

Kyoto University International Symposium
International Conference on Traditional Sciences in Asia 2017

East-West Encounter in the Science of Heaven and Earth
25-27 October 2017, Kyoto, Japan

PROGRAM

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PREFACE

Following the “*International Workshop on Traditional Science in Asia (IWTSa) – Overlapping Cosmology in Pre-modern Asia*”, which took place 17-19 June, 2015 at Kyoto University, we would like to bring together once again the leading scholars in the field of history of astronomy and astral science in various parts of Asia for an international conference on the topic of “*East-West Encounter in the Science of Heaven and Earth*”. While we tend to think of astronomical knowledge as unique to each civilization, the participants will share insights from historical studies and scientific projects exploring how different traditions interact across borders and cultures, making the science of the heaven and earth one of the most cosmopolitan knowledge systems. With particular focus on Asia - a region whose long scientific tradition has been understudied compared to that of its Western counterpart - the participants will discuss from different angles how pre-modern science had been transmitted, transformed and acculturated as they cross linguistic and cultural borders, past and present.

This conference will aim at promoting an in-depth dialogue between scholars of different disciplines and regional focuses through a combination of keynote lectures, panel sessions and a guided visit to historical places related to astronomical observation in Kyoto. Kyoto has been one of the leading centers of astronomical knowledge for centuries, and Kyoto University has been known for its research in the history of science. We hope that this conference will contribute to deepen our understanding of the relationship between traditional and modern scientific knowledge through sustained, interdisciplinary dialogue among scholars of both the Eastern and Western traditions.

ICTSA 2017 Schedule

Time	Wednesday, October 25		Thursday, October 26		Friday, October 27	
09:00	Registration		Panel 3: Visualization and Transmission (Chair: Steele)	3-1 Mak	Panel 6: East Asian Astral Sciences III (Chair: Schäfer)	
09:30				3-2 Brentjes		
10:00				3-3 Pirtea		
10:30	3-4 Isahaya					
10:30	Keynote 1: Cullen		Poster Session Talks		6-4 Perez-Jara	
11:00	Tea Break		Lunch		Lunch	
11:30	Keynote 2: Ramasubramanian					
12:00						
12:30	Photo		Film: <i>Biruni, the Quill of the Invaders</i>		Panel 7	7-1 Hashimoto
13:00	Lunch				Mapping Heaven	7-2 Fung
13:30	Panel 1: West Asian Astral Sciences (Chair: Werner)	1-1 Steele	Panel 4: East Asian Astral Sciences I (Chair: Cullen)	4-1 Shi	and Earth (Chair: Lim)	7-3 Dorofeeva-Lichtmann
14:00		1-2 Mitsuma		4-2 Morgan		7-4 Wang
14:30		1-3 Mimura	Tea Break		Tea Break	
15:00		1-4 Weil				
15:30	Tea Break		Panel 5: East Asian Astral Sciences II (Chair: Fung)	5-1 Jami	Panel 8: Modern Geosciences (Chair: Iyemori)	8-1 Ito
16:00	Panel 2: South Asian Astral	2-1 Ramasubramanian		5-2 Chu		8-2 Tsujimoto
16:30		2-2 Pai		5-3 Lim		8-3 Veenadhari
17:00	Sciences	2-3 Hirose	Poster Session			Closing
17:30	(Chair: Yano)	2-4 Verdon				
18:00	Icebreaker Speech: Hashimoto		Banquet Speech: Oike			

KEYNOTE SPEECH 1

Christopher CULLEN

Emeritus Professor and Director, Needham Research Institute and Darwin College, University of Cambridge, UK

How astral science crosses cultural and social boundaries: The Geneva sphere as an astronomical consumer item in early Edo Japan

The early modern encounter between the sciences and technologies of Europe and East Asia that began with the 16th century arrival of Jesuit missionaries in ‘the Indies’ has been studied by many scholars. In Europe during this period, an interest in new developments in science and technology began to be seen as appropriate and even fashionable for people who had no pretensions to expertise. Most studies of the contacts initiated by the Jesuits have so far concentrated on the reception and appropriation of ‘western learning’ at the levels of East Asian elite power and specialist knowledge, particularly in China. The nature of our sources - or at least the sources that scholars have chosen to study - has not made it easy to find out what happened outside those limited circles.

A device - which I shall call the ‘Geneva sphere’ from its current location - has recently come to light which appears to have been made in early Edo Japan, and which opens a so far unexpected window onto a way in which an East Asian public ‘consumed’ astronomical knowledge and imported technology with evident enthusiasm and relish, despite the disdain with which expert astronomers regarded their activity. I shall discuss this device, its nature and its origins, by way of exemplifying the broad issues set out in this abstract. [I wish to acknowledge the indispensable contribution of Hiraoka Ryuji in the prosecution of this research and the preparation of this talk.]

KEYNOTE SPEECH 2

Krishnamurti RAMASUBRAMANIAN

Professor, Department of Humanities and Social Sciences, Indian Institute of Technology Bombay, India

The role of culture in shaping scientific concepts

Over several millennia different “scientific” and “metaphysical” traditions have been pondering over the nature of the physical world, the purpose of its creation, the role of human being in it, the nature of ultimate reality, and so on. The scientists and philosophers belonging to these traditions have introduced a variety of concepts and theories in order to explain the phenomena observed by them.

As these practitioners of science are indeed a part of the society, and do not study the phenomena in isolation, the various ideas and concepts that are already prevalent in the society seem to have had a discernible influence on their thought process. This becomes evident when we look at the theories that have been put forth in the cultural background in which they emerged. Also, while a host of scientists and philosophers tend to believe that the concepts and theories need to be realistic/idealistic, having universal validity (across time and space), others have been more pragmatic in their approach with a clear understanding of the limitations of human constructs. This difference in approach, which seems to be substantially influenced by the culture, has a bearing not only on advancing a theory or a model but also on accepting other theories that have been advanced in order to explain the same phenomenon. By taking specific examples from different disciplines, we will try to highlight some of these aspects during our lecture.

PANEL SESSION

Panel 1: West Asian Astral Sciences

Chair: Marcus WERNER

Panel 2: South Asian Astral Sciences

Chair: Michio YANO 矢野道雄

Panel 3: Visualization and Transmission

Chair: John STEELE

Panel 4: East Asian Astral Sciences I

Chair: Christopher CULLEN

Panel 5: East Asian Astral Sciences II

Chair: FUNG Kam-Wing 馮錦榮

Panel 6: East Asian Astral Sciences III

Chair: Dagmar SCHÄFER

Panel 7: Mapping Heaven and Earth

Chair: Jongtae LIM 林宗台

Panel 8: Modern Geosciences

Chair: Toshihiko IYEMORI 家森俊彦

John STEELE

Professor and Chair, Department of Egyptology and Assyriology, Brown University, USA

A re-evaluation of some claims for Mesopotamian influence on East Asian astral science

Since the rediscovery of cuneiform astronomical and astrological texts in the late 19th century, several claims have been made for the transmission of Mesopotamian astronomical and astrological knowledge to China. Many of these claims were based on early interpretations of the cuneiform material, some of which have since proved to be unsound. Nevertheless, claims for Mesopotamian influence on Chinese astronomy have been repeated and accepted by scholars such as Joseph Needham. In this paper I review some of these claims and evaluate them in the light of what we now know of Mesopotamian astronomy and astrology.

