INTERNATIONAL CONFERENCE

"Astronomical Heritage of the Middle East"

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RA National Academy of Sciences

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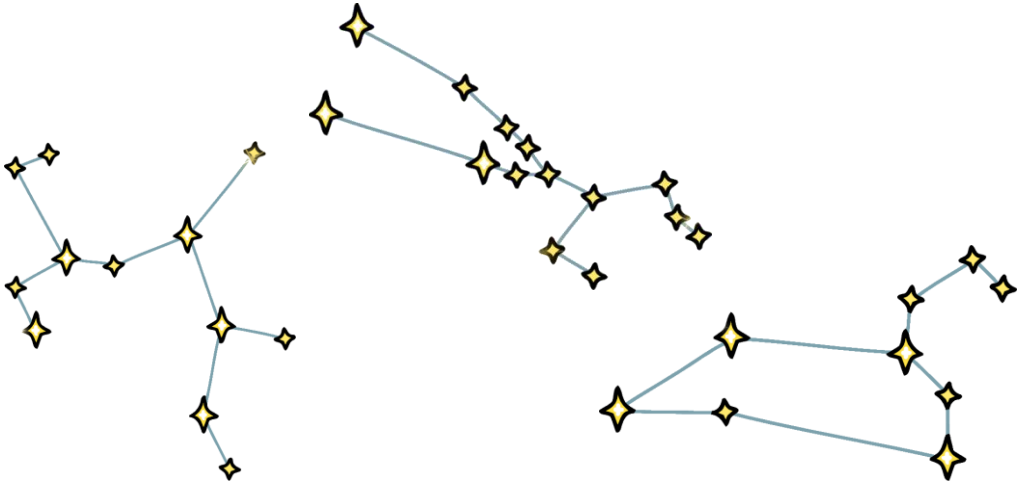
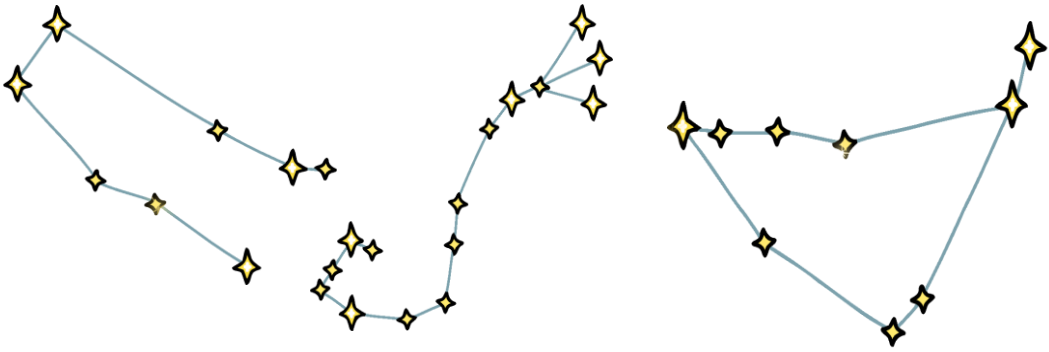


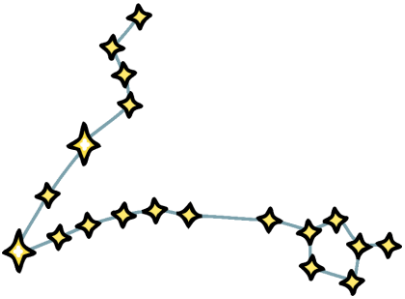
ABSTRACT BOOK



International Conference

"Astronomical Heritage of the Middle East"

ABSTRACT BOOK



Edited by*: Sona V. Farmanyan*

CONTENT

Review of Armenian Archaeoastronomy and Astronomy in Culture

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Abstract

A review is given on archaeoastronomy in Armenia and astronomical knowledge reflected in the Armenian culture. Astronomy in Armenia was popular since ancient times and Armenia is rich in its astronomical heritage, such as the names of the constellations, ancient observatories, Armenian rock art (numerous petroglyphs of astronomical content), ancient and medieval Armenian calendars, astronomical terms and names used in Armenian language since II-I millennia B.C., records of astronomical events by ancient Armenians (e.g. Halley's comet in 87 B.C., supernovae explosion in 1054), the astronomical heritage of the Armenian medieval great thinker Anania Shirakatsi's (612-685), medieval sky maps and astronomical devices by Ghukas (Luca) Vanandetsi (XVII-XVIII centuries) and Mkhitar Sebastatsi (1676-1749), etc. For systemization and further regular studies, we have created a webpage devoted to Armenian archaeoastronomical matters at Armenian Astronomical Society (ArAS) website. Issues on astronomy in culture include astronomy in ancient Armenian cultures, ethnoastronomy, astronomy in Armenian religion and mythology, astronomy and astrology, astronomy in folklore and poetry, astronomy in arts, astrolinguistics and astroheraldry. A similar webpage for Astronomy in Armenian Culture is being created at ArAS website and a

permanent section "Archaeoastronomy and Astronomy in Culture" has been created in ArAS Electronic Newsletter. Several meetings on this topic have been organized in Armenia during 2007-2014, including the archaeoastronomical meetings in 2012 and 2014, and a number of books have been published. Several institutions are related to these studies coordinated by Byurakan Astrophysical Observatory (BAO) and researchers from the fields of astronomy, history, archaeology, literature, linguistics, etc. are involved.

Astronomical Heritage of Iran

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Abstract

The sky, our common and universal heritage, forms an integral part of the total environment that is perceived by mankind. Including the interpretation of the sky as a theme in World Heritage is a logical step towards taking into consideration the relationship between mankind and its environment.

The heritage of astronomy is often linked to complex systems of representation. For example, astronomical observations are frequently motivated by a need to predict the future (for various reasons including prognostication, predicting recurrent phenomena, or 'testing' hypotheses in modern 'rational' context), and this leads to the development and use of a variety of forms of symbolic notation. As a result, attempting to interpret the heritage involves examining the diverse relationships that exist between human beings and the sky as manifested through the use of artifacts and representations.

The Islamic Republic of Iran also has various heritage sites of astronomy. One of these sites is the Maragheh Observatory, located in the heights, 2 miles west of Maragheh, situated today in the East Azerbaijan province of Iran. Maragheh Observatory was once considered one of the most prestigious observatories in the world. The

Observatory was established in 1259 CE under the patronage of the Ilkhanid Hulaguand the directorship of Nasir al-Din al-Tusi, a Persian scientist and astronomer. To save the installation from further destruction, a dome-framed shelter is now built over it.

This observatory was built 167 years before the construction of Samarkand Observatory. In its heyday, the observatory was quite reputable. For instance, Chinese experts were dispatched to Maragheh by Emperor Kublai Khan to prepare a prototype.

It is noteworthy that between the 9th and 15th centuries BC, around 23 observatories were built in Iran, amongst which the Samarkand and Jundishapour observatories were of world fame.

In 1420, the great astronomer Ulugh Beg built a madrasah in Samarkand, named the Ulugh Beg Madrasah. It became an important center for astronomical studies. In 1424, he began building the observatory to support the astronomical study at the madrasah and it was completed five years later in 1429 and called Samarkand Observatory at that time.

Among the renowned Persian astronomers mention can be made of Al-Biruni (973 AD-1048), Abd al-Rahman al-Sufi (903 AD-968), Omar Khayyam (1048-1131), Nasir al-Din al-Tusi (1201-1274), Abu al-Wafa Buzjani (940 AD – 998), Abu Ma'shar (787AD – 886), Abu Sahl al-Quhi (940AD – 100), Ahmad ibn Muhammad ibn Kathir al-Farghani (…-861 AD), Al-Birjandi (… - 1528 AD), Avicenna (980 AD – 1037), ….

