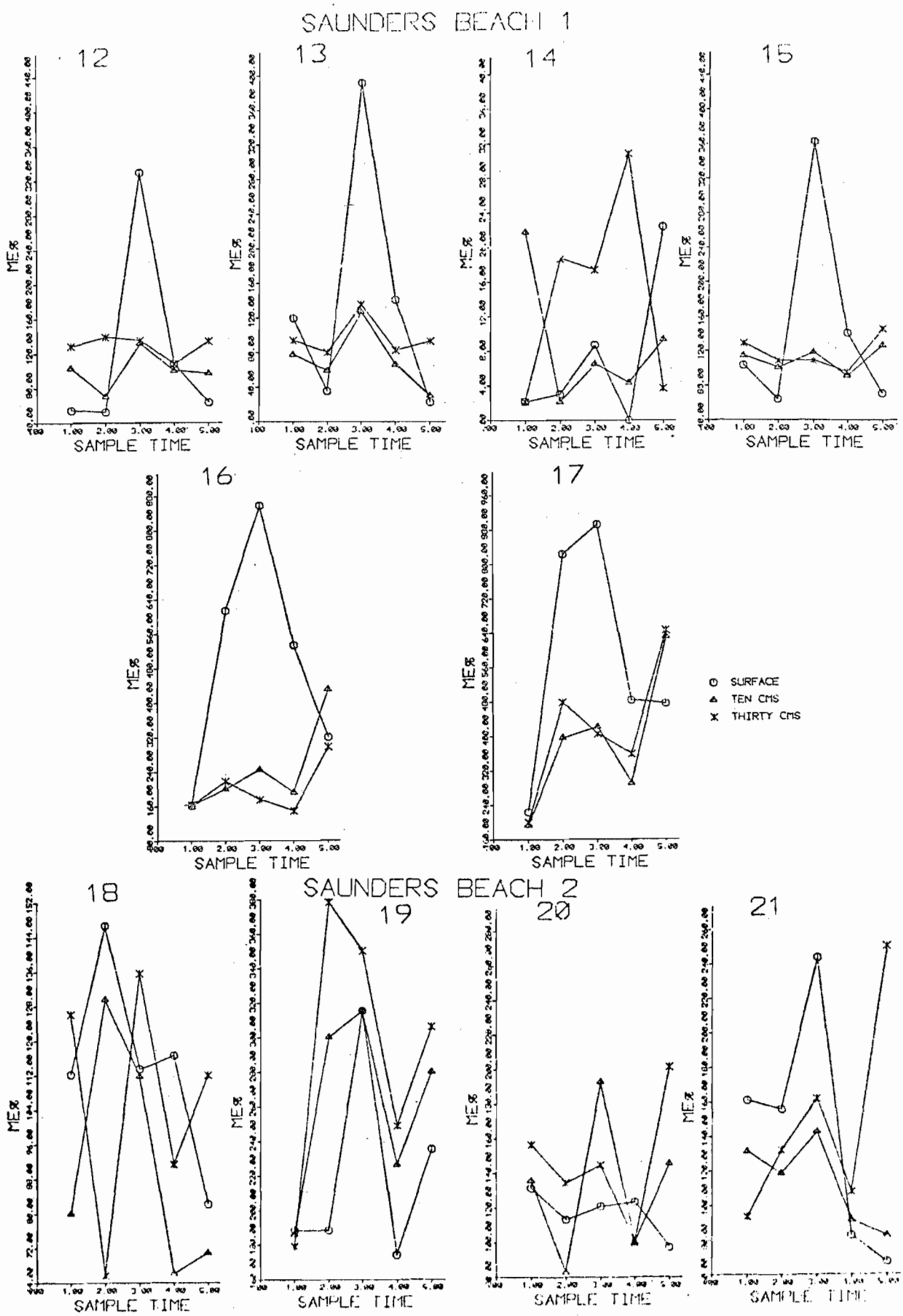


Figure 3.45 Soluble Potassium

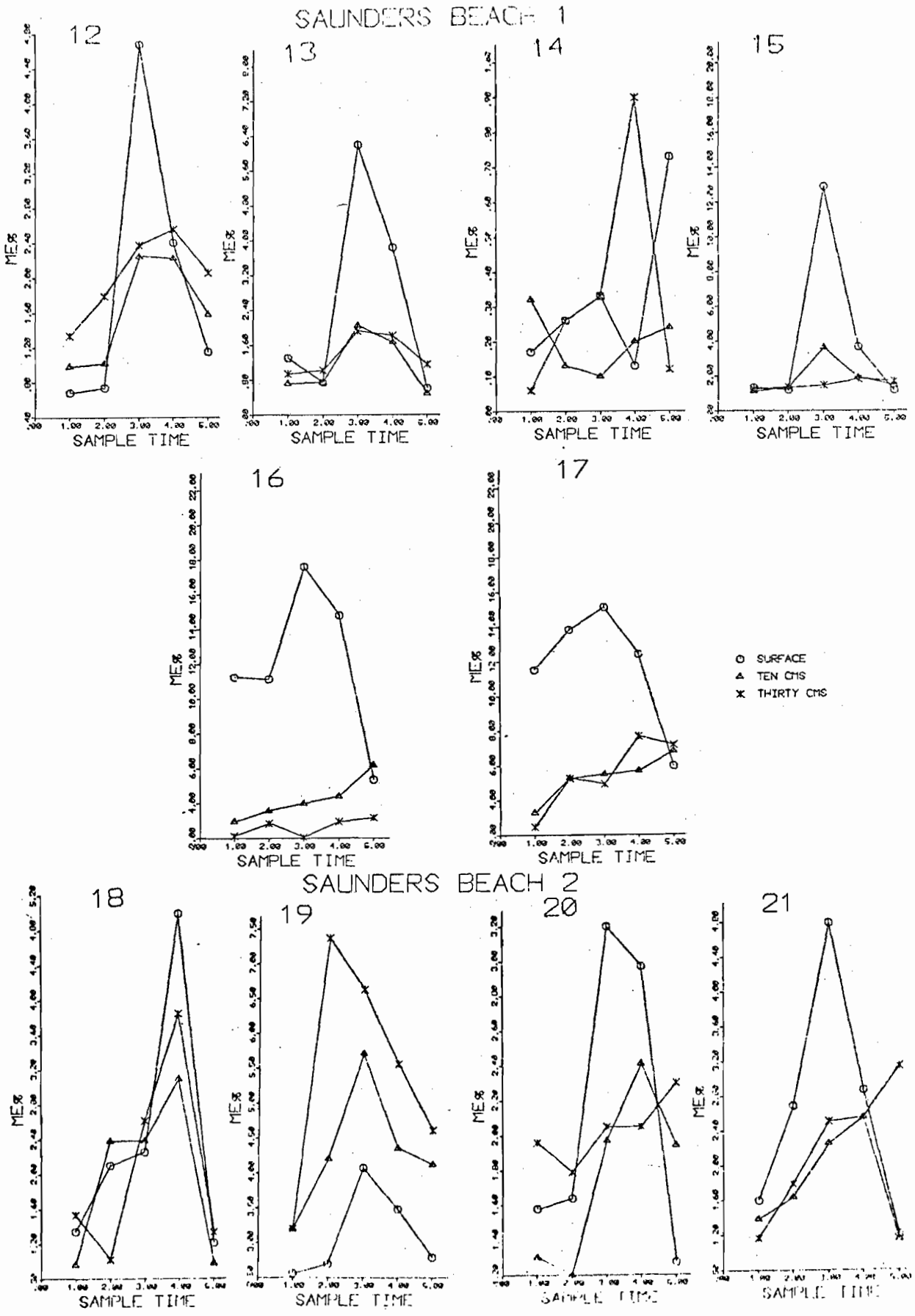


Figure 3.46 Soluble Calcium

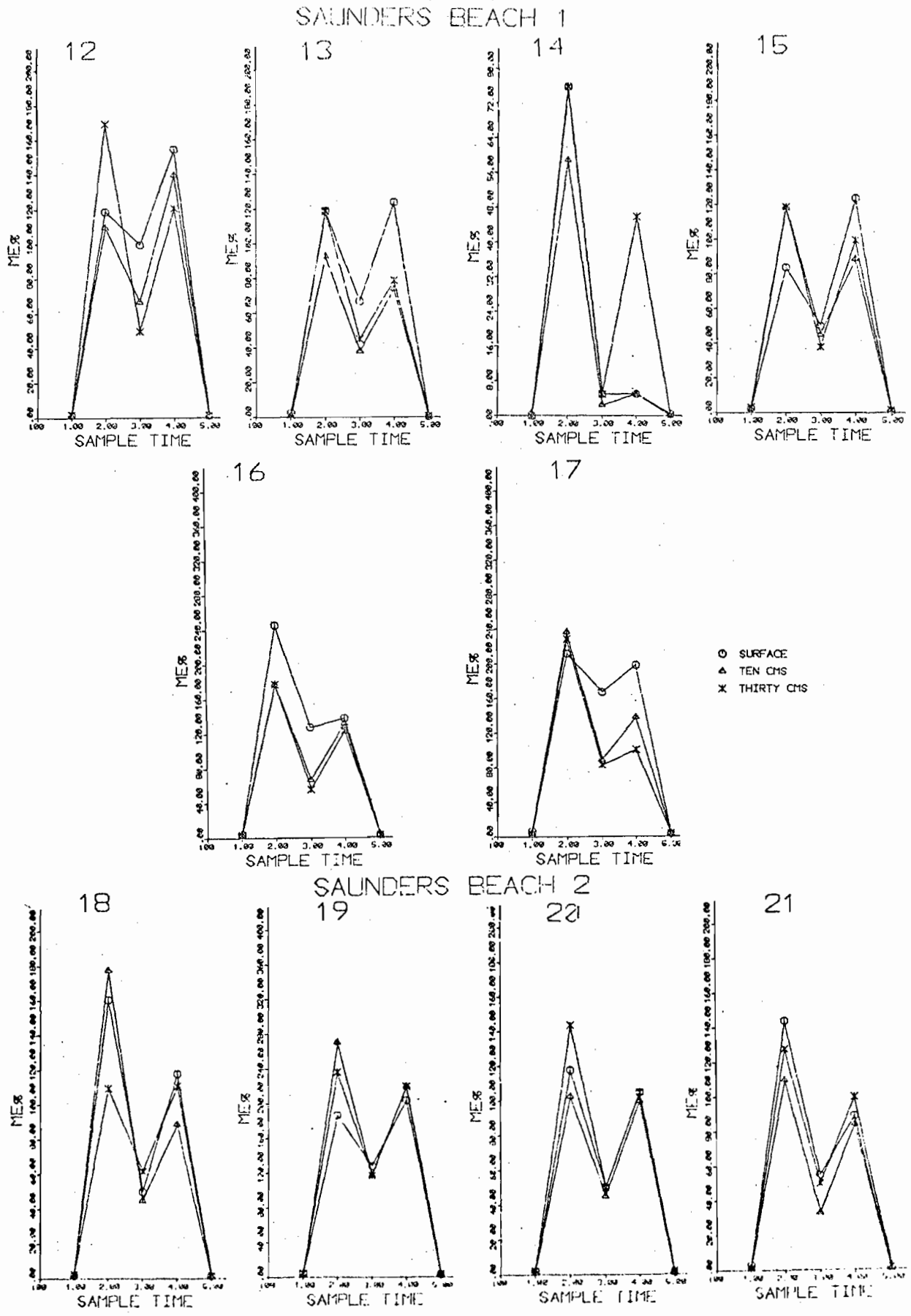


Figure 3.47 Soluble Magnesium

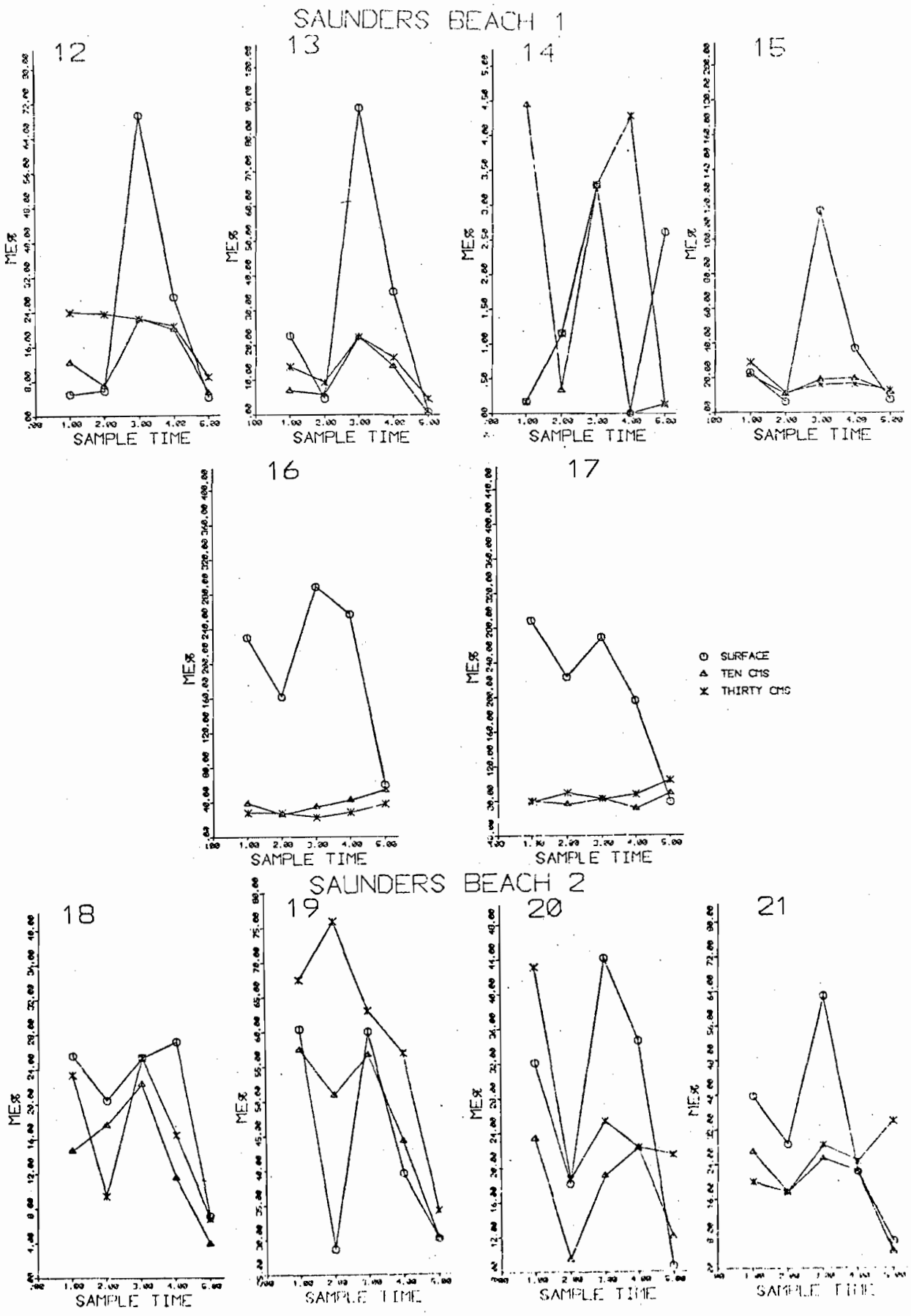


Figure 3.48 Exchangeable Sodium

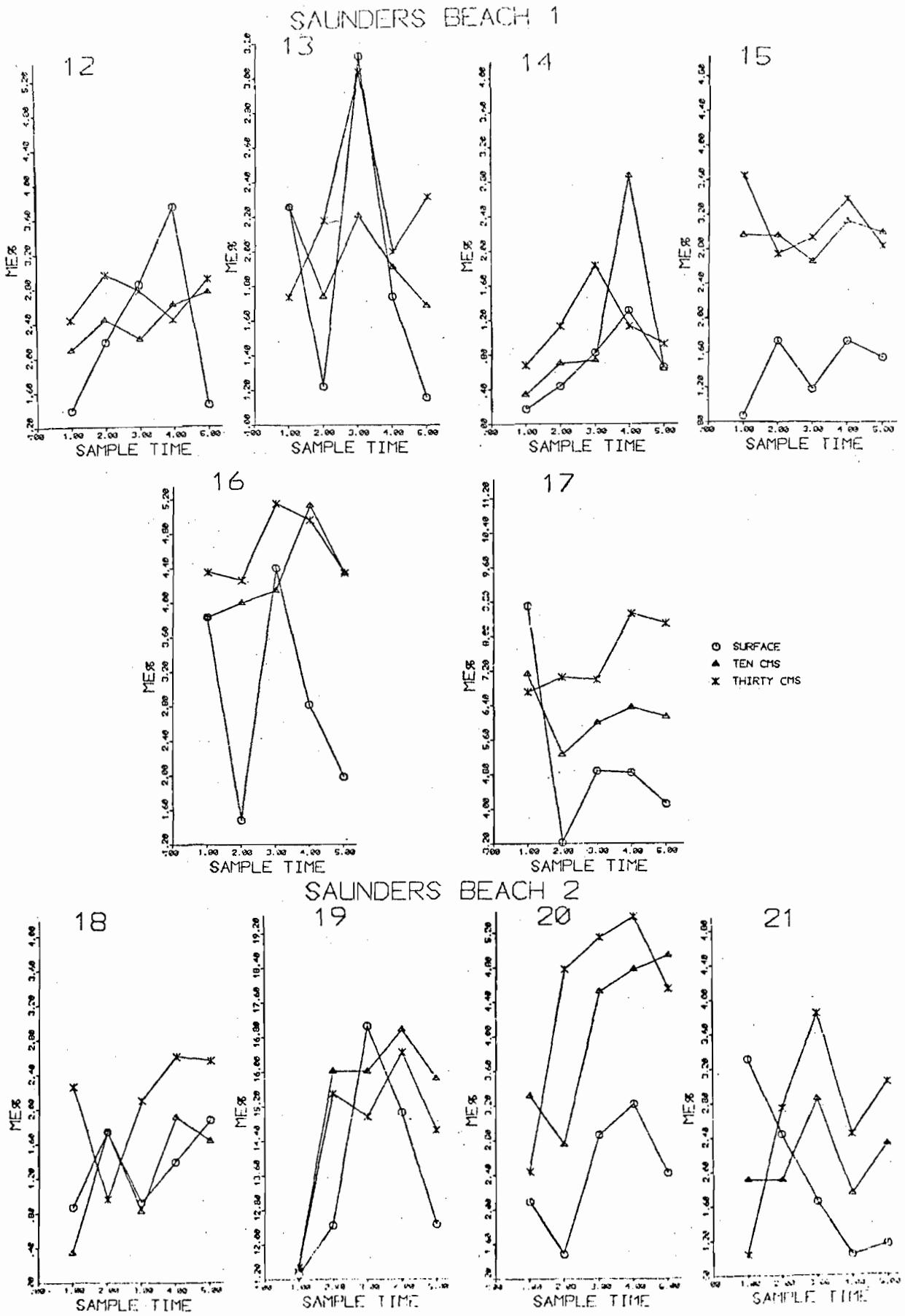


Figure 3.49 Exchangeable Potassium

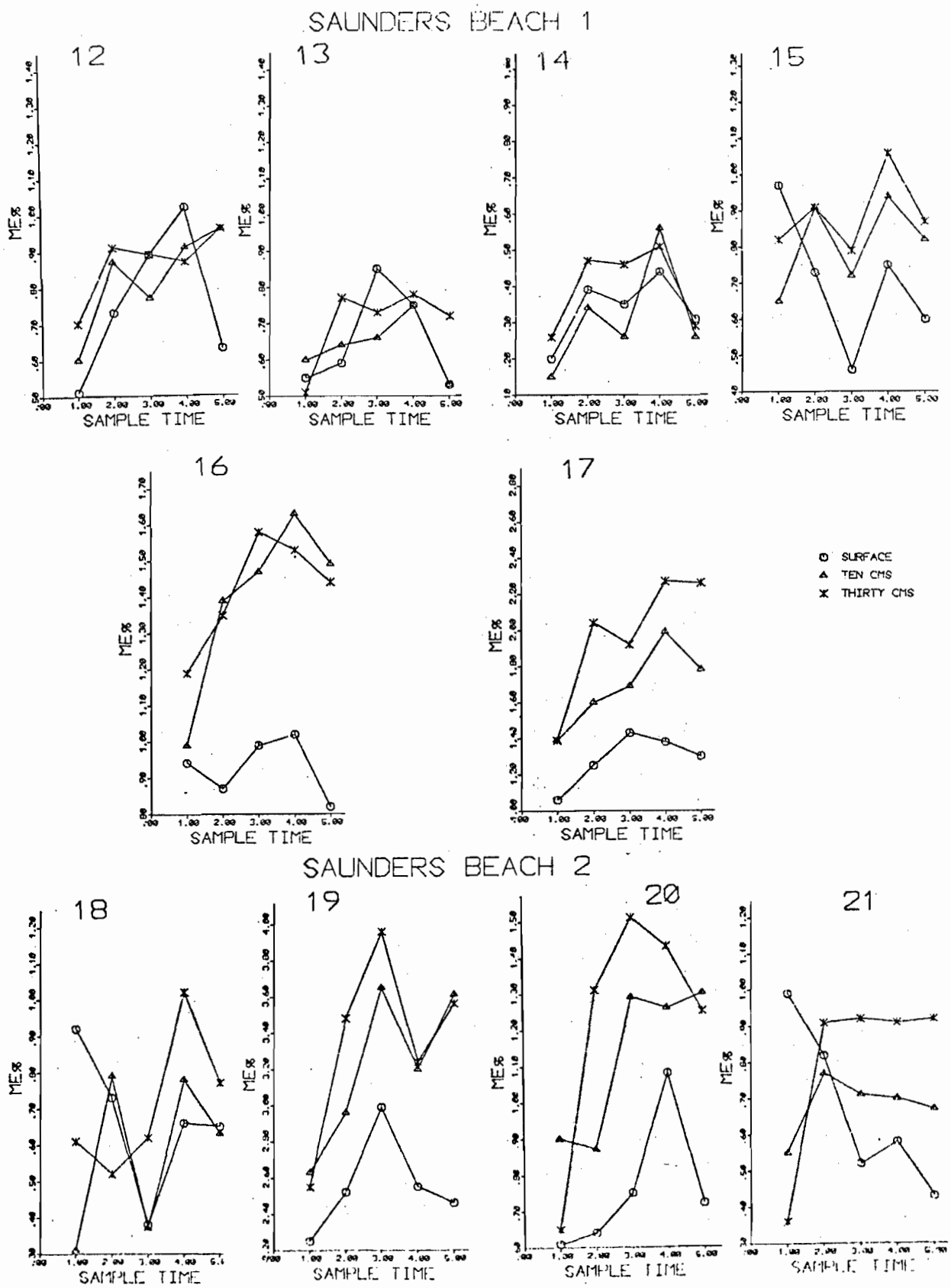


Figure 3.50 Exchangeable Calcium

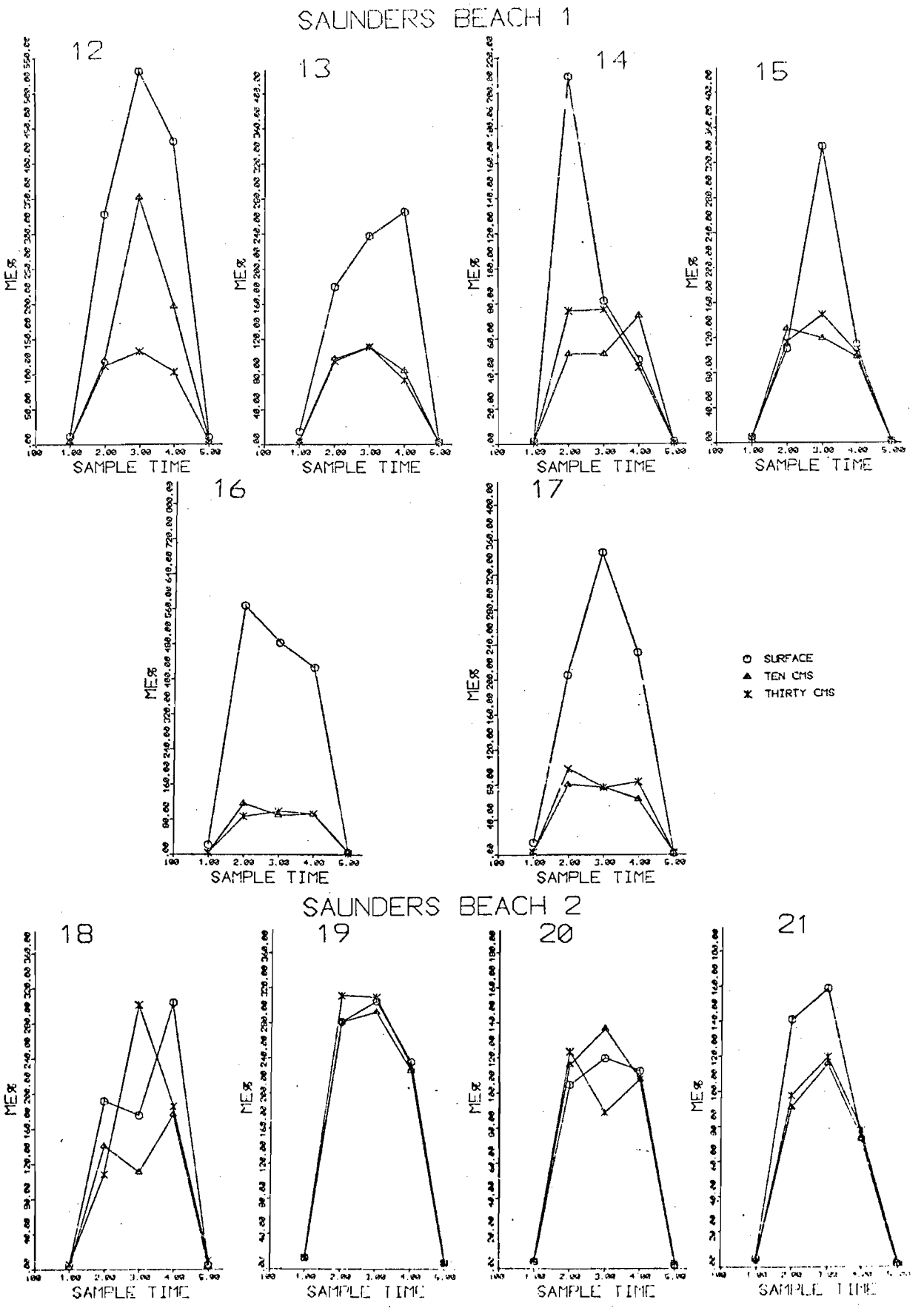
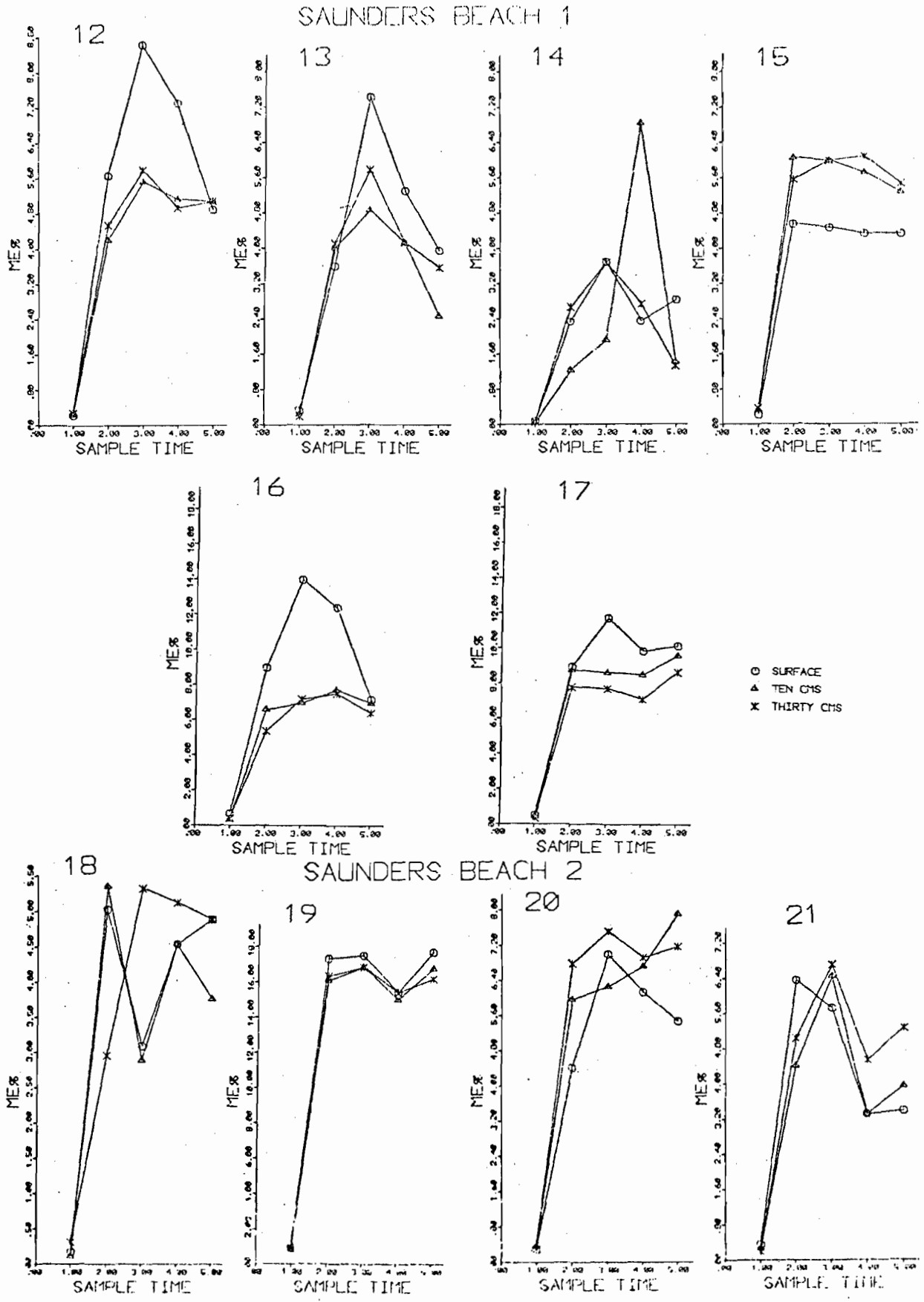


Figure 3.51 Exchangeable Magnesium



SAUNDERS BEACH CHEMICAL DATA IN SPACE THROUGH TIME

(Saunders Beach 1 Stations 1-6 represent Stations 12-17 inclusive.

Saunders Beach 2 Stations 1-4 represent Stations 18-21 inclusive.)

