IAU COMMISSION 3
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IAU XXX GENERAL ASSEMBLY
Vienna, August 2018

BOOK OF ABSTRACTS

C. Sterken (Ed.)

The Abstracts in this booklet have been compiled by C. Sterken, with a minimal amount of copy editing.

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Archaeoastronomy and Cultural Astronomy

Chair: Steve Gullberg

Monday 27 August 2018, 09:00–10:00

Commission 3 Science Meetings
International Astronomical Union, XXX General Assembly
Vienna, August 2018

The significance of solstices in the Inca empire

Steven R. Gullberg

College of Professional and Continuing Studies, University of Oklahoma, Norman, Oklahoma, USA

Abstract

The Incas were a sun-worshipping society and therefore placed great emphasis on solar horizon events. Their society centered around the Sun and used it as a calendar to mark times of the year for such as planting, harvesting, and religious festivals. Observances were made of sunrises and sunsets throughout the year and especially at times of the solstices and the zenith Sun, and it has been posited that they as well were made during the equinoxes and the anti-zenith Sun.

Few astronomical events dominate Inca culture as thoroughly, however, as do those involving the solstices. Great festivals were staged annually at the times of the solar standstills in June and December, with significant focus upon these events.

This paper will explore the astronomical and cultural significance of solar observances in relation to festivals such as that of *Inti Raymi* in June and *Capac Raymi* in December. My field research shows the greatest number of huaca solar orientations to be identified for the times of the solstices. This data supports that some of the greatest interest of the Incas was in the two times of the year when the Sun's travel stopped and reversed direction, interest that captivated their culture and led them to celebrate with some of their greatest festival activities.

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International Astronomical Union, XXX General Assembly
Vienna, August 2018

The state of virtual archaeoastronomy with *Stellarium*

Georg Zotti

Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology, Vienna, Austria

Abstract

In the past few years, the open-source desktop planetarium *Stellarium* has become a favorite application for researchers in the fields of archaeo- and ethnoastronomy. While exchangeable sky cultures had been a unique feature of this program already a decade ago, the author has joined the development team several years ago and started a long-time commitment to increase the astronomical accuracy and applicability of *Stellarium* towards 3-D visualization of architecture embedded in its surrounding landscape. An accurately created and properly oriented landscape model, in the best case based on a LIDAR terrain model with terrestrial laser scan or image-based model, can now be loaded under the artificial sky of this program. This approach allows for research of many phenomena like orientation or shadow studies of monumental architecture which else would require extended or frequent on-site visits or would be entirely impossible due to changes in the sky by orientation changes of Earth's axis or stellar proper motion. In addition, the high quality of visual simulation immediately allows the creation of images targeted to a wider audience. The latest development combines *Stellarium* with a game engine, the basic toolkit for the creation of 3-D computer games. This combination allows the creation of "Serious Games", like a simulation and demonstration of the use of historical astronomical instruments.

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International Astronomical Union, XXX General Assembly
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The "evolution of the sky": a critical reading from cultural astronomy

Alejandro Martín López

CONICET-UBA, Buenos Aires, Argentina

Abstract

This paper seeks to make a critical analysis of a series of proposals that discuss the "cosmonymy" and "mythical motifs" referring to the sky using statistical methods and correlations with archaeological data and population genetics.

Based on a model of language that starts from metaphors linked to genetics and that understands it as a "culturally transmitted replicator" that evolves on a "principle of modified descent" (Pagel 2009), these analyzes use in general a binary database of "mythical motifs" compiled by Yuri Berezkin. The statistical analyzes proposed by these authors are based on a schematization of the myths and a series of assumptions about the way in which they are transmitted and modified. This kind of new "cultural diffusionism" has a very low interaction with the works and discoveries of cultural astronomy and ethnoastronomy. Therefore, our analysis seeks to make a first critical evaluation of their assumptions considering these areas of study.

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The orientation of the Constantinian Basilica of St. Peter in Vatican

Costantino Sigismondi, Christiaan Sterken and Irene Regoli

Sapienza University of Rome, Italy

Abstract

The axis of the Basilica of St. Peter in the Vatican maintains the same orientation of the former building made by Emperor Constantine. It is oriented less than 1° from the exact East–West line.