Iranian National Observatory: Building Heritage for the Future

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Abstract

Iranian National Observatory is a major development to boost astronomical research and training in Iran. It is also a major investment in basic science, through a high-tech industrial project, executed in a research institute. We are engaged in the design and construction of an astronomical observatory equipped with a modern medium class telescope, INO340, and other observing facilities. Over the past few years, significant progress has been made in the project. Site development and construction of the telescope enclosure is underway, science operation of the site has begun and the detail design of the telescope is complete, thus paving the way for the construction of the telescope. I will present the project timeline, project status and describe how it fits into the current trend in the astronomical research and education in the country.

Archaeological Survey of Jordan

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Abstract

The Hashemite Kingdom of Jordan is located in a temperate climate in general, having four seasons.

The weather is generally cold with some rain in the winter months and hot and dry in the summer. However, climate patterns in the Kingdom vary even in one season due to their different terrains over quite short distances. For example, in less than an hour, a car can travel from the mountains of Western Amman (up to 1100 meters above sea level) to the Dead Sea area (which is 425 meters below sea level). There is also a difference in the climate between the northwestern mountains of the Kingdom and the eastern desert plateaus and between the Gulf of Aqaba and the climate of Wadi Musa.

The Kingdom is also characterized by the purity of its atmosphere, offering predominance of clear skies during the day and night time for the majority of the year (over 300 days) which made it an outstanding astronomical destination throughout the history.

Due to Jordan\'s geographical position, in the centre of the ancient world, successive civilizations have settles in the Kingdom and they used astronomical observations to govern many aspects of their lives, including:

- Trade - the success of which depends on the trader\'s knowledge of time and the coordinates and times of winds

and directions to ensure that land and sea trips are successful.
- Religious Practices - where rituals were held that coincided with the occurrence of various astronomical phenomena.
- Building and Architecture - the cities at that time required extensive knowledge of astronomy, since ancient civilizations were building their homes, clinics and temples on the basis of precise guidance to the celestial bodies for different purposes, including lighting, heating and cooling throughout the year.

In this paper we will discuss the three most important archeoastronomical sites discovered in Jordan:
1- The Astronomical effects in the city of Petra, which date back to the Nabatean period (between 600 BC to 106 AD(
2- The Jabal Waqf es Suwwan impact crater.
3- The Astronomical Dome of the Amra Palace, which was built in the Omayyad Era (Eighth century AD)

Romanians between Heaven and Earth, or between Faith and Science

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Abstract

Since the most ancient times, Romanians have lived in a territory which is crossed by the Carpathian curvature. The population inhabiting the area between the Carpathians and the Sea was particularly exposed to invasions, be it of the barbarians, of the Ottoman Empire and even of the Eastern communism. For this reason, it acted like a real buffer for Central and Western Europe.For centuries, the only places of refuge were the monasteries. The monks kept and developed there the knowledge of the \"seen and unseen\", of \"heaven and earth\". By cultivating of he things unseen, the sky, not only did they become wiser but perhaps also more tolerant of the evil they have been subjected to for over two millennia. In terms of scientific knowledge, there has always been this connection between science and religion. As early as the 2nd century AD, in the Dacian capital of Sarmizegetusa Regia, our ancestors built sanctuaries, which are still today the living evidence of their exceptional astronomical knowledge. Later, Dionysius Exiguus, a monk from the Dobruja region, worked out the calendar (525 AD) that is still used today all around the world. In the 15th century, Bishop Ioan Vitez (1408-1462) founded the first astronomical observatory in Southeastern Europe, in Oradea, at a time when the meridian of this town came to be considered the Zero Meridian (see Tabula Varadiensis of Georg von Peuerbach).

Early Astronomy in the Philippines

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Abstract

Ethnoastronomy is now one of the most sought topic in the science of astronomy research. It deals with astronomical beliefs and practice from different cultures all over the world. In the Philippines, Filipino folk literatures relating to astronomy isa major source to reveal the greatness of Filipino ethnoastronomical knowledge, beliefs, culture and traditions. Philippine culture has established their map of the sky by recognizing different star patterns many years ago. It obviously influence the lives of early Filipinos on how they think, act and live. They give high regards to what they see in the sky as guide in doing different undertakings. Filipinos made the sky as part of the rich culture and made distinctive marks on it and use it as their guide in determining the most favorable time for planting, fishing, harvesting and performing rituals for other ethnical group in different localities.Balatik and Moroporo are two of the most useful star group in the Philippine sky that greatly used in the daily lives of early Filipinos. Several myths in the Philippine cultures explains how the presence of this star patterns in the sky affects their ideas and behavior. The relevance of the appearance of the moon phase and orientation of the Sun has a significant influence in the daily activities of the early Filipinos and even the modern Filipinos. The astronomical

phenomenon observed as they look up the sky such as eclipse, meteor shower, phases of the moon among others, serve as a guide the way people observe various rituals, prayers, wedding ceremonies and even securing good fortune in any undertaking.

The Influence of Astronomy in Nepali Culture

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Abstract

Nepal is a multicultural and multiethnic country. Similarly, Nepal has the people of different religious tolerance among the people. Some festival which is celebrated by different religious communities of Nepal. And this festival is also known as national festivals. The date of festivals is decided by the movement of the planets, stars, Moon and sun. Here in this paper I would like the focus on the influence of Astronomy in Nepali culture. How they do things according the the movement of the planets and what is the scientific reason behind it.

The Jewish Chronology and Astronomy

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Abstract

Is it possible that the Biblical Year of Creation, now 5778 years ago, coincide with believed to have been a major Astronomical event? I first demonstrate how the sun-moon conjunctions occurring at the beginning of the Zodiac were calculated based on an ancient detailed astronomical set of data. I then show that all the main biblical events coincide with such conjunctions. I finally demonstrate how the detailed evaluation of the biblical chronological data can lead to the individual sizes of the constellations predating the data presently published by NASA and the Naval Observatory, thus turning the Bible to be the earliest most important sourcebook for the history of Astronomy.

Development of Astronomy in Turkey

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Abstract

In this talk historical developments in the field of astronomy in Turkey will be presented. Talk mainly will be devoted to the republican period of Turkey especially since 1933 when the first institute of astronomy was established. Apart from the historical milestones, recent developments and ongoing projects will be summarized.

Ecuadorian Quito Astronomical Observatory, an Astronomical Heritage

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Abstract

Located on strategic geographical position (Lat: 0, 12Â´, 53 Â´Â´ S; Long: 78, 30, 7 Â´Â´ W), the Quito Astronomical Observatory (OAQ) of the National Polytechnic School (EPN) is one of the oldest observatories in South America and is the National Observatory of Republic of Ecuador. The Ecuadorian President Gabriel Garcia Moreno founded this Observatory in 1873, and since the time of its foundation, it is operating without interruption. Nowadays, as the result of a hard and continuous work of restoration, the Quito Observatory looks magnificent, in great conditions where an active scientific life take places. Beside the astronomical research, an astronomical museum has established in 2012, based on the old instruments and equipment used along near 150 year by the scientist in the fields of astronomy, meteorology, seismology, and geodesy. This new astronomical museum located inside the main observatory building, in the Alameda Park, in Quito downtown, has a large collection of instruments in permanent public exhibition. The neo-classic architecture of the observatory building is one of the greatest attraction of the colonial city and part of its cultural heritage.

The First Astronomical Observatory in Cluj-Napoca

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Abstract

One of the most important cities of Romania is Cluj-Napoca (Kolozsv\\\'ar, Klausenburg). This is a traditional center of education, with many universities and high schools. From the second half of the 18th century the University of Cluj has its own Astronomical Observatory, serving for education and scientific researches. The famous astronomer Maximillian Hell was one of those Jesuits who put the basis of this Astronomical Observatory. Our purpose is to offer o short history of the beginnings of this Astronomical Observatory.

