

Astrophysics and Space Science Proceedings

Wayne Orchiston  
Tsuko Nakamura  
Richard Strom *Editors*

# Highlighting the History of Astronomy in the Asia-Pacific Region

Proceedings of the ICOA-6 Conference

 Springer

# Astrophysics and Space Science Proceedings

For further volumes:  
<http://www.springer.com/series/7395>



# Highlighting the History of Astronomy in the Asia-Pacific Region

Proceedings of the ICOA-6 Conference

Editors

Wayne Orchiston

Tsuko Nakamura

Richard G. Strom

 Springer

*Editors*

Wayne Orchiston  
Centre for Astronomy  
James Cook University  
Townsville, Queensland  
Australia  
wayne.orchiston@jcu.edu

Tsuko Nakamura  
Information Sciences  
Teikyo-Heisei University  
Higashi-Ikebukuro 2-51-4, Toshima  
Tokyo 170-0013, Japan  
tsukonk@yahoo.co.jp

Richard G. Strom  
ASTRON, Radiosterrenwacht  
Postbus 2, 7990 AA Dwingeloo  
Netherlands *and*  
Astronomical Institute  
University of Amsterdam  
Netherlands  
*and*  
Centre for Astronomy  
James Cook University  
Townsville, Queensland  
Australia  
strom@astron.nl

ISSN 1570-6591                      e-ISSN 1570-6605  
ISBN 978-1-4419-8160-8            e-ISBN 978-1-4419-8161-5  
DOI 10.1007/978-1-4419-8161-5  
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2011929865

© Springer Science+Business Media, LLC 2011

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

Printed on acid-free paper

Springer is part of Springer Science+Business Media ([www.springer.com](http://www.springer.com))

# Foreword

Since 1993 the International Conferences on Oriental Astronomy have usually been held at 3-yearly intervals in different Asian cities. Prior to ICOA-5 in Chiang Mai, Thailand, there was some discussion about the preferred geographical catchment of the conference and it was decided that it should include Australia and New Zealand, as the most south-easterly outliers of ‘Asia’ and that American scholars from nations bordering the Pacific Ocean would also be welcome. This eventually led to the Centre for Astronomy at James Cook University in Townsville, Northern Australia, hosting ICOA-6 from 7 to 11 July 2008. In order to reflect the expanded geographical focus of ICOA, the chosen theme was “Highlighting the History of Astronomy in the Asia-Pacific Region.”

The hard work involved in organising the logistics of the meeting fell to the Local Organising Committee comprising Leanne Ashmead, Alex Hons, Wayne Orchiston (Chair), Brooke Taylor, Andrew Walsh and Ian Whittingham, while the program was finalised by the Scientific Organising Committee: S.M.R. Ansari (India), John Hearnshaw (New Zealand), Bambang Hidayat (Indonesia), Rajesh Kochhar (India), Liu Ci-Yuan (China), Kim Malville (USA & Australia), Tsuko Nakamura (Co-Chair: Japan), Nha Il-Seong (South Korea), Yukio Ôhashi (Japan), Wayne Orchiston (Australia: Co-Chair), F. Rahimi (Iran), Shi Yunli (China), Irakli Simonia (Georgia), Bruce Slee (Australia), Boonrucksar Soonthornthum (Thailand), Richard Stephenson (UK & Australia), Richard Strom (The Netherlands & Australia), Brian Warner (South Africa & Australia) and Richard Wielebinski (Germany & Australia).

For a variety of reasons there were many last-minute withdrawals, and the final audience at ICOA-6 was disappointingly small, but this did not prevent us from enjoying a vibrant program with oral and poster papers by regular ICOA-attendees plus a number of Ph.D. students from the History of Astronomy program at James Cook University. The final program – adjusted for last minute ‘no shows’ who could not arrange visas in time or whose conference attendance was not approved by their employers – is shown on pages ix–xi.