Yasuyuki MITSUMA 三津間康幸

Postdoctoral Fellow, Graduate School of Arts and Sciences, University of Tokyo, Japan

Unusual Babylonian astronomical diary -99C in the light of *The Book of the Laws of Countries*

The Babylonian astronomical diary -99C is an unusual collection of planetary observations. The diary systematically reports close approaches of pairs of planets in a certain zodiacal signs from SE 212 (100/99 BC) to SE 214 (98/97 BC). While almost all the diaries were made in Babylon, the diary was thought to have been made in Uruk, another center of Babylonian astronomy in the Hellenistic period, because of its unusual style and of the uncertain provenance of its tablet (BM 140677). However, it is difficult to identify its provenance as Uruk, because only one example of the diaries (-463) has been excavated from Uruk. -99C should be thought as a collection of close approaches (probably from the diaries made in Babylon) for a special, probably astrological purpose. The style of the diary reminds us of the citations of some astrological omens in the oldest extant Syriac literal work, *The Book of the Laws of Countries* (BLC), whose astrological sources are called *The Books of the Babylonian Chaldaeans*, *The Books of the Egyptians*, and *The Book of the Chaldaeans*. Some omen protases cited in BLC clearly show a pair of planets in conjunction or in (a) certain zodiacal sign(s). Although direct relationship between -99C and BLC cannot be shown, their resemblance suggests an astrological purpose of -99C and the tradition of mentioning pairs of planets in omen protases in Arsacid and early Sasanian Mesopotamia.

Taro MIMURA 三村太郎

Associate Professor, Graduate School of Integrated Arts and Science, Hiroshima University, Japan

Scholarly exchanges in the Marāgha Observatory: reassessment of ‘Urḏī’s impact on Marāgha associates

In 1259, a huge observatory began to be built in Marāgha in the supervision of Naṣīr al-Dīn al-Ṭūsī (1201-1274). For this construction, Ṭūsī gathered prominent scholars including Mu’ayyad al-Dīn al-‘Urḏī (d. 1266), Muḥyī al-Dīn al-Maghribī (d. 1283) and Najm al-Dīn al-Qazwīnī al-Kātibī (d. 1276). As a result, Marāgha became the center of astronomical research, and its associate astronomers composed many books on ‘ilm al-hay’a, where they proposed several improvements of Ptolemaic planetary models, a part of which might influence the Copernican revolution. On the other hand, we have very little knowledge of astronomers’ scholarly interactions in Marāgha, partially because they seldom mentioned the names of the colleagues in their works. To highlight their exchanges, I will focus on ‘Urḏī’s impact on them.

‘Urḏī, who worked in Damascus and then moved to Marāgha at the request of Ṭūsī, wrote *Kitab al-hay’a* probably before coming to the observatory site. In it he offered rectification of the Ptolemaic system as well as a new planetary order, where he put Venus above the Sun. Since ‘Urḏī’s thesis on the planetary order was completely new for the Marāgha associates, analysis of how his argument caused discussions among them will reveal their actual debates in Marāgha. In this paper, I will elucidate especially how Kātibī, another scholar who was summoned by Ṭūsī, reacted to this thesis, and then I will show how astronomers in Marāgha exchanged their opinions each other.

1-4

Dror WEIL

Postdoctoral Fellow, Max Planck Institute for the History of Science, Berlin, Germany

The forgotten transmission - Arabic and Persian cosmological knowledge in late imperial China

Between the mid-17th and early-18th centuries, a network of savants in China's cultural hubs strove to reconcile and merge two, geographically and linguistically distant, intellectual discourses—the intellectual discourse that prevailed in centers of scholarship around the Islamic world and one that dominated the late imperial Chinese literati culture.

For that end, members of that network undertook extensive searches for Arabic and Persian manuscripts on theology, law, history and natural philosophy, forgotten in libraries, or newly brought to China with foreign visitors to China. By translating selections of these Arabic and Persian texts into Chinese, developing methods of evidential scholarship, as well as negotiating the meanings of some of the fundamental theories of natural philosophy and cosmology, these Chinese savants created a new intellectual space in China, bridging between Western Islamic theories of nature and their counterparts in the China.

By introducing some of the titles of Western-Islamic works that were transmitted to China through that channel, and the ways prominent members of that network discussed fundamental aspects of cosmology, space and time, this presentation will bring to light the contours of this hitherto little discussed channel of West-East knowledge transmission. It will demonstrate how western notions regarding the structure of the cosmos, the effects of the stars on human life, calendar making, and methods of historical chronology were read by late imperial Chinese scholars, and the ways foreign and local ideas were synthesized. Moreover, it will shed light on the complex nature, and level of accommodation and poly-lingualism prevalent in late imperial China's intellectual environment.

Krishnamurti RAMASUBRAMANIAN

Professor, Department of Humanities and Social Sciences, Indian Institute of Technology Bombay, India

The perception of heaven and earth in Indian astronomy and its sequel in the conception of planetary models

Debate on whether the motion of planets has to be heliocentric or geocentric is mostly confined to Greco-European and perhaps Islamic traditions of astronomy. For them, the science of astronomy was closely knitted with cosmology, whereas for Indians, it was primarily science of Time (also place and direction), developed by carefully studying the motion of celestial bodies as seen from the earth. The Indian models of planetary motion from the most ancient times accepted the fact that planetary motion can be fairly complex - in any case not confined to uniform circular motions in spheres centred or otherwise at the earth. In the purview of Indian astronomers, their business was to calculate planetary position and compute time, and not to debate on the nature of the heavens, as they ought to be. Geometrical elements like epicycle radii, Rsines etc., were of course used in specifying the computational procedure. However, the texts themselves emphasise, that these theoretical frameworks or models or artefacts which serve the purpose of achieving consonance between computations and observations. They categorically state that one should not conceive these tools to be "real" by themselves, and that they could get out of tune with reality sooner or later. Also, unlike the Greek model, the epicycle radii specified by the Indian astronomers vary in various ways during the course of the orbit. Having highlighted some of these aspects during the talk, we will also show how around 1500 CE, for the first time in the history of astronomy, the Indians arrive at a planetary model - based purely on observations - leading to a unified theory of planetary latitudes and a better formulation of equation of centre for the interior planets.

R. Venketeswara PAI

Assistant Professor, Indian Institute of Science Education and Research, Pune, India

Maṇḍalavākyas: an intermediate numerical table used in the computation of planetary longitudes

The term *vākya* literally means a sentence consisting of one or more words. In the context of astronomy, it is the string of letters in which numerical values associated with some physical quantities are encoded. The *vākya* method of finding the true longitude of the Sun, Moon and the planets (*sphuṭagraha*) is a brilliantly designed simplified version of the methods outlined in the various *Siddhāntas*, one of the classes of astronomical literature. As per the *Siddhāntas*, we first find the mean longitudes of the planets and then apply a few corrections or *saṃskāras* to get their true positions. On the other hand, the *vākya* method, by making use of a few series of *vākyas* presents a shortcut directly leading to the true longitudes of the planets at certain regular intervals, starting from a certain instant in the past. *Maṇḍalas* are two such instances which play a major role in the determination of planetary longitudes. The phrases associated with *Maṇḍalas* are *Maṇḍalavākyas*. In this talk, we would explain the concepts of *Maṇḍalas* along with the other quantity associated with it, namely, *Maṇḍaladhruvas* and the rationale for obtaining them. The two astronomical treatises used for the study are *Karaṇapaddhati* of Putumana Somayāji (1532 CE) and *Vākyakaraṇa* (1282 CE) whose authorship is unknown.