Experimental Astrophysics in Egypt: History of 5000 years still going on

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Abstract

The Semelai people are one out of eighteen aboriginal sub-groups of Peninsular Malaysia. They are grouped as the Proto Malay Orang Asli. This people speak the language which belongs to the Mon-Khmer family of languages and live around the Bera Lake in Pahang, Malaysia. They practise hunting and gathering, dwelling around the Bera Lake using dugouts as well as cultivating upland rice. The earliest literature on aboriginal knowledge in Peninsular Malaysia do not have major significant elements on cultural astronomy until a work published by Stephenson in 1977; however it only focuses on the Proto Malay Temuan people. Only recently we began re-documenting the sky knowledge and heritage of the Semelai and few other ethnics to determine if astronomical scientific knowledge is found in aboriginal cultures. The method used in this study is through qualitative ethnoastronomy approach. To our surprise, the Semelai have a significant amount of astronomical knowledge ranging from constellations, star cluster, galaxy, planets, and celestial phenomena such as the motion of the star, earthshine and its relation to the seasons. These findings are not only for archival record, but also to support the genetic and archaeological evidence that point to the migration out of the submerged Sundaland to new coastal territories in the Malay Archipelago and later on towards the

Pacific. The characteristics of each month in the Semelai calendar include traditional ecological knowledge of atmospheric parameters, biological phenomena and socio-cultural factors and they can be of use in the management and adaptation of ecology and climate change.

Observatories and Astronomers in Egypt during the Period 969-1850 AD

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Abstract

The Islamic civilization reached its peak during the period 969-1171 AD prevailing over a vast area that extended from Andalusia in the West to North India in the East. At that time, Egypt achieved remarkable progress in Science, particularly in the fields of Astronomy, Medicine and Engineering. Astronomy was, and is still, of importance from the religious point of view, since it marks the birth of the moon, and consequently the beginning of every month of the Islamic Calendar, and accordingly Islamic Feasts are timed. Astronomers also give the exact time of the five prayers of Moslems each day of the year. This paper will show the work of astronomers: bn Younes El-Masry (952-1009 A.D.), Hassan Ibn El-Hisem (965-1038 A.D.), Ali Ibn Ridwan (998-1061 A.D.). The astronomical observatories at Cairo during the period (969-1171 A.D.) were given, El-Goushy and El-Mamoun observatories were given in details. In the present communication, the work of the leading astronomers of the above mentioned period is further reported, with reference to the observatories and astronomers of the succeeding period until 1850 AD. We will give review about the Astronomical Observatories erected in this period, especially the observatories in Bulac, Abassyia, and located around Cairo.

The Aboriginal Astronomy of the Semelai

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Abstract

The Semelai are one out of eighteen aboriginal sub-groups of Peninsular Malaysia. They are grouped as the Proto Malay Orang Asli. These peoples speak language which belongs to the Mon-Khmer family and live around the Bera Lake in Pahang. They practised hunting and gathering, dwelling around the Bera Lake using dugout as well as cultivating upland rice. The earliest literatures on aboriginal knowledge in Peninsular Malaysia do not have major significant elements on cultural astronomy until a work published by Stephenson in 1977; however it only focuses on the Proto Malay Temuan people. Only recently we began to re-documenting the sky knowledge and heritage of the Semelai and few other ethnics to determine if astronomical scientific knowledge is found in the aboriginal cultures. Method used in this study is through qualitative ethno astronomy approach. To our surprise, the Semelai has significant number of astronomical knowledge ranging from constellations, star cluster, galaxy, planets, and celestial phenomena to the motion of the stars which proportional to the seasons. These findings are not only for archival record, but also supported the genetic and archaeological evidences that suggest the migration out of the submerged Sundaland to new coastal territories in the Malay Archipelago and later towards the Pacific. The characteristics of each month in the Semelai calendar which integrates traditional ecological knowledge of atmospheric parameters, biological phenomena and socio-cultural factors are useful to be incorporated in the management and adaptation of ecology and climate change.

Under the Kyrgyz sky-from Astronomy to Development

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Abstract

In the age of intense discussions about shaping developmental aid taking a look at what philosophy has to say, especially the Ancient philosophers, seems appropriate. Along with physiological necessities they discovered humans posse some particular â€˜cognitive necessitiesâ€™. How this philosophical perspective can contribute to the effectiveness of the projects offered to developing countries? What consequences such an approach provides? The project â€˜Under the common skyâ€™ is based on the idea that every human being regardless of its material situation, culture background or education desires to understand the world that surrounds him/her. In the project the basis is training for teachers to provide them with hands-on activities and sky -observation skills (sky map, telescope, Stellarium). Each school is granted with a telescope. There is an agreement with schools and teachers to complete the training and to run astroclubs and send reports. If not, the telescopes will be taken back. In this part the emphasis is put on popularization of astronomy, contemporary methods of teaching, learning how to be responsible for the equipment, showing that there is an alternative to spending leisure time in a more active and stimulating way, and developing the sense of wonder and marvel over the beauty of the Universe. We promote also ancient Kyrgyz knowledge about astronomy. The second part of the project is a competition for students who participate in the astroclubs. The prize in astrocamp. This part is used as an

opportunity to promote team work, work for the local community, sharing of knowledge and skills, hiking and dialog. Philosophical session is included to stimulate critical thinking.

Heritage for Astronomy Development in Peru Trough Two Generations; Up and Downs

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Abstract

Ancient Peruvian Cultures used to have an advanced knowledge of astronomy but unfortunately after Spain colonization almost nothing to develop astronomy was done. In 1957 a young solar physicist of Kyoto University of Japan, Mutsumi Ishitsuka, traveled to Peru to establish a Solar Corona Observatory. Then in October of 1987 the Cosmos Corona-graphic Observatory was inaugurated, the highest in the world. Unfortunately after putting in operation the observatory, it was occupied by terrorists and finally destroyed with dinamites in October of 1988. Mutsumi Ishitsuka that was in charge of the observatory has to moved to Lima to save his life. After some years, when terrorist activities were controlled by the Peruvian Government, Japanese Government donated a new Planetarium to Geophysical Institute of Peru, in a way to replenish the lost coronagraph constructed by Mutsumi Ishitsuka. Then a fund collect in Japan organized by Dr. Takehiko Kuroda of Nishi-Harima Astronomical Observatory of Japan, allowed to buy and send a 60 cm telescope to Peru, to establish an Educational Astronomical Observatory near Lima the capital of Peru, project leaded by Mutsumi Ishitsuka. The 60 cm reflector telescope arrived in Peru in 2010. The same year a Solar Flare Monitoring Telescope arrived from Hida Observatory of University of Kyoto of Japan to observe solar activity from Ica in a Solar Observatory stablished also

by Mutsumi Ishitsuka in a local university, the Ica National University. In 2006 Mutsumi Ishitsukaâ€™s son Jose Ishitsuka returned from Japan to Peru to establish the first radio astronomical observatory in Peru, in Huancayo, a place situated 300 km east from Lima. A 32 meter parabolic antenna for telecommunications was transformed into a radio telescope with a strong support of National Astronomical Observatory of Japan. The 32 m radio telescope is equipped with a 6.7 GHz receiver to monitor and search new methanol maser emission from young stellar objects. Unfortunately, since finals of 2016 when directives of Geophysical Institute of Peru changed, new directives do not recognized Mutsumi Ishitsuka and Jose Ishitsukaâ€™s effort and work, and decided to closed the Radio Astronomical Observatory and the Solar Observatory in Ica. Details of achievements and troubles that passed Mutsumi and Jose Ishitsuka will be presented on the presentation.

Modern Cosmology and the \"creatio continua\" Concept by Thomas Aquinas

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Abstract

When modern cosmology began to take shape, on the basis of the discovery of the apparent recession of the galaxies and of the application of the General Relativity equations to the entire universe, the question about the origin and of the â€œbeginningâ€of the cosmos gained new visibility. In a naÃ¯ve approach it seemed logical to identify the Big-bang with the Fiat lux, the creative act of God as accounted in the book of Genesis of the Hebraic-Christian tradition. Although the above identification is unjustified both on scientific and philosophical ground, it has been and continues to be used by creationists and materialists with obviously opposite purposes.The paper will discuss some excerpts of the work of Thomas Aquinas that clearly demonstrate the inconsistency of the above identification and provide a concept of creation that is in perfect agreement with both the Big-bang cosmological model and with the space-time of the General Relativity theory.