Figure 3.52 pH in KCl solution

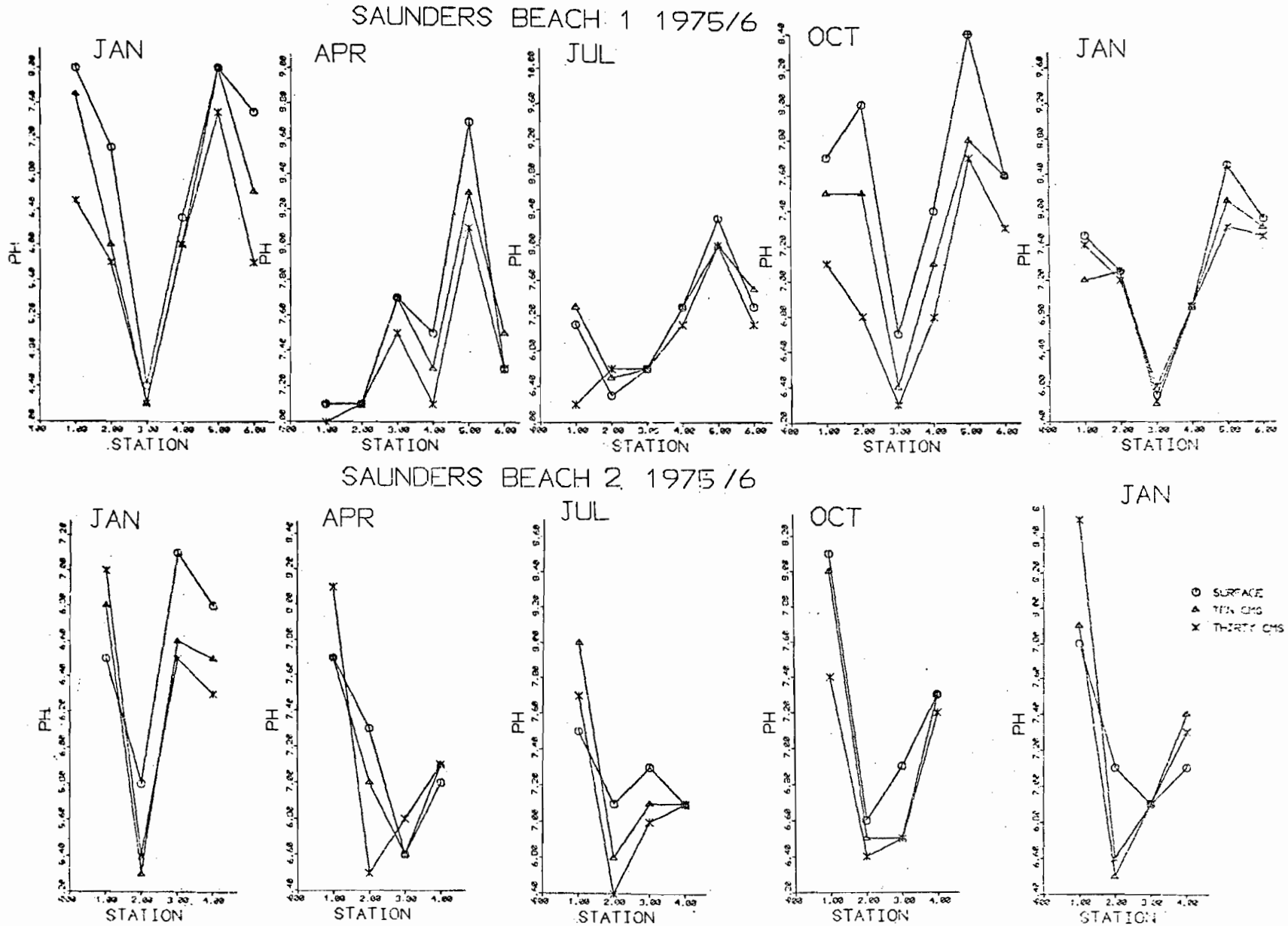


Figure 3.53 pH in distilled water

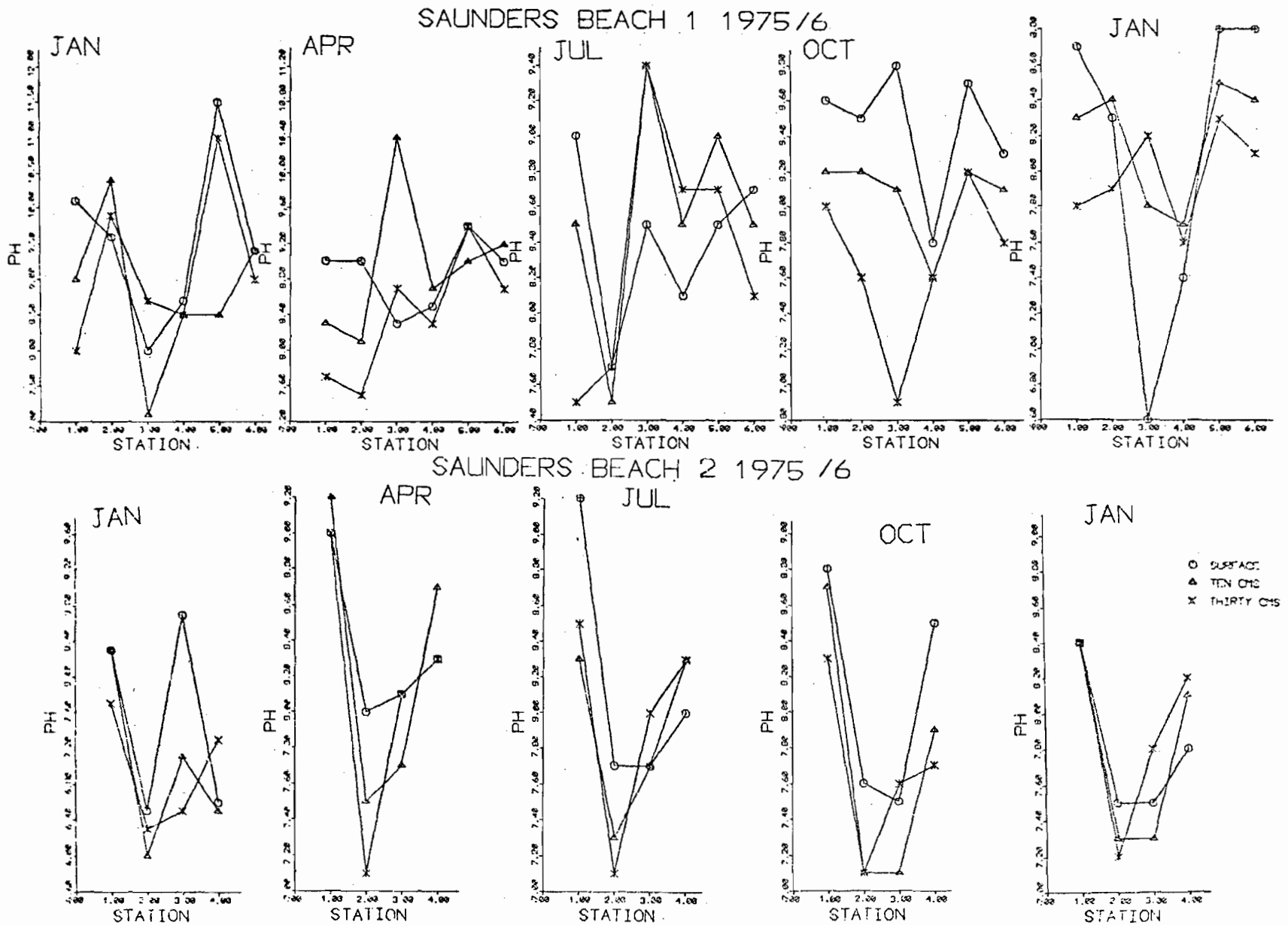


Figure 3.54 Water soluble Chloride

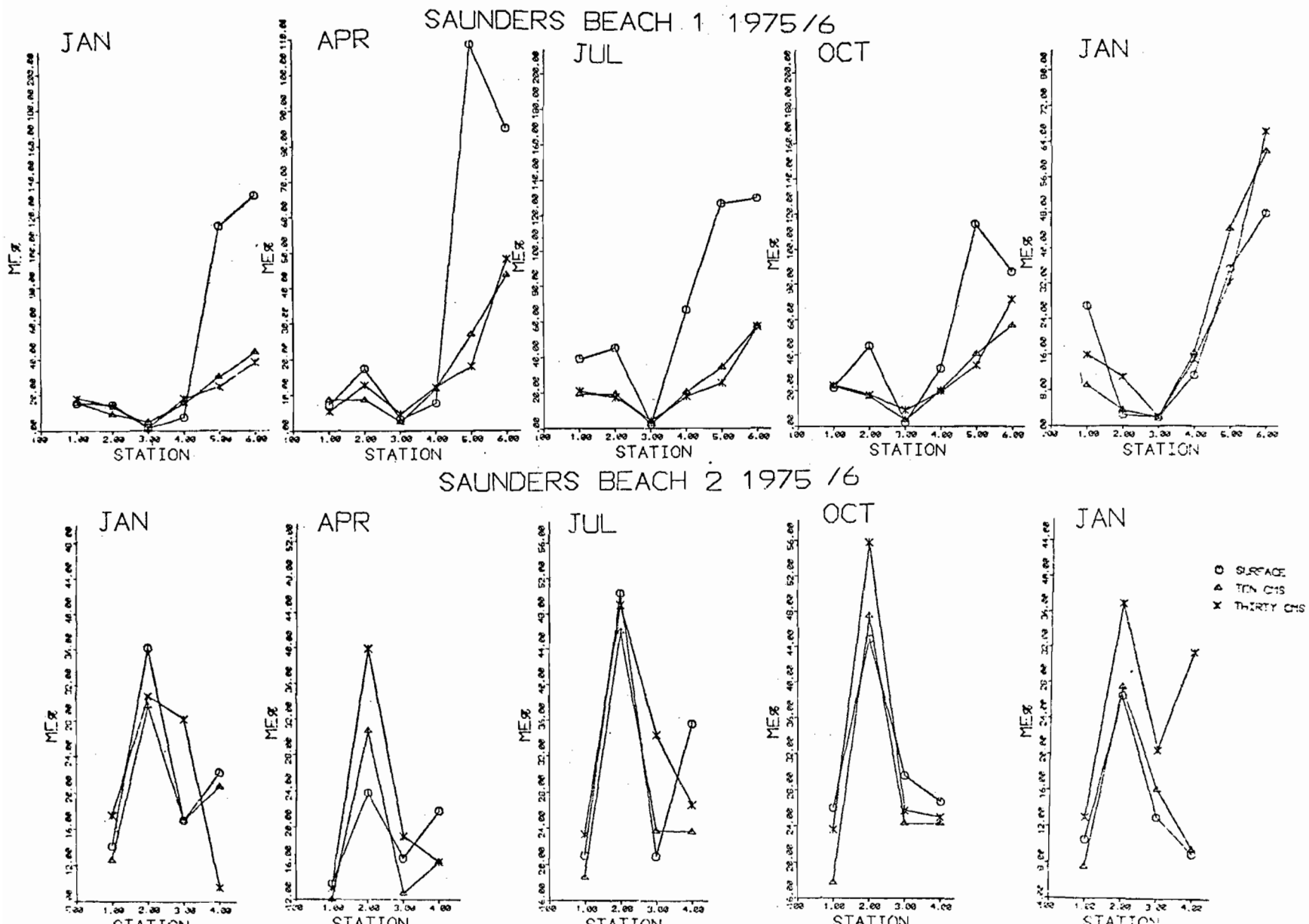


Figure 3.55 Water soluble Sulphate

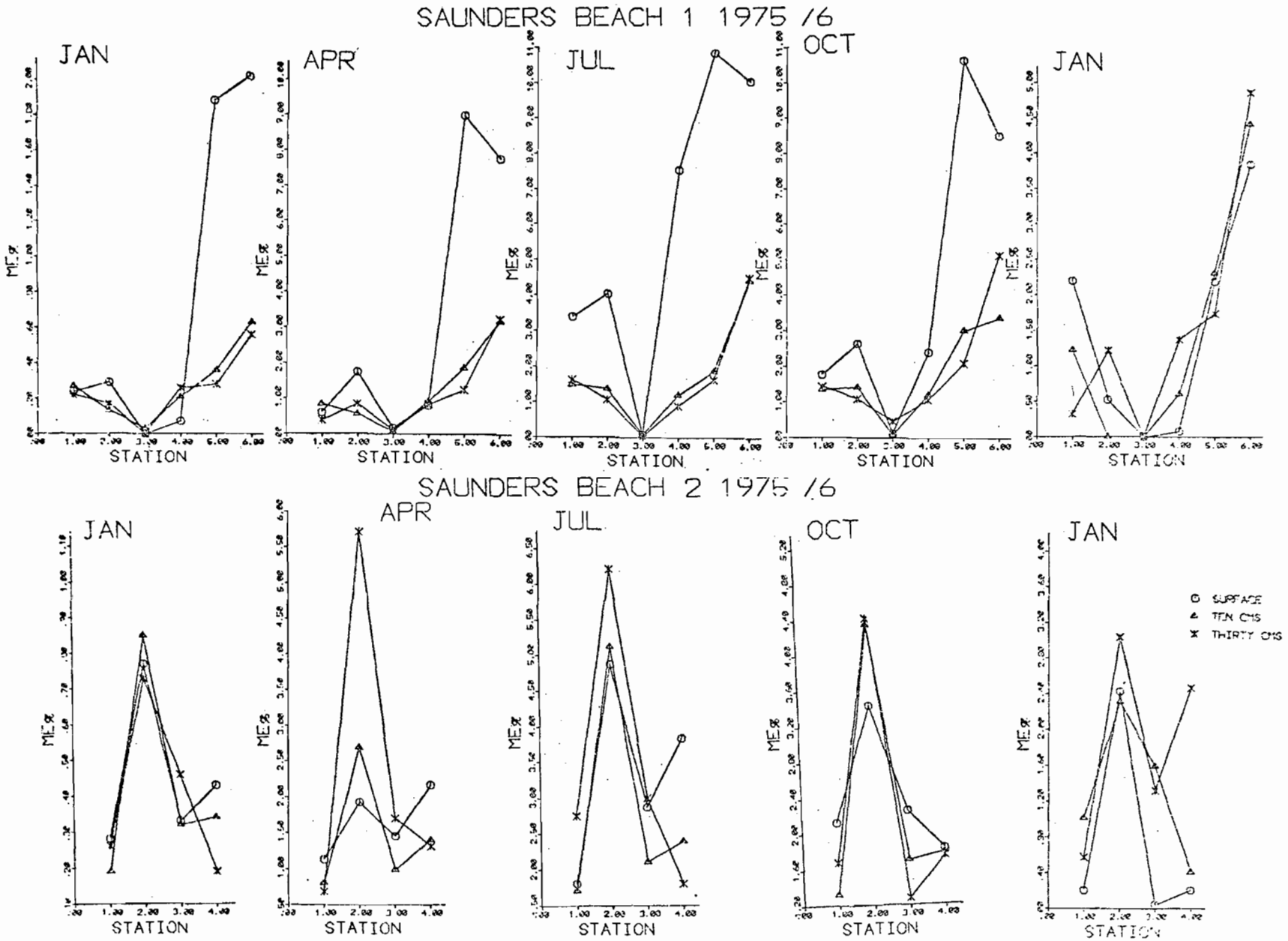


Figure 3.56 Soluble Sodium

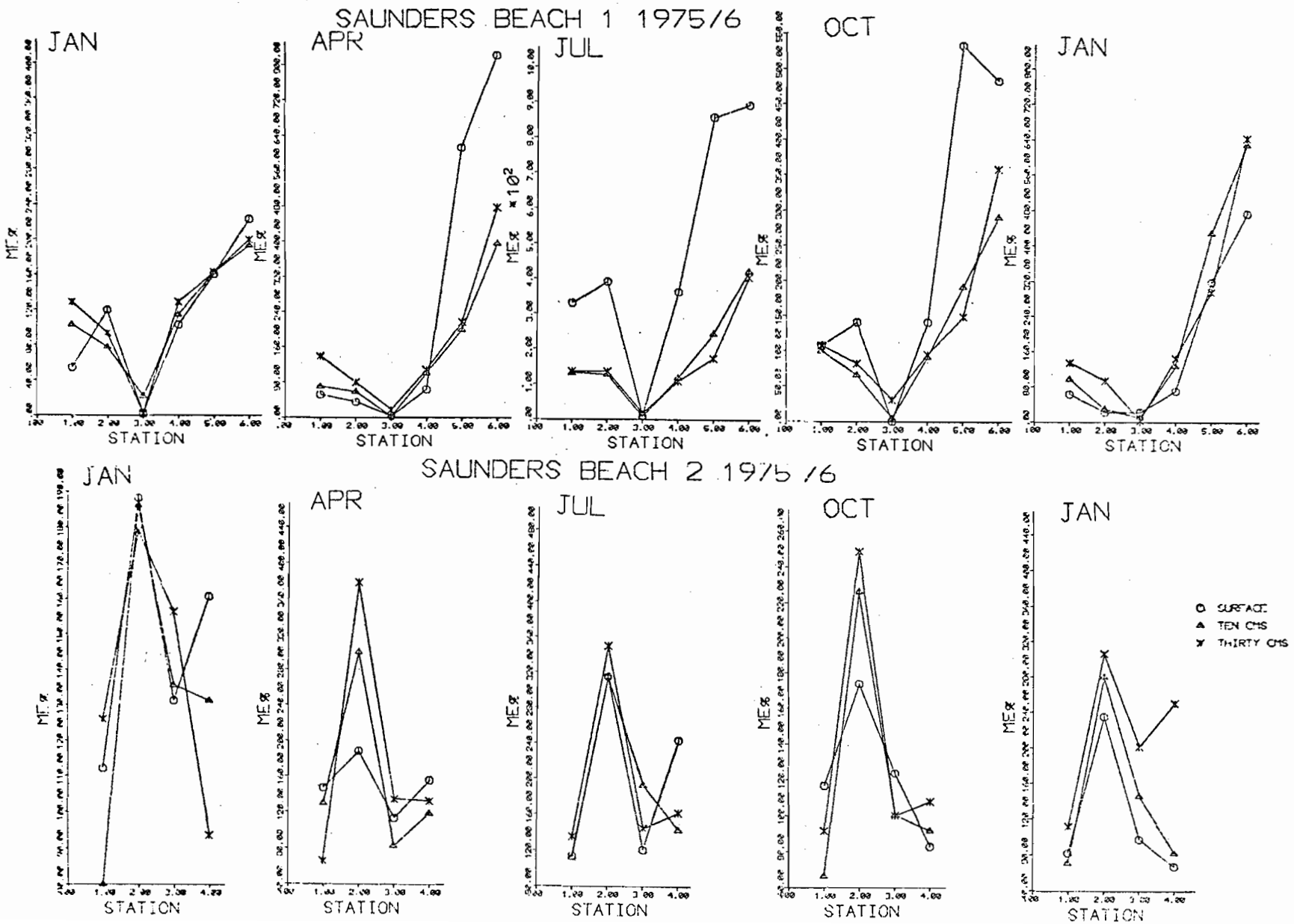


Figure 3.57 Soluble Potassium

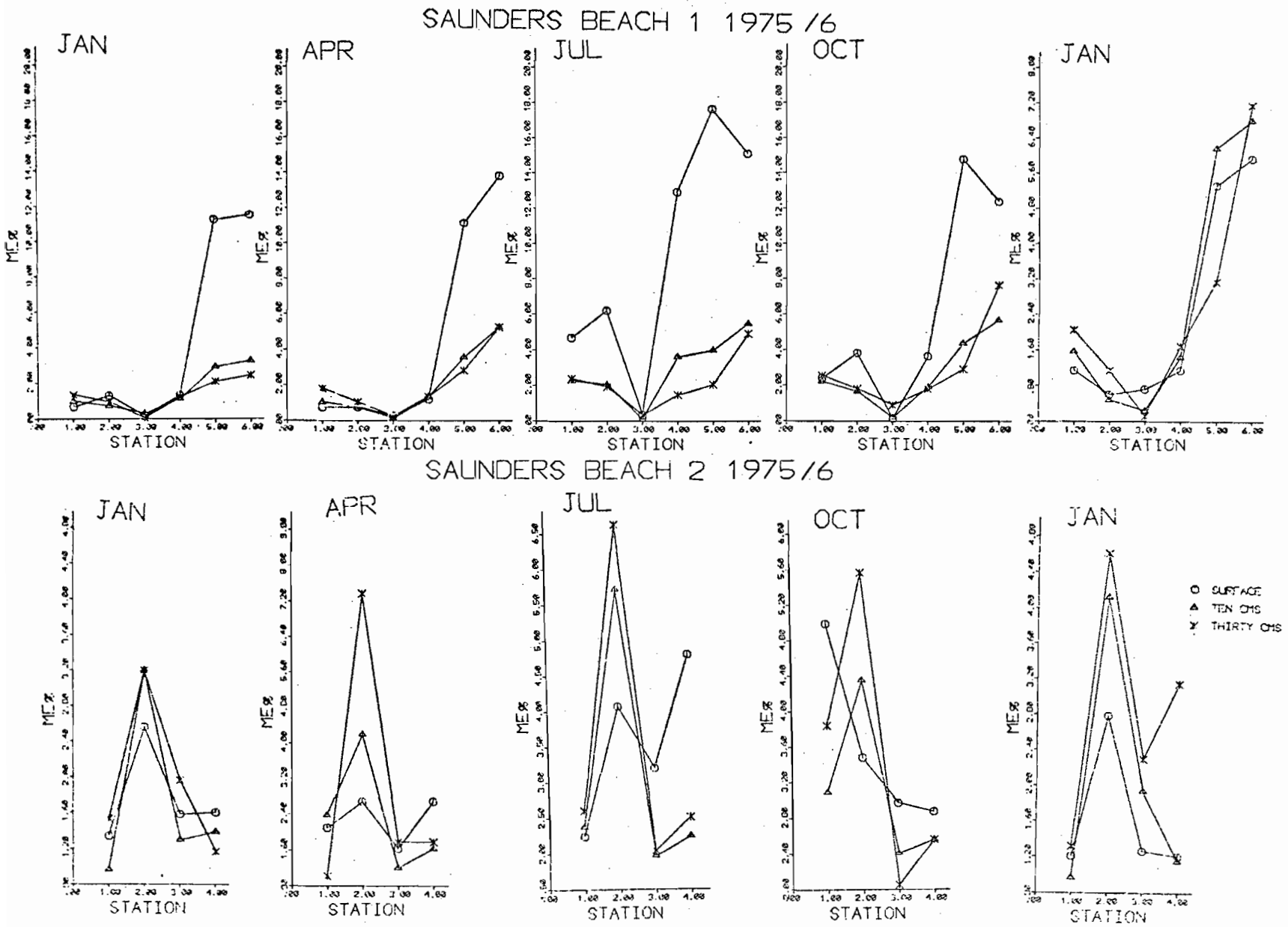


Figure 3.58 Soluble Calcium

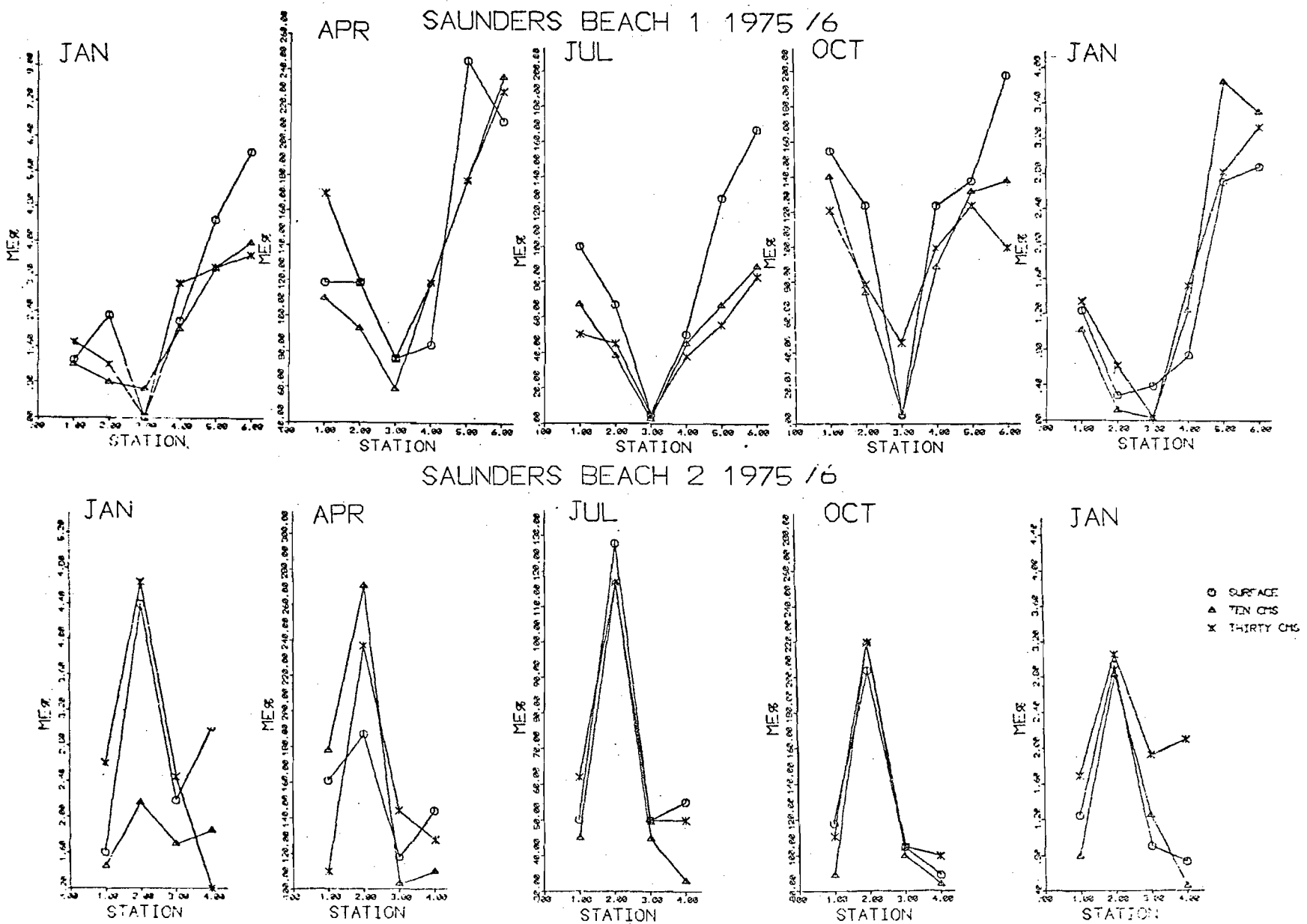


Figure 3.59 Soluble Magnesium

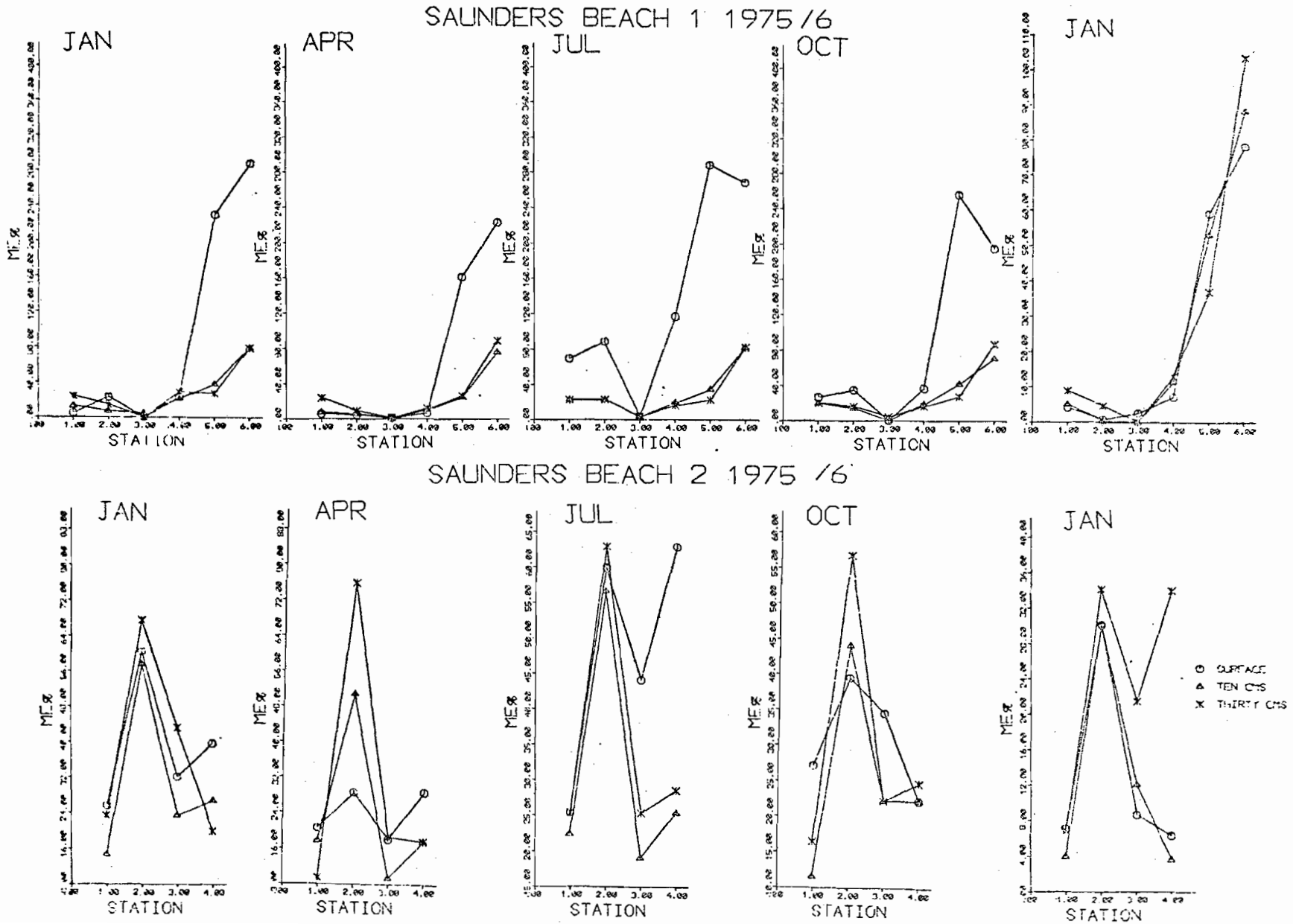


Figure 3.60 Exchangeable Sodium

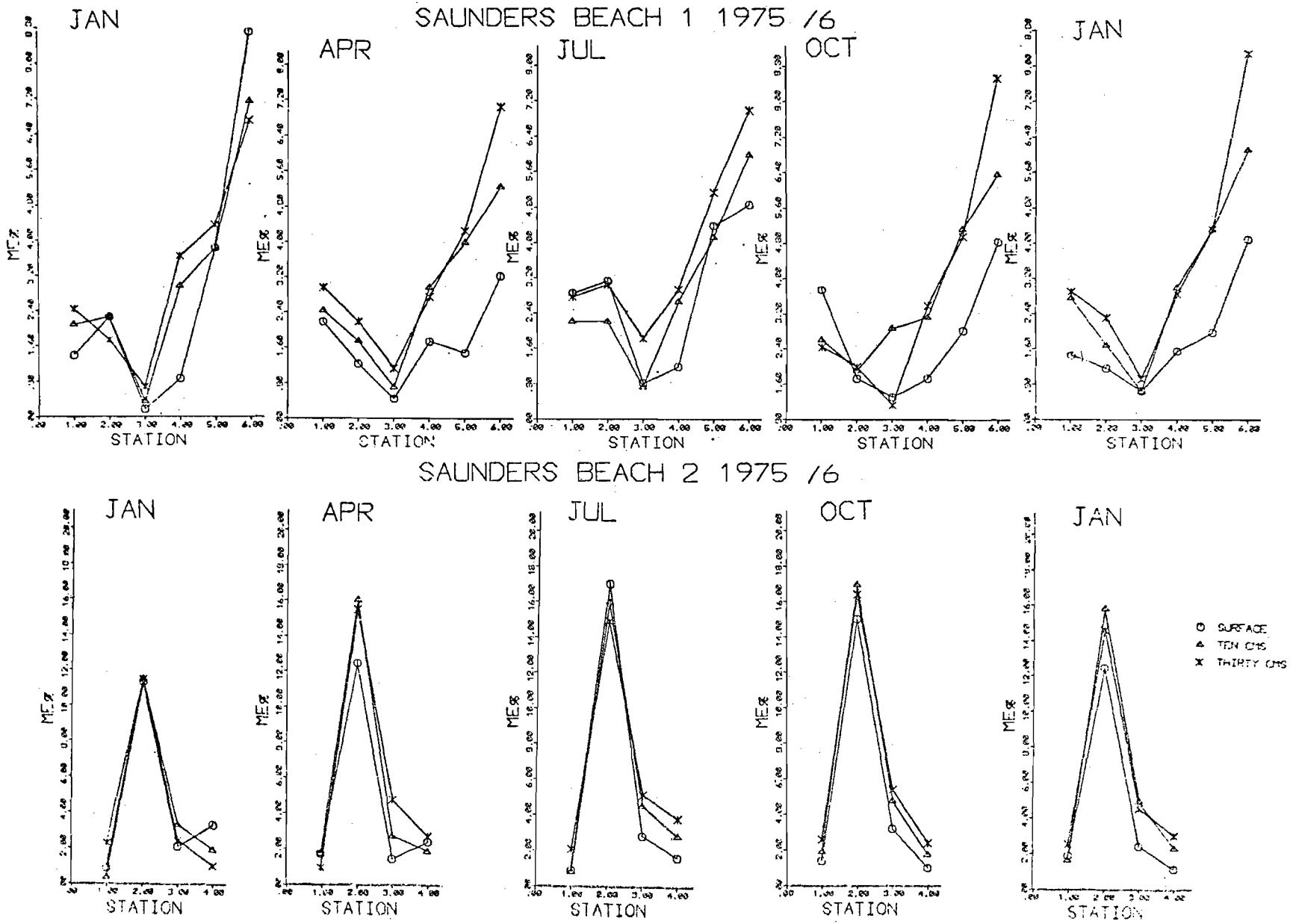


Figure 3.61 Exchangeable Potassium

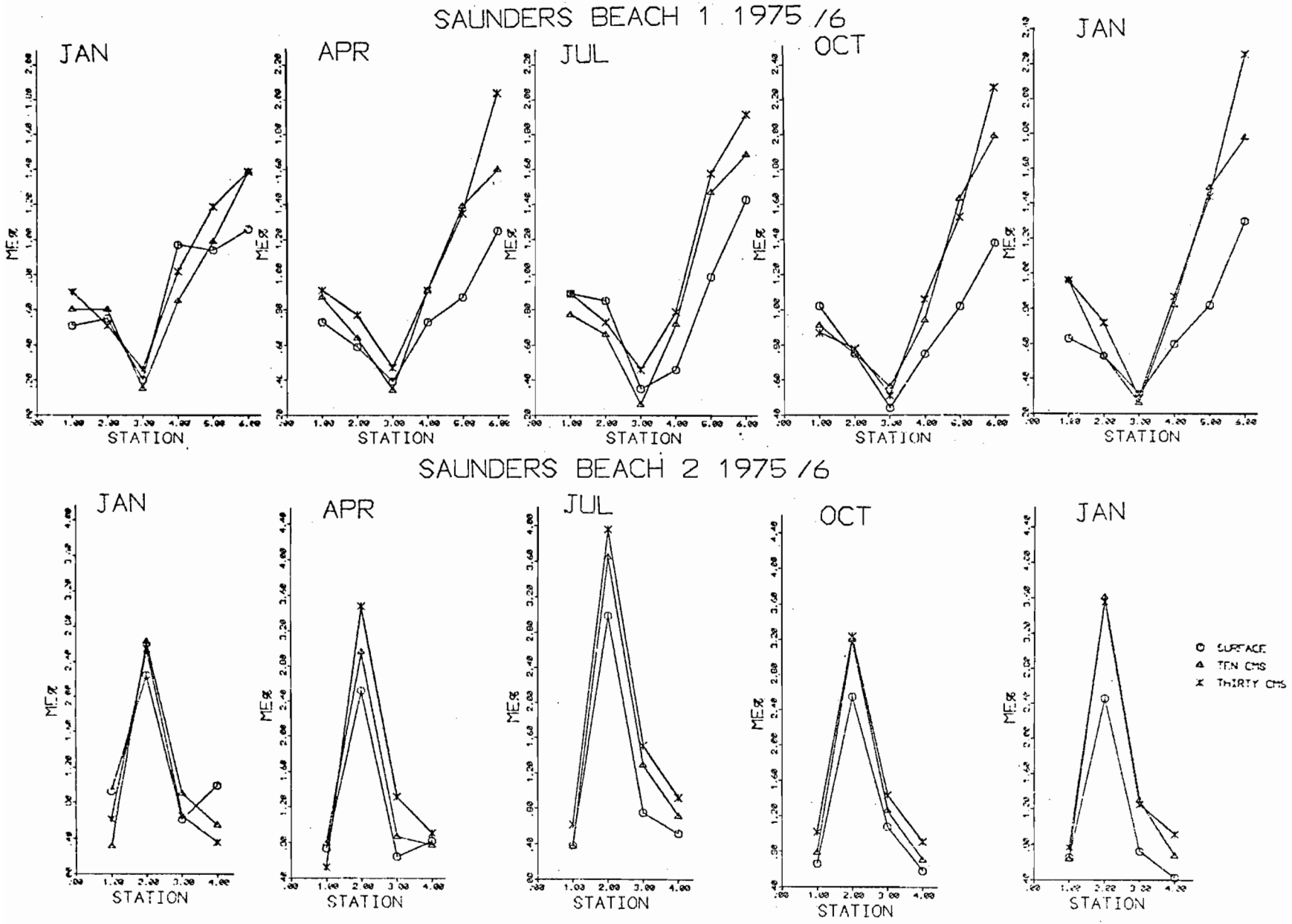


Figure 3.6.2 Exchangeable Calcium

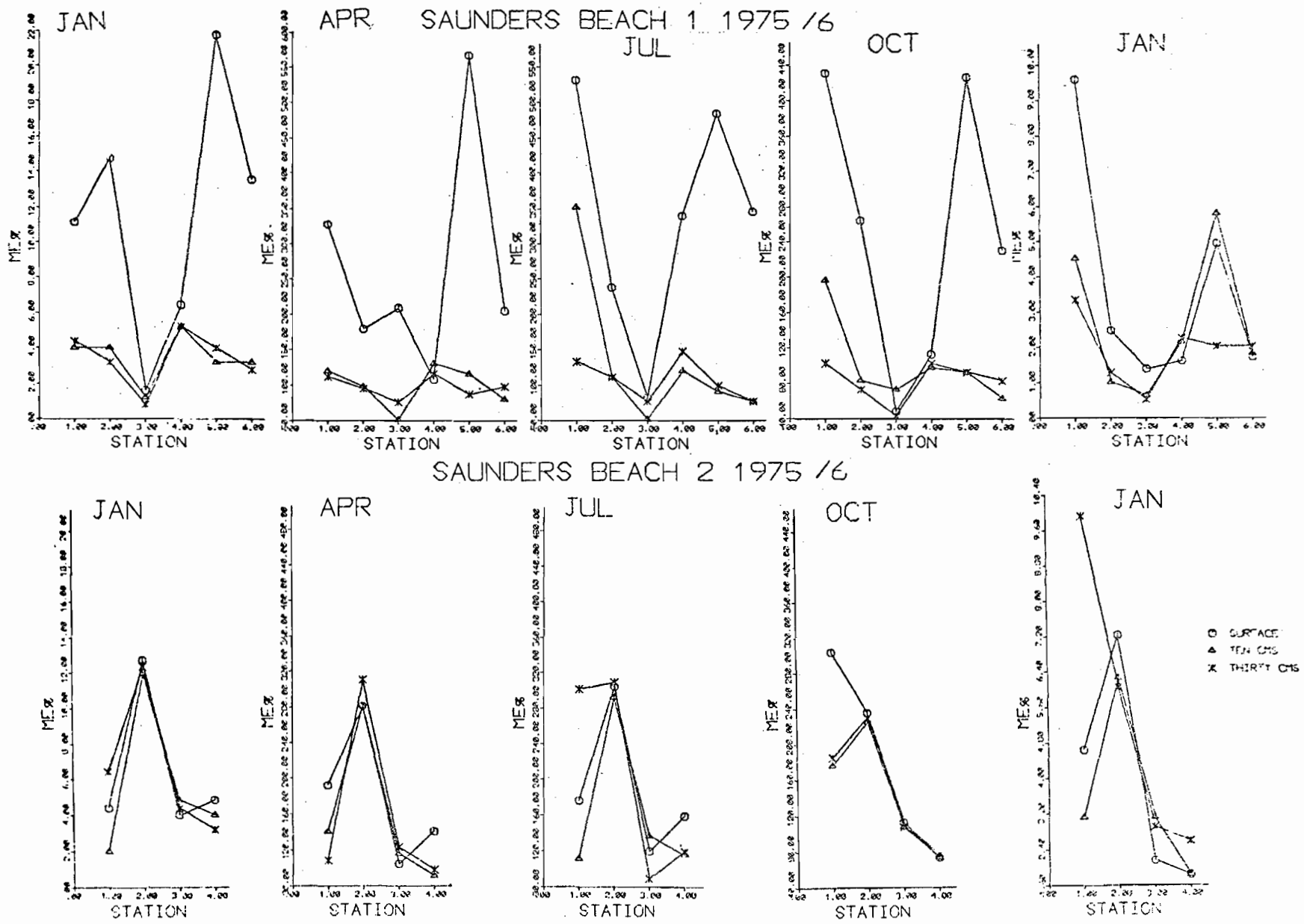
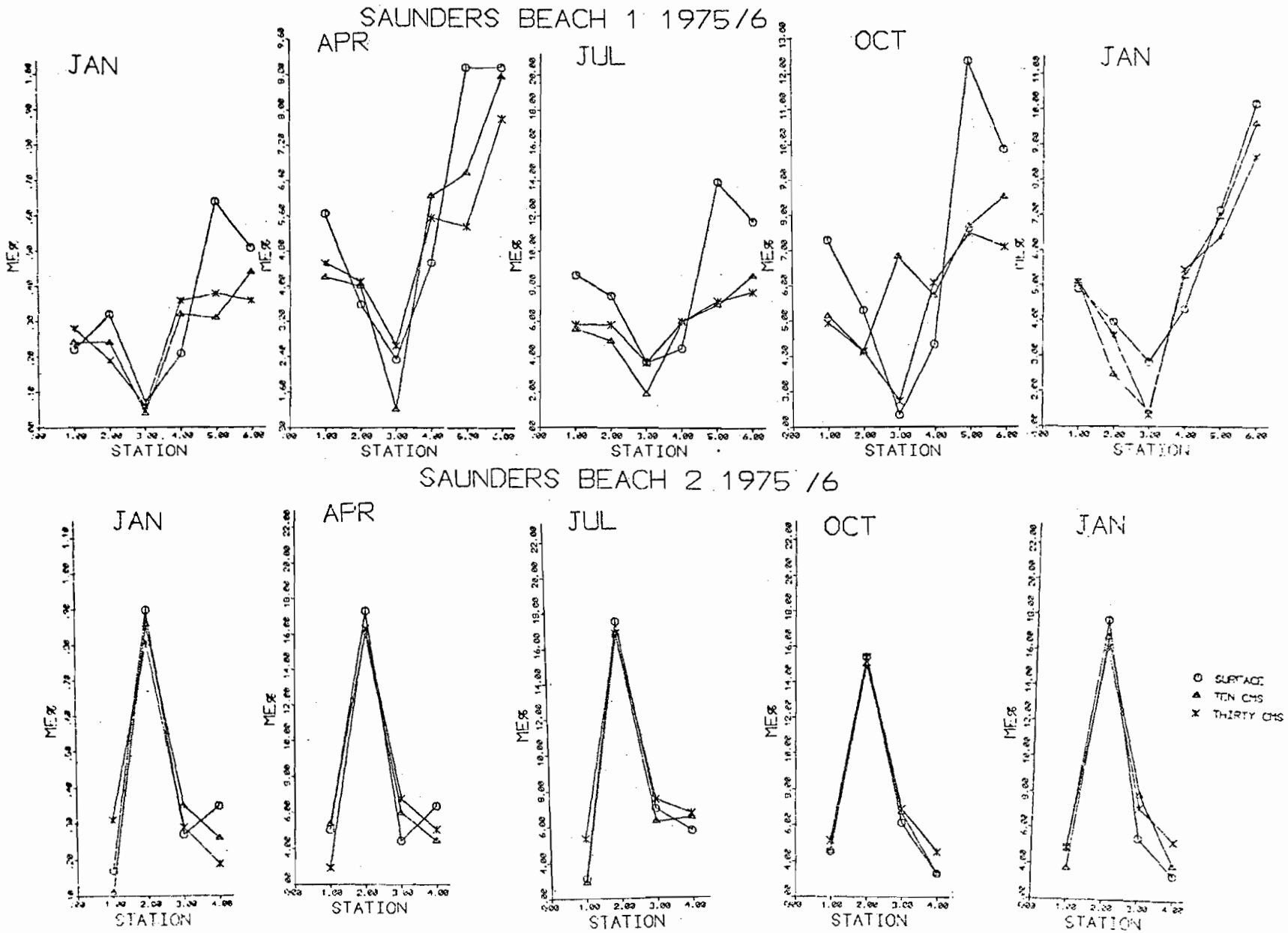


Figure 3.63 Exchangeable Magnesium



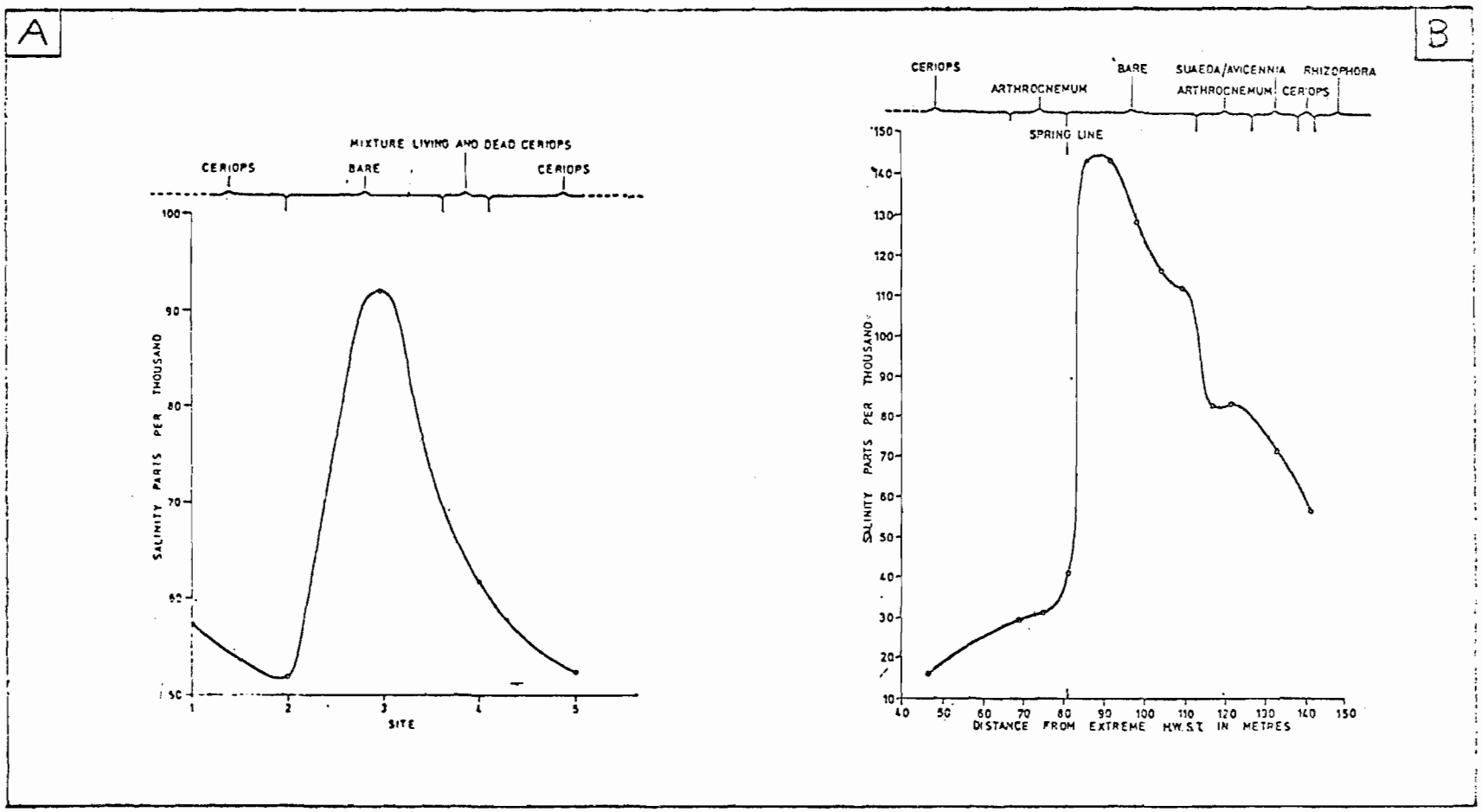


Figure 3.64 a. groundwater salinity across bare area in *Ceriops* zone, 9 July 1974.
b. groundwater salinity across salt flat, 8 July 1974.

Figure 4.1 Core logs and their location on Magnetic Island

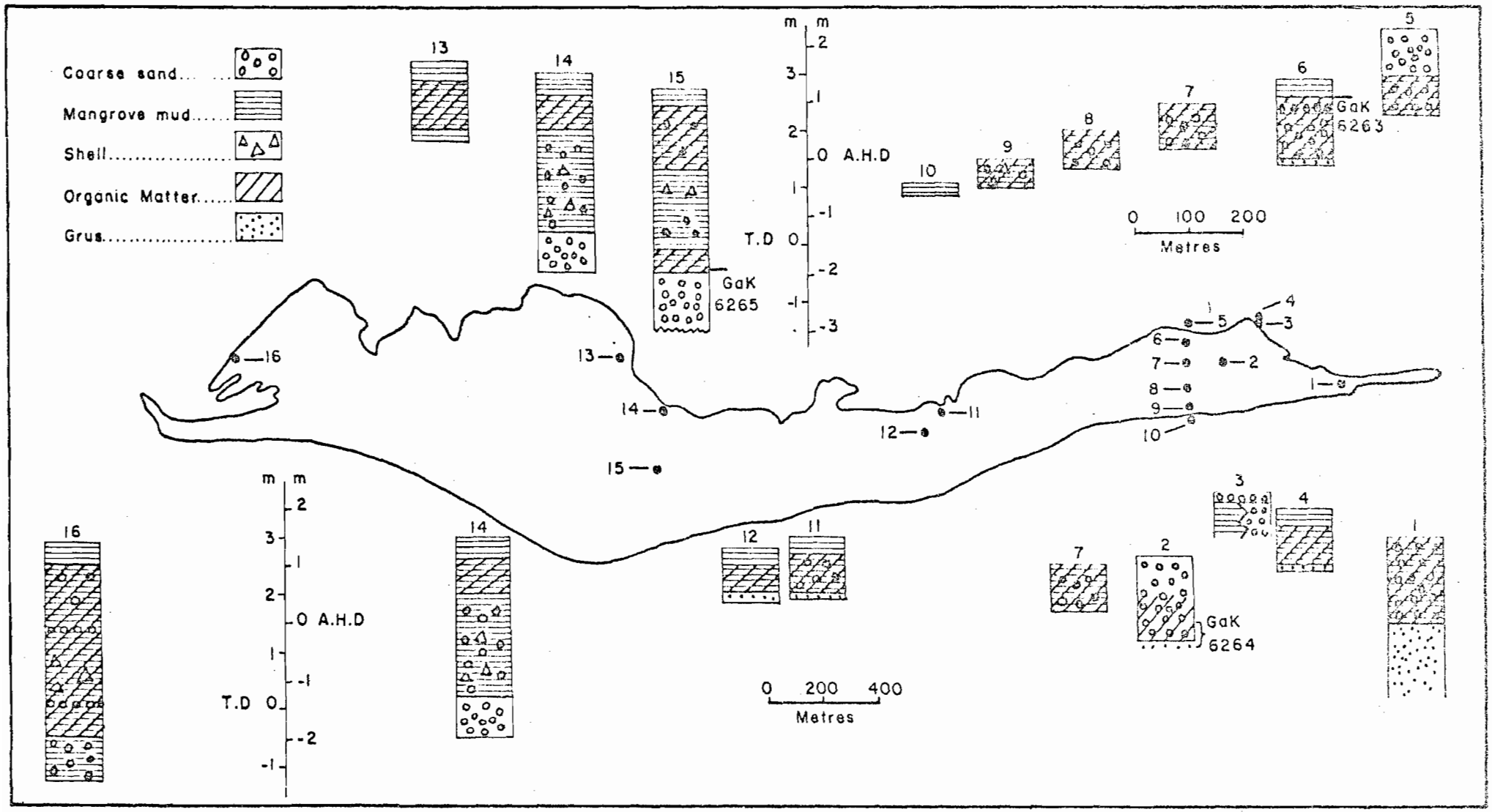


Figure 4.2 Core logs, Magnetic Island

Core 1 At boat launching area near Cockle Bay settlement turn off. Vegetation present include *Ceriops tagal*, *Avicennia eucalyptifolia*, *Osbornia octodonta* and *Aegialitis annulata*.

cm	
	grits and muds 5YR 6/1.
	grits and muds with an increase in organic matter 5YR 3/3 and root fibres 5Y 4/1.
50	organic matters with grits and muds 5YR 3/2.
	organic matter with grits and greater mud content 7.5YR 3/2.
100	grits and mud with root fibres 5Y 3/2.
	muddy layer some grit and root fibres 7.5YR 3/2.
150	grits and muds with organic material 5Y 3/1.
	shell fragments.
200	
	grus 2.5Y 5/0.
250	

Figure 4.2 continued

Core 2 100m south-east from transect. *Avicennia eucalyptifolia*, *Ceriops tagal* with some *Rhizophora stylosa* and *Bruguiera gymnorrhiza* on a coarse sandy surface.

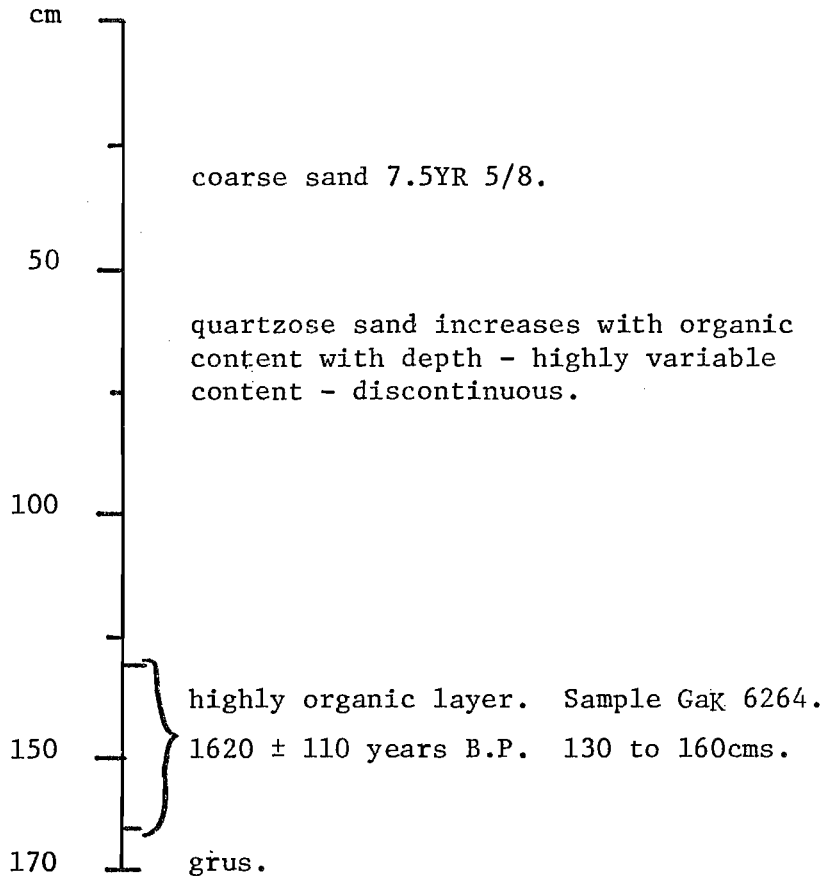
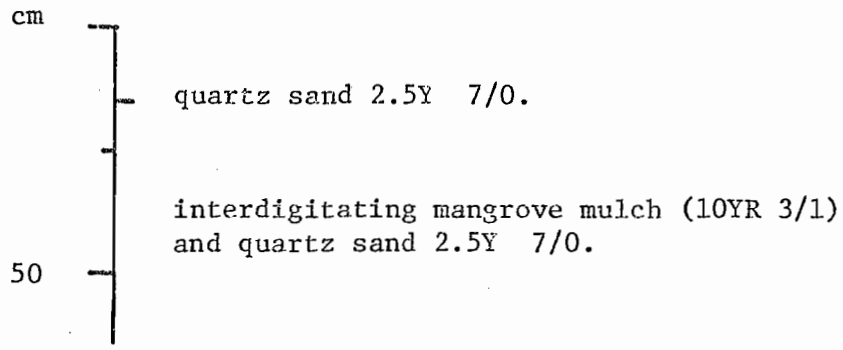


Figure 4.2 continued

Core 3 Lagoon edge - inundated on highest spring tides, dry during dry season.