Sho HIROSE 廣瀬匠

Postdoctoral Researcher, Department of Humanities, Social and Political Sciences, Swiss Federal Institute of Technology (ETH) Zurich, Switzerland

Analysing the sine computations in an anonymous commentary on Parameśvara's *Goladīpikā* 2

A variety of Sine tables, i.e. values of Sines corresponding to arcs of a specific interval, and interpolation methods for arcs of intermediary lengths can be found in different treatises by astronomers in South Asia. This paper focuses on Sine computations in an anonymous commentary on the astronomical treatise *Goladīpikā* 2 (c.1432) by Parameśvara (c.1365-1460). The author, as well as the manuscripts of his treatise and the commentary, come from the south Indian region of Kerala. The commentary, which solves examples of astronomical problems given in the *Goladīpikā* 2, provides some values of Sines in the course of the solution but does not explain how the computation has been done. I have analysed some of these results in an attempt to find which table and interpolation method could have been used. We can find at least two different manners of computation with different precisions. What does this tell us about the origin of the commentary? What can be said about the practice and circulation of mathematical and astronomical knowledge? These are the questions that I intend to investigate.

Noémie VERDON

Teaching Fellow, School of Buddhist Studies, Philosophy and Comparative Religions, Nalanda University,
India

Religious festivals of Indian and Persian calendars as transmitted by al-Bīrūnī

The Perso-Muslim polymath al-Bīrūnī (973 - *ca.* 1050) is an essential bridge between early medieval Indian and Islamic cultures due to his monograph on India (*Taḥqīq mā li-l-Hind*, *ca.* 1030). He also collects material on other important civilisations of the past in his work commonly known as the *Chronology of Ancient Nations* (*Al-āṭār al-bāqiya*, 1000). His interests in describing these various cultural spheres were many, including history, religious traditions, philosophy and mathematical astronomy. In this context, he described religious festivals of these several cultures taking place according to their respective calendars. He dedicated, for instance, an entire chapter to the Indian festivals in the *Taḥqīq mā li-l-Hind* and several chapters to that of the Persians, the Sogdians or the Khwarezmians in *Al-āṭār al-bāqiya*.

This paper aims to discuss some of Indian and Persian festivals as transmitted by al-Bīrūnī. The questions leading this paper focus on how the different festivals were scheduled during the year, on their connections with the lunar and solar movements, and their functions in the specific social contexts to which they belonged. This study will enable us to determine the extent and the reliability of his knowledge with regard to these festivals and will consider the question whether his descriptions are influenced by his intellectual and cultural background or not. Finally, it will highlight how sciences related to religious festivals were transmitted and interpreted at his time.

Bill MAK 麥文彪

Associate Professor, Hakubi Center and Institute for Research in Humanities, Kyoto University, Japan

Greco-Babylonian astral science in Asia: patterns of dissemination and transformation

Greco-Babylonian astral science had a wide dissemination throughout Eurasia during the first millennium CE. The traditional model proposed by Neugebauer, Pingree and Yano revealed how certain unique astronomical and astrological ideas spread unilaterally to India and China under different guises. This paper proposes an supplementary model where scientific notions exemplified in culturally hybrid astral texts such as the *Yavanajātaka*, *Qiyao rangzai jue* and *Yusi jing*, are treated as conglomerates of smaller packages of knowledge rather than texts representing unique monolithic traditions. These bodies of foreign knowledge invariably interacted with the indigenous systems, in India and China where an astronomical tradition was already firmly established and a process of negotiation was entailed. Different strategies were developed to absorb certain aspects of the foreign knowledge into the indigenous ones. In the case where indigenous systems were incomplete or undeveloped, the foreign system overtook the former. This is the case of Japan and Southeast Asia where a variety of Greco-Babylonian astral science survived intact and became a recognizable feature in their method of time reckoning and cosmological vision.

3-2

Sonja BRENTJES

Research Scholar, Max Planck Institute for History of Science, Berlin, Germany

Visualization of the heavens

My talk will introduce a new research project headed by Dagmar Schäfer and myself. We call it the visualization and material cultures of the heavens. Its main goal is to trace cross-cultural interactions within in Eurasia and North Africa with particular emphasis on cultures across Asia. We are of the opinion that acts of knowledge exchange and their itineraries in Asia are substantially under-researched. This applies in particular to non-imperial societies.

We believe that the representation of different aspects of the heavens from deities to demons and from stars to weather phenomena offers a rich and broad array of possibilities for studying contacts, commonalities, overlaps, differences, and ruptures across different territories, time periods, social organizations, and linguistic communities. The materiality of such representations unveils movements of concepts, values, and life styles across social strata within a given society as well as the stability or fluidity of subsets of them and thus provides access to sociocultural complexities of individual, communal, societal and cross-cultural modes of organizing relationships, knowledge practices, and human interactions on a family basis, on different sociocultural levels, with natural phenomena and the celestial realm.

In my talk I will explain the principles of the data base that we have begun to build and I will present a few examples to illustrate our expectations as well as first results.

Adrian PIRTEA

Research Assistant, Institute of Greek and Latin Languages and Literatures, Free University of Berlin, Germany

The eclipse dragon in medieval Syriac and Manichaean sources

The celestial dragon (*athalia/tli/jawzahar/rahu*), believed to be responsible for solar and lunar eclipses, was a highly popular entity in most astrological traditions of the Middle Ages: Hindu, Buddhist, Zoroastrian, Islamic, Jewish, Byzantine, and Latin. However, there are still some open questions with regard to the origins and transmission of the ‘dragon theory’ from one cultural area to another: where and in what contexts was the concept first used? Through which channels did the idea spread and how was it adopted? How did the theory impact the local astrological/astronomical traditions? Two rather neglected sources, which could provide important clues in this respect, are the Syriac and the Manichaean materials. This paper will offer a survey of these less known references to the eclipse dragon and then discuss the role of Manichaean and Syriac astrologers within the larger process of transmitting astrological ideas and theories between Asia and Europe. A careful study of these sources, some of which have only recently been edited, can shed further light on the complicated history of this elusive astrological concept.

Yoichi ISAHAYA 諫早庸一

Postdoctoral Researcher, Faculty of Humanities, Hebrew University of Jerusalem, Israel

Geometrizing Chinese astronomy?

In this presentation, I concentrate on a diagram concerning the Chinese calendar with its relevant text in a Persian astronomical work entitled *Kashf al-Ḥaqā'iq-i Zīj-i Īlkhānī* [Investigation of the Truths of the *Zīj-i Īlkhānī*] by Niẓām al-Dīn al-Nīsābūrī (d. ca. 1330). As the title shows, this work is an annotation upon the *Zīj-i Īlkhānī* [Ilkhanid Astronomical Handbook] by Naṣīr al-Dīn al-Ṭūsī (1201–1274) which distinguishes itself from other astronomical handbooks as the first Islamicate astronomical handbook (*zīj*) describing the Chinese calendar. The striking difference between the astronomy of Western and Eastern Eurasia is often explained in such a way that, while the former attached high importance to the geometrical representation of heaven, the latter's astronomy can be rather called a “numerical” one consisting of a series of values and tables. This difference is also reflected in the *Zīj-i Īlkhānī* in the sense that there is neither a geometrical diagram nor explanation in the part on the Chinese calendar. However, in the *Kashf al-Ḥaqā'iq*, al-Nīsābūrī takes a different approach to the Chinese calendar, especially in the seventh section concerning the solar and lunar equations, in which he uses a geometrical diagram to explain the mathematical procedure. In other words, in this part, a fourteenth-century scholar in Iran interpreted one aspect of Chinese astronomy through a geometrical representation, of which Islamicate astronomers had mastery. This material gives us valuable insight into the way that an Islamicate intellectual appropriated Chinese astronomy into his own astronomical tradition.