Clarification of Unknown Phenomena Using Historical Star Catalogues and Charts

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Abstract

In all ages, human beings have been trying hard to know astronomical phenomena to understand what the Universe is, where we are in and what we are. With the assistance of large telescopes, satellites or explorers, we are getting closer to the horizon of the Universe. However, even with instruments using the most advanced technologies, we can never touch any phenomena that have already passed or have very long-term variability. We still must have unknown events, for example transient objects such as novae, supernovae or other types of variable stars. Only surviving historical records have a possibility to tell us situations of each star of their times. The oldest surviving astronomical records is “Almagest” by Ptolemy (or Claudius Ptolemaeus) in the 2nd century. Magnitude data of 1022 stars are recorded with their coordinates and they are considered to be by his own observations in Alexandria. In order to inspect stellar magnitudes of earlier eras and found unknown phenomena, we referred to historical star catalogues and charts kept in libraries all over the world; Suwar al-Kawakib (al-Sufi, 986), Astronomiae Instauratae Progymnasmata (T. Brahe, 1602), Uranometria (J. Bayer, 1603), Historia Coelestis Britannica (J. Flamsteed, 1725),

Uranometria Nova (F. W. A. Argelander, 1843), etc. Mainly by comparison of magnitude records in these records, we found some stars with long-term variability. The analysis of these objects on the basis of modern observational data are still in process. In this paper, we present historical records we used and discuss about characteristics of these interesting objects.

Observations of Comets and Minor Planets in the Middle East: Past, Present, Future

Daniel W. E. Green

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Abstract

There has been a long history of making important observations of comets in the Middle East, ranging from important records of the ancient Babylonians all the way to modern observations at observatories such as the Byurakan Astrophysical Observatory in Armenia, Abastuman and Tbilisi in Georgia, Ordubad in Azerbaijan, Helwan in Egypt, and Kasan in Iran. It is of great international interest to encourage more observations of comets and minor planets from the Middle East and central Asia due to the paucity of data from these longitudes, which can help determine orbits in critical cases such as when minor planets or comets are passing close to the earth. The presence of dry, clear weather in this region for much of the year can also provide greater coverage of these significant small bodies of the solar system as well as of transient variable stars and galactic nuclei. I will discuss this as one who has announced, edited, analyzed, and archived discovery and follow-up data on these objects over four decades.

A Statistical Comparison of Ancient Astronomical Heritage Sites in the Middle East

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Abstract

The location and the orientation of cultic buildings of several different cultures in the Mediterranean, and in particular in the Middle East have been shown to be far from random. Recent research has proven that the orientation of Hittite, Phrygian, Hellenic, Egyptian and Nabataean cultic buildings among others present coherent patterns that have been investigated from the tenants of Cultural Astronomy. In particular, when those patterns are investigated taking into account the cultures and societies that produced them and how such building could be connected to the heavenly bodies a common idea transpired. Such measurements in space (i.e. orientations) when linked with the regular movements in the sky and interpreted according to the local cultures may give us information on the idea of temporality, this is the social concept of time. In the present paper I will expose the relative ideas behind these statistical analysis performed for several of these cultures, and how a comparison among them may provide also ideas of connection and exchange in this fluid area for Antiquity.

The Scientific Method: An Approach of Developing Cosmology

Magd Elias Kahil

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Abstract

An approach to monitor the development of current theories of cosmology come via applications of the scientific method. This method is essentially used to filtrate ideas and concepts such as science and pseudo-science, soft science from hard science as well as deterministic ones from non-deterministic stream of thinking. From this perspective, evaluating cosmological theories using the scientific method enables a researcher to suggest new concepts based on the apparent anomalies that are found from the meticulous way of observations. This makes a researcher to become a skeptic of all observed phenomena from the realm of updating the method of experimentation. Accordingly, the need to introduce different mathematical ideas are really essential. A good example to illustrate this idea is presented in this work which is started from displaying the geocentric model and introducing its defects to Big Bang Model and leaving the need to obtain a theory combines elementary particles with macro cosmology. On of most challenging trends is implementing the concept of geometrization of physics. Indeed, this work is assigned to enhance students , especially at the freshman level, to appreciate thinking of the importance of studying cosmology. Yet one of the advantages is introducing such a stream of thinking is to connect biology with cosmology from the glimpses of astro-biology, as a byproduct of joining biology and cosmology, in order to pave the way for comprehending the origin of life.

Digital Projection of Ancient Astronomical Heritage

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Abstract

The importance and flexibility of digital technologies and new platforms for astronomical data-storage are considered. Ancient Georgian astronomical materials of recently published electronic edition are presented. The digital atlas initiative of the Meridian of Ancient Astronomy is presented.

Heritage as a New Language of Conflicts: Astronomical Implications

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Abstract

In the last decades, heritage has been transformed into a new language in which conflicts of the most varied nature are expressed. This happened because international agencies and national governments have given increasing interest and allocated important funds to define and safeguard heritage. Something similar has already happened with environment and ecology, when - after the 1972 Stockholm environmental conference - states and transnational agencies began to pay attention to the environmental issue. Since then, a process that Jos Sergio Leite Lopez called \"environmentalization of conflicts\" begun. The environment became a way of legitimizing and giving visibility to the claims of different subaltern groups. The growing interest in heritage is generating a similar phenomenon, that's why we can say that it is a \"patrimonialisation of conflicts\". This, as happened with the case of the \"environmentalization\", involves complex contradictions, since the concept of heritage is forged in a specific cultural, political and social framework. Therefore its use to express demands and conceptions of subaltern groups implies important risks. The knowledge and astronomical practices are rapidly getting involved in this dynamic, especially after the joint initiative of UNESCO and IAU in 2009 to promote the category of astronomical heritage. In this work we seek to think, from some

ethnographic examples, about the potentialities and dangers of these categorizations. In this way we hope to contribute in the making of cultural astronomy a positive tool for the respect of diversity and the attention to the demands of subaltern groups.

Evolution of the Names of Stars in Indian Texts

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Abstract

We have compiled all the bright stars listed in various texts by Aryabhata onwards up to Chandrashekhara Samantha totaling to about 100. The 27 nakshatra system was used in India for the purpose of fixing the positions of the sun, moon and the planets have been identified in the sky though there is some ambiguity on the fainter ones. Our study reveals that many names have been borrowed from other cultures and translated into Sanskrit. It has been possible to decode the original names and translated ones. The names used by fishermen, not listed in the Sanskrit texts address the navigational needs.

Evolution of the Names of Stars in Indian Texts

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Abstract

We have compiled all the bright stars listed in various texts by Aryabhata onwards up to Chandrashekhara Samantha totaling to about 100. The 27 nakshatra system was used in India for the purpose of fixing the positions of the sun, moon and the planets have been identified in the sky though there is some ambiguity on the fainter ones. Our study reveals that many names have been borrowed from other cultures and translated into Sanskrit. It has been possible to decode the original names and translated ones. The names used by fishermen, not listed in the Sanskrit texts address the navigational needs.

Does “Iron” in Armenian Really means a “Sky Drop”?

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Abstract

In the language of the ancient Hittites and Egyptians, and later the Greeks, iron was called \"celestial metal\" or by the close in meaning word. A browse review of iron names in several languages shows that with the exception of the mentioned three languages, in other languages the name of the iron reflects its function (hard, cutting, superpower, iron-stone, etc.). According to the Hittite sources, iron was produced by the masters of the \"Hatti\" kingdom controlled by them, located, by the way, next to the kingdom of \"Hayasa\". \"Hatti\" adjoins the region on the southeastern coast of the Black Sea, where, according to Aristotle, the \"Halibs\" lived - craftsmen who produced \"the best iron\". It is known that the mountain rivers of this area brought sand and accumulated in the mouths sand with a high content of magnetite, an iron-containing mineral with a lower melting point (compared to other rocks). It is this circumstance, according to geologists, the beginning of the \"iron\" century takes place in this area in the XV-XIII centuries BC. On the basis of all of the above, the literal translation of the Armenian name of iron \"երկաթ-erkat\" = \"droped from the sky\" does not seem to be meaningless. But academic philologists categorically disagree with this. In this report, a more convincing (from the astrophysicist point of view) etymology of the Armenian word \"erkat = er-ka\" = \"heavenly metal\" is proposed.