We also enjoyed an afternoon excursion to Ravenswood, an historic gold-mining town inland from coastally-based Townsville, where the contrast between the mining

technology of the late nineteenth century was in stark contrast to the new mining venture there involving a gigantic hole in the ground, where dump trucks wound their way up the terraced sides of the open cast pit like queues of tiny ants, bringing their precious loads of gold-bearing rock to the crusher and processing plant. The scale of this operation was hard to comprehend and only became obvious when the actual size of these enormous dump trucks was realised. Apart from enjoying the interesting historic buildings still present at Ravenswood, on the trip there and back to Townsville most of the overseas delegates caught their first glimpses of wallabies (relatives of the kangaroo) and emus (those flightless birds indigenous to Australia).

After returning to Townsville and resting a little we adjourned to Satay Mas for the Conference Dinner, where the Asian and Australian menu was enjoyed by all. It just happened that this Dinner was held a few days before the 65th birthday of one of the co-editors of this volume (W.O.), and it was a delightful and an unexpected treat when suddenly the restaurant's sound system began playing "Happy Birthday to You ..." and a birthday cake suddenly appeared at one of our tables. Unfortunately, the evening did not end on so high a note as this same 'birthday boy' had a major problem with his rapidly deteriorating arthritic hip (which has since been replaced by a bionic version), and he had to be carried out of the restaurant. Fortunately, one of the Indian delegates kindly offered to drive him home, but was not familiar with the car or Townsville roads and ended up being pulled over by the local police! Fortunately, our trusty driver had not been drinking.

From the start we intended publishing the papers from the ICOA-6, and it was a pleasant surprise when Dr Harry Blom from Springer heard about the meeting and made an offer we could not refuse. Many of the papers presented in Townsville were reviewed by peers and are published in this volume, as indicated by those asterisked on pages ix–xi. A few of the non-asterisked papers have been replaced here by substitute papers.

Despite the small and select audience, ICOA-6 was a memorable event, and continued the fine tradition launched by Professor Nha all those years ago. But ICOA-6 also pioneered an expanded program with papers on archaeoastronomy, the emergence of astrophysics and the history of radio astronomy. We felt that these enriched the program, and we hope that they will remain a regular part of future ICOA meetings.

Finally, it is with great sadness that we remember Professor Kwan-Yu Chen who died in 2007, and our condolences go to his wife, Ellen, who also regularly attended the ICOA meetings. Kwan-Yu was a driving force behind the ICOA meetings, and was the lead editor of the Chiang Mai proceedings. He will be sorely missed.

Wayne Orchiston (Co-Chair)  
Tsuko Nakamura (Co-Chair)

# Participants

Andy Aros (USA)  
David Blank (Australia)  
Alex Hons (Australia)  
Billy McEwen (Australia)  
Keo McEwen (Australia)  
Colin Montgomery (Australia)  
Tsuko Nakamura (Japan)  
Ray Norris (Australia)  
Yukio Ôhaski (Japan)  
Wayne Orchiston (Australia)  
John Pearson (USA)  
Mitsuru Sôma (Japan)  
Ellen Stephenson (UK)  
Richard Stephenson (UK and Australia)  
Ron Stewart (Australia)  
Richard Strom (The Netherlands and Australia)  
Kiyotaka Tanikawa (Japan)  
Mayank Vahia (India)  
Nha Il-Seong (Korea)  
Nha Soonhe (Korea)  
Andrew Walsh (Australia)  
Edward Waluska (USA)  
Harry Wendt (Australia)  
Susan Wendt (Australia)  
Tom Wendt (Australia)  
Ian Whittingham (Australia)

Co-authors of Papers Who Were Not Present at the Meeting:

Stella Cottam (USA & JCU Ph.D. student)  
Ihsan Hafez (Lebanon & JCU Ph.D. student)



Kim Maville (USA and Australia)

Sarah Nha (Korea)

Bruce Slee (Australia)

Nisha Yadav (India)

Tadato Yamamoto (Japan)

Seiko Yoshida (Japan)

# ICOA-6 PROGRAM

Papers published in these Proceedings are followed by an asterisk.