SHI Yunli 石雲里

Professor, Department of History of Science and Scientific Archaeology, University of Science and Technology of China, Hefei, China

Stars in colors: the *Song of the Sky Pacers* and its star charts revisited

As is widely known, the *Song of the Sky Pacers* (步天歌 *bù tiān gē*) is a star catalogue composed in the 7th or 8th century as a long poem with heptasyllabic verses and illustrated with star charts. The song became very important for its division of all the constellations into Three Enclosures and Twenty-eight Mansions (三垣二十八宿 *sān yuán èr shí bā xiù*) was adopted as the official system of the stellar sky in all Chinese dynasties after the 10th century. The song was also introduced into Korea at latest in the 10th century and adopted as the official system of constellations. One interesting feature of the Korean editions is that nearly 60% of the constellations are described with three colors, i.e. red, yellow and black, while only 16% of the constellations in the extant Chinese editions still carry the same type of information. Previous studies conclude that the color is an indication of the source of the constellations described in the song, i.e. the red, black and yellow constellations are taken respectively from the constellations used by the schools of Shi Shen (石申 *shí shēn*), Gan De (甘德 *gān dé*) and Wu Xian (巫咸 *wū xián*), but as the distinction of origin became less and less important, the color information began to fade away. However, recent study shows that the color information in the song were preserved quite perfectly in both countries. In China, it was still maintained in the star charts contained in the edition of the song kept and used at the imperial observatory, while in Korea it was kept in many independent hand-drawn star maps. In a commentated copy of the song from the court of the Qing dynasty (1644-1912), the commentator gave another explanation for the colors. According to him, the colors should be the indication of the magnitude range of the stars, rather than their sources as we believed before. Hence rises a question on the real meaning of the color in the star charts attached to the song.

Daniel P. MORGAN

Researcher, CNRS, SPHERE, University Paris Diderot, France

Remarks on the foreign/expatriate leadership of the Tang Astronomical Bureau

One of the more curious details about the history of astronomy in China is the fact of foreign leadership of the/an imperial astronomical bureau by Indian, Persian, and Muslim clans from the eighth century on and, contrarily, of the negligible influence that that leadership had on the Chinese tradition of *tianwen* 天文 and *li* 曆. From the time of their entry, in the Yuan 元 (1271–1368), Muslim astronomers were segregated into their own bureau, but such, to our knowledge, was not the case for the astronomers of the Nestorian Li 李 and Buddhist Gautama 瞿曇 clans in the Tang 唐 (618–917), making it difficult to understand how little their directorships shaped the Chinese tradition. To shed new light on the apparent anomaly posed by the foreign/expatriate leadership of the Tang bureau, this paper will attempt to place it into the context of broader institutional ambiguities and evolutions over the centuries leading up to the Tang: the integration of ‘internal foreigners’ in the politics and practice of the astral sciences since the Han 漢 (206 BCE–220 CE), precedence for multiple directors and multiple directorates prior to the Yuan, and the gradual isolation of the astronomical bureau(x) through bans and bureaucratic restructuring from the sixth century on.

Catherine JAMI

Professor and Research Director, CNRS, EHESS, Paris, France

Managing heaven and earth: imperial mathematics in early Qing China

The seventeenth century witnessed major changes in the way Chinese imperial institutions managed knowledge of Heaven and Earth. These changes were brought about by the concomitance of two very different events: firstly, the arrival in China at the end of the sixteenth century of Jesuit missionaries, who thereafter used the sciences as a tool in the service of evangelisation; secondly the conquest of Ming China by the Manchus — arguably the most significant event in world history in that century.

The purpose of this contribution is to show how imperial interest in astronomy and in cartography shaped mathematics in the early Qing period, and especially during the Kangxi reign (1662-1722). In order to do so, I will revisit some of the textbooks that Jesuits missionaries wrote for the emperor during the last decades of the seventeenth century, as well as the mathematical compendium entitled *Essence of number and of their principles, imperially composed* (*Yuzhi shuli jingyun* 御製數理精蘊, 1723), which was compiled under imperial patronage during the last decades of the Kangxi reign, focusing on some methods and problems these works contain that are directly relevant to measurement techniques used in astronomy or in cartography. The inclusion of such methods into mathematics in turn made it possible and relevant for this discipline to be of direct relevance to knowledge of Heaven and Earth, and, as such, to be integrated into imperial learning.

CHU Pingyi 祝平一

Research Fellow, Institute of History and Philology, Academia Sinica, Taipei, Taiwan

Western learning, examinations, and Neo-Confucianism: a study of the astronomical section in Ying Huiqian's *Xingli Dazhong* (性理大中)

This paper investigates Ying Huiqian's 應撫謙 textual appropriation of European astronomy. Ying was a Ming loyalist and Neo-Confucian scholar in the early Qing. In his study of *Xingli daquian* (性理大全), the standard textbook for the examinations, he cited many passages from *Chongzhen lishu* (崇禎曆書) with an attempt to update the examination curriculum. His research resulted in the publication of *Xingli daquian* (性理大中), with in which he cited intensively from the *Chongzhen lishu* to discuss Neo-Confucian ideas of the heaven and earth with the newly imported European astronomy. Ying's engagement contained certain obvious tensions. Taking an examination was a sign of submission. Why was Ying as a Ming loyalist even bothered to discuss foreign astronomy in the examination textbook? How did Ying consider the relation among Neo-Confucian, Christianity, and the newly imported European astronomy? How did Ying see the question of "the other," namely the Manchus, their regime, the foreign priests and their technological knowledge? Ying would be a good showcase to study the intellectual transformation from the Wang Yangming learning to evidential scholarship in the context of the revival of the early Qing Neo-Confucianism and its complicated relations with the Western Learning.

Jongtae LIM 林宗台

Professor, College of Natural Sciences, Seoul National University, Korea

Heaven vs. empire: the calendrical reform of Chosŏn Korea in the mid-seventeenth century

When the Bureau of Astronomy of the Chosŏn Dynasty reported to the king about the impending calendrical reform in 1653, the proposed rationale for it looked quite scientific: “Since the old method has been used over 300 years, it is now the right time to reform calendars” so as to readjust them to heaven. But the Bureaus never meant to invent a new system through its own investigation of heaven. Chosŏn’s calendrical reform in 1653 was simply an adoption of the *Shixian li* system that had recently been promulgated by the Qing Dynasty. Moreover, this measure was to the Chosŏn government almost an absolute imperative set by its tributary relationship with the Qing. On which ground did then the Bureau and other actors at the Chosŏn court justified the reform as their own scientific project? This paper thus traces the changing discourses regarding calendrical reform by the Chosŏn kings, officials, and astronomers in the mid-seventeenth century. Particular attention will be paid to the ways how those actors used the two conceptual devices—the “heavenly phenomena” and the “imperial calendar”—in formulating arguments regarding calendrical astronomy. This case will shed light on the ways how the Chosŏn actors as consumers of Chinese astronomical sciences forged a sense of their own scientific agency, in the middle of the largely predetermined course of affairs.