Measurements of the orientation of the triangle Dome–Façade–Obelisk, with 2 arcminutes of accuracy, are presented.

An explanation of this direction as the result of the alignment at the sunrise azimuth on the 25th of March (feast of Annonciation) and/or towards the Mount Guadagnolo (where the Cross and Christ appeared to St Eustachius at the beginning of the second century AD, and where Constantine built a sanctuary), is also discussed, not excluding the coexistence of the two hypotheses.

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The rediscovery of the obliquity meter in the meridian line of St. Maria degli Angeli in Rome

Costantino Sigismondi, Christiaan Sterken and Silvia Pietroni

Sapienza University of Rome, Italy

Abstract

Francesco Bianchini (1662–1729) constructed the meridian line in the Basilica of S. Maria degli Angeli in Rome – after the will of pope Clement XI – with the purpose of accurately measuring the variation of the obliquity of Earth's orbit and the duration of the tropical year.

While Bianchini published many details of the meridian line in 1703, the presence of two decorations near the summer solstice position remained unexplained. These decorations are two "obliquity meters" used at 10 minutes of distance before the meridian transit. The second meter was obscured by the architect Luigi Vanvitelli when he renovated the Basilica for the 1750 jubilee year. He preserved all astronomical details on the floor, even a 6-stars arc of circle at 34.80 m from the pinhole vertical point that is related to Sirius – as well as a method of equal altitudes to measure geographical latitude, invented by the Jesuit Giovanni Battista Riccioli (1598–1671), but not found in Bianchini's documents.

Vanvitelli set up the ornament between squared pilasters that were properly cut for allowing the meridian to function at summer solstice, though not enough to illuminate both meters. This indicates that he had no understanding of the use and of the meaning of the obliquity meters, an issue that is now clear after precise measurements and geometrical calculations.

The meter that receives the image of the Sun nowadays allows direct evaluation of the secular shift of the position of the solstice since 1702.

Ethnoastronomy and Other Recent History of Astronomy Research

Chairs: Christiaan Sterken

Duane Hamacher

Wednesday 29 August, 2018 10:30-12:00

Commission 3 Science Meetings
International Astronomical Union, XXX General Assembly
Vienna, August 2018

Indigenous use of stellar scintillation for predicting weather and seasonal change

Duane Hamacher

Monash Indigenous Studies Centre, Monash University, Clayton, Victoria, Australia

Abstract

Indigenous peoples across the world observe subtle changes in the properties of stars to predict weather and seasonal change. This paper combines archival studies and ethnographic fieldwork to explore this topic in Australia's Torres Strait.

By observing subtle changes in the ways the stars twinkle, Meriam people gauge changing trade winds, approaching wet weather, and temperature changes. Properties include rapidity of brightness changes, changes in colour, and visible sharpness of the observed stars. We show how this knowledge is encoded in oral traditions and music, and briefly compare how similar knowledge is utilised by the Northern Dene of Arctic North America.

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The evolution of indigenous astronomical systems: two case studies

Wayne Orchiston

Centre for Astrophysics, University of Southern Queensland, Australia

Abstract

Ethnoastronomers tend to depict indigenous astronomical systems as static and unchanging, but archaeological studies show that prehistoric cultures were dynamic and changing, and it is right to expect that astronomical knowledge also underwent change with the passage of time. Such change could be gradual, and part of long-term "cultural drift", or rapid and even traumatic, when triggered by major environmental changes that impacted directly on human ecology.

In this paper I will explore two different examples: how the introduction of rice-farming throughout SE Asia led to a new type of astronomical system that was geared to cultivation (and not hunting-gathering), and the way in which the traditional astronomical system of the ancestral Polynesians had to change when they left their tropical homeland and settled New Zealand.

These case studies highlight the need for ethnoastronomers to synthesize archaeological, environmental, geological, genetic and even linguistic data when carrying out their research, and to allow for the impact of post-glacial environmental change on evolving late Pleistocene and Holocene astronomical systems.