## MONDAY 7 JULY 2008

- 0900–1045     *Registration and Welcome Reception*  
1045–1100     Nha Il-Seong & Wayne Orchiston: Introduction
- Session 1     APPLIED HISTORICAL ASTRONOMY (Chairman: Tsuko Nakamura)  
1100–1200     F. Richard Stephenson: “Historical Eclipses and the Earth’s  
Rotation: 700 BC–AD 1600” (Keynote Address)\*  
1200–1230     Nha Il-Seong & Sarah L. Nha: “The Possible Interpretation of a  
Mural in a Sixth Century Koguryo Tumulus as an AD 555  
Solar Eclipse Record”\*  
1230–1400     *Lunch*
- Session 2     APPLIED HISTORICAL ASTRONOMY (Chairman: Richard Strom)  
1400–1430     Kiyotaka Tanikawa, Tadato Yamamoto & Mitsuru Sôma: “Solar  
Eclipses at Sunrise and Sunset in the Chunqiu Era”\*  
1430–1500     F. Richard Stephenson: “The *Sunjongwon Ilgi* as a Major Source  
of Korean Astronomical Records”\*  
1500–1530     *Afternoon Tea*
- Session 3     ETHNOASTRONOMY & ARCHAEOASTRONOMY (Chairman: Mitsuru Sôma)  
1530–1630     Mayank Vahia & Nisha Yadav: “Archaeoastronomy in an Indian  
Context” (Keynote Address)\*  
1630–1700     Steven Gullberg, J. McKim Malville, & Wayne Orchiston: “The  
Astronomy of Peruvian *Huacas*”\*

## TUESDAY 8 JULY 2008

- 1000–1030     *Morning Tea*
- Session 1     APPLIED HISTORICAL ASTRONOMY, and OTHER RECENT RESEARCH  
(Chairman: Richard Stephenson)  
1030–1100     Richard G. Strom: “Statistics of Oriental Astronomical Records:  
What Can They Tell Us?”\*  
1100–1130     Nha Il-Seong & Sarah L. Nha: “An Introduction to Two Star  
Maps that Predate the 1395 *Cheonsang Yeolcha Bunya-jido*:  
A Planisphere of King Yi Taijo”\*

- 1130–1200 Yukio Ôhashi: “An Astronomical Problem in a Japanese Traditional Mathematical Text: The 49th Problem in the *Kenki-sanp* of Takabe Katahiro”\*
- 1200–1400 *Lunch*
- Session 2 THE EMERGENCE OF ASTROPHYSICS (Chairman: Yukio Ôhashi)
- 1400–1500 Tsuko Nakamura: “The Emergence of Modern Astronomy and Astrophysics in Japan” (Keynote Address)
- 1500–1530 *Afternoon Tea*
- Session 3 THE EMERGENCE OF ASTROPHYSICS (Chairman: Richard Strom)
- 1530–1630 John Pearson, Wayne Orchiston & J. McKim Malville: “Some Highlights of the Solar Eclipse Expeditions of the Lick Observatory” (Keynote Address)\*
- 1630–1700 Stella Cottam, Wayne Orchiston & F. Richard Stephenson: “The 1874 Transit of Venus, the *New York Times*, and the Popularisation of Astronomy in the USA”\*
- 1730 *ICOA-6 BBQ*