Some Astronomical-Cosmic Realities in the Armenian Epic \"Sasna Tzrer\"

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Abstract

The Armenian fairy-tales and the epic Sasna Tsrer contain significant information about ancient cosmic and time imagery. Particularly, even the superficial analysis of Sasna Tsrer reveals a very close relation between its general structure and the zodiacal constellations and planets. The comparison of the characters of the epic with the constellations of Zodiac shows that all the characters of Sasna Tsrer from Tsovinar to Pokr Mher have their heavenly parallels in the sky. In addition, the time, hereditary and functional relationships of heroes, which are present in the epic, have their parallels in arrangements of constellations and other heavenly bodies. These relations allow to try to estimate the "age" of Sasna Tsrer, based on a comparison of the relationship between the heroes of epos and the mutual arrangement of constellations and planets.

Kushyar ibn Labban (Gilani)

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Abstract

Kushyar ibn Labban (Gilani) was an Iranian astronomer and mathematician who lived around 10 centuries ago. Little is known about his life. But his rich scientific legacy has been preserved. They are all composed in Arabic, the lingua franca of his age. He composed an influential treatise on Hindu reckoning, two zijes (collections of astronomical tables with explanations), a treatise on astrolabe and another on astrology. A major part of his works are edited, translated and analyzed. His revision of the Ptolemaic interpolation schemes for finding the ecliptical longitudes of the planets are regarded as an important achievement in mathematical astronomy. I will give an account of his scientific heritage and the secondary literature. I will also bring a collection of books (editions and translations of his works) and a collection of about 90 posters prepared from about 50 manuscripts of his treatises extant in different libraries and collections of different countries.

Land- and skyscape in the framework of the Astronomy and World Heritage initiative: the Iberian paradigm

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Abstract

During the International Year of Astronomy IYA 2009, UNESCO and IAU promoted the Astronomy and World Heritage Initiative to study and analyze the relationship between land- and skyscapes and human interest in the celestial vault that could drive to the promotion of certain tangible and intangible astronomical heritage as human World Heritage. Since then, numerous actions have been carried out that finally drove to the creation of IAU Comission CC4 \"World Heritage and Astronomy\" within Divission C \"Outreach, Education and Heritage\" at the IAU GA in Honolulu in August 2015. In this contribution, a few short sketches of the evolution of the process and how the initiative is being implemented will be offered. Following that, a detailed analysis of a few study cases centred in the author\'s experience in Spain and Portugal will be presented: (i) an already successful paradigm in Antequera, (ii) a state of the art ongoing initiative of a cultural land- and skyscap! e in Gran Canaria and (iii) ongoing plans for future cross-national collaborative effforts within the same framework: the Seven-stone antes. A few items on astronomical heritage in danger in the Middle East will also be analyzed and future perspectives will also be briefly discussed.

Common Denominators and thoughts about Archeo-astronomy

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Abstract

I shall describe common denominators among physical structures interpreted as astronomical observatories that were found around the globe, with the intention of trying to determine whether these indicate a single root origin, or parallel and independent developments that reached similar structural firms. I shall discuss, in particular, circular structures now detected all the way from the westernmost locations in Europe to Poland and the Middle East.

History of Astronomy (Per Aspera ad Astra)

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Abstract

A brief overview on the development of astronomy and the challenges it faced along the way in various regions around the world.

The Astronomical Orientations of Sacred Buildings in the Levant during the Bronze and Iron Ages

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Abstract

Levant is a term usually intended as a geographical, historical and cultural definition of the western area of the Near East, covering the present states of Syria, Lebanon, Israel, Palestine and Jordan, to the Southern mountain of Cappadocia till the eastern flank of the Nile Delta, to the Western bank of Eufrate River, to the Eastern shore of Mediterranean Sea. Due its topographical position, this area was since the Prehistory a passageway of populations, technologies, and religious ideologies between the Eastern and the Western cultures. The populations that inhabit the Levant pay great attention to the sky at least since the V millennium BC, as it is shown by the famous Star Painting, a large painting of a big star, discovered in the site of Tuleilat al-Ghassul, in Jordan. Nevertheless, it is during the Early Bronze Age that the first urban communities of the region start to build public buildings to held important rituals devoted to the celestial gods, serving as an ideological connection between the Earth and the Sky. It is evident that the first agricultural and pastoral communities of the Levant look to the sky in order to identify periodical changes, linked with the seasons and so connected to the economical, as to the ritual life. Though some information can be gathered by Ebla and Ugarit archives, the great lack

of written data source in the more ancient periods, make difficult to delineate the precise astronomical knowledge that Levantine population had at the beginning of the first urbanization periods. In this framework, the archaeoastronomical research and in particular the orientation measurements of sacred building and tombs had helped in a significant way to delineate the astronomical knowledge of these people.

Ancient Astronomical Knowledge - the Unity of Diversity

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Abstract

Peculiarities and cultural projection of ancient astronomical knowledge are described. Substances of ancient astronomy including megalithic constructions, oral stories, and manuscripts are considered. Results of new investigations of astromegaliths and written materials of Georgia are presented. Other aspects of the problem are discussed.

Restore the Heavens

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Abstract

The present project pursuits the restoration and study of the sky chart that Professor Antonio Torres Tirado drew and published in Guadalajara, Spain, in 1898; this work consists of 15 sheets, which show the design of the constellations and nebulae of all the celestial sphere, mounted on a fabric of 377 x 196 cm. Although a thousand copies of the Mapa del Cielo were published, six copies are preserved all over the world (for example, in the Library of Madrid and in the Museum of Science in Florence). One of these copies is part of the heritage of the Astronomical Observatory of the University of La Plata, Argentina. We propose to restore the support of the piece, to take measures aimed at its conservation, to produce a history of the object, its symbolic forms and its didactic uses in light of the development of astronomy and celestial cartography in Argentina and in the world.

When Ibn Sina Saw Venus on the Disc of the Sun

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Abstract

The Persian polymath Abu \'Ali Ibn Sina (d. 1037 CE) has recorded in his Compendium of the Almagest that \'I say that I saw Venus as a spot on the surface of the sun\'. The date and place of the observation are not given. This statement has been quoted favoulrably by only a few Muslim astronomers. In the modern times, the Western world has been rather sceptical of the claim. In 1969 Goldstein critically appraised the question. From the sets of limiting terrestrial latitudes and longitudes from where the Contact I and II of the transit could be just observable provided him by Brian Marsden, Goldstein concluded that \"this transit may not have been visible where he lived\'. I have re-examined the question employing transit predictions by Fred Espenak and Xavier Jubier which are far more accurate than those available to Goldstein. A transit of Venus indeed took place in Ibn Sina\'s time, on 24 May 1032 CE. The fact is that the angular diameter of Venus when in its inferior conjunction is such that a view should in principle be possible. Therefore, one asks if Ibn Sina actually saw Venus on the disc of the Sun or mistook a sunspot for it. Ibn Sina\'s observation can not have been a chance observation and given the level of computational skills of the Islamic astronomers in the 11th century, the claim cannot be dismissed altogether. The astronomical circumstances of the transit episode and Ibn Sina\'s specific

commentary on it in his monumental work Kitab al-Shifa show that he could indeed have obtained a glimpse of the beginning of the transit just before sunset at the place he may have observed from â€“ Isfahan or Hamadan. That is also the best time to view with one\'s naked eyes, should ground conditions permit. In other words, when Ibn Sina said he saw Venus on the surface of the Sun, he meant it.