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Jan Hendrik Oort as an observational astronomer

Pieter C. van der Kruit
Kapteyn Astronomical Institute, University of Groningen, P.O.Box 800, 9700AV Groningen, The Netherlands

Abstract

Jan Hendrik Oort was not a theorist, but rather an observational/interpretative astronomer. His great example was Kapteyn, about whom he said: "Two things were always prominent: first the direct and continuous relation to observations, and secondly to always aspire to, as he said, *look through things* and not be distracted from this clear starting point by vague considerations."

Oort's work in the 1920s and 1930s was interpretative, building on the foundations of stellar dynamics as laid by Jeans and Eddington, and observations by others. He suffered from the same problem as Kapteyn did, viz. the lack of regular access to a telescope. No structural provision of a telescope was partly the reason for declining prestigious job offers by Harvard and Columbia in the early 1930s.

I will review Oort's observational work at Yale, Perkins, Mount Wilson and McDonald Observatories. I will also report on the progress of my upcoming biography of Oort, which will be a sequel to my Kapteyn biography.

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The Landgrave in Kassel and Tycho Brahe on Hven

Erik Høg

Niels Bohr Institute, Juliane Maries Vej 30, 2100 Copenhagen, Denmark

Abstract

Tycho Brahe is known as the greatest astronomer of his time, and his observations had great significance for the development of science.

Tycho received in 1576 the island of Hven not far from Copenhagen as a gift from the Danish King Frederik II, and he worked there with many collaborators during twenty years. But Tycho must share the credit for renewing astronomy with Landgrave Wilhelm IV in Kassel, as has been better recognized recently. About 1566, Wilhelm achieved much higher accuracy of star positions than any astronomer before. Twenty years later, an accuracy of about one minute of arc was obtained in Kassel, and soon after this level of accuracy was also obtained by Tycho Brahe.

In 1575, Wilhelm recommended the Danish king to support the young Tycho in Denmark, at a time when Tycho had chosen to go to Basel. This paper follows this evolution as well as the mutual process of learning between Kassel and Hven – an evolution that was not without drama.

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Royal power and the cartography of France

Suzanne Débarbat

Observatoire de Paris, France

Abstract

The famous comet, hardly observed by King Louis XIV during the 1664/1665 apparition, is more or less at the origin of the creation of the French *Académie Royale des Sciences* (December 1666), and of the *Observatoire de Paris* (March 1667). Among the Académiciens were Auzout, Picard, Huygens and others. In September 1668, Auzout received – from Giovanni Domenico Cassini in Bologna – good predictions for eclipses of the Galilean satellites of Jupiter, and Cassini was invited to join his colleagues as member of the Académie. Such is the origin of the map elaborated, during the 18th century in France.

After the assertion of the flatness of the Earth, by Newton in 1687 and its later proofs, King Louis XV requested that the map be achieved and that all the detailed maps be published by the end of the century. So doing that the complete map of France was issued from three Kings named Louis (i.e., XIV, XV and XVI), and by four Cassinis (Giovanni Domenico, Jacques, César-François and Jean-Dominique).

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Comet Donati, and the difficulty of dating landscape paintings in western art

Christiaan Sterken

Vrije Universiteit Brussel, Brussels, Belgium

Abstract

During an expedition to the Texan-Mexican border area in September–October 1858, the Belgian astronomer Jean-Charles Houzeau (1820–1888) "discovered" and admired "a beautiful comet". At that moment, he was not aware that the comet had already been discovered in June 1858 by Giovanni Battista Donati. Houzeau, as a scientist, sent detailed descriptions of his whereabouts to his family and to a colleague at the University of Brussels.

Donati's comet, with its 40-degrees curved tail, became a big-news event, and inspired visual artists worldwide. Many paintings and sketches were produced and, as anticipated, the focal point was always the brillant comet, with the night sky on the background. Some of these artworks show quite literal transcriptions of the surroundings, and even have scientific overtones, whereas others are more artistic than exact.

The analysis of a particular drawing of the alleged sky of October 5, 1858, leads to the conclusion that the depicted celestial configuration is in contradiction with that date, and that the artist could not possibly have painted the landscape and the starscape at the same moment and at the date suggested by the position of the comet with respect to Arcturus. A similar conclusion is reached for a painting by British artist William Dyce.