Yong Hoon JUN 全勇勳

Associate Professor, Faculty of Humanities, Academy of Korean Studies, Seongnam, Korea

A reception history of the Western Calendrical System (Shixianli 時憲曆) in Korea

My lecture is about the reception and domestication of Shixianli (時憲曆, Western Calendrical System) in early modern Korea. In reviewing its reception history, I will discuss on how Koreans acquired and applied the calendrical system under the international order of Sino-Korean Tribute-Investiture System 朝貢冊封體制. And then I will examine the fate of calendrical knowledge and technology in Joseon 朝鮮 Korea, and especially its differences from that of China or Japan. After Joseon's defeat to Qing 清 in 1637, the tribute-investiture relationship between the two became established. A Korean-style astronomical enterprise was formed and developed in such political conditions. Investiture, however, did not mean that China actually governed Korea; that was fairly an emblematic act by which the Korean king was recognized as the proper authority to rule his country. Korean kings could develop their own astronomy as with the connivance of the Chinese authority, and they indeed made and issued annual calendars for their people by applying their acquired Chinese calendrical knowledge. Qing's adoption of Shixianli 時憲曆 in 1645 triggered its introduction into Korea in 1654 and later Koreans catching up with a series of Chinese revisions of the calendrical system: for example, *Lixiang kacheng* 曆象考成 in 1726 and *Lixiang kaocheng houbian* 曆象考成後篇 in 1742. I will show that the political and practical contexts were the main factors for developing the Korean style astronomy.

Ryuji HIRAOKA 平岡隆二

Associate Professor, Faculty of Letters, Prefectural University of Kumamoto, Japan

**Deciphering Aristotle with Chinese medical cosmology: *Nanban Unkiron* 南蛮運氣論
and the reception of Jesuit cosmology in 17th century Nagasaki**

Nanban Unkiron 南蛮運氣論 (*Yunqi* Theory of the “Southern Barbarians”), compiled before 1671 in Nagasaki, occupies a unique position in the first influx of Western natural philosophy to Japan. Although the book discusses a typical Aristotelian–Ptolemaic cosmology of Jesuit origin, some technical terms are modified according to Chinese Yin-Yang and Five Phases theory 陰陽五行說, and several new passages are added from Chinese medical cosmology books such as *Huangdi Neijing Suwen* 黃帝內經素問 and *Gezhi yulun* 格致余論. While pursuing the possible author and origin of the book, this paper argues that: (1) the unknown author sought to decipher Aristotle in terms of Chinese medical cosmology; (2) this editorial approach was not intended to camouflage the work’s Christian origin, as previous studies implied; rather, the Chinese theory was inevitably invoked in order to understand the Western theory; and (3) this intellectual attitude was inherited and even developed further by Nishikawa Joken 西川如見 in the following generation.

Matthias HAYEK

Associate Professor, Department of East Asian Languages and Civilizations, University Paris Diderot, France

Reading heaven's mind: discourses on astral and meteorological portents in early-18th century Japan

In Edo Japan, the rise of commercial publishing led to a ever larger diffusion of classical and technical knowledge. As soon as the late 17th century, a newly formed class of literati with various social backgrounds (laymen, monks, warriors, merchants or physicians) started writing essays addressing traditional worldview and popular culture. Among other topics, the question of the ominous character of celestial and meteorological phenomena is often discussed in these essays. Nishikawa Joken (1648-1724), a merchant from Nagasaki learned in astronomy, even brushed a *Critic and defense of anomalies, Kaibendan*, in 1715, after having already brought up this same topic in his other works. Although these beliefs are sometime presented as 'popular' or 'vulgar', we may argue that there is more at stakes here than just a attempt to 'rationalize' an 'incorrect' worldview. In traditional Chinese astronomy (*Tianwen*, jp. *Tenmon*), celestial anomalies are considered as signs directed from Heaven to the sovereign. As such, predictive astronomy was put under strong restriction and limited to state specialist. The same policy was adopted in Japan, and contrarily to other divination techniques, 'astromancy' hardly spread outside of court circles prior to the Edo period. In this presentation, I will examine Joken's discourse on anomalies and try to shed a new light on the ideological background and cosmological implications of such debates.

ZHU Haohao 朱浩浩

Postdoctoral Researcher, School of Philosophy, Wuhan University, China

From Taiyi 太一 to Heaven 天 : a comparison of the astronomy systems of Xing Yunlu 刑雲路 and Xue Fengzuo 薛鳳祚

After a period of neglect, from the middle Ming dynasty, Chinese traditional astronomy was emphasized again in folk society. Many scholars, such as Zhou Shuxue 周述學, Wei wenkui 魏文魁, were devoted to traditional astronomy research. Meanwhile, European astronomy was also introduced into China by Jesuit missionaries, and finally Xu Guangqi 徐光啟, Johann Adam Schall von Bell (Tang Ruowang, 湯若望) etc. compiled *Chonzhen lishu* 崇禎曆書 as official calendar, which had a wide and deep influence on Chinese astronomy. In this paper, I will focus on the comparison of two important astronomers at that time. One is Xing Yunlu (1549-?), who focused on Chinese traditional astronomy only, compiled *Gujin luli kao* 古今律曆 and constructed a system under the supreme concept Taiyi. The other one is Xue Fengzuo (1600-1680), who studied Chinese traditional astronomy under the guidance of Xing Yunlu's best friend Wei Wenkui first, and then became a disciple of Polish missionary Nicolaus Smogulecki (Mu Nige, 穆尼閣) studying European astronomy, and constructed a system under the supreme concept Heaven, integrating European and Chinese learning. I will compare their systems and discuss their academic background, and re-explore the influence of European science in China at that time.

Javier PEREZ-JARA

Assistant Professor, International Business School, Beijing Foreign Studies University, China

Deciphering earth and heaven during the Edo Period

By the beginning of the Edo period, the inaccuracies of the traditional Chinese calendars Xuanming-li and Shoushi-li started to be progressively noticed. As a consequence of this, in 1683, Shibukawa Harumi proposed the Jōkyō-reki (貞享曆) as the first Japanese calendrical system. This lunisolar system, officially used from then, recognized that the length of the solar year is 365.2417 days. Nevertheless, in the 18th century, the eighth shogun Yoshimune Tokugawa wanted to compare this new system with Western astronomical knowledge. Given that the Sakoku policy (鎖国) allowed the important exception of the Dutch factory at Dejima as a significant window to Western technology and science, the shogun encouraged Dutch astronomy books' imports. The transcendence of this policy went beyond a technological impact, contributing heavily to shape and change traditional Japanese views on the nature of the earth and heavens. This paper aims at analyzing the nature of these changes, focusing on how Western astronomy was assimilated with Japanese own cultural heritage such as Neo-Confucianism, the I Ching, Buddhism, and Shinto. Specifically, I will analyze the appropriation of Copernican heliocentrism and Newtonian physics by Rangaku-sha (蘭学者) such as Shizuki Tadao, Yamagata Bantr, and Yoshio Nank. Through this case study, I aim to shed light on the rich cultural context of modern Japanese history of astronomy, along with closely scrutinizing the common misconception of Japan's complete isolationism and conservatism prior to the Meiji Restoration.

Keizo HASHIMOTO 橋本敬造

Professor Emeritus, Kansai University, Osaka, Japan

The encounter and crossover of astronomical knowledge from east and west in late Ming China

The task of the great organizer of the state scientific enterprise, Xu Guangqi (1562- 1633), is discussed so as to understand the character of the scientific organization introducing systematically the voluminous astronomical books brought into China by the missionaries to be translated and compiled for observations, and finally the long expected reform of the calendar system.