Sky-Related Rituals, Festivities and Calendar of Parts of Igbo-Speaking People of Southeastern Nigeria

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Abstract

The Igbo people of south-eastern Nigeria is the third largest ethnic group in Nigeria. In many places in Igbo-land, the general life of the community still largely hinges on the lunar calendar and the people look up to the king-priests who determined agricultural seasons based on this traditional calendar. Such festival like new yam festival, cult or masquerade initiation, burial and funeral ceremonies, etc. are therefore programmed on astronomical observations. These astronomical signs include the appearing of the new moon, sunrise or sunset and the appearance of specific stars. In this paper, we investigate some aspects of the culture and traditions of the Igbo-speaking people of Nigeria. The paper is based largely on oral interviews, published works of anthropology, arts, archaeology, religion etc as well as some unpublished ethnographical reports.

Relation of the Cult Practice of the Peak Sanctuary Kokino with the Local Folklore Tradition

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Abstract

The peak sanctuary Kokino located on the archaeological site "Taticev kamen" in the northeast part of the Republic of Macedonia casts light on the cult practice of the local population in the Bronze Age. The astronomical alignments marked with noticeable stone notches emphasize important dates connected with the agricultural activities and also with cosmological beliefs of the periodic nature renewal of the Bronze Age people in the region. We express the view that the heliacal rising of Aldebaran at the "mutual" marker in the same morning in the middle of May when the sun lightens one of the stone seats through the same marker is linked with the celebrations of the so-called Agrarian and Stock Breeding New Year. In this period of the year, according to the local culture and folklore tradition, the local population still celebrates different holidays which encapsulate visible elements from pagan cults.

Sunrise as Precondition for the Orientation of Grave-tombs in Ancient Armenia

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Abstract

In the beliefs and funerals rites of the ancient peoples great importance was paid to the journey of the dead to the sacred side of the world. Each religion and culture chose this or that side, which he considered sacred to them. The orientation of the grave pits in Armenia in the Bronze Age gives us ground to conclude that the orientation of the grave pits was done by watching the sunrise. The shifting of the grave pits from the accepted geographical directions, was conditioned according to the moving of the sun in the horizon day by day. Astro-archaeological calculations give us the opportunity to determine, with the exactness of three days, the month and the day when the pit was dug.

Illuminating the Way of the Dead: Exploring the Reflection of Sunlight on the Sea and its Importance for Minoan Funerary Beliefs

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Abstract

Dramatic natural phenomena can give hints to better interpret ancient cosmological beliefs. The reflection of the sun over the sea during sunsets and sunrises casts a glitter path of light, connecting the celestial body with the observer through water. Unfortunately, this wonder has not been enough investigated from an archaeological perspective. There are hints to associate this phenomenon with cosmological beliefs of the Mediterranean area. In particular, this research focuses on the Greek island of Crete and the material remains from its Bronze Age civilization. By adopting a phenomenological method, the author has gathered information on the agency of the glitter path and she has than confronted them with the iconographical evidence from the late Minoan Period. The combination of water and the sun often find its expression in the Minoan funerary art, for example in a larnax from Palaikastro where the sun is depicted underwater. These preliminary results suggest that the sunset glitter path might have been considered a solar gateway to the underworld-sea. This elongated reflection of sunlight on the sea expresses a sense of direction and has the qualities of a cosmic axis, by connecting the planes of reality of the life and death during the time of sunset. The glitter path, or glitter pillar, appears to be a liminal entity between the celestial and the watery world, by depending its qualities from the position of the sun and the movements of the sea. Only by looking at the natural world itself we can find an explanation for myths and cosmologies of the people that dwell in it.

Celestial Bodies in Ancient Armenian Mythology

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Abstract

Celestial bodies demonstrate a great variety of reflections in different spheres of Armenian mentality and culture: in rock art and sculpture, mythology and architecture, epic and music, confessional and philosophical works. The worship of celestial bodies in Armenian mythology comes from earliest times; it developed due to the perception of interconnection between the cosmic phenomena and life on the Earth. Cults of gods and goddesses personifying the Sun and the Moon, planets of the solar system and stellar-constellations, myths about Milky Way and many artifacts, prove the high level of interpretation of the Universe in Ancient Armenian culture.

Ancient Astronomical Knowledge and Rock Art in Armenia

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Abstract

The Armenian Highland was one of the important centers of astronomical observations and investigations in Ancient Orient. The great interest to the cosmic world was reflected in archaeological findings and artifacts, especially in Rock Art, containing mighty arguments on understanding and comprehension of significance of heavenly bodies, especially luminaries, in our ancestors' life. Solar marks and swastikas, lunar images, pictures of star-groups and constellations, radial and rainbow-like signs, a unique bolide image, calendar and compass pictures are witnesses of a remarkable knowledge about the Universe in those early times of human civilization.

Revealing the Answers of Cosmic Riddles in Armenian Manuscripts

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Abstract

Riddles with the topic of astronomy have their own unique place in the field of Cultural astronomy. Although there are many studies devoted to the study of of folk and individual authors riddles, there is no separate study neither by Armenian nor foreign scholars on the nature of astronomical riddles. At the present study we discussed riddles both from folklore and individual authors. As a result, we found out that folklore riddles are rich with allegory and metaphors. In the written riddles meaningful and philosophical mood is highlighted from one hand connected by educational purposes, on the other hand with the personal preferences and astronomical knowledge of the authors. All these is also related to the ancient and traditional usage of the riddles, which aimed to go deep into ideological understanding, as well as in the terrestrial and cosmic mysteries and try to identify them in their own way.

The Sun and the Moon in Iranian Painting

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Abstract

From the stone-age up to the current history, human's astronomical observations or fictions have been recorded by paintings. The existence of some astronomical elements, such as, the Sun and the Moon, in various paintings reveals a durable connection between astronomy and painting. The basis of Astronomy is the study of celestial objects, such as, stars, planets, their moons and etc. In this regard, the Sun as the nearest star and the Moon as the nearest neutral object to the Earth, are very important. The study of celestial objects in astronomy is possible through the light received from them. Light has been influencing Iranian art and culture and the manifestations are in most cases the Sun and the Moon. The role of the Sun in the Iranian culture and art dates back to ancient Mithraism, which affected nearly up to two thousand years on some religions, such as, the Judaism, Christianity and Zoroastrianism. In addition to the specific situation of the Sun, the Moon, which illuminates the night sky, has been considered frequently. The fact that Iranian art is a symbolic art, motivates the research toward investigating the arts which contain the symbolic forms of the Moon and the Sun. From the earliest to the modern Iranian artists, they used sketches of the Sun and the Moon in either symbolic or abstract manners. Considering such an influential background, this paper will present the symbols of the Sun and the Moon in a variety of Iranian paintings, including this article\'s first author\'s oil paintings.

Geographic and Societal Determinates of Ancient Astronomies

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Abstract

What has been the meaning of astronomy in ancient cultures? In many cultures, there appear to be unique connections between their astronomy and their cultural traditions, political systems, and landscape. With sufficient knowledge of a culture, one can conceivably predict their astronomy, and, in the process, learn more of their cultural traditions as well as the richness of human ingenuity. We start with Nabta Playa in southern Egypt, where, as early as the 7th millennia BCE, nomadic pastoralists built a cultural center at the western edge of seasonally flooded playa in the western Sahara. In the sediments they placed five lines of megaliths oriented to the brightest stars of their sky, developing thereby a religious center prior to sedentarism and agriculture. In the Americas, Chaco Canyon appears to have been the center of a segmentary state with some 200 outlying communities, which were tied to the center by trade, pilgrimage, and cyclic festivals, set within a sacred landscape which provided a calendar and multiple hierophanies. The Inca Empire is an example of state-supported and state-mandated astronomy, often with geopolitical motives. On the summits of some of the Andes\' highest mountains, the Inca built ceremonial sites, in which human sacrifices were aligned to the rising solstice suns. In India, the great Hindu empire of Vijayanagara evolved from

a pilgrimage center to a powerful empire which controlled much of south India until 1565 CE. A metaphorical cosmic axis was established by the Vijayanagara kings, which extended from the royal palaces, across the summit of their local version of Mt. Meru, and onto the north celestial pole. In modern India, a series of Shaivite temples in Tamil Nadu hold celebrations when the sun enters and temple and touches the lingam in its center. An interpretation of these celebrations involves an outbreak of naked eye sunspots in the 11th century. In these examples, astronomy has provided unique insights into human behavior, not readily available by other means.