Asian and Islamic Astronomy

Chair: Xiaochun Sun

Thursday 30 August, 13:30–15:00

Commission 3 Science Meetings
International Astronomical Union, XXX General Assembly
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Telescopes, temples, eclipses and ethnohistory: exploring southeast Asia's exciting astronomical history

Wayne Orchiston

Centre for Astrophysics, University of Southern Queensland, Australia

Abstract

In this review paper we will briefly discuss historically significant telescopes at Manila and Bosscha Observatories, and the first introduction of the telescope into Asia in the seventeenth century.

We will then look at the orientations of Hindu and Buddhist temples and the special role of the Hindu Sun temples before turning to the total solar eclipses of 1868, 1871, 1875 and 1929 and the key roles they played in the development of solar physics.

Finally, we turn to the special potential that SE Asia offers ethnoastronomers, and focus on just two exciting projects, involving the orang asli (i.e., the original inhabitants) and Chinese ethnic minorities (the co-called "hill tribes" of Myanmar, Thailand, Laos, Vietnam and southern China).

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South Indian stone inscriptions and a unique method of predicting eclipses

B. S. Shylaja

Jawaharlal Nehru Planetarium, High Grounds, Bangalore, India

Abstract

It is well established that the records of eclipses offer the best source of understanding of the long-term variations in the orbital and rotational parameters of the Earth. We have studied about 30,000 stone inscriptions from South India and have found that about 1,100 of them provide information on solar and lunar eclipses, planetary conjunctions and solstices and equinoxes. This large data base extends to over 1,500 years. This study also revealed records of events called *vyatipatha* that are events when the declinations of the Sun and Moon are identical. A study of the texts from the fifteenth century revealed that this is helpful in fixing the position of the nodes, which in turn are needed for predicting eclipses. Details of these techniques will be discussed with illustrations from records of the twelfth century.

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Cassini's 1679 map of the Moon and French Jesuit observations of the lunar eclipse of 11 December 1685

Lars Gislén, Françoise Launay, Wayne Orchiston, Darunee Lingling Orchiston, Boonrucksar Soonthornthum, Martin George, Suzanne Débarbat and Matthieu Husson

Abstract

On 2 February 1679, Jean Dominque Cassini from Paris Observatory presented a new map of the Moon to the Paris *Académie des Sciences*, and this map was used in December 1685 when a contingent of French Jesuit missionary-astronomers was sent to Siam (present-day Thailand) by King Louis XIV, and observed a lunar eclipse in the company of King Narai from the King's "country retreat" near the city of Lop Buri. These observations launched an intensive period of "modern" astronomical observing in Siam that only terminated with King Narai's untimely death in 1688.

In this paper we will discuss the production of this Moon map, the French Jesuit astronomers who went to Siam, and the observations they and King Narai made during the eclipse.

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Promotion of Islamic astronomy by including it in the syllabi of medieval Islamic *Madrasas*

Shaikh Mohammad Razaullah Ansari

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Abstract

The very famous stalwarts of early Islamic astronomy, Ibn al-Haytham and al-Biruni (9–10th century) and their predecessors were all products of *madrasas*, the institutions of higher learning in the Islamic countries. That educational system was continued in the following centuries, particularly the most famous *madrasa* founded by Sultan Ulugh Beg (d. 1449) in Samarqand, whose director was Qazi Zadeh Rumi. One of his students reported that Ulugh Beg used to visit the *madrasa* twice and thrice, would sit during the talks of students and explained them difficulties of astronomical texts himself.