Core 4 15m into lagoon

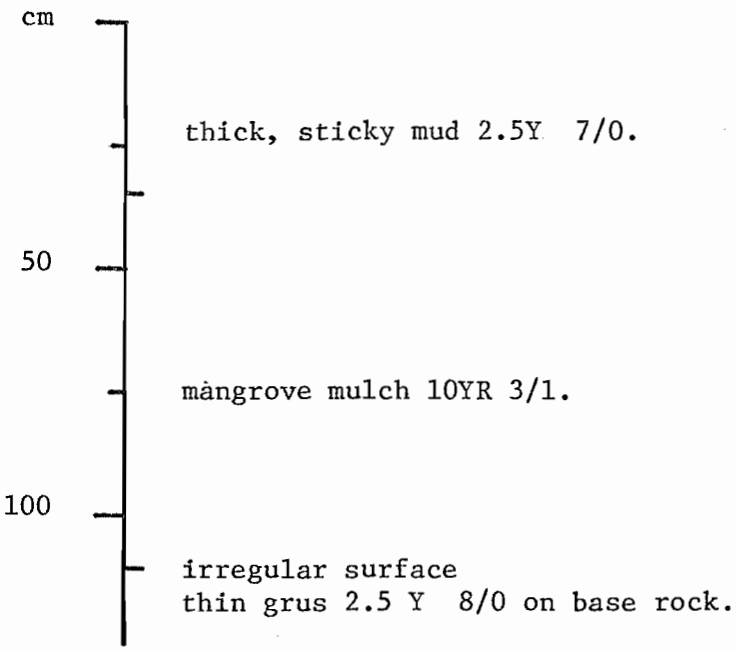


Figure 4.2 continued

Core 5 Landward edge of mangrove swamp on transect line.

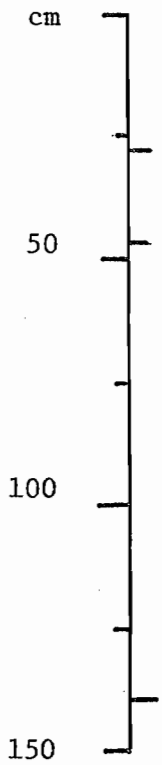
granite wash - coarse sand 5YR 3/1 to 5YR 7/1.

mangrove muds, some grit 10YR 3/1.

basement.

Figure 4.2 continued

Core 6 Edge salt pan on transect.



muds and grits 2.5YR 6/2 with orange mottling 7.5YR 5/6. GaK 6263 690 ± 90 years B.P. taken 50m seaward.

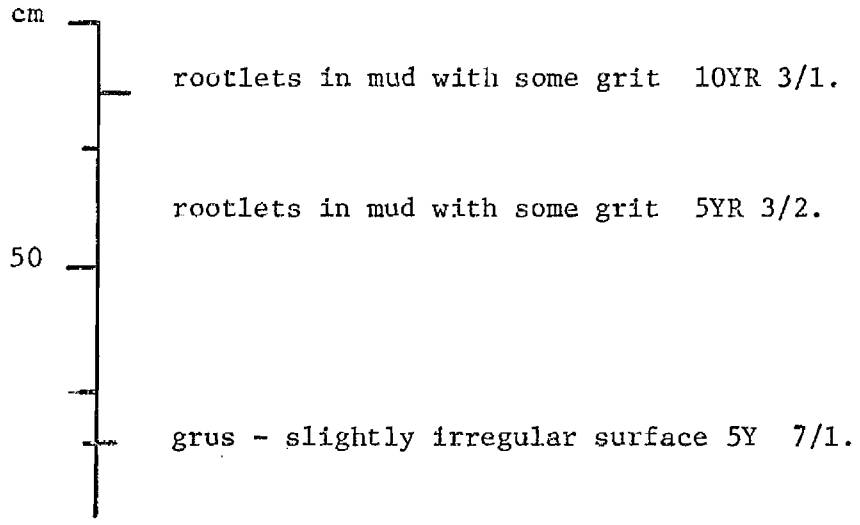
organic mucks and grit, high sand content 5YR 2.5/1.

organic mucks and grits lower mud content 5YR 3/2.

grus occ.organic material 5GY 6/1.

Figure 4.2 continued

Core 7 Edge of living and dead *Rhizophora mucronata* zone, occasional *Bruguiera gymnorrhiza* and *R. lamarkii*.



Core 8 At station 8, *R. mucronata* with occasional *B. gymnorrhiza* and *R. lamarkii*.

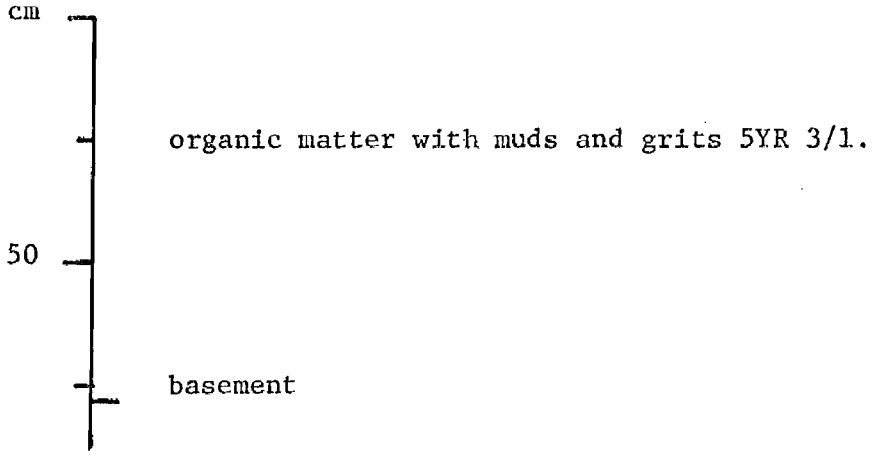


Figure 4.2 continued

Core 9 At station 9, *Rhizophora mucronata*.

cm

25

organic matter, litter and roots in muds, some grits 10YR 3/1. occ. shell debris.

reef.

Core 10 Lower tidal flat.

cm

20

muds no coarse organic matter 2.5Y 4/2.

reef

Core 11 50m north-west of Ned Lee Creek just off granite pavement. *Arthrocnemum leiostachyum*, *Suaeda maritima*, occ. *Avicennia eucalyptifolia*.

cm

muds and grits 7.5YR 7/0.

50

organic mucks with mud and grits 7.5YR 3/2.

100

grus 7.5YR 8/0.

basement.

Figure 4.2 continued

Core 12 100m north-west of Ned Lee Creek, junction *Avicennia eucalyptifolia* and *Arthrocnemum leiostachyum* zones.

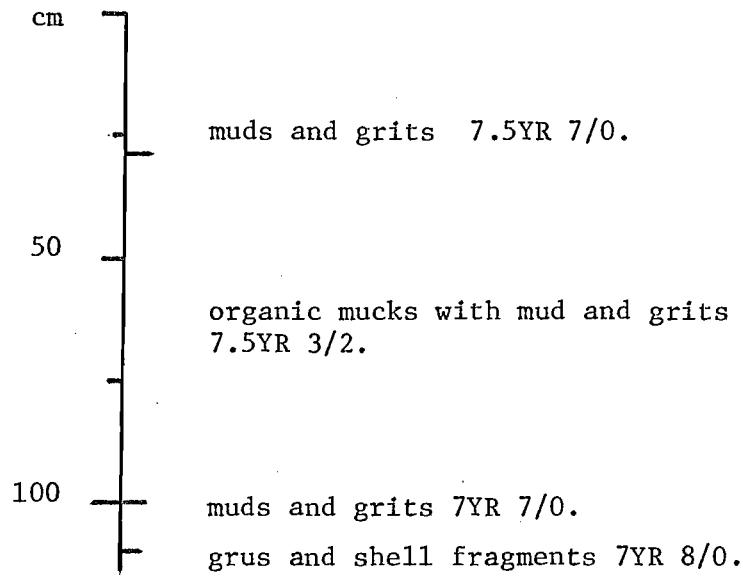


Figure 4.2 continued

Core 13 Landward edge of salt flat.

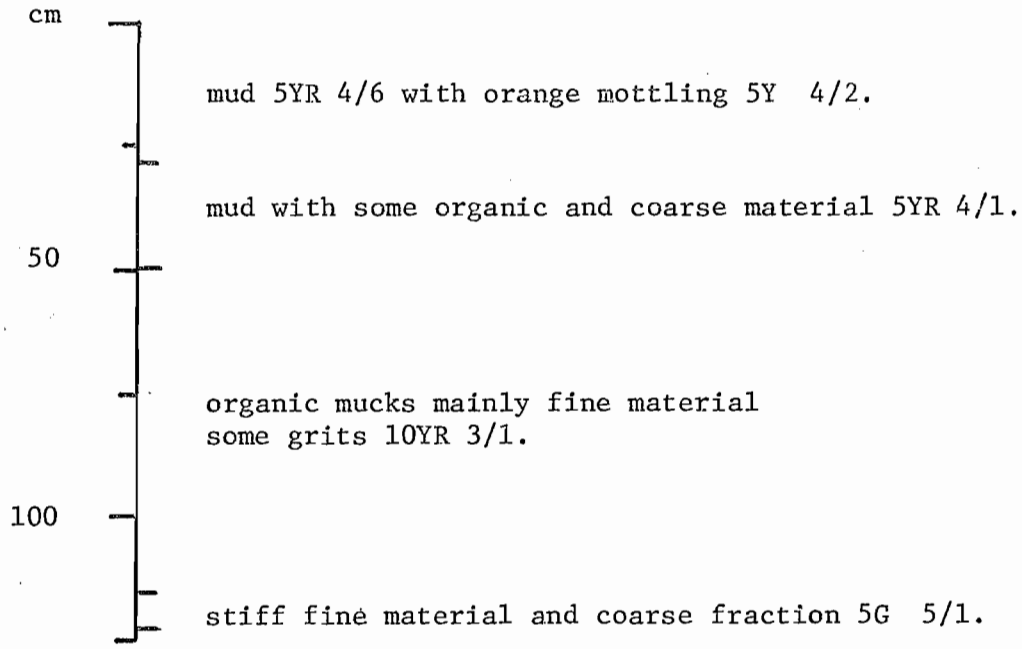
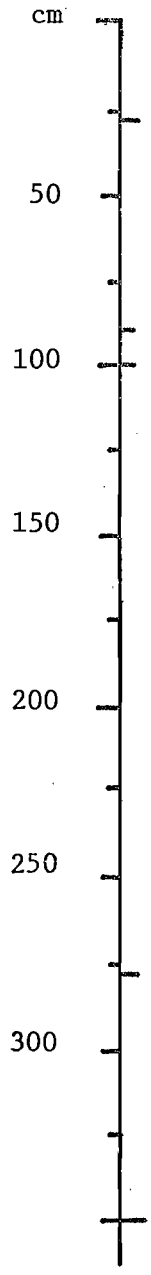


Figure 4.2 continued

Core 14 In front of granite cliffs.



muds 5YR 4/6 with some coarse material and orange mottling 5Y 4/2.

organic mucks and mud with some coarse material 10YR 3/1.

organic matter content reduced 5YR 3/1.

mud with coarse material and some shell fragments 2.5Y 4/0.

coarse material with fine matrix 2.5Y 6/0.

base

Figure 4.2 continued

Core 15 *Arthrocnemum/Ceriops* junction on seaward side of salt pan.