Understanding Uncertainty: Lessons from Astronomy

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Abstract

Whenever we read of a new astronomical discovery, the emphasis is on the nature of the result: the predicted approach of a near-earth asteroid; the discovery of a supermassive black hole; the characterization of a new exosolar planet. Much less attention is paid to the uncertainties in the measurements on which the claims are based, or to the role of assumptions in their interpretation. Topics like \"modelling errors\" and \"statistical significance\" don\'t grab the headlines, yet are fundamental to whether or not a headline is meaningful. Significance is everything: if we ignored it, we could claim and publish anything. Key to this is understanding the uncertainties in our data. The degree to which data depart from model predictions is central to the process of developing new models, an example being the elliptical orbits for planetary motions introduced by Kepler to supersede the long-accepted compound circular orbits. In this paper I will take a broad, historical look at how astronomy has moulded the development of our understanding of uncertainty and significance. A formal approach to these topics made progress around 1800 with the works of Laplace and Gauss, to mention just two. But discussions of uncertainty can be found in earlier works, not only Galileo and Kepler around

1600, but also Al-Biruni around 1000 and Ptolemy in 150 CE. Around the turn of the current century, the Bayesian approach (following pioneering work of Jeffreys in the 1920s and 30s) took off in astronomical data analysis, made possible with the rise of computational power. This is having a profound impact not only on the way we treat data, but also on how we understand significance, how we draw conclusions, and even how we construct models in the first place.

Digitized First Byurakan Survey (DFBS) – as UNESCO "Memory of the World" Documentary Heritage

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The Byurakan Astrophysical Observatory (BAO) plate archive consists of 37,500 photographic plates and films, obtained with 2.6m telescope, 1m and 0.5m Schmidt telescopes and other smaller ones during 1947-1991. The famous Markarian Survey (or the First Byurakan Survey, FBS) 2000 plates taken in 1965-1980 were digitized in 2002-2005 and the Digitized FBS (DFBS, www.aras.am/Dfbs/dfbs.html) was created. The project was completed in collaboration with Sapienza University of Roma (Italy), Cornell University (USA), Hamburger Sternwarte (Germany) and the Armenian Institute of Informatics and Automation Problems (IIAP). New science projects have been conducted based on this low-dispersion spectroscopic material. The digitized version of Markarian Survey is included in UNESCO "Memory of the World" documentary heritage list and is one of the rare items from science. I will present the DFBS scientific and technical value and its possible future use.

About some Parallels between East Slavic and Caucasian Folk Star Nominations.

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Abstract

Some well-known in East European region folk star names like the sieve, the three sisters, the Milky Way as a Strawy Way and so on. Especially some interesting connections between Slavic and Ossetian languages appear while researching the Visazhar folk constellation name, which usually nominates the Pleiades. Results of comparative studies are reinforced by areal studies of folk constellation names. These new onomastic and ethnoastronomical data is discussed in the paper.

A Pluralistic Vein in the Early Eighteen Century in Europe

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Abstract

The blaze that flared in Rome's 'Campo dei Fiori' square in February of 1600 was an attempt to incinerate a dangerous enemy of any religious beliefs arising from the Jewish-Christian tradition. The extreme punishment inflicted by the Roman Inquisition on Giordano Bruno, a wizard and a follower of hermetism but, above all, a philosopher supporting cosmological insights that threatened to seriously damage the dogmatic apparatus of Western Christianity, ought to be exemplary and persuasive enough to interrupt any form of proselytism. Nevertheless, the way towards pluralism was most definitively exposed. The many editions of Bernard Le Bovier de Fontenelle's Entretiens sur la pluralità des mondes, with a representation of many planetary systems distributed around a major heliocentric system, date back to the early Eighteenth century. The allusion to Brunian doctrine is apparent. In 1742, on the cover of his Atlas novus coelestis, Johann Gabriel Doppelmayer presented a real Brunian manifesto in which, once again, the Solar System is surrounded by other planetary systems. Two years later, Leonhard Euler published his Theoria motuum planetarum et cometarum, with an antiporta which is a clone of the pluralistic iconography of the Atlas. In the years following 1751, a fresco was painted in one hall of the Royal Palace of Prague

(now the Mathematics room) under the influence of the Jesuit Joseph Stepling, where the reference to Doppelmayer's frontispiece and Euler's antiporta is evident. We have no precise information on the pluralistic faith of either Doppelmayer and Stepling, but we know that Euler was a firm pluralist and that he kept a frequent correspondence with Stepling. These facts allow us to exclude a priori the simplistic and rather reductive hypothesis of an uncritical use of a common source. It seems more probable that Doppelmayer, Euler, and Stepling, while belonging to different cultural and religious environments, shared a common position in favor of the Brunian doctrine and exchanged information, opinions, and even, as in our case, "cryptic" iconic references to the cosmology of the Nolan philosopher.

The Astronomical Silk Road medieval astronomical exchanges between China and Eurasia

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Abstract

The astronomical Silk Road may be symbolized by two ancient observatories: one is the Dengfeng Observatory in Henan, China; the other is the Ulugh Beg Observatory in Samarkand. Since the 13th century, transmission of astronomical knowledge has been going on between China and Central Asia and beyond. In 1220, Yelv Chucai introduced the concept of lica (league distance correction, equivalent to geographical longitude) into his calendrical computation after he had observed a lunar eclipse in Samarkand: the time difference between the Chinese prediction and the actual occurrence made him invent the concept. Our analysis shows that he might have consulted Ptolemaic geographical data in determining the value of lica.

In the second half of the 13th century, Zama Luding, probably an astronomer from Maraghah Observatory, came to China to serve at Kublai Khana's court. He brought seven astronomical instruments to China, all of them are of Arabic origin and style. He also brought many books from the west,

including the Euclidean Element and the Almagest. He also served as the Director of the Muslim Huihui Observatory of the Yuan Dynasty.

The flow of astronomical knowledge was in both directions. Our analysis of two star catalogues: one is the Chinese Star Catalogue by Guo Shoujing (1231-1316) which contained equatorial coordinates of 678 stars; the other is Ulugh Beg’s (1394 -1449) Star Catalogue which was based on Ulugh Beg’s independent observations and contained positions of 1018 stars â€“ suggests that Ulugh Beg’s catalogue might be first measured equatorially and then converted to ecliptic coordinates, following Ptolemaic tradition. There was a 3 arc minute systematic error in the declinations which presumably was caused by the misalignment of the instrument\'s pole respecting the celestial north-pole. If this was the case, we may conclude that the Chinese observational techniques using equatorial instruments might have been used by Ulugh Beg in his observation of stars.

The Expedition of M. R. Stefanik to Observe the Total Solar Eclipse in 1907 from Turkestan

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Abstract

The Slovak astronomer Milan Rastislav Stefanik (1880-1919) studied at Prague university and continued his work in astronomy at observatory Paris-Meudon. In 1906, he was charged to organize the French expedition to observe the total solar eclipse on 14th January 1907 from Turkestan. They built a station at Ura-Tjuba but due to snowy weather the expedition was unsuccessful. During the journey Stefanik visited the Pulkovo observatory (and was invited to join their group) and met the German expedition from observatory Hamburg-Bergedorf. Stefanik was involved in improving the solar spectroscopy, mainly of solar corona, and largely used the photography. In the World War I Štefánik served in the French Army, finally as general of the Air Force. When he returned to Slovakia in 1919 the plane crashed during the landing and all the passengers and crew died. His international scientific and diplomatic contacts were essential for origin of an independent Czechoslovak Republic of which he became the first Minister of War. The poster will bring some details and pictures from the expedition to Turkestan.