A similar scenario in India had been as follows. The provincial Bahmani Sultans were great patrons of *madrasas*. Firoz Shah Bahmani (15th c.) has been reported to lecture 3 days per week in his *Madrasa*. Further he commissioned an observatory on the hill of Balaghat in 1408, twenty years before Ulugh Beg's observatory in Samarqand. In my paper, I list details of important *Madrasas*. It suffices to add that the curriculum comprised astronomy in higher classes, for instance, studies of Ptolemy's *Almagest*, its *Abridgement* by Chaghmini (13th c.), even *Memoirs on Astronomy* by the director of Maragha Observatory Nasiruddin Tusi (13th c.), but not his critical *Recension of Almagest*. However later the original sources were replaced by their commentaries and only astronomy 'made easy' was taught in *madrasas*, e.g., short tracts by Qushchi (15th c.) and 'Amili (16th–17th c.) which were all gradually deleted during 17th–18th centuries. This is in short the story of the death of Islamic exact sciences on the Indian subcontinent, when the British started colonising India in 18th–19th centuries.

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Observational astronomy in medieval India

Ramesh Kapoor

Indian Institute of Astrophysics, Koramangala, Bangalore-560034, India

Abstract

The Mughal memoirs, royal and by courtiers, mention several astronomical phenomena, namely, occurrence of a number of solar and lunar eclipses, fireballs and comets. These works are non-astronomy texts with little scientific content, but being from different cultures and ages permit us to see how the astronomical perceptions changed over the times. The most significant aspect of these writings is the dates noted down for heavenly events. Of the numerous comet apparitions during the Mughal period, we find reference only to the great comets of 1577 and 1618 in the Mughal writings and a few chronicles. Abū'l Faḍl (1551–1602), the prime minister of the Mughal Emperor Akbar, has recorded in the *Akbarnāmā* appearance of a comet during the 22nd year of his reign, 985 A.H./ A.D. 1577. From the recorded date, Abū'l Faḍl turns out to be an independent discoverer of one of the most famous comets in history the Great Comet of 1577 (C/1577 V1).

The year 1618 in astronomy was a unique one in that it presented three bright cometary apparitions in quick succession. The comets created enough sensation and belong to the era when Galileo's telescopic observations had created a paradigm shift in our perception of the heavens, and Johannes Kepler was introducing a fundamental change in mathematical astronomy by redefining the orbits around the Sun. Observations of two of the three great comets of 1618 were made from India also. Jahangir, the fourth Mughal Emperor of India, recorded in his *Tūzūk-i Jahāngīrī* (Memoirs of Jahāngīr) appearance of two comets in November 1618 during the royal course from the town of Dohad in Gujarat to Agra, the capital city of the Empire, via Ujjain in the year 1027 A.H./A.D. 1618. From the recorded dates,

Jahāngīr turns out to be an independent discoverer of two great comets, now designated C/1618 V1 and C/1618 W1. In his Memoirs, we find description of a few observed solar and lunar eclipses, as also recovery in Punjab of a meteorite in April 1621.

There is record of a comet in the writings of an 18th century Indian historian Sayyid Muḥammad 'Ali al-Ḥusaini. In 1759–60 he wrote a History of the Timur dynasty, *Tārīkh -i Rāḥat Afzā*, covering the period 1359–1759. From another book authored by him, we learn that he had been associated with places such as Nishāpūr in Khurāsān, Najaf in south of Baghdad in Iraq. The family eventually settled down in India under the patronage of Būrhanul Mulk Saiyad Sa'ādat Khān, a noble of the Mughal Emperor Mu?ammad Shah and Governor of Awadh.

Tārīkh -i Rāḥat Afzā mentions a detonating fireball in 1155 A.H. (1742–43) and an earthquake in 1171 A.H (1757–58). More importantly, it records the occurrence of a comet in the year 1154 A.H. (1741–42). About the comet, he states on the p. 143 of *Tārīkh -i Rāḥat Afzā* that in the year 1154 A.H. a comet appeared during the evening in the West, in the months of *Shawwāl, Dhu'l Qa'dah and Dhu'l Ḥajjah* and afterwards it made its appearance in the East, during the early morning. No astronomical detail is given. Most likely, the observations were made from Burhanpur, in modern Madhya Pradesh. The circumstances suggest him to be an independent discoverer of the bright comet of 1742, now designated C/1742 C1. The way he reports the natural occurrences, Muḥammad 'Alī comes out more as representing a totally independent cultural tradition. His comment, that it is the same comet, suggests of a rare perception. It overarched canonical knowledge and whatever practical astronomy he might have known for his inference, it is independent of the Western tradition.