### WEDNESDAY 9 JULY 2008

- 1000–1030 *Morning Tea*
- Session 1 ISLAMIC ASTRONOMY (Chairman: Richard Stephenson)
- 1030–1100 Farhad Rahimi: “Seven Articles in *Sala-al-Sama*, for Determination of the Diameter, Distance and Mass of the Earth and the Seven Planets”
- 1100–1200 Nha Il-Seong: “History of the ICOA Conferences, and General Discussion about Future ICOA Conferences”
- 1200–1400 *Lunch*
- Session 2 THE HISTORY OF JAPANESE ASTRONOMY & POSTERS (Chairman: Wayne Orchiston)
- 1400–1430 Mitsuru Soma and Kiyotaka Tanikawa: “Japanese Astronomy in the Seventh Century”\*
- 1430–1440 Tsuko Nakamura and Kiyotaka Tanikawa: “The Book *One Hundred Years of Astronomy in Japan*” (Poster)
- 1440–1450 Seiko Yoshida and Tsuko Nakamura: “Kiyotsugu Hirayama: Discoverer of Asteroid Families” (Poster)\*
- 1450–1500 General Discussion
- 1500–1530 *Afternoon Tea*
- Session 3 ISLAMIC ASTRONOMY and THE HISTORY OF RADIO ASTRONOMY (Chairman: Wayne Orchiston)
- 1530–1600 Ihsan Hafez, F. Richard Stephenson & Wayne Orchiston: “Abdul-Rahman al-Sufi and his *Book of the Fixed Stars* – An Overview”\*
- 1600–1700 Edward Waluska: “Quasi-Stellar Objects, The Owens Valley Radio Observatory, and the Changing Nature of the Caltech-Carnegie Nexus” (James Cook University Ph.D. Completion Seminar)

**THURSDAY 10 JULY 2008**1000–1030 *Morning Tea*

- Session 1 ETHNOASTRONOMY & ARCHAEOASTRONOMY and THE HISTORY OF RADIO ASTRONOMY (Chairman: Mayank Vahia)
- 1030–1130 Ray P. Norris: “The Astronomy of Indigenous Australians” (Keynote Address)
- 1130–1200 Ron Stewart, Harry Wendt, Wayne Orchiston & Bruce Slee: “The World’s First Radiospectrograph – Penrith 1949”
- 1215 *ICOA-6 Field Trip (to Ravenswood)*
- 1800 *ICOA-6 Dinner*

**FRIDAY 11 JULY 2008**1000–1030 *Morning Tea*

- Session 1 THE HISTORY OF RADIO ASTRONOMY (Chairman: Tsuko Nakamura)
- 1030–1100 Edward Waluska, Wayne Orchiston, Bruce Slee & Harry Wendt: “Cygnus A in Historical Perspective: Unravelling the Enigma of the first ‘Radio Star’”
- 1100–1200 Harry Wendt: “The Contribution of the Division of Radiophysics Potts Hill and Murraybank Field Stations to International Radio Astronomy” (James Cook University Ph.D. Completion Seminar)\*
- 1200–1400 *Lunch*
- Session 2 THE HISTORY OF RADIO ASTRONOMY (Chairman: Kiyotaka Tanikawa)
- 1400–1500 Ron Stewart, Harry Wendt, Wayne Orchiston & Bruce Slee: “A Retrospective View of Australian Solar Radio Astronomy – Part 1 (1945–1960)” (Keynote Address)\*
- 1500–1530 *Afternoon Tea*
- Session 3 THE HISTORY OF RADIO ASTRONOMY (Chairman: Nha Il-Seong)
- 1530–1600 Harry Wendt, Wayne Orchiston & Bruce Slee: “From String and Sealing Wax to Serious Science: The First 10 Years of Australian H-line Research (1951–1961)”
- 1600–1630 Ron Stewart, Wayne Orchiston & Bruce Slee: “The Sun Sets on a Brilliant Mind: John Paul Wild (1923–2008), Solar Radio Astronomer Extraordinaire”\*
- 1630–1700 Harry Wendt, Wayne Orchiston & Bruce Slee: “The Contribution of W.N. Christiansen to Radio Astronomy: 1948–1960”\*
- 1700 Nha Il-Seong & Tsuko Nakamura: Concluding Remarks



# Contents

## Part I Applied Historical Astronomy

<b>Historical Eclipses and Earth's Rotation: 700 BC–AD 1600</b> .....	3
F. Richard Stephenson	
<b>Solar Eclipses at Sunrise or Sunset in the Chunqiu Period</b> .....	21
Kiyotaka Tanikawa, Tadato Yamamoto, and Mituru Sôma	
<b>The Possible Interpretation of a Mural in a Sixth Century Koguryo Tumulus as an AD 555 Solar Eclipse Record</b> .....	45
Nha Il-Seong and Sarah L. Nha	
<b>Statistics of Oriental Astronomical Records: What Can They Tell Us?</b> .....	53
Richard G. Strom	