And to realise the enterprise, the second generation of mainly scientifically trained Jesuit missionaries, including J. Schreck and Adam Schall von Bell, needed to be supplied from Europe. We are able to deal with the formation and characteristic aspect of the organization, not only with the calendar-astronomical but also with the socio- religious background. And it is made clear that it was not necessarily only the Christian faith, but also the motivation emerging from Confucianistic governmental needs which made possible the scientific state activity of the calendar reform to be carried out immediately.

Next, by discussing the characteristic aspect of the subject matter, the achievements realised can be clearly described. They are basically the world system adopted, and the star atlases manufactured in Beijing. The former is the Tyconic world system and the latter is symbolically the *Jianjie zongxing-tu*, or Visible-sky Planisphere. The long range of the Chinese efforts not only to introduce scientific materials used for the necessity of the state, but also the active works carried out, including the instrument manufactures and observations, are considered and discussed in detail.

FUNG Kam-Wing 馮錦榮

Professor, Institute for Humanities and Social Sciences, University of Hong Kong, China

Mapping East Asia: transmission of Western surveying in China, Japan and Korea (1580-1740)

When the Jesuits firstly arrived in East Asia in the sixteenth century, they were not aware of the possible impacts in the following centuries brought by their European surveying instruments and techniques of making maps and terrestrial globes. With the instruments and the techniques, they transmitted cartographic knowledge to Chinese, Japanese and Korean intellectuals and supervised them performing surveying and making maps and terrestrial globes. This paper will discuss European surveying instruments, techniques of making maps and terrestrial globes and the tradition of Western surveying in the late pre-modern era of China, Japan and Korea, which collaboratively contributed to the creation of a new cartographic understanding of East Asia.

Vera DOROFEEVA-LICHTMANN

Researcher, CNRS, EHESS, Paris, France

‘Cosmograph’-tailored maps in late East Asian cartography

The so-called Sino-Korean Atlases are a cartographical puzzle, beginning with the lack of a stable title. They were outstandingly popular in late Chosôn 朝鮮 Korea (18th-19th centuries), but their origins and authorship are unclear. Their confusingly archaic and simplistic maps continued to be produced and reproduced in an almost unchanged form, not matching the mainstream of modern cartography and insensitive to its development.

In the proposed paper I shall survey the peaks of scholarly interest in the Sino-Korean Atlases and their research trends; then I shall focus on the world (‘wheel’) maps or the “Maps of the Under-Heaven” (*Tianxiatu/Ch'onhado* 天下圖) and the maps of China in the Atlases.

I shall criticize the misleading conventional name ‘wheel maps’, which following the ground-breaking study by Nakamura Hiroshi 中村拓 (1947), overemphasises their similarity with East Asian maps of Jambudvīpa. Instead I call attention to their completely overlooked affinity with the ‘cosmograph’-tailored maps, which convey the symbolism of the square earth inscribed into the round heavens. These maps usually entitled “Maps of Established Positions of Heavens and Earth” (*Tiandi dingwei zhi tu* 天地定位之圖) are found in Chinese compendiums on divination dating from the early 17th century onwards. Structural similarity of these maps with the Early Chinese divination boards – ‘cosmographs’ (*shipan* 式盤) and diviner’s bronze mirrors provides evidence of continuous influence of early spatial concepts through the history of the Chinese tradition of mapping space.

WANG Qianjin 汪前進

Professor, School of Humanities, University of Chinese Academy of Sciences, Beijing, China

Two newly discovered ancient Chinese globes in Europe

Generally, there were two primary sources of ancient Chinese globes. Firstly, those globes were made in the *Kangxi Period* and *Guangxu Period*. Most of those globes were the collection of the Palace Museum in Beijing. Secondly, in the British Museum, there are also the collection of the Chinese globes were made by missionary Niccolo Longobardi (龙华民, 1559—1654). According to the previous research, there were no more collection of ancient Chinese globes beyond those two primary sources.

Nevertheless, there is the other collection of ancient Chinese globes from Europe. Recently, two ancient Chinese globes have been discovered by Ralph Kauz (廉亚明), Professor of Chinese at the University of Bonn in Germany. By the comparison of the documentary and the photos, the current research can confirm that one of the globes was made by German missionary Johann Adam Schall von Bell (汤若望, 1591-1666).

8-1

Kazuyuki ITO 伊藤和行

Professor, Graduate School of Letters, Kyoto University, Japan

Seismology in Meiji Japan: emergence of historical earthquake studies

In this presentation, I discuss Japanese seismology in the Meiji era, particularly the emergence of historical earthquake studies in which past earthquakes are investigated by examining historical documents.

In Meiji Japan, the government employed many foreign researchers to introduce European science and technology in Japan. Many of these researchers experienced earthquakes for the first time and some conducted earthquake-related studies. In 1880, they established the first seismology society in the world—the Seismological Society of Japan (-1892). Some society members—Heinrich Edmund Naumann, Ichizo Hattori, and John Milne (1850-1913)—personally examined historical documents of past earthquakes. In 1892, the Earthquake Investigation Committee (-1925) was established and one of its purposes was to collect and examine historical documents of past earthquakes. In 1904, the committee published *Historical Documents on Earthquakes in Japan*, which has been expanded and revised in 1941, 1943, and 1951.

I also refer to the present project of volunteers transcribing historical documents and converting them into electronic data through the Internet.

Motohiro TSUJIMOTO 辻本元博

Member, Japan Cartographers Association, Sakai, Japan

Analyzing the early 19th century's geomagnetic declination in Japan from Tadataka Inoh's *Santou-Houi-Ki*

The oldest observed data of magnetic declination in Japan was 2 degree 50 min E in Hirado city in 1613 by John Saris. In 1639, the Japanese government decided the isolation to Catholic countries, due to the fear of their colonialism, continuing to open the country to Holland, China, Korea. It also prohibited Japanese to go abroad, or the building of big ships. Therefore, obtaining new observed data of magnetic declination in Japan was extremely impaired until 1854 when Japan reopened the country. In late 18th century, Imperial Russia began to come to the northern area of Japan to expand their dominion. The Japanese government commanded cartographer Tadataka Inoh to do a national land survey of Japan, and compile the national land survey map of Japan for national defense.

Before the start of the national land survey in 1800, Inoh tried to confirm the geomagnetic declination in Edo (Tokyo). The magnetic declination in Edo was very near 0 degrees. Although Inoh's team carried out the survey, it did not apply the concept of declination.

We are analyzing the geomagnetic declination from Tadataka Inoh's ledger Santou-Houi-Ki comprising of 67 volumes of survey azimuth angle measured by magnetic compass during the years 1800-1816, covering nearly the entire area of mainland of Japan. The accuracy of survey azimuth angle recorded in Santou-Houi-Ki is 0 degree 05min. We are making this data base of geomagnetic declination useful for global data.