Historical Instruments and Other Recent History of Astronomy Research

Chairs: Wayne Orchiston

Christiaan Sterken

Thursday 30 August, 2018 15:00–16:30

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Vienna, August 2018

The life and times of Aden & Marjorie Meinel; a biography

James B. Breckinridge and Helmut Abt

College of Optical Sciences, The University of Arizona, Tucson, AZ, USA

Abstract

We are collecting information on Professor Aden and Marjorie Pettit Meinel for their biography. Aden Baker Meinel, an astronomer, optical scientist, astrophysicist, atmospheric physicist, and telescope designer, died in Henderson, Nevada, on 2 October 2011. He was the founding director of Kitt Peak National Observatory (1955–1960) and the Optical Science Center (1965–1971) of the University of Arizona. He was also the director of Steward Observatory from 1963 to 1965. Marjorie was a daughter of Mt. Wilson astronomer Edison Pettit. Aden was very active in the IAU and was president of the commission on telescopes and instruments, which is no longer active. During his long career he was a consultant on the Chinese LAMOST and a 48-inch telescope in Hyderabad, India.

We would like to discuss your experiences with them. Please send an email to James B. Breckinridge at jbreckin@caltech.edu to help us.

Aden developed an interest in astronomy in high school. At 19 he entered Caltech as a sophomore. In 1942 Aden dropped out of school to join the US Navy's Caltech rocket program. He went to Europe in 1944 to investigate the German V-2 rocket factory at Nordhausen and its underwater-rocket testing facility at Toplitzsee.

Upon his return in 1946 he entered graduate school of astronomy at the University of California, Berkeley, where he earned his Astronomy PhD in 3 years. His advisor was C. D. Shane. Aden designed and built a Schmidt telescope and used it to make the

first observations of the IR emission bands of molecular oxygen and hydrogen in the atmosphere to demonstrated that auroras are produced by solar protons. He graduated in 1949 and accepted an appointment to Yerkes Observatory at the University of Chicago in 1950.

In 1955 NSF appointed Aden to search potential sites for a national observatory to provide telescope access for astronomers in the US. The result was Kitt Peak National Observatory, and Aden its first director. He proved the practicality of segmented telescope mirrors with his design of the MMT.

Aden recognized the need for an interdisciplinary academic center of excellence in optical science. In 1964 he became the first director of the UA's Optical Sciences Center and created a graduate degree program in optics. Today this College of Optical Sciences has more than 2,500 graduates and 100 faculty teaching more than 90 courses. Aden joined NASA's Jet Propulsion Laboratory (JPL) in 1983. His work laid the foundation for JWST. In 1986, Aden concluded that detecting exoplanets was feasible and NASA created the exoplanet program. During an active research career that spanned almost 70 years, Aden published more than 250 papers and 6 books. Among his awards were the AAS Helen B. Warner Prize in 1954 and the OSA's Adolph Lomb medal in 1952 the Frederic Ives Medal in 1980. He and Marjorie Meinel, his wife and long-time research collaborator, jointly received three awards from SPIE.

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The Wind Tower at the Royal Observatory, Cape of Good Hope

Ian S. Glass

South African Astronomical Observatory

Abstract

In 1841 the Royal Observatory was selected as the site for a magnetic observatory in connection with the "Magnetic Crusade" movement initiated by Gauss, von Humboldt and Sabine.

Forming part of this was the Wind Tower, a small round building that contained a self-recording Osler Anemometer. The Tower and its wind-vane can be seen on early images of the Observatory. Supposedly its design was based on the "Temple of the Winds" in Athens.

By 1880, observations had been discontinued and Gill had a concrete pier installed and a dome placed over it. Inside he placed a 15-cm Grubb refractor of 1.8-m focal length.

Almost immediately, W. Findlay made the first observations of the Great Comet of 1882 using this telescope. Shortly afterwards, a photographic camera was attached to the instrument and used to secure guided observations of the Comet, leading ultimately to Gill's Cape Photographic Durchmusterung. The Grubb mount was used for one of the cameras of the latter programme.