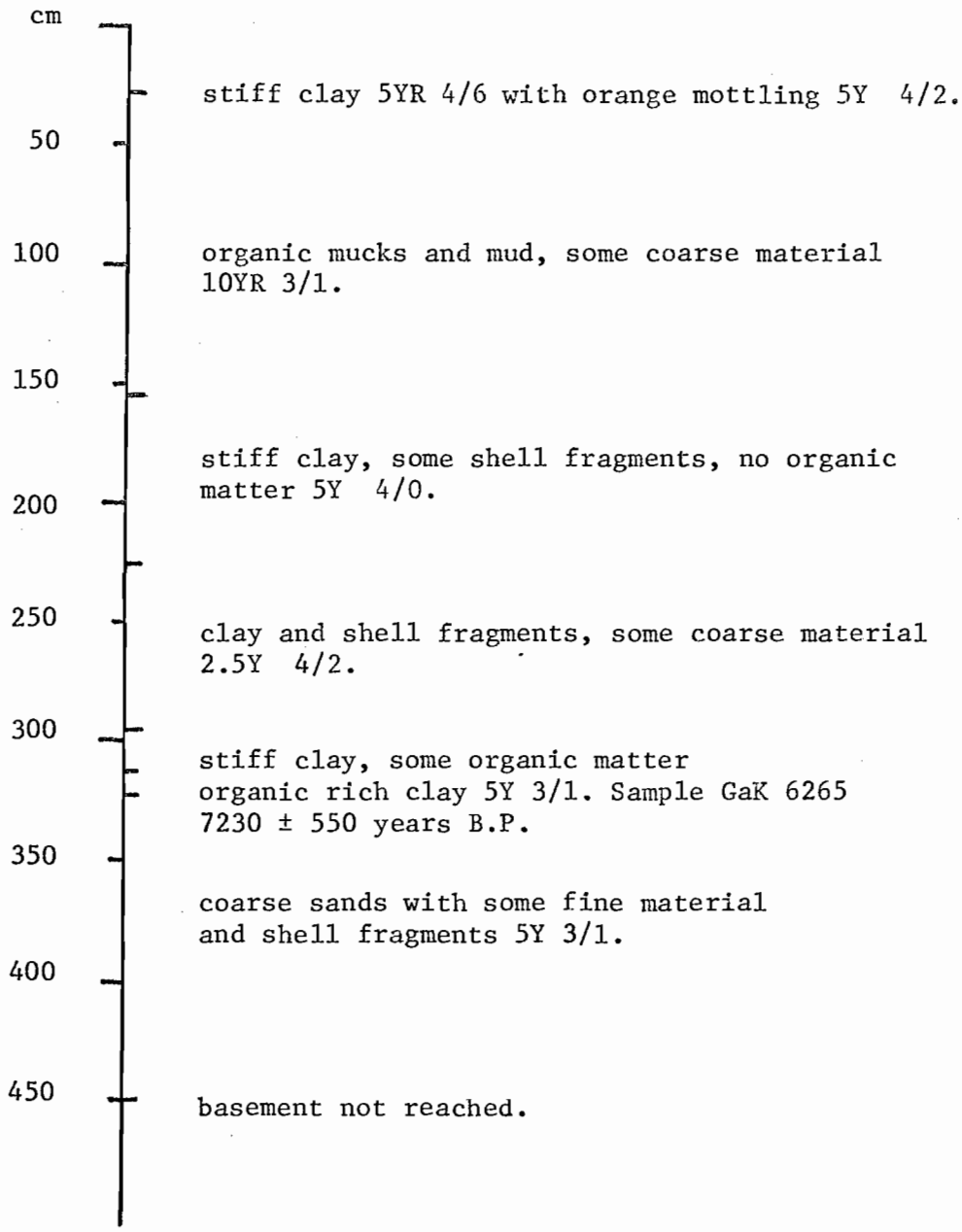


Figure 4.2 continued

Core 16 By beach chenier near West Point on bare salt flat.

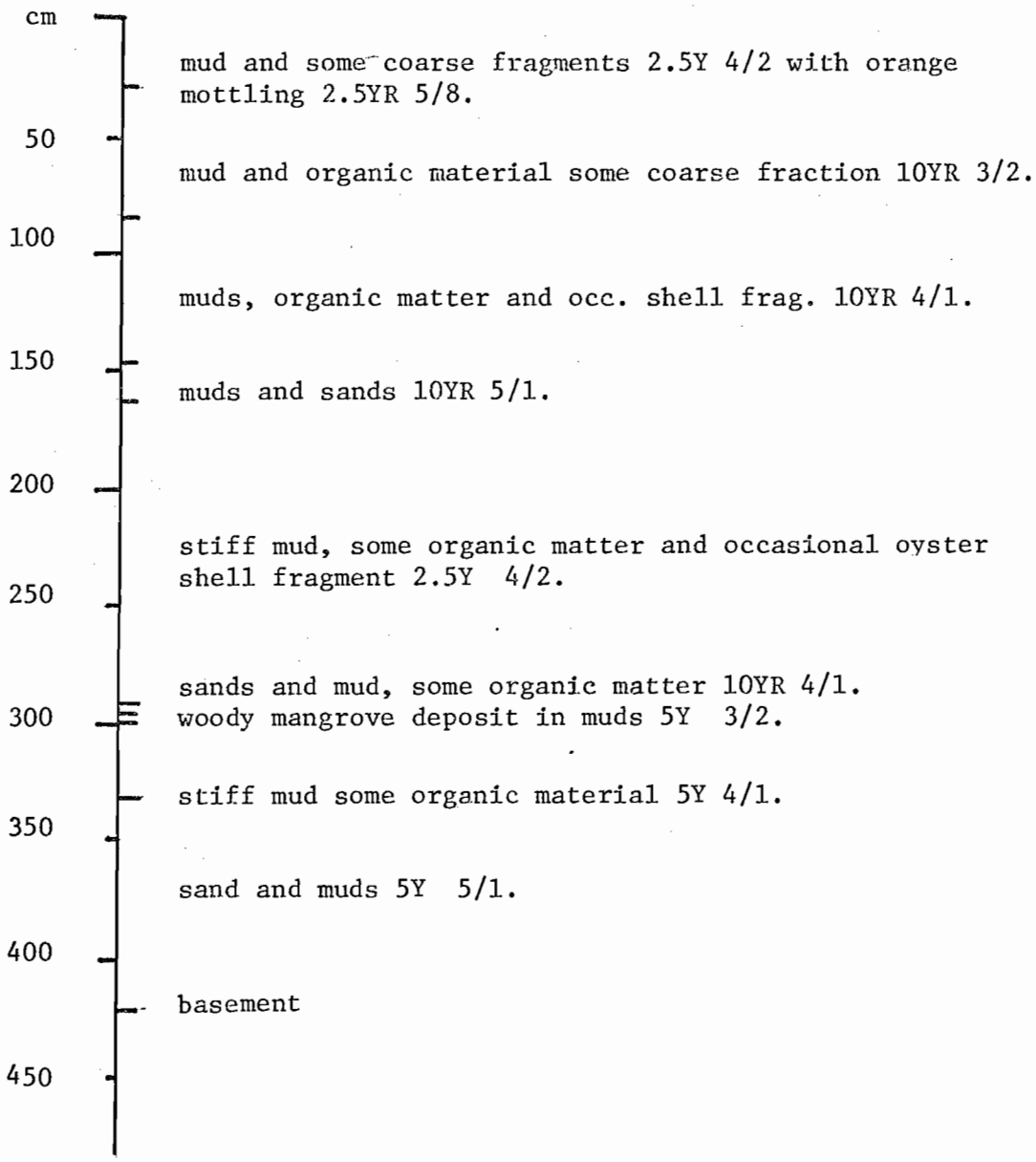


Figure 4.3 Core logs, Saunders Beach

Core 17 Left bank Althaus Creek, 1km upstream from mouth; edge of a *Sporobolus/Ceriops* zone.

cm

sand 10YR 4/3.

sand and fines, some organic material and mottling along roots 10YR 4/2.

sand and fines 2.5Y 4/3, some organic matter.

50

increase in fines with sand some organic matter 5Y 5/1.

100

as above 2.5Y 4/1.

increase in fines with sand and some organic matter 2.5Y 3/1.

150

sand and fines some organic matter 2.5Y 4/3.

sand 2.5Y 4/1

Core 18 Right bank of Althaus Creek 200m from landward edge of transect 1.

cm

oxidised muds and sands 10YR 5/3 - 2.5Y 5/2 with nodules 2.5YR 3/6.

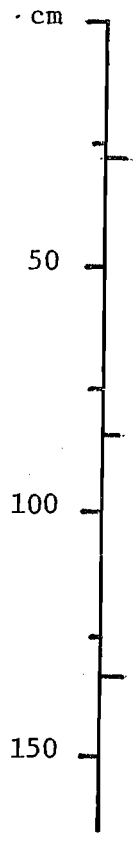
50

stiff clay some organic matter 2.5Y 6/o.

no further penetration.

Figure 4.3 continued

Hole 19 Right bank Althaus Creek on the second transect in mixed *Rhizophora/Bruguiera* zone.



sandy clay 5Y 3/2 with some oxidised organic matter 5Y 3/3.

increase in organic matter 5Y 3/1
no oxidation.

mud 5G 4/1 with rootlets and shell fragments at base.

sand and some mud 5Y 4/1.

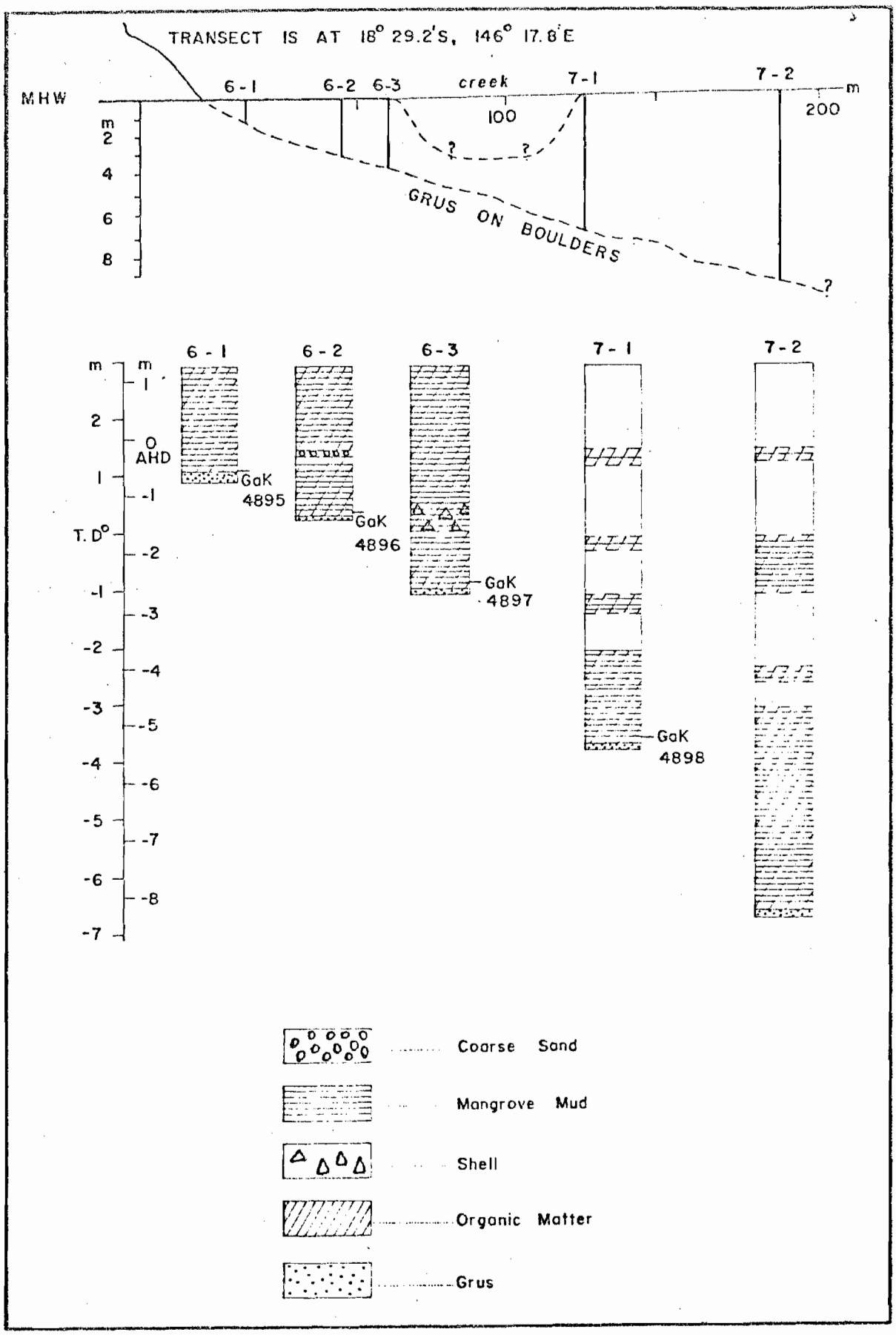


Figure 4.4 Core logs and their location, Hinchinbrook Island

Figure 4.5 Core Logs from Hinchinbrook Data

Hole 6-1 15m north of base of boulder strewn hillslope.

	cm	
		grey mud with root fibres and mangrove wood.
	50	ditto.
	100	ditto.
		ditto.
	150	ditto.
Sample 6-1		10 to 20cm grey or brown muddy peat over 0 to 10cm light grey clay rich weathered granite grus.
	200	Sample 6-1 is a composite of 8 pieces, each 5 to 10cm long at contact with weatherd granite. Depth 1.52 to 1.68m below present marsh surface. Once core had a modern 5mm diameter mangrove root which was discarded. Surface relief of 30cm on boulders or cobbles at base of peat and mud.

Sample 6-1 : GaK-4895 4680 ± 135 C_{14} years B.P.

Figure 4.5 continued

Hole 6-2 50m north of marsh edge, 15m south of top of creek bank in *Bruguiera* and *Rhizophora*

cm	
	dark grey sticky mud with black wood fragments.
50	dark grey soft mud 2mm live(?) root bottom of core.
100	soft runny grey mud. Bottom 5cm with 1cm x -section of red mangrove wood.
	20cm core; soft grey fibrous mud over 5cm fibrous dark brown peaty mud.
150	dark grey soft mud. 1cm layer of wood chips and v.c.sand 2.5cm from bottom.
	20cm woody, peaty mud over 20cm dark grey soft mud 1cm diameter red stick at contact.
200	dark grey soft mud with some root fibres.
250 Sample 6-2	dark grey peaty mud. Section shows numerous 2mm laminae of brown organic trash in mud.
	runny core penetrated 7cm in granite grus and clay. Sample 6-2 is a composite of 10 samples all from 2.44 to 2.6m. Collected basal 5 to 10cm of organic mud directly on grus or rock with 15cm relief.

Date 2180 ± 90 C_{14} years B.P., GaK-4896

Figure 4.5 continued

Hole 6.3 South of creek bank at base of a big *Bruguiera* on top of muddy slope about 60m north of hillslope.

cm

50

All cores grey still mud, cuts clean with knife. Chips of bark(?) at 8-11cm intervals. Pieces red brown, 2mm thick, horizontal in cores.

100

150

200

250

300

rare shell fragments in some holes, especially 2.7 to 3.2m.

350

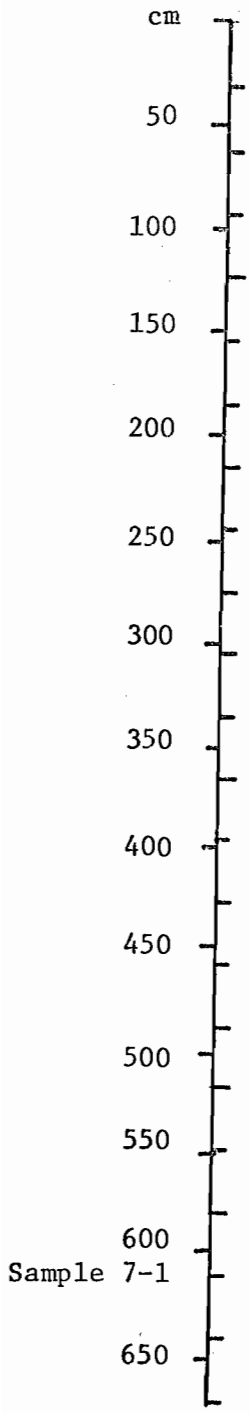
Sample 6-3
1350 ± 80 yrs B.P.

Sample 6-3 composite of 10 samples each organic mud and wood chips, bottom 10cm of 20cm cores.

Date 1350 ± 80 C_{14} years B.P., GaK-4897

Figure 4.5 continued

Hole 7.1 North shore of creek about 100m upstream of holes 6-1 to 6-3, behind *Rhizophora* channel fringe.



dark grey fibrous peaty mud.

soft grey mud sucked out of barrel.

dark grey mud with numerous thin layers of red brown plant fragments.

dark grey mud with numerous 2mm layers of finely divided organics. Bottom 5cm sandy and firm.

stiff grey mud and sand. Reddish wood fragments at base.

ditto large red wood fragments at base sandy top 5cm then stiff mud.

soft grey mud and V.C. sand grus dark grey.

part penetration plastic soft grey clay with abundant angular granite grus fragments.

Sample 7-1 10 to 12 core sections of organic mud with wood fragments mostly bottom of core.

Date 7130 ± 150 C_{14} years B.P., GaK-4898

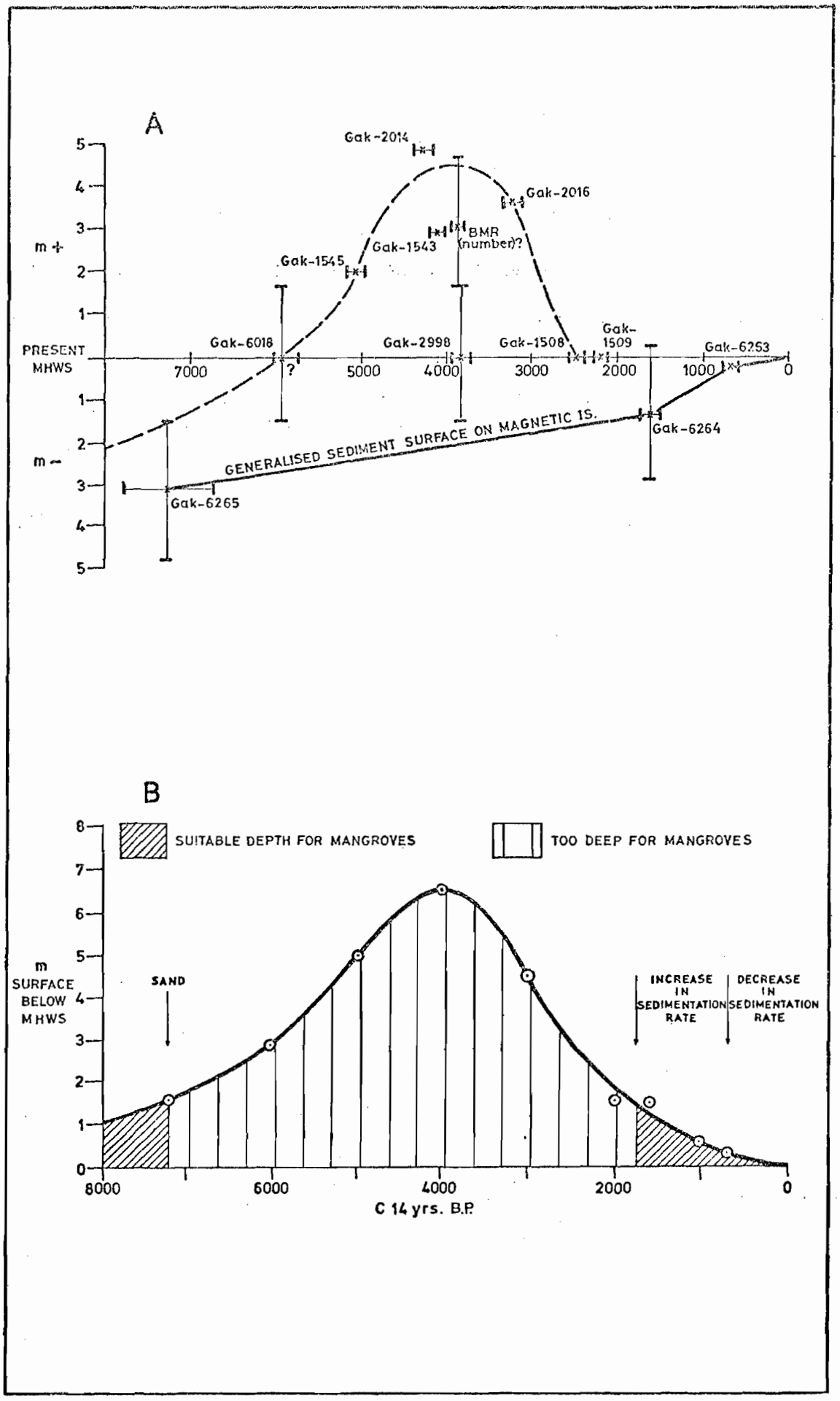
Figure 4.5 continued

Hole 7-2 60m north of 7-1 land surface about 30cm higher than 7-1 in *Rhizophora/Bruguiera* grove.

cm	
50	
100	
150	
	stiff grey mud with root fibres and red wood fragments.
200	
250	
300	stiff grey mud with
350	thin layers of very fine sand and organic trash
400	finely divided.
450	
500	
550	stiff grey mud with abundant red and black wood fragments.
600	
650	soft grey mud flowed from barrel. stiff olive grey plastic mud.
700	as above organic fragment at base.
	disturbed core.
750	stiff grey mud with red or black wood (bark?) fragments.
800	grey clay
850	very smooth,
900	stiff.
	dark grey peaty mud with very fine or medium sand and
950	blackwood fragments. runny grey sand. grus light grey.

Figure 4.6 (a) Generalized sea-level curve for the Townsville area.

(b) Hypothesized relationship between the sediment surface and mean high water spring tides, Magnetic Island.


A
Gak-2014
Gak-2016
BMR (number)?
Gak-1543
Gak-1545
Gak-6018
Gak-2998
Gak-1508
Gak-1509
Gak-6263
Gak-6264
Gak-6265
GENERALISED SEDIMENT SURFACE ON MAGNETIC IS.
PRESENT MHWS
m +
m −
7000
5000
4000
3000
2000
1000
0
B
SUITABLE DEPTH FOR MANGROVES
TOO DEEP FOR MANGROVES
m SURFACE BELOW MHWS
SAND
INCREASE IN SEDIMENTATION RATE
DECREASE IN SEDIMENTATION RATE
8000
6000
4000
2000
0
C 14 yrs. B.P.

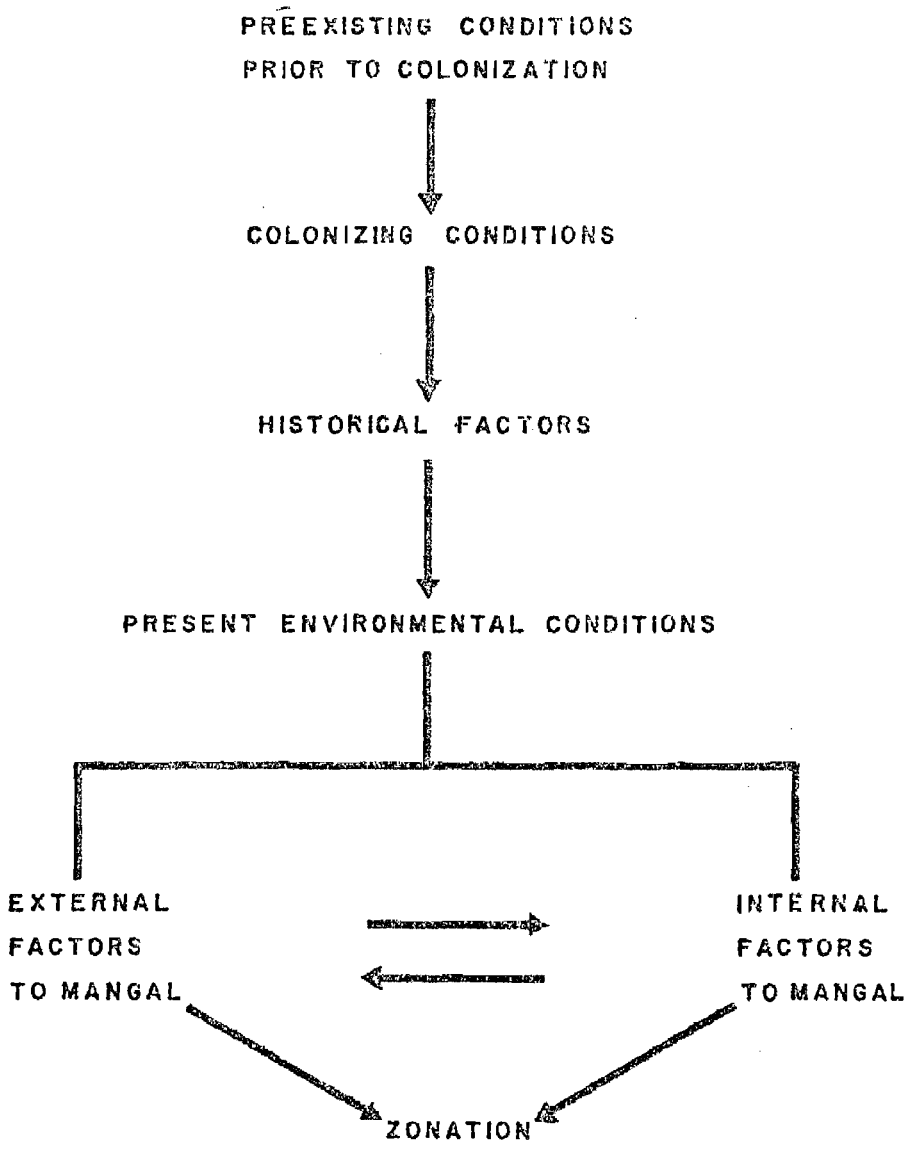


Figure 5.1 Sequential Factors Influencing the Development of Mangals

Sequential factors influencing the development of mangals

Factors influencing the zonation of mangroves

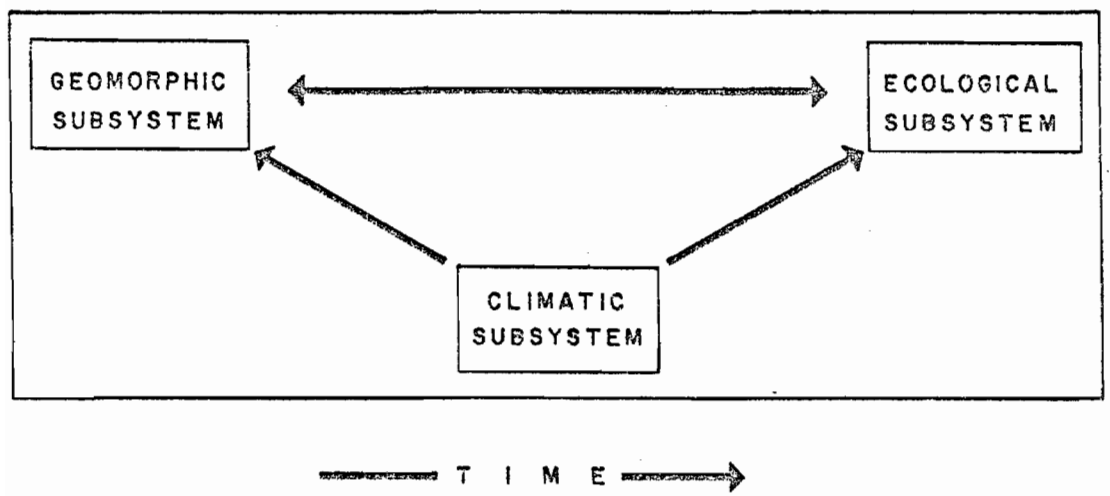


Figure 5.2 Factors Influencing the Zonation of Mangroves

Figure 5.3 Interaction within mangals in the Townsville region

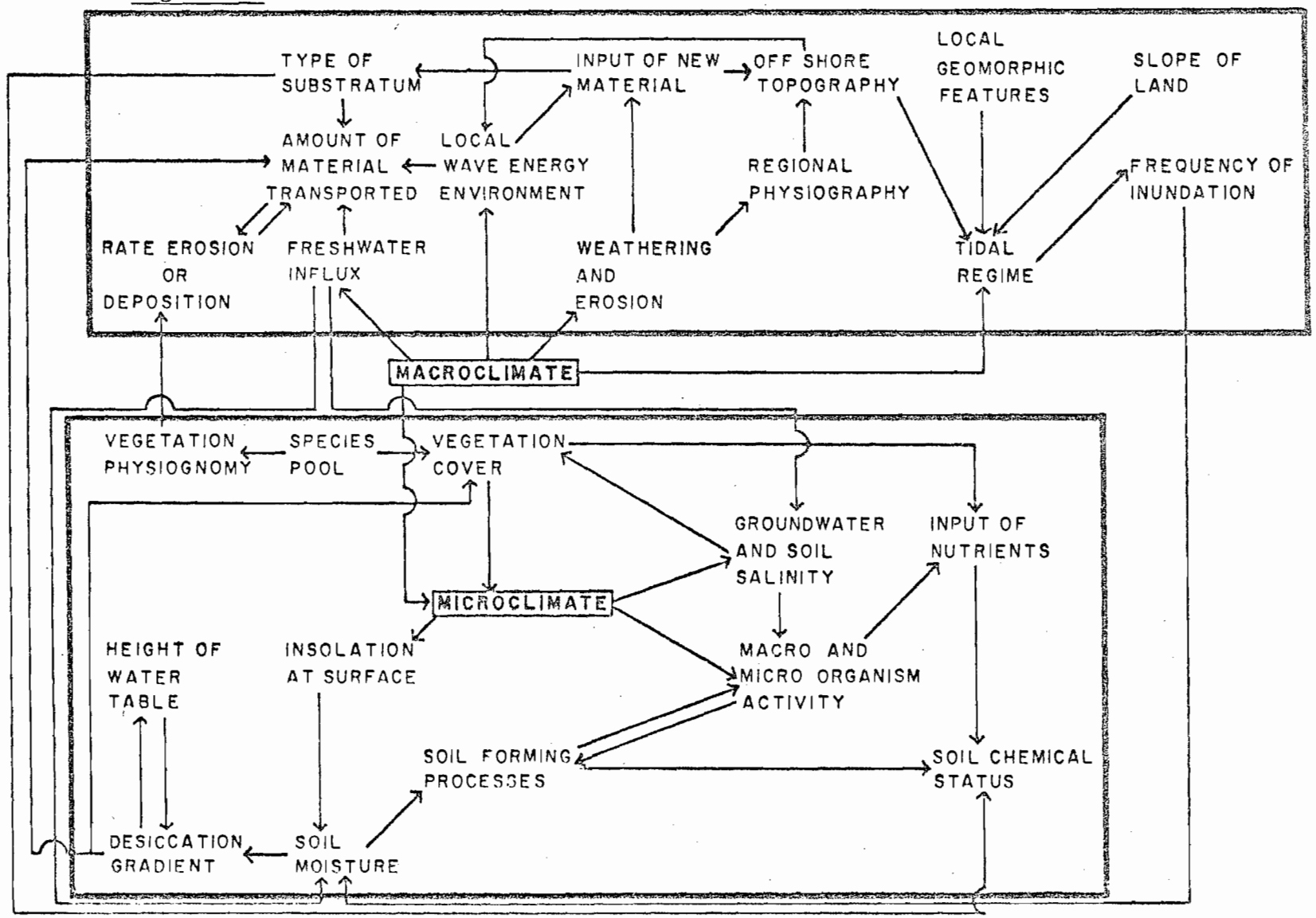


TABLE 1.1

LIST OF SPECIES

AIZOACEAE

Sesuvium portulacastrum L.

CHENOPODIACEAE

Arthrocnemum halocnemoides Nees var. *pergranulatum* J.M. Black

A. leiostachyum Benth. Paulsen

Suaeda maritima L.

EUPHORBIACEAE

Excoecaria agollocha L.

MELIACEAE

Xylocarpus australisicum Ridl.

X. granatum Koen.

MYRTACAE

Osbornia octodonta F.v.M.

SONNERATIA

Sonneratia alba J.E. Smith

RHIZOPHORACEAE

Bruguiera exaristata Ding Hou

B. gymnorrhiza (L.) Lamk.

Ceriops tagal (Perr.) C.B. Rob.

Rhizophora lamarkii Montr.

R. stylosa Griff.

COMBRETACEAE

Lumnitzera racemosa Willd.

MYRSINACEAE

Aegiceras corniculatum (L.) Blanco.

PLUMBAGINACEAE

Aegialitis annulata R. Br.

RUBIACEAE

Scyphiphora hydrophyllacea Gaertn.

VERBENACEAE

Avicennia eucalyptifolia Zip ex Miq.

POACEAE

Sporobolus virginicus L.

TABLE 1.2

AVERAGE SPACING OF PNEUMATOPHORES OF
Avicennia eucalyptifolia and *Sonneratia alba*

Seaward Fringe

	<1m from tree trunk	>3m from tree trunk
A. eucalyptifolia	2.26cm	5.96cm
S. alba	3.19cm	6.52cm

Upper Intertidal Slope

	<1m from tree trunk	>3m from tree trunk
A. eucalyptifolia	3.69cm	3.98cm

TABLE 2.1 ACTUAL TIDE LEVELS, TOWNSVILLE HARBOUR, OCTOBER 1973 TO DECEMBER 1975, INCLUSIVE.

