comets. On the contrary, asteroids are rocky primitive objects (although some of them contains icy volatiles) distributing in the mainbelt between Mars and Jupiter orbits. Because of frequent encounters in the mainbelt, asteroids have experienced a number of repeated impacts until the present day. Namely, it is important to investigate thermal alternation process of cometary volatiles and refractories in the solar radiation field, whereas collisional and subsequence phenomena of asteroidal bodies. Although recent spacecraft observations revealed the physical natures on the surfaces of comets and asteroids, their interiors still remain largely unexplored.

It is likely that a sudden brightening of a comet is associated with rapid sublimation of internal CO and CO2 or phase transition of amorphous H2O. An episodic dust ejection from an asteroid is causally related to an impact among asteroids, sudden sublimation of remaining subsurficial volatiles, etc. Because these transient phenomena provide rare opportunities to investigate their interiors, immediate observations using any optical instruments are particular important. In my presentation, I will review some examples of such transient phenomena in the solar system and propose possible collaborative research using the Korean Small Telescope Network.

고천문/교육홍보

[구 HE-01] Mural constellations found in 5C Ara-Gaya(阿羅伽耶) tomb

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We report about the constellations discovered in Ara-Gaya Malisan tomb 13 of late 5th century. In December 2018, constellation-shaped grooves were newly found on the ceiling of the tomb 13 of the Ara-Gaya (42-532 CE.) polity in Haman(咸安). The tomb 13 is located at the top/center of the Malisan and is one of the largest burial mounds.

Grooves were found in one of the slabs of the grave cover-stone (160 * 80~60cm). The total number of grooves are 134 and each groove has a diameter of 1.5~4.0 cm. The grooves were made by pecking or grinding. From the preliminary study , we identified these grooves with traditional constellations such as 房, 心, 尾, 箕, 斗, which correspond to Scorpius and Sagittarius of modern constellations near the Milky Way.

It shows that advanced astronomy also existed in Ara-Gaya tomb while star charts were painted in Goguryeo tombs. This carries great importance in studying the development and exchange of astronomy in the Korean Peninsula.

[구 HE-02] An analysis of the stars recorded in『Hun-Gai-Tong-Xian-Tushuo 渾蓋通憲圖說』

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The『Hun-Gai-Tong-Xian-Tushuo 渾蓋通憲圖說』, which was an important astronomical book in East-Asia, was published by Li Zhi-zao (李之藻, 1565-1631) in 1607. This book was including the data of stars. We analyzed the data of stars recorded in『Hun-Gai-Tong-Xian-Tushuo 渾蓋通憲圖說』. Based on historical background, we assumed that the data of stars recorded in『Hun-Gai-Tong-Xian-Tushuo 渾蓋通憲圖說』 likely referenced knowledge from the ancient Arab/Islam culture. In conclusion, we assume a correlation with the star catalogue included in『Almagest』by Ptolemaios. Therefore, we think that this star's data will become important data for comparison with the star catalogues published in Arabic/Islam.

[구 HE-03] Statistical estimation of the epochs of observation for the 28 determinative stars in the Shi Shi Xing Jing and the table in Cheonsang Yeolcha Bunyajido (석씨성경과 천상열차분야지도의 이십팔수 수거성 관측 연도의 통계적 추정)

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The epochs of observation for the 28 determinative stars in the Shi Shi Xing Jing and Cheonsang Yeolcha Bunyajido are estimated by using two fitting methods. The coordinate values in these tables were thought to be measured with meridian instruments, and so they have the axis-misalignment errors and random errors. We adopt a Fourier method, and also we devise a least square fitting method. We do bootstrap resamplings to estimate the variance of the epochs. As results, we find that both data sets were made during the 1st century BCE or the latter period of the Former Han dynasty. The sample mean of the epoch for the SSXJ data is earlier by about 15-20 years than that for the Cheonsang