Bhaskara VEENADHARI

Professor, Indian Institute of Geomagnetism, Navi Mumbai, India

Extreme space weather events as seen in the historical geomagnetic records of Colaba, India

Geomagnetic variations recorded at ground can well project the role of electromagnetic fields and currents in the ionosphere. Active regions in the sun give rise to flares, coronal mass ejections and several major solar energetic particle events of varying amplitudes and characteristics resulting in geomagnetic disturbances. Solar flares and Coronal Mass Ejections (CMEs) are the most prominent and violent manifestation of the solar activity. When the ejecta from solar flares and CMEs hit the Earth's magnetosphere, they often lead to intense magnetic storms. The geomagnetic data from Colaba Magnetic Observatory consisted of systematic hourly eye observations using Grubb's magnetometer from 1847 to 1872 in continuation of the earlier series of observations at Colaba since 1841. The regular daily photographic records of the geomagnetic components are available since 1872 to 1905 from Colaba. The geomagnetic records from Colaba-Alibag observatories in India, contain historically the longest and continuous observations recorded on photographic paper since 1872 to the present day digital data using modern magnetometers. Data reduction and analysis techniques evolved at various stages of data processing. Some of the super intense space weather events are investigated using old preserved historical records of Colaba, India. The study of super intense storms after 1900 as recorded at Alibag Observatory will provide important insights into plausible interplanetary conditions for intense geomagnetic storms and probable frequency of their occurrence.

Hisashi HAYAKAWA 早川尚志

JSPS Research Fellow, Graduate School of Letters, Osaka University, Japan

Great auroral displays during the Carrington Magnetic Storm: a crossroads of East Asian history and Western geoscience

The Carrington flare in 1859 is not only one of the most extreme but one of the earliest solar flares captured in the history of ground-based telescopic observations. This flare caused extreme magnetic storms with great auroral displays even in low latitude areas. While Western geo-scientists analyzed the auroral displays with great surprise, East Asian historians recorded these displays in the context of their historical science. This presentation examines East Asian auroral records during the Carrington magnetic storms in comparison with contemporary Western scientific reports. Here, we can see how East Asian historians and Western scientists see the same event. At the same time, this presentation introduces an example of a “broken telephone” during auroral observation in Kii within previous studies, suggesting that scientists examine not only published catalogues but also original historical documents.

POSTER SESSION

(contributions in alphabetical order)

P-1

CHANG Chun Hao 張峻豪 (with YANG Wei-Ting 楊偉婷)

Master's Student, Institute of History, National Tsing-Hua University, Hsinchu, Taiwan

A new research methodology of cartography – take the Buddhist world maps in Japan as an example

We would like to study the relation of 18 Buddhist world maps made in Japan from 14th to 19th century. The maps with the same topic sometimes show different cartographic styles and represent various knowledge and concepts of different periods. For building the relation network of maps, this paper attempts to discuss first the applicability of the methodology of “textual analysis” for the study of cartography. The 18 maps are divided into three groups: “Go Tenjiku zu” 五天竺圖, “Nansenbushu bankoku shoka no zu” 南瞻部洲萬國掌菓之圖 and “Nan ‘enbudai shokoku shuuran no zu” 南閻浮提諸國集覽之圖. We designed two methods: one is by analyzing the directions and distances of several identified points on the maps in three different groups to find the effective “feature” of maps; one is to apply our computer-aided method, which is designed on the basis of Phylogenetic method, to build the genealogical tree of maps. We will compare the results of these two methods to analyze their effectiveness.

According to the result of our methodology, this paper will explain the relation of these maps in each group and draws the genealogical tree of three group map. We will provide a possible relation network of these maps.

Jinsong GUO

Doctoral Student, East Asian Studies Department, Princeton University, USA

The first Newtonian science in China? Precession-based historical chronology in Jean-Francois Foucquet's *Lifa Wenda (Dialogue on Astronomical Methods)*

Jean-Francois Foucquet (1665-1741), a French Jesuit missionary who worked at the Qing court for two decades and later Bishop of Eleutheropolis in Palestine, proposed a well-known thesis on Chinese chronology in his *Tabula Chronologica Historiae Sinicae* (1729) and subsequent "Explanation" of the tables published in English in *Philosophical Transactions* that the reliable epoch of Chinese history was only a few hundred years earlier than the common era, thus discrediting previous Jesuit reports on this matter. However, I have found, in the Chinese manuscript *Lifa Wenda (Dialogue on Astronomical Methods)* attributed to Foucquet, another treatment of Chinese chronology which potentially complements his works on the subject in Western languages but employs different sets of approaches and sources. This chronological discussion, buried in the section on *hengxing* (fixed stars), evaluates a number of Chinese historical sources and chronological frameworks against the measurement of precession according to Giovanni Battista Riccioli (1598-1671), and re-determines the date of the ancient sage Yao in a peculiar Biblical scheme different from both Vulgate and Septuagint derivations. The reliance on precession and the emphases on the long processes of the spread of civilization interestingly resembles Newton's conception of chronology, which, though not published yet, had been heatedly discussed in the French academia and the Jesuit network by 1720. While unravelling this possible connection with Newtonian chronology, my paper will also evaluate the role of Foucquet's "invisible" Chinese collaborators and will comment on how formats of tables feature in the cross-cultural dialogue about historical dates.

P-3

Tadahiro HATAKEYAMA 畠山唯達

Associate Professor, Information Processing Center, Okayama University of Science, Japan

Archaeomagnetism in Japan: introduction to history and applications

Archaeomagnetism is a part of paleomagnetism, whose objects of paleomagnetic measurements are derived from archaeological relics and ruins. Paleomagnetism can reveal the ancient status of the geomagnetic field. The paleomagnetic data are classified in two categories, direction and intensity of the magnetic field at a point on the surface of the Earth and at a certain past time. In Japan, archaeomagnetic field direction studies have been well developed since the middle of 1950s, while the number of the data from archaeomagnetic intensity studies is larger than the data of direction in other regions. The main target of archaeomagnetic studies in Japan was the floor of kilns in which ancient pottery was baked. According to our counting, archaeomagnetic direction data were measured at more than 2000 sites (more than 20000 samples) during the last half century in Japan. Paleomagnetic direction is obtained only from oriented samples, and an abundance of floors of buried kilns yields many direction data. In this talk, we introduce the history of archaeomagnetic studies in Japan. Moreover, we will introduce the application of the archaeodirection data to the historical sciences.

P-4

Matthieu HUSSON

Researcher, CNRS, SYRTE, Paris Observatory, France

TAMAS, Table Analysis Method for the history of Astral Sciences: a research project

Astral sciences have peculiar relations to space and time due to their epistemological feature (pre-modern and modern chronology and geography are closely related to astronomy). This makes them a very important source for the history of knowledge transmissions on various scales. Among astral sciences sources, astronomical tables are central. TAMAS is an international research project dedicated to the methodological issues related to the study of astronomical tables (critical edition and analysis) in a wide variety of sources: Arabic, Chinese, Latin, Sanskrit, Greek, Hebrew. In this poster we are going to present how tools developed by TAMAS, in particular digital tools, are going to produce new results and allow to ask new questions on the history of astronomical tables and, in particular, on the way they can help document knowledge transmission.

Yu KITAHARA 北原優

Doctoral Student, Graduate School of Integrated Science for Global Society, Kyushu University,
Fukuoka, Japan

A review of the development of modern archaeointensity research in the orient and occident

Archaeointensity research is an important area of archaeomagnetic study, although the development of archaeointensity research was slow until the beginning of the 21st century because the experimental techniques and data interpretation are complicated and difficult. However, since then, high-accuracy archaeointensity data have been accumulated gradually all over the world, using modern experimental techniques, like the IZZI-Thellier method (e.g. Tauxe and Staudigel, 2004) or the Tsunakawa-Shaw method (e.g. Yamamoto et al., 2003). In particular, a large-scale interdisciplinary project involving archaeology and archaeomagnetism called AARCH was implemented in Europe from 2002 until 2006, and a number of archaeointensity and archaeodirection data were accumulated.