	J-M	%	Cum. %	A-J	%	Cum. %	J-S	%	Cum. %	O-D	%	Cum. %	TOTAL	%	Cum. %
3.8	5	1.45	1.45										5	0.31	0.31
.7	3	0.87	2.32							1	0.19	0.19	4	0.25	0.56
.6	8	2.32	4.64				2	0.56	0.56	2	0.30	0.57	12	0.76	1.32
3.5	9	2.61	7.25	5	1.42	1.42	5	1.4	1.96	1	0.19	0.76	20	1.26	2.58
3.4	1	0.29	7.54	1	0.28	1.7	8	2.24	4.2	8	1.51	2.27	18	1.13	3.71
.3	11	3.19	10.73	11	3.12	4.82	3	0.84	5.04	6	1.13	3.4	31	1.95	5.66
.2	7	2.03	12.76	11	3.12	7.94	7	1.96	7.0	7	1.32	4.72	32	2.02	7.68
.1	20	5.80	18.56	13	3.68	11.62	5	1.4	8.4	23	4.33	9.05	61	3.85	11.53
3.0	23	6.67	25.23	25	7.08	18.7	11	3.08	11.48	32	6.03	15.08	91	5.74	17.27
2.9	18	5.22	30.45	23	6.51	25.21	22	6.16	17.64	31	5.84	20.92	94	5.93	23.2
.8	22	6.35	36.83	25	7.08	32.29	20	5.6	23.24	35	6.59	27.51	102	6.43	29.63
.7	18	5.22	42.05	29	8.21	40.5	23	6.42	29.66	36	6.78	34.29	106	6.68	36.31
.6	28	8.12	50.17	31	8.78	49.28	20	5.6	35.26	55	10.36	41.65	134	8.45	44.76
2.5	29	8.40	58.57	28	7.93	57.21	19	5.32	40.8	42	7.91	52.56	118	7.44	52.2
2.4	25	7.25	65.82	25	7.08	64.29	15	4.20	44.78	46	8.66	61.22	111	7.00	59.2
.3	27	7.83	73.65	22	6.23	70.52	30	8.4	53.18	38	7.16	68.38	117	7.38	66.58
.2	31	8.99	82.64	22	6.23	76.75	28	7.84	61.02	31	5.84	74.22	112	7.06	73.64
.1	20	5.80	88.44	18	5.10	81.85	31	8.68	69.7	28	5.28	79.5	97	6.12	79.76
2.0	17	4.93	93.37	10	2.83	84.68	38	10.64	80.34	22	4.14	83.64	86	5.42	85.18
1.9	8	2.32	95.69	15	4.25	88.93	20	5.6	85.94	19	3.58	87.22	62	3.91	89.09
.8	8	2.32	98.01	11	3.12	92.05	26	7.28	93.32	13	2.45	89.67	58	3.66	92.75
.7	3	0.87	98.88	12	3.40	95.45	14	3.92	97.14	18	3.39	93.06	47	2.96	95.71
.6	1	0.29	99.17	8	2.27	97.72	5	1.4	98.54	16	3.01	96.07	30	1.89	97.6
1.5	2	0.58	99.75	6	1.7	99.42	5	1.4	99.94	14	2.64	98.71	27	1.7	99.3
1.4				1	0.28	99.7				6	1.13	99.84	7	0.44	99.74
1.3	1	0.29	100.04	1	0.28	99.98				1	0.19	100.03	3	0.19	99.93
TOTAL	345			353			357			531			1586		

TABLE 2.2

MAGNETIC ISLAND SEDIMENT DATA

STATION	MEAN	SORTING	SKEWNESS	KURTOSIS	% CARBONATE
1-1	0.45956	1.39038	0.87016	3.42852	1.5
2	0.29380	1.43102	0.78622	3.18227	
3	-0.34732	1.38818	0.69560	3.11740	
2-1	0.99115	1.53578	0.75735	2.71435	5.0
2	1.77775	1.47215	0.28125	2.24131	
3	0.77410	1.42577	0.79258	3.02062	
3-1	1.04895	1.47392	0.70214	2.69973	7.0
2	1.11511	1.54090	0.76206	2.64236	
3	1.44794	1.96250	0.54966	1.84158	
4-1	0.96435	1.43583	0.74400	2.99765	3.9
2	0.81947	1.51839	1.00744	3.34337	
3	0.60534	1.41431	1.02305	3.57497	
5-1	0.94386	1.48699	0.92334	3.10414	4.3
2	0.60673	1.34865	1.06253	3.74615	
3	0.62255	1.34276	1.05001	3.79893	
6-1	0.54215	1.45300	1.17533	3.82663	0.7
2	0.46815	1.40011	1.08111	3.98019	
3	0.51195	1.38669	1.13591	3.85125	
7-1	0.70300	1.57516	0.93776	3.05570	2.9
2	1.26803	1.62396	0.58643	2.29584	
3	0.71300	1.43012	0.93211	3.36189	
8-1	1.09659	1.54505	0.70206	2.60461	4.3
2	1.05710	1.56797	0.77115	2.71006	
3	1.26922	1.61218	0.61430	2.30499	
9-1	1.59364	1.56370	0.46499	2.06245	6.9
2	1.37337	1.60466	0.39461	2.15345	
3	1.56319	1.60907	0.26552	1.97540	
10-1	1.89403	1.59313	0.12946	1.83152	11.9
2	1.51070	1.49636	0.26019	2.10064	
11-1	2.16565	1.59245	-0.09673	1.84330	11.8
2	1.79385	1.57187	0.10198	2.03818	

TABLE 2.3

SAUNDERS BEACH SEDIMENT DATA

STATION	MEAN	SORTING	SKEWNESS	KURTOSIS	% CARBONATE
12-1	2.20370	1.20393	0.15340	2.39824	2.5
2	2.09761	1.36100	0.28303	2.13668	
3	2.38971	1.24923	0.21459	2.23013	
13-1	2.48845	1.28427	0.05609	2.09250	1.0
2	2.40536	1.11389	0.12058	2.56918	
3	2.41765	1.15421	0.07288	2.39558	
14-1	2.26203	1.09641	0.76044	2.82355	1.9
2	1.87246	0.82234	0.90928	5.57511	
3	2.41806	1.11700	0.36844	2.34201	
15-1	3.26877	1.42827	-1.05010	3.21465	4.7
2	2.91714	1.45207	-0.57750	2.36683	
3	3.26292	1.57114	-1.08152	3.19910	
16-1	3.20703	1.49343	-0.66476	2.01363	7.0
2	2.73255	1.66640	-0.31867	1.72031	
3	2.65680	1.52344	-0.09586	1.66658	
17-1	3.62049	1.39062	-1.30970	3.21408	5.8
2	2.89966	1.59142	-0.46312	1.77934	
3	2.89980	1.59683	-0.41240	1.73272	
18-1	2.07817	0.96351	-0.51819	3.23574	4.9
2	2.13411	0.93713	-0.44883	3.22548	
3	2.11261	0.74791	-0.51960	4.05301	
19-1	2.07856	1.23883	0.37307	2.28332	2.9
2	1.68355	1.35550	0.29925	2.41591	
3	1.90600	1.29743	0.49925	2.38531	
20-1	2.17318	0.94538	-0.52154	3.92203	2.8
2	1.52304	1.10979	0.46318	2.19859	
3	2.16097	1.07479	0.06475	2.79656	
21-1	1.92082	1.04320	0.20253	3.23033	4.2
2	1.97465	1.05325	0.34785	3.21048	
3	1.94594	1.14328	0.34658	3.33577	

TABLE 2.4

ORPHEUS ISLAND SEDIMENT DATA

STATION	MEAN	SORTING	SKEWNESS	KURTOSIS	% CARBONATE
R1	1.81508	1.57474	0.11124	1.86035	68.8
R2	1.36906	1.73134	0.52880	2.14739	55.0
R3	0.96980	0.83465	-0.03996	3.19406	31.8
R4	0.00309	0.75531	0.69437	4.87904	37.9
R5	0.27322	1.02590	0.70299	3.76289	38.0

TABLE 2.5

WHOLE ROCK ANALYSIS OF ROCK AND SOIL SAMPLES

	Adamellite (after Stephenson 1970)	Bare Flat				Lower Tidal
		Surface	10cm	20cm	30cm	Flat Surface
	%	%	%	%	%	%
SiO_2	73.1	64	59.2	62.8	64.4	60.0
TiO_2	0.32	0.47	0.4	0.44	0.26	0.46
Al_2O_3	13.9	11.4	10.0	10.2	9.8	10.4
ΣFe_2O_3	0.92	2.56	2.16	1.8	1.0	2.16
FeO	0.94					
MnO	0.11	0.063	0.056	0.058	0.041	0.062
MgO	0.30	3.06	0.95	0.85	0.58	0.88
CaO	0.35	0.42	0.4	0.4	0.4	6.2
Na_2O	4.3	4.25	6.0	5.2	4.5	3.0
K_2O	4.65	2.82	2.67	2.92	3.22	3.26
P_2O_5	0.05					
H_2O+	0.96					
H_2O-	0.14					
CO_2	<0.01					
Sr[1]		300	320	276	276	960
Ca[1]		3	4	4	1	4
Ni[1]		not detected				
Co[1]		not detected				
Pb[1]		not detected				
Zn[1]		34	24	25	16	37

[1] - p.p.m.

Table 3.1 Station 1 Chemical Data

MAGNETIC ISLAND CERIOPS LANDWARD ZONE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	5.50	6.30	16.50	1.98	28.27	1.28	2.48	15.14	1.74	0.26	3.67	3.46
	6.00	6.80	25.00	3.59	60.89	2.58	4.41	38.04	2.61	0.51	5.33	5.67
	5.00	6.30	36.00	2.52	60.89	2.48	4.41	40.65	3.83	0.55	6.00	7.18
FEBRUARY												
	6.20	7.50	14.00	1.04	38.26	17.28	6.47	17.28	1.74	0.21	5.25	4.47
	6.20	6.20	41.60	3.65	95.65	34.07	7.39	34.07	1.91	0.28	6.99	7.24
	4.80	6.30	42.80	8.34	95.66	47.22	11.08	47.72	2.44	0.37	10.50	7.44
MARCH												
	6.30	3.50	12.00	0.00	56.55	1.28	2.00	13.99	1.03	0.43	2.79	3.82
	6.30	3.70	33.00	0.00	97.88	1.87	2.50	18.11	2.61	0.54	3.51	5.86
	4.50	4.20	19.00	0.21	76.12	1.66	2.24	13.99	2.35	0.49	3.91	5.66
APRIL												
	6.80	7.10	18.00	0.00	96.14	2.20	0.50	22.22	1.11	0.40	3.19	5.26
	6.80	7.50	28.70	0.00	210.98	4.04	3.49	39.50	4.09	1.25	5.19	8.62
	6.30	8.00	40.20	0.83	141.38	4.04	2.99	36.21	7.97	0.65	5.19	8.62
MAY												
	6.80	8.10	30.00	1.77	141.38	3.28	2.50	24.69	2.49	0.57	4.79	7.63
	6.20	6.80	48.50	3.33	300.15	5.61	3.99	52.67	4.23	0.78	5.43	8.22
	6.20	7.70	51.50	3.85	208.80	4.35	3.59	42.80	2.10	0.54	3.67	5.26
JUNE												
	6.50	7.70	51.00	2.50	252.30	5.27	2.50	36.62	2.37	0.55	3.79	5.76
	6.20	6.60	75.00	3.95	417.60	7.68	4.99	50.84	5.12	0.98	5.39	8.23
	5.10	5.80	65.00	4.78	487.20	9.57	12.74	71.19	6.47	0.92	6.39	9.67
JULY												
	6.20	8.00	25.50	1.15	169.65	3.74	1.80	43.62	0.97	0.37	2.50	3.29
	6.20	7.30	29.00	1.48	267.09	3.23	2.74	23.04	2.71	0.65	2.55	4.84
	6.00	8.10	49.00	2.99	387.15	6.66	4.59	50.20	4.49	0.90	4.99	7.47
AUGUST												
	6.10	6.50	16.00	1.31	111.36	2.51	1.25	13.99	1.77	0.39	2.20	3.95
	5.00	5.30	50.10	3.94	367.14	6.55	3.94	48.14	4.87	0.69	4.59	7.37
	4.70	5.10	58.00	4.60	334.95	6.86	3.69	53.33	4.35	0.69	4.89	7.37
SEPTEMBER												
	6.30	6.70	41.50	2.59	248.56	5.48	2.54	36.62	1.71	0.45	3.79	5.72
	6.20	6.30	65.00	4.02	321.03	6.45	3.44	38.72	4.87	0.71	4.89	8.49
	5.50	5.60	65.50	5.89	503.53	11.42	5.44	77.53	8.53	0.98	6.73	11.48
OCTOBER												
	6.60	6.80	45.00	2.93	365.40	7.81	2.48	65.84	1.99	0.34	3.68	5.59
	6.00	6.10	38.50	1.95	313.20	6.08	3.10	49.38	3.58	0.60	4.30	7.24
	5.00	5.60	45.50	2.31	400.20	8.10	4.13	65.84	5.96	0.71	6.14	10.20
NOVEMBER												
	6.70	7.30	41.00	3.93	313.54	6.82	3.00	64.01	1.57	0.32	3.71	5.17
	6.40	7.60	37.00	2.67	297.86	5.05	3.47	45.72	2.92	0.49	4.18	6.01
	6.20	6.50	45.00	2.71	391.92	7.32	5.13	64.01	4.10	0.64	5.57	8.69
DECEMBER												
	7.20	7.60	8.00	0.74	293.96	6.35	1.90	47.42	2.62	0.43	4.17	6.76
	6.40	6.60	72.00	6.35	821.05	14.45	5.53	117.83	5.43	0.75	4.94	8.95
	5.80	6.30	44.50	2.42	486.55	8.58	2.85	68.98	3.82	0.54	4.06	7.67

Table 3.2 Station 2 Chemical Data

MAGNETIC ISLAND LANDWARD ARTHROCNEMUM ZONE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	6.60	8.10	39.50	9.20	158.77	6.27	3.89	107.80	4.18	0.91	4.67	9.68
	5.50	6.80	50.20	5.20	102.22	2.10	3.03	42.00	2.78	0.84	4.00	4.33
	5.50	6.80	40.50	7.55	104.39	2.46	4.41	52.66	2.61	0.91	4.00	4.67
FEBRUARY												
	7.70	8.70	68.20	13.96	197.83	78.18	9.24	78.18	2.44	0.50	4.37	9.87
	7.10	8.00	33.60	15.63	161.74	49.21	9.24	49.21	2.09	0.51	4.37	6.06
	6.00	6.50	35.80	4.17	132.61	44.44	8.32	44.44	1.91	0.49	3.50	5.27
MARCH												
	6.70	4.80	37.00	2.29	219.68	4.89	3.99	58.43	1.53	0.87	4.63	7.50
	2.80	4.10	45.00	2.50	210.98	3.20	4.74	43.29	2.61	1.19	2.95	5.53
	3.10	4.80	46.00	1.87	160.95	2.46	4.49	28.80	2.61	1.12	3.15	6.12
APRIL												
	7.00	8.10	88.90	9.26	563.33	12.29	3.69	213.98	1.79	0.68	7.18	10.13
	6.80	8.30	37.00	0.52	195.75	3.51	2.00	46.91	2.77	1.12	2.40	5.92
	6.60	8.30	30.00	0.00	154.42	2.05	2.40	27.16	3.51	1.12	2.59	5.92
MAY												
	6.30	8.30	81.50	7.28	456.75	9.32	3.59	135.63	3.98	1.16	4.49	10.72
	6.50	8.00	33.00	1.87	187.05	2.84	2.79	32.98	2.37	0.95	2.63	5.13
	6.50	8.10	29.50	1.66	195.75	2.30	2.79	33.74	2.61	1.04	2.83	5.46
JUNE												
	6.50	8.00	103.00	9.57	743.85	13.31	3.74	148.96	6.89	1.49	5.39	13.49
	6.50	7.50	46.00	1.77	308.85	4.25	3.04	39.50	3.13	1.22	2.50	4.74
	5.80	8.00	43.00	2.39	300.15	3.58	3.24	36.62	4.14	1.49	3.19	5.99
JULY												
	7.30	9.00	62.50	4.27	522.00	10.03	3.69	80.16	0.97	1.16	3.97	6.91
	7.00	8.30	32.50	1.48	356.70	3.74	3.04	32.92	2.71	1.20	2.55	5.00
	6.50	8.70	37.00	2.17	400.20	4.04	3.44	39.09	4.49	1.47	3.29	5.89
AUGUST												
	7.30	7.50	81.50	2.60	652.50	12.65	4.24	116.45	3.58	1.02	4.59	10.40
	6.30	5.90	49.00	7.23	334.95	4.45	3.39	36.62	4.11	1.26	2.59	9.28
	6.40	6.70	45.00	2.60	334.95	4.20	3.39	40.33	3.82	1.26	2.59	4.93
SEPTEMBER												
	7.20	7.70	105.50	9.09	838.94	18.79	4.19	169.70	2.92	1.33	5.75	8.92
	7.10	7.20	37.50	2.54	321.03	4.76	3.24	44.03	3.65	1.47	2.51	5.33
	4.60	5.90	43.50	2.54	341.74	5.22	3.24	49.38	4.14	1.51	2.51	5.33
OCTOBER												
	6.50	6.90	136.50	14.74	1252.80	23.72	4.54	345.66	3.18	0.98	5.53	9.54
	6.60	7.30	34.50	1.72	330.60	5.21	2.89	45.27	4.17	1.46	1.84	5.92
	6.60	7.30	32.50	1.21	278.40	4.34	2.48	37.04	3.58	1.21	2.15	5.92
NOVEMBER												
	6.90	7.10	136.50	10.49	1018.99	20.22	7.61	265.18	2.19	0.82	4.64	10.34
	6.80	7.30	39.50	2.16	313.54	4.30	3.64	39.62	3.24	1.05	2.78	5.87
	6.60	7.00	33.00	1.69	266.51	3.29	3.64	33.53	2.82	0.86	2.32	5.17
DECEMBER												
	7.80	8.20	53.00	7.88	527.10	12.07	2.21	112.08	1.81	0.79	4.50	7.12
	6.90	7.40	30.50	3.20	354.78	5.88	2.53	48.86	3.22	1.11	2.20	5.30
	5.70	7.10	40.50	3.68	415.59	6.83	2.53	58.92	3.22	1.22	2.41	5.30

Table 3.3 Station 3 Chemical Data

MAGNETIC ISLAND SALT FLAT CHEMICAL DATA 1975

PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY											
8.10	8.70	52.30	12.69	147.02	4.91	5.51	98.75	2.44	0.79	4.00	11.78
7.00	8.30	66.20	12.27	173.99	4.91	5.51	111.09	3.65	1.28	4.00	10.09
4.10	5.00	151.30	21.11	182.69	3.96	6.07	223.82	4.70	0.91	6.67	6.81
FEBRUARY											
8.50	10.10	59.80	9.38	206.52	80.65	9.24	80.65	1.91	0.47	4.37	12.05
7.70	9.90	73.60	9.27	250.00	97.10	11.09	97.10	2.44	0.61	4.37	10.93
6.60	7.30	113.60	30.22	260.87	246.87	14.78	246.87	2.61	0.36	6.12	4.34
MARCH											
5.40	7.10	78.50	3.74	482.85	8.12	4.99	104.52	3.92	1.22	3.35	13.46
5.80	7.70	95.00	4.68	443.70	5.43	5.49	110.28	3.92	1.36	3.15	10.38
6.50	8.10	106.50	7.90	528.52	6.32	4.24	129.21	5.03	1.39	3.71	6.71
APRIL											
10.70	8.70	91.00	3.43	613.35	12.67	6.59	168.72	4.38	1.41	5.19	16.45
10.10	9.00	52.80	1.87	376.28	4.43	3.49	81.97	3.62	1.15	2.20	9.08
9.20	9.20	68.80	2.70	498.08	5.12	2.79	120.98	4.66	1.32	2.79	6.78
MAY											
8.30	9.00	98.00	8.32	606.82	12.29	5.49	160.48	3.48	1.19	6.87	17.24
8.00	8.50	67.50	4.58	232.72	5.45	3.59	106.17	3.98	1.24	3.03	11.71
7.50	7.50	70.00	5.41	487.20	4.91	2.79	119.34	4.11	1.28	3.03	7.70
JUNE											
8.50	8.70	85.50	6.55	682.95	12.49	3.89	120.98	3.69	1.45	3.79	17.77
8.10	8.70	76.00	4.68	604.65	6.81	3.39	89.71	4.94	1.61	2.50	10.86
7.00	8.10	83.00	10.50	661.20	6.81	3.04	107.81	6.09	2.51	5.59	8.42
JULY											
7.50	9.20	93.00	7.22	761.25	12.90	5.29	139.91	3.10	1.47	3.99	14.21
8.00	8.70	76.00	6.03	693.39	7.94	3.44	108.64	3.31	1.75	3.29	10.43
6.60	6.60	120.50	3.94	1004.85	11.62	3.99	189.29	4.07	1.47	4.99	7.11
AUGUST											
8.40	8.70	56.50	4.08	661.20	10.75	6.09	94.64	3.58	1.24	2.79	15.23
6.70	7.30	77.50	4.91	661.20	7.17	4.04	97.11	4.87	1.43	2.40	10.00
6.20	6.10	97.50	6.57	752.55	8.04	4.04	133.44	6.40	1.33	2.99	7.57
SEPTEMBER											
8.20	8.80	85.50	6.63	756.03	14.74	5.09	132.01	3.65	1.37	3.29	14.71
7.80	7.20	67.00	5.27	600.74	7.37	3.44	92.18	4.63	1.61	1.96	8.29
5.60	5.50	120.00	11.31	911.41	12.39	3.44	184.35	5.60	1.33	3.79	4.67
OCTOBER											
7.80	8.00	155.00	11.70	1496.40	23.43	5.78	288.05	6.36	1.33	6.14	16.12
7.80	7.50	61.50	2.96	609.00	7.81	3.72	90.53	4.17	1.42	2.46	10.86
5.30	4.60	120.50	11.12	1140.40	16.49	4.54	209.86	8.75	1.26	5.22	9.21
NOVEMBER											
8.30	8.60	152.50	15.43	1175.76	20.47	8.76	237.74	3.45	1.10	6.96	15.03
7.90	8.20	69.50	4.51	564.36	6.57	4.30	88.39	3.34	1.03	2.55	9.40
6.60	7.30	125.50	16.80	1034.67	13.65	5.79	237.94	5.12	1.01	5.34	6.58
DECEMBER											
8.60	8.50	71.50	5.30	770.37	13.03	4.11	119.27	3.42	1.04	2.52	14.44
8.10	8.10	73.50	5.30	810.92	10.80	2.21	117.83	4.22	1.36	2.09	9.50
7.50	7.80	84.50	7.09	800.79	10.17	1.90	127.89	5.63	1.61	2.20	7.49

Table 3.4 Station 4 Chemical Data

MAGNETIC ISLAND SEAWARD ARTHROCNEMUM ZONE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	7.70	9.40	58.30	13.73	132.67	3.63	3.31	81.96	4.87	0.73	4.00	7.04
	6.80	9.40	31.90	5.37	95.30	1.82	3.31	41.97	3.48	0.97	4.00	5.42
	6.60	8.00	32.70	5.46	141.37	2.71	3.86	59.25	5.05	1.07	5.01	6.81
FEBRUARY												
	6.50	7.30	41.60	7.06	173.91	62.87	9.24	62.87	1.39	0.37	3.50	7.01
	4.20	3.60	29.60	0.21	154.35	43.61	10.16	43.61	2.09	0.51	4.37	5.79
	2.50	3.00	48.60	5.21	228.26	62.87	12.01	62.87	2.61	0.62	6.12	7.01
MARCH												
	7.10	9.20	56.00	2.91	267.52	4.79	4.49	66.71	3.39	1.22	4.63	11.58
	9.00	8.50	69.00	3.33	352.35	3.53	5.79	68.31	3.92	1.49	3.91	7.37
	8.50	0.00	68.00	4.16	416.30	5.27	5.99	92.50	5.05	1.52	5.03	8.09
APRIL												
	7.70	8.70	89.00	4.06	457.62	8.27	3.49	143.20	2.94	1.03	5.99	9.67
	7.30	7.30	41.20	1.25	317.55	3.66	3.49	69.96	4.58	1.35	3.69	6.78
	5.30	5.70	80.80	9.57	756.90	8.98	6.29	216.45	7.55	1.15	9.58	7.37
MAY												
	8.10	8.50	56.00	4.06	328.42	6.14	3.59	70.79	3.98	1.42	5.27	10.40
	7.50	8.30	47.50	3.12	300.15	3.40	3.59	54.32	4.23	1.36	3.95	7.63
	7.10	8.00	66.50	8.42	356.70	4.66	3.99	79.01	3.98	1.09	4.67	7.04
JUNE												
	8.00	8.50	67.00	4.26	474.15	7.53	3.74	66.66	4.94	2.39	4.59	10.27
	7.50	8.30	51.50	3.22	426.30	4.45	3.59	46.50	4.70	2.22	3.49	7.01
	7.00	7.70	67.00	4.99	487.20	5.99	3.89	71.19	4.14	1.31	4.19	6.58
JULY												
	8.00	8.50	63.50	5.62	567.24	10.69	4.34	92.59	3.69	1.75	5.19	10.92
	7.50	8.50	60.00	3.98	580.29	8.19	4.59	93.82	4.87	1.92	3.99	7.27
	7.00	7.00	72.00	7.83	478.50	5.32	4.34	62.52	7.20	1.51	5.47	6.58
AUGUST												
	0.20	8.50	59.00	3.32	374.10	7.01	4.74	53.33	3.82	1.08	3.69	10.63
	6.90	7.60	60.50	4.05	550.71	5.94	4.24	76.54	5.12	1.37	3.09	7.37
	7.00	7.10	82.00	4.77	557.67	7.17	4.04	73.66	4.11	1.20	2.99	6.42
SEPTEMBER												
	8.30	8.40	76.00	6.24	590.38	10.50	4.34	94.23	4.87	1.57	5.75	9.57
	5.50	5.30	55.50	5.85	580.03	9.27	3.64	85.92	5.85	1.92	4.35	7.01
	4.10	4.20	76.00	7.41	631.79	9.78	3.24	100.57	5.36	1.57	4.77	6.38
OCTOBER												
	7.60	8.10	104.50	10.34	1078.80	18.23	6.40	205.75	4.17	1.33	11.36	11.52
	7.60	8.10	52.50	3.16	487.20	6.94	4.13	74.07	4.77	1.63	4.30	8.08
	5.60	5.90	60.00	4.86	522.00	8.10	3.92	90.53	3.98	1.26	4.30	7.24
NOVEMBER												
	8.10	8.40	119.00	12.21	987.64	16.68	10.09	204.22	3.13	1.01	7.43	10.81
	7.70	8.10	55.00	7.22	485.98	5.31	4.80	79.25	3.65	1.16	3.71	7.99
	6.50	6.80	52.00	6.60	564.36	7.08	3.97	112.78	4.38	0.97	4.87	7.05
DECEMBER												
	8.00	8.40	53.00	5.67	547.37	8.74	2.21	100.59	4.43	1.32	3.29	9.50
	7.70	8.00	57.50	5.15	628.46	8.26	3.32	93.40	4.83	1.58	2.96	7.67
	7.20	7.30	66.50	7.09	669.01	8.74	3.00	99.15	5.23	1.47	3.51	7.86

Table 3.5 Station 5 Chemical Data

MAGNETIC ISLAND SUAEDA / AVICENNIA ZONE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	7.50	7.70	31.10	6.59	97.87	2.97	4.41	48.22	4.70	1.41	4.67	11.55
	7.70	10.10	36.80	6.39	91.34	1.94	3.31	46.90	2.78	1.02	3.33	0.59
	4.30	10.10	56.00	16.89	173.99	4.65	4.41	97.43	4.70	1.14	4.67	7.67
FEBRUARY												
	5.00	3.30	36.80	4.17	154.35	46.41	11.09	46.41	3.30	0.77	5.25	11.26
	6.20	3.70	39.00	2.08	173.91	50.36	10.16	50.36	1.91	0.51	4.37	6.38
	5.80	3.70	71.40	19.60	223.91	87.23	11.09	87.23	2.44	0.54	7.87	7.31
MARCH												
	8.70	8.70	55.50	3.95	416.30	4.66	5.49	74.89	5.88	1.71	5.03	12.04
	8.50	8.10	48.00	1.56	316.68	2.56	5.49	43.12	5.88	1.79	4.27	9.54
	4.40	5.30	81.00	17.16	232.72	7.99	9.73	172.83	10.70	1.49	10.06	8.95
APRIL												
	8.10	8.70	67.50	6.24	482.85	7.88	4.79	120.98	6.51	1.98	5.59	14.74
	8.10	7.70	51.00	3.43	284.92	2.94	2.99	58.93	4.09	1.25	2.99	7.37
	4.40	4.40	104.00	16.74	756.90	8.81	5.49	246.90	7.74	1.09	8.38	6.12
MAY												
	6.60	8.10	57.50	4.37	321.90	4.35	4.49	70.70	7.20	1.88	5.87	11.52
	6.80	8.00	44.00	2.29	252.30	2.97	3.39	52.67	4.11	1.34	4.07	7.44
	6.50	7.10	75.00	8.32	504.60	8.88	5.09	135.80	5.85	1.50	7.27	9.21
JUNE												
	7.30	8.00	64.50	5.20	478.50	8.19	4.39	69.13	8.21	2.63	5.59	11.91
	7.50	8.00	48.00	2.60	356.70	4.25	3.39	47.73	4.70	1.67	3.19	7.60
	5.30	5.30	79.50	7.90	613.35	9.93	4.54	117.69	5.29	1.49	5.59	7.44
JULY												
	8.00	8.70	53.50	5.33	522.00	8.19	5.94	75.72	5.25	2.71	6.19	11.45
	8.00	8.50	50.50	3.49	430.65	4.81	4.34	55.14	5.46	1.88	4.29	7.96
	6.20	6.80	83.00	0.46	751.68	10.85	5.59	138.26	4.87	2.06	7.98	10.07
AUGUST												
	7.60	7.90	50.50	3.63	439.35	7.17	4.89	58.46	5.36	1.47	5.39	10.63
	6.70	7.40	48.50	3.74	478.50	5.84	4.89	54.73	5.64	1.67	3.59	8.39
	3.00	3.40	74.00	8.20	630.75	10.44	5.04	109.87	5.88	1.37	5.19	7.17
SEPTEMBER												
	8.40	8.70	67.00	4.84	590.38	10.96	5.09	83.78	7.31	2.59	6.87	12.53
	7.60	8.00	51.50	3.74	383.24	4.76	2.89	52.34	3.65	1.51	2.67	6.58
	4.10	4.60	66.50	7.64	590.28	9.78	3.44	102.63	4.63	1.37	4.49	5.95
OCTOBER												
	7.50	8.20	67.50	4.45	713.40	11.28	5.99	106.99	7.95	2.85	6.76	12.83
	7.00	8.00	33.50	0.94	330.60	4.05	2.89	45.26	4.57	1.51	3.07	7.57
	4.20	5.90	63.00	6.08	713.40	12.15	4.95	131.68	7.16	1.85	7.98	9.54
NOVEMBER												
	7.80	8.40	87.50	6.95	752.49	10.11	8.93	128.02	7.52	2.43	6.96	11.98
	7.70	8.20	43.00	2.20	297.86	3.54	3.97	45.72	4.07	1.23	3.25	7.20
	5.50	6.40	70.50	7.18	580.04	6.82	4.96	106.68	5.85	1.42	5.57	9.40
DECEMBER												
	7.80	8.40	49.50	4.99	527.10	8.42	4.11	71.85	10.26	3.01	5.49	14.80
	7.80	8.20	39.00	2.36	446.00	6.35	2.85	57.48	5.03	1.79	3.18	8.41
	5.70	5.70	43.50	6.57	456.14	8.42	2.21	74.72	5.03	1.50	3.18	7.86