## Part II Archaeoastronomy

<b>The Origin and Growth of Astronomy, as Viewed from an Indian Context</b> .....	61
M.N. Vahia and Nisha Yadav	
<b>The Astronomy of Peruvian <i>Huacas</i></b> .....	85
Steven Gullberg and J. McKim Malville	

## Part III Astronomers, Books, Manuscripts, and Star Charts

<b>Abdul-Rahmān al-Šūfī and His <i>Book of the Fixed Stars</i>: A Journey of Re-discovery</b> .....	121
Ihsan Hafez, F. Richard Stephenson, and Wayne Orchiston	

<b>Japanese Astronomy in the Seventh Century</b> .....	139
Mitsuru Sôma and Kiyotaka Tanikawa	
<b>An Astronomical Problem in a Japanese Traditional Mathematical Text: The 49th Problem of the Kenki-sanpo of Takebe Katahiro</b> .....	153
Yukio Ôhashi	
<b>Hirayama Kiyotsugu: Discoverer of Asteroid Families</b> .....	171
Seiko Yoshida and Tsuko Nakamura	
<b>The 1395 Planisphere, <i>Cheongsang Yeolcha Bunya-Ji-Do</i>, and Two Earlier Star Maps in Korea</b> .....	199
Nha Il-Seong and Sarah L. Nha	
<b>The <i>Seungjeongwon Ilgi</i> as a Major Source of Korean Astronomical Records</b> .....	209
F. Richard Stephenson	
<b>Part IV Nineteenth Century Transits of Venus and Solar Eclipses</b>	
<b>The 1874 Transit of Venus and the Popularisation of Astronomy in the USA as Reflected in the <i>New York Times</i></b> .....	225
Stella Cottam, Wayne Orchiston, and Richard Stephenson	
<b>Some Highlights of the Lick Observatory Solar Eclipse Expeditions</b> .....	243
John C. Pearson, Wayne Orchiston, and J. McKim Malville	
<b>The Total Solar Eclipses of 7 August 1869 and 29 July 1878 and the Popularisation of Astronomy in the USA as Reflected in the <i>New York Times</i></b> .....	339
Stella Cottam, John Pearson, Wayne Orchiston, and Richard Stephenson	
<b>Part V The History of Australian Radio Astronomy</b>	
<b>The Contribution of the Division of Radiophysics Potts Hill Field Station to International Radio Astronomy</b> .....	379
Harry Wendt, Wayne Orchiston, and Bruce Slee	
<b>The Contribution of the Division of Radiophysics Murraybank Field Station to International Radio Astronomy</b> .....	433
Harry Wendt, Wayne Orchiston, and Bruce Slee	

<b>The Contribution of the Division of Radiophysics Dapto Field Station to Solar Radio Astronomy, 1952–1964</b> .....	481
Ronald Stewart, Wayne Orchiston, and Bruce Slee	
<b>The Sun Has Set on a Brilliant Mind: John Paul Wild (1923–2008), Solar Radio Astronomer Extraordinaire</b> .....	527
Ronald Stewart, Wayne Orchiston, and Bruce Slee	
<b>Paul Wild and His Investigation of the H-Line</b> .....	543
Harry Wendt	
<b>An Overview of W.N. Christiansen’s Contribution to Australian Radio Astronomy, 1948–1960</b> .....	547
Harry Wendt, Wayne Orchiston, and Bruce Slee	
<b>A Retrospective View of Australian Solar Radio Astronomy 1945–1960</b> .....	589
Ronald Stewart, Harry Wendt, Wayne Orchiston, and Bruce Slee	
<b>About the Authors</b> .....	631
<b>Index</b> .....	643