East Asia area is not an exception in this academic trend. For example, 10 archaeointensity data using the IZZI-Thellier method from China (Cai et al., 2014) and 11 similar data from Korea (Hong et al., 2013) have been published, covering about the past 2000 years.

On the other hand, in Japan, progress in this field has been limited since Sakai and Hirooka (1986) published a number of data using the old experimental technique (Sakai-Thellier method). To break this state, we have been carrying out paleointensity experiments for baked earth from the floor surface of the ancient Sueki climbing kilns in Japan, using modern experimental techniques.

In this presentation, we compare the archaeointensity data in the orient and occident and discuss their trends. In addition, we explore the possibility to start a project like AARCH in East Asia in the future.

Michelle McCOY

Postdoctoral Researcher, Max Planck Institute for the History of Science, Berlin, Germany

The Hellenistic zodiac in Chinese and Inner Asian visual culture

The appearance of the Hellenistic zodiac palaces (*shier gong*) in China is widely recognized as a key moment in the transmission of astral knowledge across medieval Eurasia. Previous studies have treated the palaces' manifestations in texts and pictures as generally commensurate, identifying local reception and adaptation in variations of both naming and iconography. Less considered has been the type of pictorial sign used to represent them, namely the symbolic roundel, or how these roundels were configured and positioned within overall pictorial and spatial programs. This paper will examine depictions in of the zodiac in paintings, prints, and sculptures produced across modern-day China, including the Song, Liao, and Xixia states, encompassing Sichuan, Hebei, Jiangnan, and the Hexi corridor between roughly the 10th and 13th centuries. Despite certain representational consistencies within this wide geographic and cultural range, the signs' variable configurations demonstrate that how they were understood was hardly fixed, ranging, I will attempt to show, from elements of correlative cosmology and astral reckoning to something more akin to auspicious signs that were unlinked, it seems, from celestial topography or prognostication altogether. Focusing on the pictorial dimension of this special case of cultural transmission thus sheds light not only on the intertwined histories of art, religion, and astrology in premodern China, but also the status there of the image itself.

Daniel SAID MONTEIRO

Doctoral Student, University Paris Diderot, France

Astronomical and calendrical sciences in the works of Nishikawa Joken (1648-1724)

This study is an examination of early modern Japanese cosmological thought as represented by the works of Nishikawa Joken (1648-1724). Although he lived precisely during the time when the control over foreign trade was strictest in Japan, his social status and geographical position enabled a close contact with knowledge from abroad.

The connections between astronomy and its calendrical applications are at the core of Joken's cosmology. The different cosmographical models inherited from ancient China remain his principal reference, and he considers calendar-making and its political significance an essential part of astronomical practices. He contrasts the four elements in the European tradition with the theory of the "five phases" (*gogyō* 五行), which has a corresponding function in Chinese philosophy, and claims that the Sino-Japanese understanding of reality is more sophisticated.

In this paper I will analyze the use of astronomical and calendrical sciences by Nishikawa Joken. It is highly likely that scientific treatises produced in China by the Jesuits were already circulating clandestinely in Japan by his time despite the official ban on such texts. Moreover, Joken had access to the Japanese translations of other prohibited works on Western cosmology published by the Jesuits active in Japan. By looking at the impact of these channels of scientific knowledge on Nishikawa Joken's works, I hope to shed light on the Japanese conception of the cosmos during the Edo period.

Sethykar SAMAN

Undergraduate Student, Royal University of Phnom Penh, Cambodia

A short history of astronomical interpretations of Angkor Wat

In 1976 a paper titled “Astronomy and Cosmology at Angkor Wat” was published in one of the most influential journals, the *Science*; by the time of publication two of its three authors were graduate students, while the third one was still an undergraduate. However, this paper became one of the most cited sources in publications on archaeoastronomy of medieval Cambodia. The authors claimed that information about a number of astronomical phenomena (movements of the Sun and the Moon, calendar, cosmological cycles) was encoded in the very structure of the monument. Later one of the authors, Eleanor Mannikka published a monograph presenting her detailed analysis of Angkor Wat; in this work she added a large number of details to the initial interpretation of the temple presented in the paper of 1976.

The “astronomical” interpretation of Angkor did not sound unconventional to the experts in “archaeoastronomy”, a discipline created in the late 19th century and actively developed in 1960s and 1970s. The publication on Angkor thus appeared at the moment when the “paradigm” of this new discipline was already established, and the interpretation of the three students was considered rather favorably.

My contribution is not aiming at proving or disproving the “astronomical” interpretations; instead, I propose a critical analysis of the history of archaeoastronomical interpretation of Angkor. I would like to show that a number of colonial scholars already interpreted ancient monuments of Southeast Asia in terms of traditional cosmography much earlier than the three authors of the paper of 1976.

XU Bin 徐斌

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Modeling heaven and earth: the impact of astronomical / calendrical system on capital city planning in early imperial China

“Modeling heaven and earth” (xiang tian fa di) in capital city planning refers to the theory and method of arranging the layout of city by imitating the pattern of certain constellations at a crucial moment in ancient China. As recorded in the *Shiji*, *Shuijing zhu* and *Sanfu huangtu*, the planning of Xianyang, the first capital city in imperial China was characterized by “modeling heaven and earth”. Based on historical records, archaeological proofs and recovery of star maps, the close relationship between the planning and the astronomical / calendrical system is revealed in this paper. Two types of “modeling heaven and earth” emerged during the Pre-Qin and Qin. One is the model of “Hengqiao Nan Du” in the period of the King Zhaoxiang of Qin (r.306B.C.-251B.C.); the other is the model of “Epang Du Wei” in the period of the First Qin Emperor (r.246B.C.-210B.C.). Correspondences are found between the celestial patterns and the territorial patterns both in location and meaning. Reasons for the shift lie in the expansion of the city and the transition of its center on one hand, and the First Qin Emperor’s instruction on adopting a new beginning of the year on the other. The celestial pattern of the latter model reflects the beginning moment of the Zhuanxu Calendar. Considering the status of ancient astronomy and calendar and their function to show the Mandate of Heaven, the intention of such planning could be concluded as to demonstrate and reinforce the authority of emperors by combining the heaven and earth, as well as integrating the time and space in their capital cities.

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A study of two Chinese maps from Mawangdui

The paper is devoted to a critical assessment of methods used to analyse pre-modern Chinese maps. We shall consider the two maps dated of the Early Han dynasty (206 BC – AD 9) unearthed from Tomb no. 3 in Mawangdui 馬王堆 in 1972-74, namely, the so-called “topographic map” and the “administrative map” (or “garrison map”); they were drawn on silk and covered the regions of the modern Hunan 湖南 and Guangdong 廣東 provinces as well as a part of the Zhuang Autonomous region of the Guangxi Province 廣西壯族自治區. Some authors suggested that each of the two maps was made according to a particular scale; it also has been often assumed that the maps were oriented along the South-North axis. One of the authors of the present paper (Yang Wei-Ting) found that both statements about the maps are wrong, namely, that the maps were not designed according to a fixed scale (different mapped areas had different scales) and that their orientations were not identical. In our paper we will critically assess the available methodologies of identification of the locations presented on the maps, provide results of a further study of the two maps, and discuss the ancient mathematical techniques and observational practices that may have been used to evaluate the distances represented in the maps.