Table 3.6 Station 6 Chemical Data

MAGNETIC ISLAND SEAWARD CERIOPS ZONE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	6.30	10.70	63.80	9.58	104.39	3.50	4.41	71.43	2.78	0.66	4.67	7.40
	8.50	11.20	70.80	7.49	150.07	5.17	8.82	96.28	5.74	1.14	6.67	10.67
	9.00	11.50	59.80	8.74	171.82	6.01	8.82	123.45	4.87	0.97	6.67	6.68
FEBRUARY												
	5.70	4.20	53.40	10.94	192.61	67.81	9.24	67.81	1.91	0.40	6.12	7.83
	5.30	4.50	85.20	14.80	250.00	98.75	13.86	98.75	4.35	0.67	9.62	10.33
	5.00	4.60	67.40	18.80	220.26	87.23	9.24	87.23	2.09	0.44	6.99	4.87
MARCH												
	6.80	8.00	53.00	2.39	505.08	2.71	3.24	34.57	1.91	0.63	3.33	5.33
	7.70	6.80	87.00	4.58	156.60	6.32	8.48	89.21	9.10	1.86	7.62	14.08
	4.60	5.00	72.50	7.07	387.15	6.32	5.49	99.58	3.69	1.12	6.87	6.32
APRIL												
	6.60	7.30	80.00	5.82	441.52	7.35	4.49	102.88	4.87	1.09	6.39	9.94
	4.40	4.50	75.00	6.86	382.80	6.60	5.49	89.71	6.98	1.44	8.38	10.79
	6.00	7.00	60.40	7.70	309.72	5.68	2.79	81.47	3.13	0.84	4.99	5.07
MAY												
	7.30	7.30	51.00	2.81	282.75	5.04	3.09	59.26	3.11	0.82	5.03	7.76
	5.70	5.80	79.50	7.90	504.60	9.45	5.69	132.50	6.96	1.39	8.22	10.40
	4.20	4.10	83.50	9.15	465.45	9.01	5.09	139.91	3.98	1.04	7.03	6.05
JUNE												
	6.80	7.10	47.50	3.22	348.00	5.99	3.39	51.03	3.55	1.02	4.39	7.44
	6.30	6.50	78.50	6.03	669.70	8.45	4.89	107.81	8.21	1.80	6.69	11.71
	4.40	5.00	84.50	6.97	722.10	12.65	4.74	140.73	7.83	1.80	7.39	9.05
JULY												
	7.30	8.30	49.50	3.69	300.15	7.17	4.34	50.20	8.35	1.20	6.19	8.16
	5.80	6.00	69.00	6.89	604.35	10.55	4.99	99.58	5.25	1.71	6.19	8.16
	4.60	5.00	76.50	10.46	682.95	12.39	11.23	125.10	8.35	1.88	8.38	8.16
AUGUST												
	6.90	7.30	49.00	3.43	415.86	7.17	5.04	50.20	5.36	1.24	5.39	5.61
	6.10	6.60	58.00	4.71	495.50	8.96	5.04	72.01	5.36	1.37	5.29	9.21
	4.50	4.40	74.00	7.96	565.50	10.75	5.44	104.11	4.11	0.96	6.19	5.99
SEPTEMBER												
	6.70	8.00	50.00	3.78	393.59	7.17	3.24	52.34	3.90	1.02	4.65	7.01
	6.00	5.90	64.00	5.66	528.16	9.52	3.79	77.53	6.33	1.61	5.33	8.49
	3.50	3.60	45.50	4.91	393.59	7.83	2.89	69.13	3.41	1.22	4.23	5.10
OCTOBER												
	6.50	6.90	98.00	8.78	904.80	15.62	6.19	156.37	2.98	0.89	9.21	8.88
	5.50	5.70	48.00	3.90	609.00	11.82	4.13	113.22	4.97	1.17	5.22	7.90
	3.70	4.20	60.00	8.03	407.20	8.39	3.30	82.30	5.57	1.51	7.68	9.21
NOVEMBER												
	6.90	7.00	101.50	9.62	971.96	16.17	8.93	192.02	3.76	1.08	9.05	10.57
	4.80	4.90	61.00	5.10	548.69	8.34	6.94	106.68	5.22	1.20	5.57	9.63
	6.30	6.30	75.50	8.83	627.07	10.36	6.94	131.06	5.84	1.46	7.19	10.33
DECEMBER												
	7.60	8.00	44.50	5.51	506.82	8.58	2.53	77.60	5.23	1.18	4.28	10.24
	6.40	6.80	58.50	7.93	608.19	12.71	3.64	99.15	5.63	1.68	5.49	11.70
	5.20	5.50	63.50	1.09	598.05	12.87	3.00	104.90	5.03	1.40	5.38	7.68

Table 3.7 Station 7 Chemical Data

MAGNETIC ISLAND RHIZOPHORA 1 STATION CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY												
	10.70	11.20	31.60	8.34	80.47	2.71	6.62	51.35	5.57	0.80	6.67	10.30
	10.40	11.50	30.60	17.68	104.39	4.40	9.93	86.24	3.83	5.86	8.00	5.79
	10.40	11.50	29.20	11.02	89.17	3.35	7.72	65.17	3.48	0.73	6.67	5.92
FEBRUARY												
	4.10	4.40	58.00	26.05	130.43	54.31	10.16	54.31	3.30	0.50	10.49	7.83
	2.80	3.20	38.60	25.11	154.35	80.32	12.94	80.32	2.26	0.40	8.74	3.92
	4.00	3.70	25.60	14.07	660.87	44.44	8.32	44.44	2.26	0.41	6.99	3.68
MARCH												
	5.50	5.70	41.00	4.99	345.02	3.43	5.24	51.85	8.53	1.12	9.10	13.03
	4.60	4.40	51.00	9.05	204.45	4.15	6.24	70.78	3.69	0.87	6.87	6.12
	3.50	4.00	51.00	10.19	204.45	4.40	6.99	110.28	6.70	1.42	11.50	10.13
APRIL												
	5.40	5.80	51.20	6.97	334.95	6.42	4.79	95.47	7.45	1.16	9.58	10.53
	3.70	4.40	36.50	6.23	195.75	3.69	2.99	58.93	3.71	0.93	7.18	7.37
	4.10	4.60	55.00	11.86	293.63	5.53	4.79	97.94	5.05	1.12	9.38	7.17
MAY												
	5.00	5.40	47.00	4.06	263.17	5.07	3.39	59.26	4.85	1.04	7.42	10.20
	4.20	4.60	59.50	11.65	328.42	6.27	4.49	116.87	4.85	1.24	10.18	7.24
	4.10	4.00	63.00	10.92	339.30	6.81	5.01	7.81	3.84	1.00	8.22	6.05
JUNE												
	5.10	4.00	43.50	3.64	387.15	6.66	4.54	54.32	6.82	1.00	6.69	10.66
	2.50	3.00	43.00	6.86	321.90	5.99	4.29	56.79	5.29	1.08	6.69	8.65
	3.70	5.40	49.00	6.86	378.45	6.81	4.99	73.25	5.19	1.10	7.39	8.23
JULY												
	5.80	6.00	40.00	5.37	295.80	5.63	3.44	42.38	4.49	1.08	7.98	10.76
	5.50	5.70	46.50	10.05	358.44	7.42	4.99	76.95	6.23	1.18	8.98	8.85
	5.00	5.10	64.50	13.29	454.14	9.01	5.59	103.70	6.61	1.05	8.98	6.05
AUGUST												
	5.30	5.50	57.00	5.95	391.50	7.01	4.74	50.61	4.99	0.75	6.99	10.00
	4.10	4.50	52.50	8.48	495.50	7.58	4.74	65.84	5.38	0.75	7.88	9.41
	4.30	4.70	57.50	8.06	508.95	9.22	5.44	81.48	4.99	0.73	7.88	8.39
SEPTEMBER												
	5.00	4.80	57.00	7.53	486.77	9.06	4.89	75.39	9.14	1.35	8.82	12.53
	4.80	4.90	48.50	9.98	445.35	9.06	4.19	79.58	9.14	1.57	9.52	12.34
	3.60	3.70	67.50	12.95	548.88	11.93	4.74	129.87	6.46	1.20	10.48	8.09
OCTOBER												
	4.70	4.90	44.00	3.94	417.60	8.39	3.30	65.84	5.67	1.92	7.98	11.19
	3.00	3.30	68.00	16.00	643.80	13.60	5.78	148.14	6.16	1.32	13.51	8.88
	3.00	3.30	33.50	6.32	302.80	8.68	3.30	86.41	2.58	0.68	6.76	3.95
NOVEMBER												
	6.50	6.80	49.00	5.38	407.60	6.82	5.79	76.20	5.95	1.01	7.19	10.10
	5.00	5.70	56.00	11.86	454.63	7.83	6.61	112.78	5.63	1.16	8.62	7.75
	5.30	5.20	50.50	10.17	470.30	8.59	5.79	115.82	4.18	0.94	7.43	5.87
DECEMBER												
	5.70	6.20	46.00	7.93	506.82	9.05	3.48	87.66	8.45	1.40	8.67	9.69
	5.30	5.80	52.50	1.48	567.64	11.44	3.16	116.40	7.85	1.48	8.01	12.25
	4.80	4.90	57.50	17.75	608.19	12.71	3.64	130.77	8.04	1.36	9.00	8.77

Table 3.8 Station 8 Chemical Data

MAGNETIC ISLAND RHIZOPHORA 2 STATION CHEMICAL DATA 1975

PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY											
5.40	5.50	48.60	17.06	152.24	4.30	9.93	101.54	9.22	2.28	10.67	18.43
5.10	5.70	52.00	21.08	150.02	4.81	11.03	93.31	8.87	2.54	12.00	19.28
3.30	3.70	92.00	35.57	182.69	7.21	15.44	150.75	11.31	2.74	12.00	18.37
FEBRUARY											
4.50	5.10	46.80	20.32	197.83	82.29	11.09	82.29	5.91	0.79	13.99	11.32
4.80	5.30	51.60	26.78	192.17	82.29	12.01	82.29	6.44	0.91	16.61	12.57
3.70	4.40	56.00	39.60	197.83	121.30	12.01	121.30	4.70	0.78	13.11	6.05
MARCH											
5.10	5.30	59.50	12.48	261.00	6.76	8.98	118.51	8.00	1.69	12.21	33.62
5.00	5.30	69.00	12.90	366.27	7.55	9.98	135.30	12.04	2.22	16.09	17.57
4.80	5.00	72.00	8.32	421.95	5.02	7.48	93.82	8.32	1.49	10.38	12.83
APRIL											
5.70	6.30	54.20	6.81	382.80	6.07	6.99	93.00	7.83	1.44	11.18	13.03
3.60	4.80	53.20	8.68	400.00	6.42	7.68	118.18	12.88	2.45	13.97	17.31
4.00	4.80	107.50	18.20	687.30	12.29	14.07	230.44	12.88	2.23	24.95	12.44
MAY											
5.00	6.30	74.00	9.15	232.72	7.94	7.19	130.03	11.83	1.80	12.81	15.07
5.30	5.70	67.00	11.13	421.95	8.06	7.19	126.74	10.94	2.01	14.77	14.87
5.00	5.80	43.50	7.49	243.60	4.91	4.39	68.31	3.84	1.09	10.42	8.42
JUNE											
5.30	6.80	62.50	6.24	487.20	7.68	5.29	83.12	10.09	1.62	10.18	13.49
5.00	6.00	54.00	7.28	487.20	8.70	6.09	87.24	10.27	1.98	10.78	13.75
4.20	6.00	62.00	9.26	613.35	11.11	5.84	126.74	10.44	2.00	12.18	12.79
JULY											
5.70	6.60	70.00	9.27	580.29	9.27	8.13	94.23	5.74	2.16	10.78	16.32
5.30	5.80	66.00	12.43	580.27	10.55	7.83	108.24	5.46	2.22	12.38	13.72
5.00	6.40	79.50	16.65	613.35	11.88	7.14	132.50	4.87	1.93	11.58	10.76
AUGUST											
5.90	5.70	72.50	8.51	582.90	9.98	8.13	81.48	8.32	1.54	9.98	13.02
5.30	5.70	54.00	9.06	478.50	9.52	7.49	76.54	5.62	1.86	8.68	12.83
3.60	4.50	62.00	12.59	609.00	11.32	7.49	102.05	4.35	1.49	10.48	10.20
SEPTEMBER											
5.50	5.70	59.00	8.58	528.18	9.78	6.19	87.98	8.89	1.33	11.62	12.53
4.90	4.70	54.00	11.66	425.65	8.01	4.34	83.78	6.94	1.47	8.68	10.63
4.70	4.70	62.50	13.18	569.50	11.93	5.79	121.47	6.94	1.42	10.90	8.72
OCTOBER											
6.30	6.70	76.50	8.93	817.00	13.89	11.97	127.56	15.51	2.48	19.65	21.71
5.20	5.80	66.00	9.98	609.00	11.86	7.02	111.11	9.34	1.73	15.97	15.46
5.00	5.20	80.00	11.70	703.00	14.46	8.26	172.83	10.54	2.31	16.58	14.15
NOVEMBER											
5.70	6.00	92.00	11.78	940.61	13.65	19.18	188.98	17.33	2.66	19.49	19.50
5.50	5.60	69.50	13.27	627.07	10.87	11.57	140.21	7.72	1.87	12.99	13.15
5.60	6.40	64.50	13.27	611.40	8.84	9.92	149.33	6.58	1.68	11.60	11.04
DECEMBER											
6.50	6.60	58.00	1.14	547.37	10.96	5.38	96.28	0.85	1.54	10.12	13.71
5.90	6.20	57.00	1.66	608.19	12.71	4.90	123.58	9.86	2.08	9.68	13.16
5.00	5.50	72.00	21.11	760.23	15.36	5.38	155.50	11.26	2.47	11.43	14.07

Table 3.9 Station 9 Chemical Data

MAGNETIC ISLAND RHIZOPHORA 3 STATION CHEMICAL DATA 1975

PHKCL	PHH2O	WSCL MEX	WSSO4 MEX	SOLNA MEX	SOLK MEX	SOLCA MEX	SOLMG MEX	EXNA MEX	EXK MEX	EXCA MEX	EXMG MEX
JANUARY											
5.80	6.10	32.40	8.15	195.74	8.52	7.64	149.11	13.92	1.84	22.67	20.67
4.80	6.60	116.00	27.87	163.11	6.27	19.75	87.55	5.74	2.24	30.67	12.11
6.30	7.50	76.00	31.20	92.21	3.27	1.93	43.61	4.18	1.02	30.00	11.42
FEBRUARY											
5.10	3.30	34.00	7.50	94.78	29.46	10.16	29.46	6.44	0.66	34.10	10.40
5.40	3.50	77.00	34.91	224.35	68.30	20.32	68.30	4.52	0.70	22.73	10.53
5.40	3.10	51.80	7.02	173.91	74.89	12.01	74.89	6.44	0.89	48.96	15.54
MARCH											
6.30	7.30	55.50	5.41	337.12	5.68	11.98	72.42	9.36	1.99	24.15	13.82
6.60	3.10	50.00	5.02	345.02	4.04	14.97	43.12	6.12	1.16	29.14	11.78
7.00	3.10	62.00	7.28	204.45	4.92	13.97	53.50	3.74	1.06	39.12	8.95
APRIL											
6.60	7.70	52.50	5.82	309.72	5.53	11.58	67.49	7.17	1.57	32.85	12.24
4.80	6.50	56.80	6.76	326.25	6.22	5.49	79.01	4.09	1.18	9.58	7.37
6.60	8.30	47.50	4.58	309.72	6.07	11.18	67.49	3.71	1.12	38.32	8.62
MAY											
7.70	9.20	46.00	3.95	274.05	5.32	8.28	59.26	4.11	1.24	32.32	9.61
7.70	9.00	47.00	6.45	252.30	5.32	6.29	55.96	2.37	0.89	17.17	7.04
7.70	8.50	52.00	6.97	300.15	11.67	9.38	68.31	3.48	1.06	13.65	8.62
JUNE											
6.60	8.10	72.50	5.62	556.80	9.93	10.13	77.36	8.28	1.66	29.44	12.50
6.50	7.10	74.00	10.19	513.30	11.62	7.19	113.16	6.44	1.37	11.98	8.42
5.10	6.00	55.00	7.80	487.20	9.57	9.08	83.53	4.91	1.17	18.36	9.05
JULY											
7.10	8.50	45.50	7.38	274.05	6.14	7.14	32.92	3.71	0.98	24.65	8.65
7.10	8.00	70.00	12.39	546.36	11.11	10.03	99.58	4.87	1.18	17.07	9.34
6.80	7.70	64.00	14.46	624.86	12.13	12.52	116.87	6.52	1.34	19.96	9.54
AUGUST											
7.10	7.80	84.50	8.79	739.50	13.41	12.52	92.59	5.05	2.33	18.06	14.64
5.60	6.10	58.50	10.21	517.65	11.16	6.64	92.59	2.30	1.15	8.18	7.96
7.20	6.70	66.00	11.83	669.90	13.26	12.18	105.34	2.68	1.12	16.17	9.41
SEPTEMBER											
7.60	8.00	37.00	5.46	258.91	5.94	5.44	29.30	2.80	0.72	23.95	7.01
6.20	5.00	37.50	7.25	289.97	6.91	5.44	50.29	2.19	0.63	8.38	5.72
4.50	6.35	70.00	12.05	611.09	13.57	9.23	106.83	5.85	1.12	17.56	9.15
OCTOBER											
7.60	8.20	47.00	5.07	504.60	6.29	10.32	69.96	7.36	1.43	40.53	14.81
7.70	8.20	50.50	8.89	504.60	10.13	8.67	74.07	6.56	1.36	38.69	13.49
7.00	8.50	48.50	5.89	552.40	9.26	9.49	65.84	5.17	1.05	49.74	11.84
NOVEMBER											
7.50	7.90	59.00	9.38	564.36	9.85	16.54	100.58	6.58	1.46	36.20	13.42
7.70	7.80	66.00	10.95	650.43	11.88	15.54	134.11	7.31	1.65	35.27	14.56
7.80	8.00	54.00	10.25	517.33	9.60	15.54	91.44	5.12	1.23	35.27	10.81
DECEMBER											
7.60	7.80	34.00	7.09	395.32	8.10	6.96	53.17	4.63	1.18	31.23	10.97
7.70	8.40	44.00	10.50	466.28	8.37	6.96	70.41	4.22	1.14	21.55	9.32
8.20	8.00	52.50	10.24	506.82	9.85	9.80	71.85	4.22	1.00	32.54	9.14

Table 3.10 Station 10 Chemical Data

MAGNETIC ISLAND AVICENNIA / SONNERATIA FRINGE CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY												
	6.80	8.10	49.60	12.69	158.77	4.65	18.75	72.74	4.52	1.39	32.00	11.76
	7.10	9.00	33.00	9.72	108.74	3.63	12.13	48.22	1.39	0.26	28.67	8.29
FEBRUARY												
	5.50	3.70	32.40	18.76	178.26	115.54	17.56	115.54	4.52	0.83	46.33	13.89
	6.20	4.00	27.00	9.38	136.96	40.32	13.86	40.32	2.61	0.58	41.96	6.32
MARCH												
	6.60	4.40	49.50	4.37	261.00	4.30	15.47	53.50	6.09	1.78	36.73	12.04
	4.00	5.10	38.50	5.62	197.92	3.79	10.48	36.54	2.61	1.12	35.21	9.15
APRIL												
	7.70	8.10	57.50	3.48	352.35	5.68	14.97	67.49	6.00	1.72	38.32	11.19
	8.10	8.10	45.60	4.37	261.00	4.97	11.18	50.20	3.71	1.32	41.32	10.79
MAY												
	8.10	9.00	40.00	3.43	234.90	4.79	8.58	37.86	2.49	1.06	37.13	8.62
	8.00	8.50	32.00	4.48	206.62	4.35	6.89	32.10	2.24	0.95	35.13	9.01
JUNE												
	7.30	8.70	40.50	2.39	300.15	5.63	13.22	32.92	3.13	1.04	31.54	7.83
	7.50	8.00	41.50	3.12	330.60	6.55	9.33	36.62	2.75	1.02	29.44	8.23
JULY												
	7.70	8.30	40.50	5.66	329.73	6.91	10.38	37.86	3.79	1.25	30.74	9.74
	7.50	8.10	36.50	5.54	285.36	6.40	8.98	32.92	2.92	1.08	31.14	9.54
AUGUST												
	8.00	8.60	40.50	4.53	369.75	6.71	10.87	24.69	1.41	1.05	37.23	8.82
	8.30	8.40	49.00	5.22	400.20	7.88	11.87	30.04	2.44	1.15	38.92	9.80
SEPTEMBER												
	8.10	8.20	41.00	4.33	310.68	6.66	7.24	29.30	3.17	1.03	32.93	8.29
	8.30	8.10	41.50	6.01	321.03	7.63	7.98	37.69	3.53	0.98	36.33	7.57
OCTOBER												
	8.40	8.60	37.00	3.16	330.60	6.94	7.43	45.26	2.98	0.98	47.28	10.86
	8.10	8.50	34.00	6.01	330.60	7.23	8.67	45.26	3.48	1.15	50.36	11.19
NOVEMBER												
	8.50	8.20	38.00	3.38	344.89	6.06	12.90	60.96	2.92	1.16	38.52	9.16
	7.80	8.30	35.50	6.09	344.89	6.82	13.23	60.96	2.92	1.12	38.92	9.63
DECEMBER												
	8.30	8.60	31.50	4.73	314.23	6.51	6.33	40.24	3.42	1.07	28.59	7.86
	8.00	8.50	34.00	4.57	354.78	7.15	7.75	44.55	4.02	1.29	32.98	10.24

Table 3.11 Station 11 Chemical Data

MAGNETIC ISLAND LOWER TIDAL FLAT CHEMICAL DATA 1975

	PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY												
	7.70	9.40	33.40	9.51	92.21	3.35	13.23	43.61	1.30	1.02	30.67	9.73
	8.10	10.10	56.00	11.12	113.09	4.40	13.23	49.70	2.17	1.22	30.67	9.28
FEBRUARY												
	4.40	5.10	32.60	10.94	119.56	34.89	12.94	34.89	2.78	0.60	43.71	6.71
	4.80	5.30	28.20	8.86	109.56	33.58	12.01	33.58	3.13	0.70	43.71	12.05
MARCH												
	5.70	9.60	46.00	4.37	254.48	4.15	12.97	43.12	3.44	1.43	41.72	10.59
	6.00	8.70	42.00	6.86	219.68	3.92	11.98	36.54	2.87	1.55	41.72	11.19
APRIL												
	8.30	8.70	47.50	2.29	219.68	4.40	9.78	41.97	3.13	1.19	36.53	8.62
	8.10	8.50	38.50	2.60	178.35	4.07	6.99	30.45	2.07	1.10	39.52	8.29
MAY												
	8.10	8.30	40.50	4.06	234.90	4.91	8.58	39.50	2.98	1.19	39.32	9.61
	8.30	8.70	47.50	4.16	226.20	4.79	7.68	36.21	2.98	1.28	38.72	10.00
JUNE												
	8.00	9.20	41.00	2.60	339.30	6.81	10.38	32.92	4.79	1.13	33.53	9.67
	8.00	9.00	35.00	6.55	330.60	6.55	8.78	31.27	3.52	1.53	34.73	10.07
JULY												
	8.00	8.50	36.00	3.85	261.00	5.84	13.77	27.98	2.44	1.03	30.14	8.65
	7.70	8.50	41.50	5.09	329.73	7.68	10.68	35.80	2.73	1.31	33.73	10.23
AUGUST												
	8.50	8.50	34.00	3.53	320.16	6.09	9.13	17.28	2.56	1.17	37.23	9.21
	8.50	8.80	45.00	5.78	361.05	8.04	11.53	26.33	2.86	1.52	37.23	10.40
SEPTEMBER												
	8.50	8.20	31.50	4.29	269.27	6.20	6.89	27.24	2.31	0.91	34.93	7.86
	8.60	8.80	30.00	5.07	269.27	6.45	7.24	27.24	2.44	1.05	38.72	9.18
OCTOBER												
	8.20	8.70	26.50	3.24	261.00	5.50	7.02	28.81	2.68	1.02	49.90	9.21
	8.40	8.90	27.50	3.90	226.20	5.50	6.60	28.81	2.19	1.02	47.28	8.88
NOVEMBER												
	8.40	8.40	32.50	2.94	250.83	4.80	10.91	36.58	1.98	0.90	37.13	7.75
	8.50	8.60	32.00	4.83	282.18	5.56	12.57	42.67	2.19	1.20	39.45	8.69
DECEMBER												
	8.50	8.60	28.50	0.53	273.68	5.72	5.38	35.92	3.02	1.07	31.23	8.41
	8.50	8.50	29.00	2.25	283.82	5.88	5.69	37.36	2.41	1.00	34.30	8.77

Table 3.12 Station 12 Chemical Data

SAUNDER'S BEACH 1 RHIZOPHORA CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
8.00	10.10	15.00	0.24	54.37	0.68	1.30	4.94	1.39	0.51	11.13	0.22
7.70	9.00	15.10	0.27	103.09	0.98	1.20	12.23	2.09	0.60	3.99	0.24
6.50	8.00	17.80	0.22	128.75	1.34	1.70	23.87	2.44	0.70	4.39	0.28
APRIL											
7.10	9.00	7.10	0.60	52.20	0.74	118.76	5.76	2.18	0.73	327.34	5.66
7.10	8.30	8.60	0.84	70.47	1.02	109.78	6.91	2.44	0.87	119.76	4.21
7.00	7.70	5.40	0.39	139.20	1.79	169.66	23.46	2.96	0.91	111.78	4.54
JULY											
7.10	9.00	39.00	3.40	329.73	4.68	99.80	69.13	2.85	0.89	530.94	8.62
7.30	8.50	19.10	1.48	131.81	2.25	66.87	22.32	2.21	0.77	351.30	5.53
6.20	7.50	20.70	1.63	135.72	2.38	49.90	22.32	2.77	0.89	132.53	5.79
OCTOBER											
7.70	8.60	21.50	1.77	107.88	2.41	154.69	27.16	3.74	1.02	431.14	7.30
7.50	8.20	22.10	1.35	100.05	2.23	139.74	19.75	2.61	0.91	196.41	5.13
7.10	8.00	22.90	1.44	107.88	2.56	120.76	20.58	2.44	0.87	102.99	4.94
JANUARY											
7.70	8.70	27.00	2.19	63.49	1.15	1.24	4.18	1.45	0.63	9.60	4.89
7.20	8.30	9.00	1.22	97.10	1.58	1.02	5.23	2.75	0.96	4.53	5.08
7.60	7.80	16.00	0.32	134.44	2.06	1.35	8.89	2.90	0.96	3.34	5.08

Table 3.13 Station 13 Chemical Data

SAUNDER'S BEACH 1 CERIOPS 1 ZONE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
7.10	9.60	14.40	0.29	119.62	1.30	2.30	22.72	2.26	0.55	14.76	0.32
6.00	10.40	8.90	0.13	77.43	0.72	0.80	6.91	2.26	0.60	3.99	0.24
5.80	9.90	13.50	0.17	93.95	0.94	1.20	13.83	1.74	0.51	3.19	0.19
APRIL											
7.10	9.00	17.40	1.75	35.23	0.74	118.76	4.61	1.22	0.59	179.64	3.59
7.10	8.10	8.60	0.56	58.73	0.74	92.81	5.76	1.74	0.64	97.80	4.01
7.10	7.50	12.70	0.85	80.04	1.02	118.76	9.38	2.18	0.77	95.01	4.11
JULY											
6.30	7.70	44.90	4.04	391.50	6.19	66.87	88.23	3.13	0.85	237.13	7.43
6.50	7.50	18.90	1.37	127.02	2.05	37.92	22.32	2.21	0.66	110.98	4.87
6.60	7.70	17.10	1.07	135.72	1.92	44.91	22.32	3.04	0.73	110.98	5.79
OCTOBER											
8.00	8.50	44.90	2.64	140.94	3.84	123.75	35.39	1.74	0.75	264.70	5.30
7.50	8.20	16.50	1.42	66.12	1.66	73.85	13.99	1.91	0.75	83.43	4.14
6.80	7.60	17.60	1.09	82.65	1.82	78.84	16.46	2.00	0.78	73.05	4.14
JANUARY											
7.30	8.30	2.50	0.53	22.41	0.61	0.28	0.78	1.16	0.53	2.48	3.95
7.30	8.40	3.50	0.00	29.88	0.48	0.11	0.26	1.69	0.53	1.02	2.46
7.20	7.90	11.00	1.22	93.36	1.15	0.62	4.70	2.32	0.72	1.29	3.57

Table 3.14 Station 14 Chemical Data

SAUNDER'S BEACH 1 SPOROBOLUS ZONE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
4.40	8.00	1.40	0.00	2.17	0.17	0.01	0.17	0.17	0.20	1.60	0.07
4.20	7.10	4.60	0.03	21.75	0.32	0.64	4.44	0.34	0.15	1.20	0.04
4.20	8.70	1.30	0.00	2.17	0.06	0.01	0.17	0.68	0.26	0.80	0.06
APRIL											
7.70	8.30	3.10	0.18	3.04	0.26	75.85	1.15	0.44	0.39	209.18	2.34
7.70	10.40	2.40	0.07	2.17	0.13	58.88	0.33	0.70	0.34	51.10	1.22
7.50	8.70	4.70	0.13	18.71	0.26	75.85	1.15	1.13	0.47	75.85	2.66
JULY											
6.60	8.50	2.30	0.07	8.70	0.33	4.99	3.29	0.82	0.35	81.44	3.69
6.60	9.40	2.60	0.08	6.53	0.10	2.50	3.29	0.73	0.26	51.10	1.91
6.60	9.40	4.40	0.04	17.40	0.33	4.99	3.29	1.83	0.46	76.65	3.68
OCTOBER											
6.70	8.80	1.90	0.12	0.00	0.13	4.99	0.00	1.31	0.44	47.90	2.34
6.40	8.10	3.40	0.08	4.35	0.20	4.99	0.00	2.87	0.56	73.05	6.83
6.30	6.90	8.90	0.47	30.88	0.90	45.91	4.28	1.13	0.51	43.51	2.73
JANUARY											
5.90	6.60	2.00	0.00	22.41	0.73	0.39	2.61	0.65	0.31	1.40	2.82
5.80	7.80	2.00	0.00	9.34	0.24	0.03	0.13	0.63	0.26	0.65	1.41
6.00	8.20	2.00	0.00	3.73	0.12	0.03	0.13	0.92	0.29	0.54	1.32

Table. 3.15 Station 15 Chemical Data

SAUNDER'S BEACH 1 CERIOPS 2 - INLAND - ZONE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
6.30	8.70	7.40	0.07	103.09	1.32	2.18	22.72	0.87	0.97	6.43	0.21
6.00	8.50	15.20	0.21	114.40	1.11	2.00	21.40	2.96	0.65	5.23	0.32
6.00	8.50	18.20	0.26	128.75	1.24	3.04	28.81	3.65	0.82	5.23	0.36
APRIL											
7.50	8.50	7.60	0.81	63.94	1.18	83.83	6.26	1.74	0.73	107.78	4.54
7.30	8.70	11.60	0.94	100.92	1.33	118.76	10.53	2.96	0.91	130.54	6.05
7.10	8.30	12.10	0.85	108.75	1.33	118.76	11.69	2.75	0.91	115.77	5.56
JULY											
7.30	8.10	66.30	7.56	363.22	12.90	49.90	116.54	1.18	0.46	339.32	4.47
7.30	8.50	20.10	1.21	118.32	3.61	44.91	19.09	2.66	0.72	119.76	5.99
7.10	8.70	17.70	0.90	109.19	1.46	37.92	15.97	2.94	0.79	146.91	5.99
OCTOBER											
7.40	7.80	32.30	2.41	140.94	3.66	123.75	37.04	1.74	0.75	112.97	4.34
7.10	7.60	20.10	1.22	91.35	1.92	88.82	19.75	3.13	0.94	97.80	5.72
6.80	7.60	19.60	1.07	95.70	1.82	99.80	16.62	3.39	1.06	102.99	6.09
JANUARY											
6.90	7.40	11.50	0.08	70.96	1.15	0.73	7.32	1.55	0.60	1.62	4.33
6.90	7.70	16.50	0.61	126.97	1.45	1.24	11.50	3.00	0.82	2.16	5.27
6.90	7.60	15.00	1.38	145.65	1.70	1.52	13.07	2.85	0.87	2.27	5.47

Table 3.16 Station 16 Chemical Data

SAUNDER'S BEACH 1 ARTHROCNEMUM ZONE CHEMICAL DATA 1975/6

	PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY												
	8.00	11.50	114.90	1.88	160.90	11.23	4.49	229.62	3.83	0.94	21.75	0.64
	8.00	8.50	30.20	0.36	163.12	2.94	3.39	37.86	3.83	0.99	3.19	0.31
	7.50	11.00	24.60	0.28	163.12	2.12	3.39	27.49	4.35	1.19	3.99	0.38
APRIL												
	8.70	9.40	108.80	9.00	613.35	11.14	245.51	160.98	1.48	0.87	566.86	8.96
	8.30	9.00	27.10	1.88	200.10	3.58	177.64	25.02	4.00	1.39	115.77	6.58
	8.10	9.40	18.20	1.26	217.50	2.84	177.64	26.67	4.26	1.35	87.43	5.36
JULY												
	8.30	8.50	127.00	10.87	856.95	17.61	127.74	288.05	4.40	0.99	483.03	13.95
	8.00	9.00	34.30	1.87	243.60	3.99	66.87	34.57	4.14	1.47	89.82	6.96
	8.00	8.70	25.60	1.64	174.00	2.05	55.89	22.32	5.15	1.58	98.60	7.17
OCTOBER												
	8.40	8.70	113.80	10.65	532.44	14.80	137.72	255.95	2.82	1.02	426.74	12.37
	7.80	8.20	40.40	3.02	191.40	4.40	131.74	41.97	5.13	1.63	92.61	7.70
	7.70	8.20	34.10	2.10	148.77	2.94	123.75	27.98	4.96	1.53	92.61	7.50
JANUARY												
	8.50	8.80	35.50	2.19	319.08	5.33	2.71	59.22	1.98	0.82	4.96	7.15
	8.10	8.50	44.50	2.31	430.38	6.18	3.84	53.19	4.34	1.49	5.83	6.96
	7.80	8.30	32.50	1.74	296.82	3.15	2.82	37.14	4.34	1.44	2.05	6.40