This telescope was used later on for many purposes, such as a programme by W. de Sitter using a Zöllner photometer, comet searching and occultation timing.

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Jacobus Cornelius Kapteyn, master of accuracy

Pieter C. van der Kruit

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Abstract

J.C. Kapteyn, father of the tremendous success of Dutch astronomy in the twentieth century, is best remembered nowadays for being incorrect. The Kapteyn Universe was correct in the vertical direction, and it constituted the first real application of stellar dynamics. But in the Galactic plane it suffered from the neglect of interstellar absorption, and from an incorrect interpretation of Kapteyn's Star Streams. The absorption being negligible in spite of Kapteyn's earlier deduction of significant reddening was adopted on the authority of Shapley, and the two opposite Star Streams turned out to be the manifestation of a triaxial velocity ellipsoid. Poor observational data led him to reject this interpretation.

Kapteyn actually was an exceptionally careful observer and interpreter of observational data. As a young man he successfully tried to measure parallaxes from meridian passage timing. His analysis of the Star Streams gave directions that are correct to a remarkable few degrees, when the deviation of the vertex is taken into account. And his analysis of reddening of stars resulted in an estimate of the amount of interstellar absorption that is remarkably close to the truth. Observational uncertainty was the cause of his unfortunate conclusions.

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Phenomena or signs

Alejandro Martín López

CONICET-UBA, Buenos Aires, Argentina

Abstract

Western academic astronomy, starting from a worldview that assumes the separation between nature / culture / super-nature, understands the events of the celestial space as "astronomical phenomena". This leads Western science to think in terms of laws and "physical interactions". When from the ethnoastronomy we approach the conceptions of the sky of other cultures, we implicitly project this conception.

In this presentation, based on previous works, we seek to show how this becomes a source of incorrect understandings when the root metaphors of the cultures in question are very far from those of Western science. To do so, we will deal with the case of the Guaycur Chaco aboriginal groups, whose basic ideas about the cosmos are modeled by the social relations between diverse intentional beings, fundamentally modeled by power. In this context, self-interest in the sky has different motivations, methods and budgets than Western science. These are oriented to establish courses of action in relation to the intentions of the celestial beings, using for it the clues or signs that can be observed in the sky.

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Who named the largest moons of Jupiter? Johannes Kepler contributed

Jay M. Pasachoff

Williams College–Hopkins Observatory, Williamstown, Massachusetts 01267 USA

Abstract

It is little known that one day after Galileo discovered what are generally called the Galilean moons of Jupiter (which is very well visible in the evening sky this month), Simon Marius of Nuremberg independently discovered them, if we go by written notes. (If we go by verbal accounts, Marius may well have seen them first.) In his book *Mundus Iovialis* (1614) Marius credits Kepler for giving him the idea to name the moons Io, Europa, Ganymede, and Callisto, the names that have stuck, even if the set of moons are known as the Galilean moons. Galileo took strong objection to Marius's report of independent discovery but historical verification favors Marius's claim.

At the Smithsonian Institution's National Air and Space Museum, two audio clips (#3 and #48) about Kepler's work (51 seconds and 2 minutes 41 seconds, respectively) recorded by Pasachoff are available to visitors; they are available also at `https://airandspace.si.edu/explore-universe-audio-tour`

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The perilous situation of institutional and private astronomical archives

Christiaan Sterken and Wolfgang R. Dick

Vrije Universiteit Brussel, Brussels, Belgium
Potsdam, Germany

Abstract

In the course of our editorial work on a 500-page memorial Volume (*In memoriam Hilmar Duerbeck*, Akademische Verlagsanstalt 2018) on Hilmar Willi Duerbeck (1948–2012), we encountered incredible situations that could jeopardise the preservation of unique and most valuable personal and professional documents.

The situations range from personal loss, accidental or intentional destruction, institutional indifference and nonchalance, to forced removal from shutdown institutes to closed-down observatories and back.

The Duerbeck state of affairs – along with the case of his spouse Waltraut C. Seitter (1930–2007) – is not an isolated issue, but is a worldwide problem that our Commission should consider to tackle in one way or another (see also the contribution by James B. Breckinridge and Helmut Abt in this Meeting).