V. V. Stratonov (1869-1938)
An Astronomer on the Way from Middle East to Prague

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Abstract

Vsevolod Viktorovič Stratonov was born in Odessa, graduated at the local university and started to work here for two years at the university observatory. The next two years he spent at the Pulkovo Observatory, where he acquired a large skill in photographic techniques. In 1895 he moved to Tashkent and remained here as an astrophysicist on the observatory for about ten years. In 1905, he left the career of practical astronomer due to an eye disease. He became deputy manager of the tsarist directorium and worked in public service of Caucasus mountain areas, reorganised the Polytechnical University in Tbilisi and lectured astronomy at the university for girls. In 1911 he was appointed the director of tsarist Russian state-owned bank. During the revolution of 1917 he lost this position. Afterwards he was named the Professor of Astronomy on the Moscow State University. In Moscow, he established the Main State Astrophysical Observatory and intended to found, besides the central astrophysical institute, lot of branch astrophysical observatories from Odessa to Vladivostok. Up to 1922 he managed to build the Central astrophysical institute that

included also the observatory in Tashkent. His forced emigration in 1922 caused the end of this monumental project. Moreover V.V. Stratonov managed organization activities on technical faculties of the First Central Asian State University in Tashkent. On its Faculty of Science he was elected the dean and on the Faculty of Medicine he was named the lifelong member of honour. V. V. Stratonov moved with his family to Czechoslovakia via Berlin in 1923. He worked in Prague on the Russian people's university and from the beginning of his stay in Czechoslovakia he held numerous public lectures both in Prague and regions. After acquiring the Czech citizenship in 1938 he was appointed a professor at Czech Technical University in Prague and lectured the Descriptive Astronomy. His about 50 books and essays were written in Russian, French, German and Czech. For his book „Sur le mouvement des facules solaires", published in the publishing house of the academy of sciences in St Petersburg, he gained the great tsarist prize and a golden medal. On the Tashkent observatory he led the astrophysical laboratory and devoted almost solely to photography with using the Carte du Ciel standard refractor. The results of ten-year work at Tashkent are covered in 5 volumes.

Al-Shirazi and the Non-Ptolemaic Planetary Models

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Abstract

Coming after Mu'ayyad al-Dīn al-'Urḍī (1200-1266) and Naṣīr al-Dīn al-Ṭūsī (1201-1274), Quṭb al-Dīn al-Shīrāzī (1236-1311), a leading figure of the so-called Marāgha school in astronomy, presents his predecessors' non-Ptolemaic models and criticizes them in his three hay'a books. Since his own new models in Nihāya al-Idrāk (written in Arabic in 1281) and Ikhtīyārāt Muẓaffarī (written in Persian in 1282) are not without difficulties, in his latest book on hay'a, al-Tuḥfa al-Shāhīya (written in Arabic in 1285) he puts forward his modified models inspired from Ṭūsī\'s and 'Urḍī\'s models and produces a series of new models for Mercury and the oscillation of the spheres. Nevertheless, in spite of all his attempts, the tradition of non-Ptolemaic modeling after him never converged to a series of standard models.

Immersive Visualization Technologies for Astronomy Outreach

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Abstract

The development of modern technologies affects each aspect of human life. In this context, one of the biggest innovations was the development of Immersive Visualization Technologies, which people try to use everywhere: from games to difficult surgeries. In this respect \"Immersive Education Solutions\" project aimed at making the astronomical (and not only) education and astronomy outreach more productive, by producing immersive 360 degree animated astronomical movies, which people can watch in planetariums or with Virtual Reality devices. This, in fact, catches the interest of everybody and helps to easily and visually deliver the content. So, with our two astronomical movies \"From the Center of the Universe to the Piece of Multiverse\" and \"The Big Family of Planet Earth\", we made a big wave of love and interest towards astronomy and provide a new tool and possibilities for astronomy outreach.

Analysing Education as a Variable in "The Sky in Our Lives Survey"

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Abstract

"The Sky in Our Lives" is a survey that was created in 2006 by Dr. Jarita Holbrook and has been modified and improved since then to more accurately capture the relationship between people living today and the night sky (Holbrook, 2009). The survey is broken down into 5 parts: Part I "Demographic Information" deals with the demographic information of the respondents, Part II "The Sky in your life" section explores how people use the sky in their everyday life or have used the sky in the past, for example using the stars for night navigation. Part III with little modification, this section is the Noctcaelador Inventory developed by psychologist William E. Kelly (Kelly, 2004). This part of the survey tests a person's psychological attachment to the sky. Part IV "Astrology" this survey part is to test a person's belief in astrology. The final part which is Part V is to test a person's attitude towards astronomy. This section incorporates part of the Astronomy Attitude Survey developed by Michael Zeilik (Zeilik, 2002). The greater the educational attainment, the more positive the attitude towards astronomy & science (part V), the less a belief in astrology (part IV), and a higher psychological attachment to the night sky (part III).

The First Cosmological Works (Rasāʾil al-Hayʾa) in Islamic Period

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Abstract

Hayʾa works is a general name for the astronomical works which provide a geometrical description of the configuration of the world. Most of this kind of astronomical works were written by Islamic scholars probably under the influence of Ptolemy's Planetary Hypotheses. Most of Islamic hayʾa works have a similar structure and order of chapters and have been written in 6AH/12AD century. Nevertheless, we have some astronomical works in 3-4AH/9-10AD centuries which have some similarities with the hayʾa works so that we can call them the "predecessors of hayʾa works". Al-Farghānī's Jawāmiʿ ʿ Ilm al-Nujūm and the third chpter of Kūshyār's al-Zīj al-Jāmiʿ are two important works among these predecessors. Considering the four chapter organization for Hayʾa works, i.e. mathematical and physical introduction, configuration of the heavens, mathematical geography and masses and distances (Abʿād wa Ajrām), we introduce in this article these two treatises. This article claims that the third chapter of Kūshyār's al-Zīj al-Jāmiʿ is more similar to the next Hayʾa works and probably it is more impressive.

History and Kinds of Astrolabe in the Middle East and its Use in Armenia

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Abstract

Astrolabe is the most important astronomical instrument. In fact, this instrument is a sky simulator that is used to measure and process astronomy. It\'s about three thousand years old. The most numerous astrolabe number is made in the Middle East. Most kinds of astrolabe only were have used in the Middle East. In this presentation, we will explain how many kinds of astrolabe that have forgotten and we have resurrected or made. We have designed or fabricated ten kinds of astrolabe so far. In the end, we talk about using astrolabe in Armenia. Apparently so far, five astrologers have been found in Armenia. In some of these astrolabes, a few letters are carved in Armenian letters. But a sample is made entirely with Armenian language and letters. Therefore, in Armenia, this instrument has been well-known.

The World Year

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Abstract

As ancient indian astronomy the universe is cyclically created and destroyed, and that the successive cataclysms coincide with grand conjunctions of all planets at the zero point of the ecliptic. Indian astronomers have divided the world year to 4 yugas. A complete Yuga starts with the tishya yuga, dvapara yuga, and treta yuga into a krita yuga. In this paper We want to talk about division of time in indian and islamic astronomy. These star-cycles are known through the canon of alfazari and yakub ibn Tarik where drived from a hindu. Biruni in malelhend and abumashar in hazarat talked about the same system of time. Twelve thousand divya-years, are one caturyuga, and 1000 caturyuga are one kalpa, a period at the beginning and end of which there is a conjunction of the seven planets and their aspides and nodes in 0 of aries, in the point of the vernal equinox.therefore each planet makes within a kalpa a sertain number of complete revolutions or cycles. All four yugas together are one caturyuga.71 caturyugas are one manvantara, and 14 manvantaras,together with a samdhi of the duration of one kritayuga between each two of them,are one kalpa. Muslim authors call the days of the kalpa the days of the sind-hind or the days of the world.

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