Table 3.17 Station 17 Chemical Data

SAUNDER'S BEACH 1 SALT FLAT CHEMICAL DATA 1975/6

	PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY												
	7.50	9.40	132.40	2.02	223.58	11.51	6.04	288.05	8.70	1.06	13.53	0.51
	6.60	9.40	44.00	0.63	193.13	3.27	3.97	79.34	7.13	1.39	3.19	0.44
	5.80	9.00	38.60	0.56	200.09	2.46	3.69	79.34	6.71	1.39	2.79	0.36
APRIL												
	7.30	9.00	85.10	7.79	822.15	13.82	211.58	222.21	3.22	1.25	205.19	8.96
	7.50	9.20	43.70	3.19	395.85	5.25	236.53	75.88	5.26	1.60	79.84	8.75
	7.30	8.70	48.30	3.27	478.50	5.25	228.54	88.88	7.05	2.04	97.80	7.80
JULY												
	7.30	8.70	130.00	10.08	891.75	15.10	166.67	268.30	4.87	1.43	345.31	11.71
	7.50	8.50	57.40	4.43	421.95	5.48	88.82	81.97	5.99	1.69	76.65	8.62
	7.10	8.10	56.90	4.52	404.55	4.91	82.83	81.97	6.99	1.92	76.65	7.70
OCTOBER												
	7.60	8.30	86.90	8.53	482.85	12.39	197.60	195.05	4.84	1.38	230.74	9.87
	7.60	8.10	56.70	3.39	290.58	5.68	137.72	70.78	6.35	1.99	63.07	8.52
	7.30	7.80	71.40	5.15	358.44	7.65	99.80	87.24	8.53	2.27	83.03	7.11
JANUARY												
	7.90	8.80	48.00	3.85	474.90	5.94	2.88	78.29	4.11	1.30	1.73	10.16
	7.80	8.40	62.00	4.42	630.73	6.79	3.50	88.32	6.13	1.78	1.83	9.60
	7.70	8.10	66.50	4.87	645.57	7.15	3.33	103.60	8.30	2.26	2.05	8.66

Table 3.18 Station 18 : Chemical Data

SAUNDER'S BEACH 2 MIXED MANGROVE FRINGE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
6.50	8.30	14.10	0.28	112.23	1.34	1.60	25.51	0.87	0.92	4.39	0.17
6.80	8.30	12.60	0.19	80.04	0.96	1.45	14.65	0.34	0.31	1.99	0.11
7.00	7.70	17.50	0.26	126.14	1.53	2.60	23.37	2.26	0.61	6.42	0.31
APRIL											
7.70	9.00	13.70	1.13	146.60	2.10	160.68	20.45	1.74	0.73	191.62	5.03
7.70	9.20	12.00	0.80	129.63	2.38	177.64	17.61	1.74	0.79	140.52	5.36
8.10	9.00	13.30	0.68	65.68	1.02	109.78	9.38	0.96	0.52	108.58	2.96
JULY											
7.50	9.20	21.00	1.80	113.53	2.25	49.90	25.35	0.92	0.38	175.65	3.09
8.00	8.30	18.60	1.70	111.80	2.38	44.91	22.32	0.82	0.37	110.98	2.89
7.70	8.50	23.30	2.75	135.72	2.61	61.88	25.35	2.10	0.62	301.00	5.33
OCTOBER											
8.10	8.80	26.00	2.13	116.58	4.99	117.76	27.16	1.39	0.66	303.79	4.54
8.00	8.70	17.70	1.32	66.12	3.09	88.82	11.52	1.91	0.78	176.45	4.54
7.40	8.30	23.60	1.68	91.35	3.84	110.78	16.46	2.61	1.02	185.63	5.13
JANUARY											
7.80	8.40	10.50	0.20	82.16	1.21	1.24	7.06	1.88	0.65	4.64	4.89
7.90	8.40	7.50	1.01	70.96	0.97	0.79	3.92	1.64	0.63	3.13	3.76
8.50	8.40	13.00	0.57	112.04	1.33	1.69	6.79	2.56	0.77	9.93	4.89

Table 3.19 Station 19 Chemical Data

SAUNDER'S BEACH 2 RHIZOPHORA/BRUGUIERA ZONE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
5.80	6.50	36.20	0.77	188.34	2.56	4.39	60.41	11.31	2.25	12.69	0.90
5.30	6.00	29.70	0.85	186.17	3.20	2.15	57.45	11.48	2.63	11.93	0.86
5.40	6.30	30.80	0.73	179.21	3.20	4.64	67.49	11.48	2.55	12.33	0.81
APRIL											
7.30	8.00	23.80	1.92	188.35	2.69	186.63	28.64	12.44	2.52	281.04	17.31
7.00	7.50	30.70	2.69	300.15	4.20	270.46	50.86	16.01	2.96	281.04	16.09
6.50	7.10	39.90	5.71	378.45	7.37	236.53	75.88	15.49	3.48	310.98	16.32
JULY											
7.10	7.70	50.30	4.87	315.37	4.07	127.74	59.91	17.05	2.99	304.59	17.50
6.80	7.30	46.00	5.12	315.37	5.71	116.77	56.62	16.01	3.65	292.21	16.84
6.60	7.10	49.00	6.20	350.17	6.63	116.77	62.88	14.96	3.96	309.38	16.84
OCTOBER											
6.60	7.60	44.90	3.43	174.00	3.48	203.59	39.50	15.05	2.53	235.53	15.40
6.50	7.10	47.50	4.34	226.20	4.35	219.56	44.14	16.96	3.20	225.55	15.00
6.40	7.10	55.80	4.41	248.82	5.56	219.56	56.79	16.44	3.24	230.74	15.40
JANUARY											
7.10	7.50	26.50	2.43	235.28	2.79	2.93	30.11	12.46	2.46	7.23	17.69
6.50	7.30	27.50	2.31	280.09	4.12	2.82	30.11	15.82	3.61	6.26	16.75
6.60	7.20	37.00	3.04	306.23	4.61	3.05	34.12	14.63	3.56	6.04	16.18

Table 3.20 Station 20 Chemical Data

SAUNDER'S BEACH 2 CERIOPS 1 ZONE CHEMICAL DATA 1975/6

	PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY												
	7.10	8.70	17.00	0.33	131.36	1.58	2.18	32.10	2.09	0.61	3.99	0.27
	6.60	7.10	17.00	0.32	135.71	1.30	1.70	23.37	3.31	0.90	4.83	0.35
	6.50	6.50	28.30	0.46	156.59	1.96	2.45	43.13	2.44	0.65	4.39	0.29
APRIL												
	6.60	8.10	16.60	1.45	113.10	1.64	117.76	18.11	1.48	0.64	104.59	4.41
	6.60	7.70	12.70	0.99	82.65	1.20	102.79	9.38	2.75	0.87	115.77	5.96
	6.80	8.10	19.00	1.70	134.41	1.79	143.71	18.60	4.78	1.31	123.35	6.78
JULY												
	7.30	7.70	20.90	2.87	120.93	3.20	49.90	44.11	2.86	0.75	119.76	6.98
	7.10	7.70	23.70	2.11	192.70	1.97	44.91	19.09	4.52	1.29	136.53	6.25
	7.00	8.00	34.40	3.00	144.85	2.05	49.90	25.35	5.15	1.51	89.02	7.50
OCTOBER												
	6.90	7.50	29.60	2.26	123.54	2.97	104.79	34.57	3.22	1.08	112.57	6.12
	6.50	7.10	24.30	1.71	100.05	2.41	99.80	22.22	4.78	1.26	107.78	6.71
	6.50	7.60	25.70	1.28	100.05	2.05	104.79	22.22	5.39	1.43	107.78	6.91
JANUARY												
	6.90	7.50	13.00	0.04	97.10	1.27	0.90	8.62	2.42	0.72	2.16	5.46
	6.90	7.30	16.10	1.59	145.65	1.94	1.24	12.02	4.94	1.30	3.13	7.90
	6.90	7.80	20.50	1.32	201.66	2.30	1.92	21.43	4.55	1.25	2.91	7.15

Table 3.21 Station 21 Chemical Data

SAUNDER'S BEACH 2 CERIOPS 2 ZONE CHEMICAL DATA 1975/6

PHKCL	PHH2O	WSCL ME%	WSSO4 ME%	SOLNA ME%	SOLK ME%	SOLCA ME%	SOLMG ME%	EXNA ME%	EXK ME%	EXCA ME%	EXMG ME%
JANUARY											
6.80	6.60	22.30	0.43	160.94	1.60	3.00	39.67	3.31	0.99	4.83	0.35
6.50	6.50	20.80	0.34	131.36	1.39	1.85	26.83	1.91	0.55	3.99	0.26
6.30	7.30	9.60	0.19	93.65	1.17	1.20	19.92	1.04	0.36	3.19	0.19
APRIL											
7.00	8.30	21.80	2.17	155.73	2.69	143.71	28.64	2.44	0.82	140.92	6.35
7.10	8.70	16.20	1.40	118.32	1.64	109.78	17.61	1.91	0.77	91.02	4.41
7.10	8.30	16.20	1.31	132.24	1.79	127.74	17.61	2.75	0.91	97.80	5.03
JULY											
7.10	8.00	35.60	3.83	243.60	4.79	54.89	62.88	1.65	0.52	158.88	5.72
7.10	8.30	23.60	2.39	142.68	2.25	32.93	25.35	2.85	0.71	115.77	6.45
7.10	8.30	26.60	1.80	161.82	2.51	49.90	28.48	3.84	0.92	119.76	6.71
OCTOBER											
7.30	8.50	26.70	1.83	82.65	2.87	88.83	22.22	1.04	0.58	73.05	3.32
7.30	7.90	24.30	1.79	91.35	2.56	83.83	22.22	1.75	0.70	73.05	3.32
7.20	7.70	25.00	1.75	107.88	2.56	99.80	24.69	2.44	0.91	77.84	4.54
JANUARY											
7.10	7.80	9.00	0.20	67.22	1.21	0.73	6.27	1.16	0.43	1.83	3.39
7.40	8.10	9.50	0.41	82.16	1.15	0.45	3.65	2.32	0.67	1.83	3.95
7.30	8.20	31.50	2.47	250.21	3.15	2.09	33.97	3.04	0.92	2.59	5.27

TABLE 3.22:

SALINITY READINGS MAGNETIC ISLAND

STATION	1	2	3	4	5	6	7	8	9	10	11
MONTH											
1973											
NOV 1	38.4	66.0	91.9	94.1	95.3	96.0			37.1		
2			39.6	39.8	38.8	37.8			36.4	37.1	37.0
DEC	39.1	66.6	131.6	86.1	75.9	66.6			34.7		
	2.9	4.9	11.7		31.2	27.7				32.0	34.4
1974											
JAN	13.2	60.8	118.0	92.0	68.8	67.6			25.1		
	22.1	23.5	23.5	26.3	25.0	23.0			26.0	26.8	25.4
FEB	36.6	34.1	98.8	36.7	39.6	34.1			36.5		
	36.6	37.0	35.6	38.3	35.5	37.2			36.6	36.9	35.3
MAR	23.5	36.5	108.7	60.9	58.6	66.5			36.7		
	37.0	36.6	37.2	37.1	36.6	37.7			35.4	33.4	34.1
APR	30.1	37.5	118.9	81.9	73.1	77.5			40.6		
			37.1	36.7	36.7	37.3			39.3	38.7	38.4
MAY	39.9	56.3	132.5	79.9	74.8	59.3			39.3		
									37.2	34.1	34.1
JUNE	35.0	23.2	130.8	68.4	58.8	59.2			34.5		
		34.1	35.4	34.1	34.0	32.7			37.4	36.1	38.7
JULY	17.2	30.6	141.3	83.6	71.2	57.6			36.0		
									36.7	36.0	36.0
AUG	20.7	41.2	133.7	77.1	81.6	58.0			35.0		
									34.8	34.7	33.6
SEPT	35.2	46.8	129.6	70.4	70.8	56.4			35.9		
	39.3	50.4	50.8	58.0	42.0	38.7			35.9	36.5	36.0
OCT	36.2	58.4	124.8	71.2	75.2	65.2			36.2		
	42.0	42.8	45.6	50.4	41.9	38.3			33.9	30.6	35.8
NOV		64.4	136.8	78.9	93.0	69.6			37.11		
	45.3	43.2	47.5	39.5	49.5	39.7			36.9	37.1	37.3
DEC	36.1	60.0	90.4	60.0	64.8	54.4			26.0		
	34.4	34.8	31.9	35.6	32.1	31.6			30.0	30.4	30.3

STATION	1	2	3	4	5	6	7	8	9	10	11
MONTH											
1975											
JAN	26.7	56.8	124.0	72.8	72.1	50.1	32.3	30.5	27.7		
	30.4	35.2	30.9	33.3	30.4	30.0	30.9	30.8	30.8	30.8	30.7
FEB	24.4	55.2	117.2	46.0	59.6	76.4	34.6	34.6	34.4		
	32.6	32.4	34.5	36.2	34.0	33.3	34.2	33.9	34.1	34.1	34.6
MAR	16.2	38.0	105.6	52.0	58.0	50.4	30.0	30.8	31.9		
	29.2	36.5	31.4	34.1	31.1	31.5	31.9	32.0	32.0	32.3	32.8
APR	20.0	34.8	120.0	78.8	86.4	54.0	31.0	35.5	33.5		
	35.4	36.6	36.9	37.7	35.7	35.1	34.1	34.1	33.5	33.5	33.7
MAY	31.4	50.4	125.6	78.0	72.4	55.2	31.5	36.1	36.2		
	40.9	44.4	43.2	43.6	40.4	38.6	37.5	36.5	36.1	36.2	36.0
JUNE	40.4	54.4	131.4	79.2	78.0	63.2	36.9	36.6	37.1		
		45.2	63.2	50.0	39.6	38.8	37.6	37.6	36.6	36.4	35.6
JULY	34.3	57.2	120.0	76.8	73.6	62.8	32.8	32.8	34.2		
		45.2	45.6	48.0	42.5	38.2	38.0	37.0	36.8	36.5	35.8
AUG	17.8	53.2	108.0	94.4	76.8	56.0	32.8	34.8	35.4		
		50.0	40.3	48.0	38.5	36.3	36.6	35.4	35.1	35.2	34.9
SEPT	37.4	68.0	126.0	86.0	89.6	66.0	37.8	36.9	36.5		
			42.5	52.6	52.4	42.7	39.8	37.8	37.3	37.3	37.5
OCT	38.2	56.0	124.0	84.8	88.0	63.2	37.3	36.5	36.5		
							40.1	35.9	35.6	36.9	36.3
NOV	34.4	64.8	110.8	77.2	66.4	41.2	31.7	27.7	33.4		
	35.1	35.8	35.0	37.5	35.0	32.5	34.0	33.9	31.5	33.4	32.8
DEC	52.8	55.6	102.8	75.2	66.0	51.2	32.5	31.9	32.0		
	35.2	33.2	34.1	33.1	32.9	34.0	32.8	31.1	31.1	31.3	31.1

1 - ground water salinity p.p.t.
2 - salinity of water in bed load traps p.p.t.

TABLE 3.23:

SALINITY READINGS : SAUNDERS BEACH

STATION		12	13	14	15	16	17	18	19	20	21
DATE											
9/3/74	1	41.8	64.7		65.2	47.5	66.1	38.1	46.0	63.2	67.7
	2	40.3			42.2	48.2	37.3	41.8	43.7	44.5	41.8
18/7/74	1	37.9			35.5	46.8	90.6	38.1	37.3	47.1	39.6
	2	35.0	34.7		36.2	41.0	36.4	34.8	36.8	35.9	37.6
9/1/75	1	32.2			34.4	48.0	68.0	24.8	27.8	28.5	37.4
	2	27.5							28.0	28.4	27.5
7/4/75	1	20.8				49.2	103.0	20.3	26.9	33.7	32.5
	2	24.0						30.6	30.3	30.6	
7/7/75	1	too deep to collect						30.9	40.8	42.3	50.0
	2	36.2						34.8	39.5	39.0	
6/10/75	1	37.2	39.9		44.0	52.8	102.0	37.6	37.0	37.5	50.0
	2	25.8						34.8	36.1	37.6	

1 - ground water salinity p.p.t.

2 - salinity of water in bed load traps p.p.t.

MAGNETIC ISLAND

FACTOR ANALYSIS

TABLE 3.24

SURFACE 12v

Variable	Factor Loadings I	II	III	IV
pHKCl	-0.100	0.911	0.087	0.054
pHH_2O	-0.092	0.895	0.075	-0.009
WSCl	-0.929	0.116	-0.166	-0.083
$WSSO_4$	-0.611	-0.405	0.046	0.461
SolNa	-0.816	0.211	-0.277	-0.157
SolK	-0.354	-0.442	0.406	0.484
SolCa	-0.012	-0.062	-0.245	0.904
SolMg	-0.931	0.003	-0.156	-0.041
ExNa	-0.096	-0.288	-0.869	0.090
ExK	-0.160	0.144	-0.877	0.054
ExCa	0.364	0.213	-0.103	0.782
ExMg	-0.393	-0.102	-0.716	0,235
Eigenvalue	3.772	2.466	2.002	1.162
% covariance	31.432	20.554	16.678	14.433

TABLE 3.25

SURFACE, 10v

Variable	Factor Loadings I	II	III
pHKCl	0.086	0.933	-0.054
pHH_2O	0.077	0.923	-0.044
WSCl	0.937	0.099	0.152
$WSSO_4$	0.310	-0.155	0.180
SolNa	0.925	0.101	0.190
SolK	0.005	-0.141	-0.144
SolCa			
SolMg	0.914	0.007	0.160
ExNa	0.075	-0.280	0.885
ExK	0.170	0.128	0.878
ExCa			
ExMg	0.270	-0.004	0.816
Eigenvalue	3.684	2.278	1.828
% covariance	36.846	22.78	17.28

TABLE 3.26

10cm, 12v

Variable	Factor Loadings I	II	III	IV
pHKCl	-0.059	-0.091	0.937	0.156
pHH_2O	-0.092	-0.015	0.933	0.137
WSCl	0.812	0.082	-0.007	-0.311
$WSSO_4$	0.132	-0.198	-0.214	-0.818
SolNa	0.851	0.061	0.008	0.286
SolK	0.048	0.012	-0.153	-0.802
SolCa	-0.059	-0.683	-0.001	-0.662
SolMg	0.831	0.110	-0.173	-0.224
ExNa	0.581	-0.121	-0.408	0.078
ExK	0.198	0.024	0.202	0.027
ExCa	-0.221	-0.918	0.159	-0.069
ExMg	0.542	-0.603	-0.163	-0.072
Eigenvalue	3.838	2.569	2.030	1.096
% covariance	31.99	21.4	17.92	9.14

TABLE 3.27

10cm, 10v

Variable	Factor Loadings I	II	III	IV
pHKCl	-0.051	0.939	-0.153	0.042
pHH_2O	-0.082	0.943	-0.145	-0.024
WSCl	0.789	-0.014	0.298	-0.240
$WSSO_4$	0.055	-0.175	0.821	-0.342
SolNa	0.867	-0.024	-0.275	-0.110
SolK	0.051	-0.153	0.842	0.262
SolCa				
SolMg	0.790	-0.167	0.214	-0.390
ExNa	0.428	-0.359	-0.043	-0.737
ExK	0.112	0.255	-0.117	-0.818
ExCa				
ExMg	0.323	-0.104	0.198	-0.710
Eigenvalue	3.772	2.230	1.233	0.959
% covariance	37.72	22.31	12.33	9.59

TABLE 3.28

30cm, 12v

Variable	Factor Loadings I	II	III	IV
pHKCl	0.018	0.034	-0.959	0.051
pHH_2O	0.078	-0.079	-0.927	0.026
WSCl	-0.898	0.073	0.024	-0.109
$WSSO_4$	-0.502	0.616	0.233	0.142
SolNa	-0.675	-0.242	0.001	-0.409
SolK	-0.305	0.471	0.138	0.653
SolCa	-0.095	0.909	0.031	0.059
SolMg	-0.923	0.142	0.070	-0.134
ExNa	-0.412	0.219	0.184	-0.736
ExK	-0.362	-0.011	0.009	-0.784
ExCa	0.175	0.791	-0.097	-0.257
ExMg	-0.068	0.581	0.075	-0.718
Eigenvalue	3.886	2.188	1.855	1.615
% covariance	32.36	19.07	15.46	13.46

TABLE 3.29

30cm, 10v

Variable	Factor Loadings I	II	III	IV
pHKCl	-0.086	-0.947	-0.064	-0.009
pHH_2O	-0.034	-0.942	-0.101	0.094
WSCl	0.156	0.015	0.285	-0.858
$WSSO_4$	0.299	0.132	0.822	-0.190
SolNa	0.169	0.061	-0.260	-0.850
SolK	-0.272	0.066	0.839	-0.031
SolCa				
SolMg	0.231	0.048	0.354	-0.846
ExNa	0.829	0.146	0.015	-0.358
ExK	0.751	-0.008	-0.222	-0.385
ExCa				
ExMg	0.905	0.038	0.122	0.013
Eigenvalue	3.711	1.964	1.598	1.144
% covariance	37.11	19.64	15.98	11.44

TABLE 3.30

Surface, 12v; Stations 1,7,8,9,10,11

Variable	Factor Loadings I	II	III
pHKCl	-0.224	-0.707	-0.541
pHH_2O	-0.139	-0.647	-0.593
WSCl	0.868	0.024	0.103
$WSSO_4$	0.314	-0.037	0.827
SolNa	0.813	0.007	0.193
SolK	-0.097	-0.055	0.891
SolCa	0.410	-0.701	0.442
SolMg	0.851	0.110	0.328
ExNa	0.885	0.165	0.173
ExK	0.916	-0.198	0.007
ExCa	-0.003	-0.905	0.127
ExMg	0.821	-0.058	0.254
Eigenvalue	5.271	2.514	1.899
% covariance	43.93	20.95	15.83

TABLE 3.31

Surface, 10v; Stations 1,7,8,9,10,11

Variable	Factor Loadings I	II	III
pHKCl	-0.156	0.919	-0.198
pHH_2O	-0.073	0.924	-0.225
WSCl	0.865	-0.089	0.109
$WSSO_4$	0.316	-0.202	0.859
SolNa	0.816	0.027	-0.164
SolK	-0.096	-0.235	0.886
SolCa			
SolMg	0.839	-0.238	0.291
ExNa	0.865	-0.302	0.066
ExK	0.924	0.047	-0.001
ExCa			
ExMg	0.822	-0.109	0.235
Eigenvalue	5.043	2.283	0.974
% covariance	50.43	12.83	9.75

SAUNDERS BEACH

FACTOR ANALYSIS:
TRANSECT ONE

TABLE 3.32

SURFACE, 12v

Variable	Factor Loadings I	II	III
pHKCl	0.211	0.432	0.724
pHH_2O	0.211	-0.179	0.887
WSCL	0.867	0.326	0.259
$WSSO_4$	0.639	0.716	0.002
SolNa	0.729	0.598	-0.017
SolK	0.844	0.442	0.112
SolCa	0.205	0.855	0.097
SolMg	0.914	0.277	0.172
ExNa	0.854	-0.032	0.207
ExK	0.739	0.343	0.206
ExCa	0.129	0.883	0.103
ExMg	0.428	0.799	-0.089
Eigenvalue	7.309	1.752	1.061
% covariance	60.91	14.60	8.84

TABLE 3.33

SURFACE, 10v

Variable	Factor Loadings I	Factor Loadings II
pHKCl	0.075	-0.814
pHH_2O	0.343	-0.822
WSCL	0.812	-0.257
$WSSO_4$	0.482	-0.063
SolNa	0.566	-0.042
SolK	0.738	-0.135
SolCa		
SolMg	0.860	-0.165
ExNa	0.873	-0.165
ExK	0.654	-0.229
ExCa		
ExMg	0.211	-0.016
Eigenvalue	6.519	1.437
% covariance	65.20	14.37

TABLE 3.34

10cm, 12v

Variable	Factor Loadings I	II	III
pHKCl	0.459	-0.492	0.471
pHH_2O	-0.018	0.057	0.956
WSCL	0.978	-0.088	0.041
$WSSO_4$	0.882	-0.355	-0.095
SolNa	0.947	-0.037	0.033
SolK	0.955	-0.186	0.024
SolCa	0.254	-0.811	0.096
SolMg	0.952	0.006	0.077
ExNa	0.919	-0.050	0.118
ExK	0.932	-0.256	0.098
ExCa	-0.137	-0.864	-0.077
ExMg	0.647	-0.597	-0.226
Eigenvalue	7.393	1.755	1.215
% covariance	61.61	14.62	10.12

TABLE 3.35

10cm, 10v

Variable	Factor Loadings I	Factor Loadings II
pHKCl	0.252	-0.310
pHH_2O	0.028	-0.961
WSCl	0.954	0.009
$WSSO_4$	0.796	0.199
SolNa	0.889	0.021
SolK	0.886	0.054
SolCa		
SolMg	0.979	-0.056
ExNa	0.911	-0.074
ExK	0.858	-0.002
ExCa		
ExMg	0.482	0.379
Eigenvalue	7.177	1.214
% covariance	71.77	12.14

TABLE 3.36

30cm, 12v

Variable	Factor Loadings I	II	III
pHKCl	0.253	0.214	0.064
pHH_2O	0.016	-0.115	0.971
WSCl	0.974	0.022	-0.035
$WSSO_4$	0.890	0.152	-0.259
SolNa	0.932	0.002	-0.002
SolK	0.948	0.115	-0.102
SolCa	0.182	0.899	0.002
SolMg	0.979	0.047	0.060
ExNa	0.949	0.077	0.108
ExK	0.921	0.152	0.041
ExCa	-0.048	0.910	-0.159
ExMg	0.492	0.430	-0.398
Eigenvalue	7.301	2.133	1.053
% covariance	60.85	17.77	8.78

TABLE 3.37

30cm, 10v

Variable	Factor Loadings I	II	III
pHKCl	0.193	-0.079	0.951
pHH_2O	0.031	-0.978	-0.021
WSCl	0.965	0.039	0.181
$WSSO_4$	0.871	0.275	0.301
SolNa	-0.914	0.003	0.266
SolK	0.932	0.119	0.277
SolCa			
SolMg	0.982	-0.037	0.028
ExNa	0.939	-0.095	0.246
ExK	0.899	-0.021	0.401
ExCa			
ExMg	0.449	0.431	0.713
Eigenvalue	7.146	1.333	0.966
% covariance	71.46	13.33	9.6

TABLE 3.38

SURFACE, 12v; Stations 12,13,14,15

Variable	Factor Loadings I	II	III
pHKCl	-0.095	0.494	-0.746
pHH_2O	0.102	-0.161	-0.888
WSCl	-0.913	0.263	-0.118
$WSSO_4$	-0.939	0.287	-0.024
SolNa	-0.888	0.084	0.069
SolK	-0.973	0.154	0.041
SolCa	-0.129	0.852	-0.121
SolMg	-0.952	0.101	0.075
ExNa	-0.227	0.359	-0.148
ExK	-0.148	0.321	-0.192
ExCa	-0.438	0.684	-0.079
ExMg	-0.328	0.713	0.174
Eigenvalue	6.505	2.264	1.190
% covariance	54.21	18.86	9.92

TABLE 3.39

SURFACE, 10v; Stations 12,13,14,15

Variable	Factor Loadings I	II	III
pHKCl	0.122	-0.322	0.747
pHH_2O	-0.114	0.022	0.904
WSCl	0.926	-0.254	0.129
$WSSO_4$	0.958	-0.178	0.031
SolNa	0.875	-0.375	-0.040
SolK	0.981	-0.093	-0.038
SolCa			
SolMg	0.949	-0.233	-0.057
ExNa	0.222	-0.877	0.210
ExK	0.146	-0.841	0.251
ExCa			
ExMg	0.357	-0.813	-0.130
Eigenvalue	5.599	1.976	1.119
% covariance	55.99	19.76	11.19

SAUNDERS BEACH

FACTOR ANALYSIS:
TRANSECT TWO

TABLE 3.40

SURFACE, 12v

Variable	Factor Loadings I	II	III
pHKCl	-0.076	0.841	0.144
pHH_2O	-0.142	0.826	0.287
WSCl	0.819	-0.144	-0.468
$WSSO_4$	0.811	0.267	-0.397
SolNa	0.672	-0.187	-0.547
SolK	0.881	0.319	-0.136
SolCa	0.305	0.595	-0.488
SolMg	0.889	-0.364	-0.129
ExNa	0.318	-0.239	-0.896
ExK	0.284	-0.266	-0.898
ExCa	0.548	0.658	-0.393
ExMg	0.220	0.218	-0.893
Eigenvalue	6.281	2.750	1.301
% covariance	52.339	22.919	10.844

TABLE 3.41

SURFACE, 10v

Variable	Factor Loadings I	II	III
pHKCl	0.007	-0.931	-0.032
pHH_2O	-0.062	-0.852	-0.232
WSCl	0.805	0.271	0.434
$WSSO_4$	0.841	-0.173	0.409
SolNa	0.657	0.230	0.565
SolK	0.908	-0.230	0.152
SolCa			
SolMg	0.849	0.448	0.103
ExNa	0.297	0.324	0.879
ExK	0.259	0.355	0.876
ExCa			
ExMg	0.251	-0.173	0.925
Eigenvalue	5.689	2.04	1.25
% covariance	56.889	20.403	12.5

TABLE 3.42

10cm, 12v

Variable	Factor Loadings I	Factor Loadings II
pHKCl	0.045	0.919
pHH_2O	0.007	0.935
WSCl	0.776	-0.522
$WSSO_4$	0.902	-0.156
SolNa	0.758	-0.522
SolK	0.889	-0.329
SolCa	0.782	0.237
SolMg	0.628	-0.655
ExNa	0.758	-0.596
ExK	0.740	-0.606
ExCa	0.899	0.203
ExMg	0.880	-0.168
Eigenvalue	7.763	2.406
% covariance	64.69	20.05

TABLE 3.34

10cm, 10v

Variable	Factor Loadings I	Factor Loadings II
pHKCl	-0.093	0.951
pHH_2O	-0.153	0.932
WSCl	0.839	-0.399
$WSSO_4$	0.930	0.029
SolNa	0.867	-0.339
SolK	0.942	-0.151
SolCa		
SolMg	0.695	-0.588
ExNa	0.870	-0.425
ExK	0.868	-0.419
ExCa		
ExMg	0.931	0.044
Eigenvalue	7.102	1.779
% covariance	71.016	17.794

TABLE 3.44

30cm, 12v

Variable	Factor Loadings I	II
pHKCl	-0.505	0.731
pHH_2O	-0.553	0.777
WSCl	0.909	-0.033
$WSSO_4$	0.902	0.351
SolNa	0.891	-0.069
SolK	0.957	0.111
SolCa	0.555	0.555
SolMg	0.864	-0.338
ExNa	0.949	-0.133
ExK	0.947	-0.091
ExCa	0.609	0.626
ExMg	0.861	0.329
Eigenvalue	7.877	2.228
% covariance	65.64	18.57

TABLE 3.45

30cm, 10v

Variable	Factor Loadings I	II
pHKCl	-0.115	0.940
pHH_2O	-0.182	0.949
WSCl	0.829	-0.384
$WSSO_4$	0.961	-0.049
SolNa	0.862	-0.328
SolK	0.912	-0.294
SolCa		
SolMg	0.618	-0.706
ExNa	0.831	-0.483
ExK	0.859	-0.429
ExCa		
ExMg	0.961	0.007
Eigenvalue	7.311	1.698
% covariance	73.11	22.98

MAGNETIC ISLAND

DISCRIMINANT ANALYSIS

TABLE 3.46

SURFACE

$\alpha = 0.05$ F = 1.845 d.f. = 12,110

Stations Similar

4/6

10/11

TABLE 3.47

10cm

$\alpha = 0.05$ F = 1.845 d.f. = 12,110

Stations Similar

1/2, 5

2/4, 5

4/5

10/11

TABLE 3.48

30cm

$\alpha = 0.05$ F = 1.887 d.f. = 12,88

Stations Similar

4/5, 6

5/6

SAUNDERS BEACH

DISCRIMINANT ANALYSIS:

TRANSECT ONE

TABLE 3.49

SURFACE

$\alpha = 0.05$ F = 2.60 d.f. = 12, 13

Stations Similar

12/13, 15

13/14, 15

14/15

TABLE 3.50

10cm

$\alpha = 0.05$ F = 2.60 d.f. = 12, 13

Stations Similar

12/13, 15

13/15

TABLE 3.51

30cm

$\alpha = 0.05$ F = 2.60 d.f. = 12, 13

Stations Similar

12/13, 14, 15

13/14, 15

SAUNDERS BEACH

DISCRIMINANT ANALYSIS:

TRANSECT TWO

TABLE 3.52

SURFACE

$\alpha = 0.05$ F = 4.68 d.f. 12, 5

Stations Similar

18/20, 21

20/21

TABLE 3.53

10cm

$\alpha = 0.05$ F = 4.68 d.f. = 12, 5

Stations Similar

18/20, 21

20/21

TABLE 3.54

30cm

$\alpha = 0.05$ F = 4.68 d.f. = 12, 5

Stations Similar

18/21

20/21

TABLE 3.55 GROUND WATER SALINITY: MULTIPLE REGRESSION ANALYSIS

ALL STATIONS ON MAGNETIC ISLAND

Multiple R	0.59676
R square	0.35612
Adjusted R square	0.34103
Standard error	22.16106

Variable	Coefficient(B)	Std. Error (B)	F
Distance	-0.56964	0.11531	24.406
Height	-89.40737	21.30717	17.607
Exposure between sampling	0.09804	0.03257	9.061
Constant	319.07467		

P = 0.05 F = 2.68 (3, 128 d.f.)

STATIONS 3 - 11

Multiple R	0.95063
R. square	0.90370
Adjusted R square	0.90092
Standard error	9.09608

Variable	Coefficient (B)	Std. Error (B)	F
Distance	-1.05469	0.05023	440.957
Height	-117.31299	7.07542	274.908
Exposure between sampling	-0.00397	0.00181	4.827
Constant	541.68166		

P = 0.05 F = 2.70 (3, 104 d.f.)

Increase in R square from using first two variables to using the three variables is 0.00447.

TABLE 4.1

RATES OF ACCRETION ON MAGNETIC ISLAND

STATION		1974 D	J	F	M	A	M	J	J	A	S	O	N	1975 D	J	F	M	A	M	J	J	A	S	O	N	D
1a	1	-3	-5	-1	-3	0	3	-1	1	-1	-4	-1	3	0	-4	0	0	-1	0	0	-1	1	-1	2	-3	2
	2	-3	-8	-9	-12	-12	-9	-10	-9	-10	-14	-15	-12	-12	-16	-16	-16	-17	-17	-17	-18	-17	-18	-16	-19	-17
b	1	4	-5	-4	-1	11	-2	-2	3	-1	-1	1	0	1	-4	2	9	-9	2	3	1	-2	0	6	-4	0
	2	4	-1	-5	-6	5	3	1	4	3	2	3	3	4	0	2	11	2	4	7	8	6	6	12	8	8
2	1	1	0	-1	1	1	2	0	-2	-1	1	-1	1	-2	-2	-1	1	-1	2	-1	1	0	-2	0	1	-2
	2	1	1	0	1	2	4	4	2	1	2	1	2	0	-2	-3	-2	-3	-1	-2	-1	-1	-3	-3	-2	-4
3	1	-3	5	-3	0	-4	1	2	-3	0	1	-1	-1	1	0	1	0	0	0	0	0	0	0	1	-1	0
	2	-3	2	-1	-1	-5	-4	-2	-5	-5	-4	-5	-6	-5	-5	-4	-4	-4	-4	-4	-4	-4	-4	-3	-4	-4
4	1	-4	3	1	-1	4	0	1	-2	1	-1	1	-1	-6	0	-3	0	2	22	-3	-1	-1	4	3	-5	-4
	2	-4	-1	0	-1	3	3	4	2	3	2	3	2	-4	-4	-7	-7	-5	17	14	13	12	8	11	6	2
5	1	-1	1	-2	0	0	1	-1	-1	0	0	0	-3	-1	2	0	-2	-2	3	2	0	1	-1	-2	2	-1
	2	-1	0	-2	-2	-2	-1	-2	-3	-3	-3	-3	-6	-7	-5	-5	-7	-9	-6	-4	-4	-3	-4	-6	-4	-5
6a	1	0	-3	1	-3	1	4	-4	-2	1	1	-1	1	0	-1	-3	-1	1	5	-2	0	0	-1	0	2	-2
	2	0	-3	-2	-5	-4	0	-4	-6	-5	-4	-5	-4	-4	-5	-8	-9	-8	-3	-5	-5	-5	-6	-6	-4	-6
b	1	15	-3	-5	-2	-2	8	-3	1	2	5	4	1	2	2	-1	-2	-4	4	1	2	1	-1	2	-3	-1
	2	15	12	7	5	3	11	8	9	11	16	20	21	23	25	24	22	18	22	23	25	26	25	27	24	23
7a	1													-3	-8	-3	7	24	-30	1	-1	5	-6	9	-5	5
	2													-3	-11	-14	-7	17	-13	-12	-13	-8	-14	-5	-10	-5
b	1													-1	-11	-8	-1	-11	24	-3	2	3	-2	10	2	-3
	2													-1	-12	-20	-21	-32	-8	-11	-9	-6	-8	2	4	1
8a	1													5	-3	-1	-7	2	1	9	0	-3	-3	-1	-8	2
	2													5	2	1	-6	-4	-3	6	6	3	0	-1	-9	-7
b	1													6	3	7	-1	-3	1	19	-2	-3	-7	0	-1	-14
	2													6	9	16	15	12	13	32	30	27	20	20	19	5
9a	1	0	8	-1	2	-3	7	-1	0	-2	1	2	4	-2	-1	-1	-3	3	-1	1	5	-4	-1	-3	-2	-6
	2	0	8	7	9	6	13	12	12	10	11	13	17	15	14	13	10	13	12	13	18	14	13	10	8	2
b	1	3	-6	-2	1	2	1	-5	5	-2	-2	3	1	2	-5	0	2	-1	-1	1	1	-3	1	0	0	0
	2	3	-3	-5	-4	-2	-1	-6	-1	-3	-5	-2	-1	1	-4	-4	-2	-3	-4	-3	-2	-5	-4	-4	-4	-4
10	1	-2	5	13	-3	-4	0	4	-2	-3	-12	2	5	0	-3	-2	0	-1	-3	1	2	-8	-1	-3	13	-6
	2	-2	3	16	13	9	9	13	11	8	-4	-2	3	3	0	-2	-2	-3	-6	-5	-3	-11	-12	-15	-2	-8
11	1	1	-2	-2	-5	6	4	3	-3	-6	-2	1	2	Lost	3	0	7	-7	-12	8	2	3	4	-2	6	-1
	2	1	-1	-4	-9	-3	1	4	1	-5	-7	-6	-4	"	-1	-1	6	-1	-13	-5	-3	0	4	2	8	7
10cm		0	-3.7	1.1	-6.4	0.7	2.7	-1.7	-4.2	1.5	-3.2	3.3	2.2													
grid		0	-3.7	-2.6	-9.0	-8.3	-5.6	-7.3	-11.5	-10.5	-13.7	-10.4	-8.2													

1 - gross change mm
2 - net change mm

a - away from the influence of vegetation
b - subject to vegetational influences

TABLE 4.2 GROSS CHANGES IN SURFACE LEVEL, MAGNETIC ISLAND

	1974				1975			
Station	D-M mm	A-J mm	J-S mm	O-D mm	J-M mm	A-J mm	J-S mm	O-D mm
1a	-12	+ 2	- 4	+ 2	- 4	- 1	- 1	+ 1
1b	- 6	+ 7	+ 1	+ 2	+ 7	- 4	- 1	+ 2
2	+ 1	+ 3	- 2	- 2	- 2	0	- 3	- 1
3	- 1	- 1	- 2	- 1	+ 1	0	0	0
4	- 1	+ 5	- 2	- 6	- 3	+21	- 6	- 6
5	- 2	0	- 1	- 4	0	+ 3	0	- 1
6a	- 5	+ 1	0	0	- 5	+ 4	- 1	0
6b	+ 5	+ 3	+ 8	+ 7	- 1	+ 1	+ 2	- 2
7a					- 7	- 5	- 2	+ 9
7b					-21	+10	+ 3	+ 9
8a					- 6	+10	- 6	- 7
8b					+15	+17	-12	-15
9a	+ 9	+ 3	- 1	+ 4	- 5	+ 3	0	-11
9b	- 4	- 2	+ 1	+ 6	- 3	- 1	- 1	0
10	+13	0	-17	+ 7	- 5	- 3	- 7	+ 4
11	- 9	+13	-11	lost	+ 6	-11	+ 9	+ 3
TOTAL	-12	34	-30	15	-33	37	-26	-15

TABLE 4.3

RATES OF ACCRETION AT SAUNDERS BEACH

STATION	7/74		1/75		4/75		7/75		10/75		
12a	30[1]	30[2]	4[1]	34[2]	0[1]	34[2]	-3[1]	31[2]	4[1]	35[2]	
b	19	19	-4	15	8	23	10	33	13	46	
13a	-20	-20	27	7	-4	3	15	18	- 6	12	
b	0	0	3	3	-3	0	1	1	1	2	
b	0	0	0	0	2	2	-1	1	2	3	
14	No observed change										
15a	53	53	-64	-11	-4	-15	10	- 5	0	- 5	
b	>-200		reset		6	6	4	10	-5	5	(->200)
16a	0	0	0	0	-5	- 5	3	- 2	-4	- 6	
17a	0	0	0	0	-3	- 3	2	- 1	-1	- 3	
18a	- 7.5	- 7.5	>-200				-4	-11	11	0	(->200)
b	1	1	-37	-36	-9	-45	-4	-49	22	-27	
19a	- 2	- 2	6	4	21	25	-27	- 2	11	9	
b	10	10	-18	- 8	15	7	-13	- 6	15	9	
20a	6	6	- 6	0	7	7	4	11	-2	9	
	6	6	-10	- 4	14	10	13	23	-11	12	
21a	missing		1	1	5	6	1	7	-4	3	
	4	4	- 6	- 2	5	3	1	4	1	4	

[1] gross change mm
[2] net change mm
a in open away from direct vegetational influences
b behind an obstruction, e.g. a prop root

TABLE 4.4

RATES OF ACCRETION AT ORPHEUS ISLAND

STATION	18-19/12/73	22/9/74		23/9/74		7/2/75		8/2/75		NET RESULT
1a	+ 6.6[1]	+8	+14.6[2]	-1[1]	+13.6[2]	+5[1]	+18.6[2]	-3[1]	+15.6[2]	+15.6
b	-13.3	+2	-11.3	+3	- 8.3	-7	-15.3	+3	-12.3	-12.3
2a	+ 1.3	LOST				LOST				
b	+ 0.6									
3a	- 6.4	+6	- 0.4	-29	-29.4	LOST				
b	+ 5.4	LOST								
4a	-15.5	+27	+ 9.5	-9	+ 0.5	+62	+62.5	-1	+61.5	+61.5
b	+ 4.5	-27	-22.5	+25	+ 2.5	LOST				
5a	-20	LOST				LOST				

[1] gross change mm
[2] net change mm
a in the open away from direct vegetational influences
b behind a prop root or pneumatophore

TABLE 4.5

NET CHANGE IN DEPOSITION AT GRIDS AND REFERENCE STAKES FROM PREVIOUS SAMPLE PERIODS

Grid	21/4/75 av. ht. cm	26/5/75 av. net change cm	23/6/75 av. net change cm	22/7/75 av. net change cm	21/8/76 av. ht. cm
10cm	7.9	0	+0.14	+0.2	6.9
5cm	7.6	local scour >10cm frame exposed	no observed change	partial infilling	10.4
2.5cm	8.3	local scour >10cm frame exposed	no observed change	infilling leaving whole framework exposed 5cm on seaward and 4cm on landward side	-
1cm	local scour frame exposed	local scour >10cm frame exposed	no observed change	grid toppled over and hole infilled	-
reference peg	9.7	-1.2	+0.8	+0.2	5.8
Avicennia/ Sonneratia fringe	10.1	-0.3	+0.1	+0.2	9.5

TABLE 4.6

NET CHANGES IN SURFACE LEVELS FROM PREVIOUS SAMPLE PERIOD FOR THE 2.5cm GRID

	2/1/76 av. ht. cm.	16/2/76 av. change cm	10/5/76 av. change cm	21/8/76 av. change cm
Bare mud	10.00	-4.54	-2.45	+4.95
Avicennia/ Sonneratia fringe	7.96	-2.04	-2.03	+2.41

TABLE 4.7

Load transported through mangal on Magnetic Island

TABLE 4.7

MAGNETIC ISLAND

11/73				12/73			
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1 1				1 1			
2				2			
3				3			
2 1				2 1			
2				2			
3				3			
3 1				3 1			
2				2			
3	291.29	0.95	582.58	3			
4 1	181.61	0.79		4 1			
2	339.03	1.86		2			
3	800.97	1.67	355.99	3			
5 1	59.36	3.72		5 1			
2	253.23	1.01		2	83.87	2.47	
3	255.81	1.07	99.15	3	5,091.94	0.41	2,545.97
6 1	62.9	0.91		6 1			
2	360.32	0.26		2	758.39	0.02	
3	13,157.42	0.08	5,099.78	3	8,132.16	0.16	3,152.03
7 1				7 1			
2				2			
3				3			
8 1				8 1			
2				2			
3				3			
9 1	767.74	7.47		9 1	139.03	13.05	
2	2,151.61	7.94		2	563.55	7.01	
3	11,387.42	1.56	818.06	3			
10 1	725.5	8.76		10 1	209.35	4.74	
2	2,022.9	9.44		2	1,291.29	6.80	
3	11,710.0	0.46	763.86	3	6,949.03	1.43	404.96
11 1	641.63	34.52		11 1	326.45	43.0	
2	893,55	27.56		2	494.52	13.19	
3	8,758.39	1.13	553.28	3	7,150.65	0.83	386.52

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	1/74				2/74		
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1 1	214.5	3.55		1 1	138.06	1.31	
2	981.29	8.24		2	281.94	0.52	
3	493.87	0.79	121.04	3	639.67	0.72	192.09
2 1	84.52	1.18		2 1	114.84	1.06	
2	159.03	1.48		2	145.48	4.57	
3	370.32	1.25	98.75	3	528.19	0.62	150.91
3 1	101.6	4.0		3 1	256.13	0.90	
2	154.2	1.78		2	461.94	0.92	
3	646.45	0.32	152.1	3	1,559.03	0.87	389.75
4 1	182.6	2.98		4 1	345.16	0.37	
2	229.68	1.59		2	259.35	1.29	
3	38.06	1.11	8.61	3	1,288.71	2.05	309.04
5 1	6.97	1.09		5 1	138.06	1.76	
2	98.1	75.0		2	189.03	0.81	
3	298.7	0.53	63.96	3	548.39	2.41	124.07
6 1	133.87	1.71		6 1	352.26	0.28	
2	230.65	2.93		2	290.97	1.30	
3	554.19	0.78	118.67	3	1,801.29	1.48	407.53
7 1				7 1			
2				2			
3				3			
8 1				8 1			
2				2			
3				3			
9 1	1,930.32	2.59		9 1	1,040.65	1.44	
2	1,932.22	0.36		2	916.45	2.36	
3	43,781.29	0.88	2,793.96	3	4,063.55	1.76	263.52
10 1	1,576.45	4.89		10 1	901.29	3.05	
2	4,410.32	10.48		2	1,449.03	5.09	
3	39637.00	2.34	2,233.07	3	5,134.19	3.03	293.38
11 1	1,168.39	6.16		11 1	604.19	4.53	
2	3,236.13	6.91		2	842.58	6.24	
3	20,491.61	3.48	1,122.83	3	11,632.90	0.18	646.39

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

3/74				4/74			
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1 1	82.9	1.32		1 1			
2	321.62	0.47		2			
3	1,016.12	0.37	554.25	3			
2 1	135.16	1.93		2 1			
2	127.74	5.09		2			
3	3,393.87	0.37	1,272.70	3			
3 1				3 1			
2	349.68	3.0		2			
3	3,406.45	0.47	681.20	3	756.0	0.44	646.15
4 1	197.09	3.04		4 1			
2	305.16	2.22		2	157.6	1.78	
3	449.68	1.34	118.34	3	663.1	0.78	305.58
5 1	192.58	9.29		5 1	198.9	0.81	
2	402.25	1.44		2	383.87	0.57	
3	1,200.32	1.03	313.13	3	898.3	1.04	371.2
6 1	170.00	1.15		6 1			
2	450.65	2.43		2	541.28	0.5	
3	1,286.13	1.36	335.51	3	338.0	1.11	139.67
7 1				7 1			
2				2			
3				3			
8 1				8 1			
2				2			
3				3			
9 1	3,411.29	4.02		9 1	1,685.5	9.45	
2	8,527.09	2.60		2	6,013.5	3.95	
3	45,282.91	0.87	2,802.16	3	20,634.1	1.17	2,807.36
10 1	3,966.64	4.14		10 1	1,656.13	5.75	
2	10,559.68	1.25		2	3,474.76	3.84	
3	91,473.87	0.44	5,681.6	3	32,405.16	1.12	1,851.72
11 1	1,489.04	4.79		11 1	315.8	1.71	
2	4,984.84	4.90		2	1,440.32	6.91	
3	58,461.61	1.45	3,597.64	3	20,902.26	2.64	1,114.79

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

5/74				6/74			
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1 1				1 1			
2				2			
3				3			
2 1				2 1			
2				2			
3				3	223.9	1.14	373.17
3 1				3 1			
2				2	185.1	1.68	
3				3	308.7	5.93	160.78
4 1				4 1	33.9	0.04	
2				2	63.9	4.82	
3				3	723.9	55.08	377.03
5 1				5 1	70.7	1.09	
2				2	186.7	4.36	
3				3	379.4	18.26	197.6
6 1				6 1	47.9	1.22	
2				2	208.4	0.26	
3				3	293.2	0.63	152.71
7 1				7 1			
2				2			
3				3			
8 1				8 1			
2				2			
3				3			
9 1	2,073.55	3.30		9 1	259.7	4.88	
2	5,608.71	1.40		2	1,053.3	1.27	
3	32,935.48	1.72	3,160.79	3	5,688.3	0.99	432.24
10 1	1,172.26	6.95		10 1	259.4	4.22	
2	1,227.00	0.32		2	840.3	7.40	
3	76,612.9	1.04	3,761.07	3	7,964.8	2.87	528.17
11 1	1,023.22	8.26		11 1	397.1	86.93	
2	2,577.07	4.81		2	1,150.7	1.57	
3	28,892.91	2.08	1,370.63	3	3,555.8	4.17	231.95

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

7/74				8/74			
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1 1				1 1			
2				2			
3				3			
2 1				2 1			
2				2			
3				3			
3 1				3 1			
2				2			
3				3			
4 1				4 1			
2				2			
3				3			
5 1				5 1			
2				2			
3				3			
6 1				6 1			
2				2			
3				3			
7 1				7 1			
2				2			
3				3			
8 1				8 1			
2				2			
3				3			
9 1	1,373.9	1.32		9 1	227.74	1.86	
2	2,820.6	0.79		2	647.42	6.9	
3	22,770.3	0.35	2,009.73	3	7,941.29	0.59	635.30
10 1	1,085.5	2.18		10 1	223.22	8.64	
2	2,942.9	1.70		2	942.90	3.59	
3	69,460.0	0.33	3,704.53	3	11,379.35	0.53	711.21
11 1	596.2	8.78		11 1	213.22	1.15	
2	1,427.5	3.88		2	448.39	3.44	
3	23,683.2	0.70	1,230.30	3	11,787.42	0.77	710.94

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

Station	9/74 A[1]	9/74 B[2]	9/74 C[3]	Station	10/74 A[1]	10/74 B[2]	10/74 C[3]
1-1				1-1			
2				2			
3	1385.16	1.50	2098.72	3	2251.29	1.73	2251.29
2-1				2-1			
2				2			
3	882.91	0.94	531.87	3	2200.35	0.35	1654.4
3-1	133.87	1.37		3-1	145.8	0.97	
2	206.45	1.61		2	260.0	0.88	
3	448.71	2.81	103.63	3	693.87	0.74	170.01
4-1	149.03	1.19		4-1	170.64	2.16	
2	135.81	2.66		2	2344.52	34.74	
3	1298.38	2.66	263.89	3	1807.09	5.02	344.21
5-1	82.58	2.41		5-1	215.16	1.51	
2	295.80	1.20		2	349.04	1.98	
3	1978.39	3.30	402.11	3	2098.71	8.75	399.75
6-1	204.84	1.41		6-1	150.97	5.78	
2	248.71	1.26		2	412.26	2.17	
3	470.65	1.97	95.66	3	1162.91	2.08	221.51
7-1				7-1			
2				2			
3				3			
8-1				8-1			
2				2			
3				3			
9-1	599.04	12.86		9-1	2747.09	3.51	
2	1342.90	4.24		2	2750.65	0.54	
3	7697.09	1.53		3	65806.45	0.92	4270.37
10-1	640.32	7.63	499.16	10-1	2572.57	4.8	
2	2663.87	1.46		2	4547.41	5.55	
3	26960.64	0.95	1676.66	3	66617.1	2.98	4163.57
11-1	814.52	5.73		11-1	2188.71	7.79	
2	1456.45	8.92		2	3830.0	5.50	
3	16219.04	8.72	987.76	3	36396.42	1.95	2228.81

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND.

Station	11/74 A[1]	B[2]	C[3]	Station	12/74 A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3	2143.54	0.17	2143.54	3	1978.07	0.13	1978.07
2-1				2-1			
2				2			
3	517.74	0.77	345.16	3	700.33	7.16	500.24
3-1				3-1			
2				2			
3	573.55	0.59	201.95	3	116.13	1.12	40.05
4-1				4-1			
2				2			
3	1459.36	2.34	398.73	3	479.68	7.72	137.05
5-1				5-1			
2				2			
3	1040.87	5.25	284.42	3	236.79	9.64	67.65
6-1				6-1			
2				2			
3	1114.52	0.43	282.87	3	276.78	3.81	79.08
7-1				7-1			
2				2			
3	1220.32	0.81	200.53	3	440.00	8.47	93.62
8-1				8-1			
2				2			
3	6396.78	2.35	644.83	3	666.77	1.19	68.04
9-1				9-1			
2				2			
3	8617.1	0.52	550.26	3	1113.22	2.12	78.40
10-1				10-1			
2				2			
3	5986.13	2.53	372.27	3	1449.04	3.40	85.74
11-1				11-1			
2				2			
3	3854.74	2.44	234.9	3	1860.0	2.34	104.49

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

1/75				2/75			
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3	481.94	0.49	166.2	3	500.29	8.96	200.11
2-1				2-1			
2				2			
3	574.17	0.91	155.2	3	589.35	0.70	235.74
3-1				3-1			
2				2			
3	782.26	0.71	163.0	3	333.87	0.73	95.38
4-1				4-1			
2				2			
3	597.07	2.55	97.9	3	925.44	1.02	264.41
5-1				5-1			
2				2			
3	1668.71	0.08	273.6	3	1096.45	0.48	313.27
6-1				6-1			
2				2			
3	350.00	3.5	57.4	3	541.93	1.33	154.83
7-1				7-1			
2				2			
3	494.2	0.84	60.3	3	639.03	1.39	98.31
8-1				8-1			
2				2			
3	7978.71	1.59	699.9	3	4387.35	1.35	417.84
9-1				9-1			
2				2			
3	33846.13	0.50	2383.5	3	7289.02	1.43	502.69
10-1				10-1			
2				2			
3	24596.16	1.72	1527.7	3	5045.79	0.52	325.53
11-1				11-1			
2				2			
3	15310.96	2.27	933.6	3	15353.87	0.46	990.57

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	3/75						
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3	1247.07	2.57	799.4	3			
2-1				2-1			
2				2			
3	340.97	1.79	133.19	3			
3-1				3-1			
2				2			
3	416.13	2.31	162.55	3			
4-1				4-1			
2				2			
3	1488.39	0.60	326.40	3			
5-1				5-1			
2				2			
3	555.81	2.19	121.88	3			
6-1				6-1			
2				2			
3	449.35	3.54	98.54	3			
7-1				7-1			
2				2			
3	1626.45	1.22	247.93	3			
8-1				8-1			
2				2			
3	3511.93	3.46	332.56	3			
9-1				9-1			
2				2			
3	8605.49	0.71	591.03	3			
10-1				10-1			
2				2			
3	12093.84	0.28	777.24	3			
11-1				11-1			
2				2			
3	6536.78	0.39	420.10	3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	4/75				5/75		
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3	2039.67	2.4	3343.72	3	388.7	0.39	777.4
2-1				2-1			
2				2			
3	445.16	0.81	729.77	3	420.00	0.79	560.00
3-1				3-1			
2				2			
3	142.26	0.54	88.36	3	488.39	0.98	279.08
4-1				4-1			
2				2			
3	303.23	0.65	116.18	3	289.36	1.02	165.34
5-1				5-1			
2				2			
3	187.42	0.12	71.80	3	218.71	0.28	124.97
6-1				6-1			
2				2			
3	90.00	0.41	34.48	3	208.71	0.38	119.26
7-1				7-1			
2				2			
3	290.32	0.38	51.75	3	211.29	0.15	44.48
8-1				8-1			
2				2			
3	729.68	1.15	75.92	3	1706.77	1.45	220.22
9-1				9-1			
2				2			
3	1009.03	0.67	74.13	3	22976.45	1.74	1671.01
10-1				10-1			
2				2			
3	1363.87	0.32	82.11	3	33271.94	0.94	2112.5
11-1				11-1			
2				2			
3	1266.65	0.84	76.25	3	8829.03	0.76	560.57

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

Station	6/75 A[1]	B[2]	C[3]	Station	7/75 A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3				3			
2-1				2-1			
2				2			
3	343.97	0.28	687.94	3	1319.03	1.58	2638.1
3-1				3-1			
2				2			
3	380.00	0.21	380.00	3	977.41	0.44	381.69
4-1				4-1			
2				2			
3	574.42	0.11	147.95	3	772.9	0.3	301.91
5-1				5-1			
2				2			
3	429.55	0.50	116.09	3	597.08	0.22	233.23
6-1				6-1			
2				2			
3	189.36	0.21	51.17	3	315.16	0.9	123.10
7-1				7-1			
2				2			
3	387.74	0.71	82.49	3	902.26	0.27	253.44
8-1				8-1			
2				2			
3	762.90	1.29	87.68	3	791.29	0.54	92.44
9-1				9-1			
2				2			
3	939.68	0.53	73.99	3	1722.90	0.51	137.17
10-1				10-1			
2				2			
3	2541.61	0.40	185.51	3	3622.58	0.42	218.75
11-1				11-1			
2				2			
3	2966.09	0.38	216.50	3	2430.64	0.29	146.77

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	8/75				9/75		
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3				3			
2-1				2-1			
2				2			
3	571.61	0.54	1143.22	3			
3-1				3-1			
2				2			
3	402.91	0.93	255.00	3	235.80	0.54	471.60
4-1				4-1			
2				2			
3	647.10	0.6	409.55	3	357.75	0.38	230.80
5-1				5-1			
2				2			
3	513.55	0.43	325.03	3	317.42	0.47	204.78
6-1				6-1			
2				2			
3	431.83	0.82	273.31	3	789.99	0.45	509.67
7-1				7-1			
2				2			
3	700.51	1.06	195.61	3	2630.64	1.81	741.02
8-1				8-1			
2				2			
3	780.34	1.05	90.94	3	2131.61	0.97	282.33
9-1				9-1			
2				2			
3	981.94	0.37	84.79	3	8832.56	0.38	764.72
10-1				10-1			
2				2			
3	1700.96	0.17	116.66	3	22277.05	0.09	1531.06
11-1				11-1			
2				2			
3	1130.64	0.26	77.54	3	10142.56	0.38	697.08

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	10/75				11/75		
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3				3	998.39	2.68	1996.78
2-1				2-1			
2				2			
3				3	1509.36	0.31	1886.7
3-1				3-1			
2				2			
3				3	901.61	1.44	901.61
4-1				4-1			
2				2			
3				3	756.73	0.15	236.48
5-1				5-1			
2				2			
3				3	631.93	0.42	197.48
6-1				6-1			
2				2			
3				3	372.19	0.86	116.31
7-1				7-1			
2				2			
3	1445.77	0.52	556.06	3	248.07	0.48	32.22
8-1				8-1			
2				2			
3	474.63	0.72	84.75	3	823.87	0.37	77.72
9-1				9-1			
2				2			
3	4233.97	0.15	336.02	3	1942.59	0.49	137.77
10-1				10-1			
2				2			
3	820.77	0.61	56.21	3	2748.06	0.15	184.43
11-1				11-1			
2				2			
3	3069.29	2.00	210.22	3	2790.32	0.49	182.37

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

MAGNETIC ISLAND

	12/75						
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
1-1				1-1			
2				2			
3	937.73	1.82	937.73	3			
2-1				2-1			
2				2			
3	879.03	5.11	732.52	3			
3-1				3-1			
2				2			
3	609.03	0.37	304.51	3			
4-1				4-1			
2				2			
3	236.45	0.45	67.56	3			
5-1				5-1			
2				2			
3	201.62	0.47	57.61	3			
6-1				6-1			
2				2			
3	350.65	0.6	100.19	3			
7-1				7-1			
2				2			
3	602.90	0.19	76.32	3			
8-1				8-1			
2				2			
3	1283.23	0.47	118.82	3			
9-1				9-1			
2				2			
3	11489.68	0.8	809:13	3			
10-1				10-1			
2				2			
3	13361.61	0.2	884.87	3			
11-1				11-1			
2				2			
3	7663.22	0.48	497.61	3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

TABLE 4.8

Load transported through mangal swamp
Saunders Beach

TABLE 4.8

SAUNDERS BEACH

Station		3/74 A[1]	B[2]	C[3]	Station		7/74 A[1]	B[2]	C[3]
12	1	257.1	1.18		12	1	354.52	3.06	
	2	642.58	0.79			2	543.23	3.07	
	3	2068.39	0.69	281.43		3	1549.35	0.66	245.93
13	1				13	1			
	2					2			
	3					3	731.94	0.38	209.13
14	1				14	1			
	2					2			
	3					3			
15	1				15	1			
	2					2	211.94	∞	
	3	881.3	1.13	440.65		3	3548.39	0.49	1182.8
16	1				16	1			
	2					2	178.39	7.92	
	3	11759.8	1.02	5879.9		3	1643.22	1.95	547.74
17	1				17	1			
	2					2	390.32	2.38	
	3	691.61	0.84	345.81		3	1651.94	2.38	550.64
18	1	207.1	2.34		18	1	256.45	11.02	
	2	209.13	4.06			2	336.45	2.23	
	3	2449.03	1.29	218.66		3	1477.42	0.33	175.88
19	1	386.13	2.09		19	1	287.74	5.07	
	2	680.97	2.23			2	358.71	1.65	
	3	1806.45	6.53	180.64		3	1252.91	3.44	232.02
20	1				20	1	180.32	4.38	
	2	411.2	2.68			2	413.87	2.75	
	3	1055.16	1.16	175.86		3	909.36	3.16	227.34
21	1				21	1	160.97	21.6	
	2	334.52	4.18			2	346.77	1.95	
	3	640.33	1.77	200.1		3	1815.15	0.35	567.23

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

SAUNDERS BEACH

Station		1/75 A[1]	B[2]	C[3]	Station		4/75 A[1]	B[2]	C[3]
12	1				12	1			
	2					2			
	3	1170.0	0.04	303.9		3	17328.71	0.20	5412.22
13	1				13	1			
	2					2			
	3					3			
14	1				14	1			
	2					2			
	3					3			
15	1				15	1			
	2					2			
	3					3			
16	1				16	1			
	2					2			
	3					3			
17	1				17	1			
	2					2			
	3					3			
18	1	98.71	3.5		18	1	155398.0	0.20	18499.76
	2	101.61	0.89			2			
	3					3			
19	1	265.16	3.40		19	1			
	2	397.42	2.97			2			
	3	615.80	0.99	159.95		3	1274.0	4.34	245.00
20	1				20	1			
	2					2			
	3	500.32	2.75	151.61		3	2724.84	3.82	1964.31
21	1				21	1			
	2					2			
	3	588.71	0.53	226.43		3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

SAUNDERS BEACH

	7/75				10/75		
Station	A[1]	B[2]	C[3]	Station	A[1]	B[2]	C[3]
12 1				12 1			
2				2			
3	490.64	0.73	125.81	3	14323.22	0.3	2137.79
13 1				13 1			
2				2			
3				3			
14 1				14 1			
2				2			
3				3			
15 1				15 1			
2				2			
3				3			
16 1				16 1			
2				2			
3				3			
17 1				17 1			
2				2			
3				3			
18 1				18 1			
2				2			
3	998.07	1.83	133.08	3	2947.41	6.41	300.76
19 1				19 1			
2				2			
3	508.39	2.38	203.36	3	2063.87	4.00	286.65
20 1				20 1			
2				2			
3	1828.71	0.36	1015.95	3	3154.20	0.16	1314.25
21 1				21 1			
2				2			
3				3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

TABLE 4.9

Load Transported through Mangal on Orpheus Island

TABLE 4.9:

ORPHEUS ISLAND

Station	12/73 A[1]	B[2]	C[3]	Station	7/74 A[1]	B[2]	C[3]
R1 1	6670.0	1.1		R1 1			
2	11966.77	0.55		2			
3	39298.71	0.36	1969.86	3			
R2 1	4541.3	2.23		R2 1	149.35	4.38	
2	8008.7	3.22		2	301.61	1.17	
3	29205.0	0.61	1245.42	3	1193.87	1.05	58.67
R3 1	2191.6	0.13		R3			
2	30446.4	0.01		3a	378200.31	0.01	72730.83
3				3b	57030.64	0.04	10967.41
R4 1	6296.8	0.15		R4			
2	39917.1	0.03		4a	169.03	1.43	18.37
3				4b	153.87	0.99	16.73
R5 1	2100.0	0.64		R5 1			
2	8130.3	0.28		2			
3	1058710	0.01	91663.0	3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

ORPHEUS ISLAND

Station		2/75 A[1]	B[2]	C[3]	Station		A[1]	B[2]	C[3]
R1	1	225.16	0.63		R1	1			
	2	380.00	0.14			2			
	3	32277.09	0.15	1744.71		3			
R2	1	243,89	0.71		R2	1			
	2	330.63	1.04			2			
	3	4931.94	0.29	227.28		3			
R3	1	190.97	0.42		R3	1			
	2	112.23	0.32			2			
	3	15922.25	0.01	1809.34		3			
R4	1	325.48	1.91		R4	1			
	2	502.58	0.53			2			
	3					3			
R5	1				R5	1			
	2					2			
	3	2482.58	0.19	162.79		3			

1 total load, mg/l

2 ratio amount greater than 63 microns: amount less than 63 microns (1:x)

3 total load per unit time covered mg/l/hr

Plate 1 Magnetic Island July 1971

Plate 2 Magnetic Island July 1975
post Cyclone Althea 24/12/71

Plate 3 Study area on Magnetic Island - transect goes across the central lighter and barer area.

Plate 4 Saunders Beach mangroves

Plate 5 Mangroves in Hazard Bay, Orpheus Island

Plate 6 Grids simulating pneumatophores - from foreground 5cm, 10cm, 2.5cm and 1cm grids.