

Traditional Korean Astronomy : Science of the Heavens

○ Changbom Park
School of Physics, KIAS

Astronomy begins with observing the heavens. After constant and meticulous observation, people named the heavenly bodies, connected the stars to form constellations, and made constellation charts, which are maps of the heavens. It was only after a lot of observational data had been collected that information about the heavenly bodies could be systemized and regularity found in astronomical phenomena, ultimately leading to the invention of cosmology to explain the universe and its changes. Based on their understanding of the universe and the principles of its motion, people could then formulate accurate calendars with a view to predicting future astronomical phenomena. Hence, an introduction to traditional Korean astronomy should reflect the generic aspects of the science and begin with an examination of the astronomical observations made by ancient Koreans.

Of the three developmental phases of astronomy- accumulating observational information, systematizing astronomical knowledge, and then creating a model of the universe and forecasting astronomical phenomena- traditional Korean astronomy had brilliant achievements in the first two. Ancient Korean kingdoms established their own bureaus of astronomy, built observatories, and employed officials dedicated to observing astronomical phenomena. Official observations of astronomical phenomena started from the 1st century B.C. and the extensive records handed down include over 20,000 items. Comparably detailed records were made only by Korea's immediate neighbors: China, which began official recording of astronomical phenomena about 2,800 years

ago (circa 8th century B.C.); and Japan, which began 1,400 years ago (7th century A.D.).



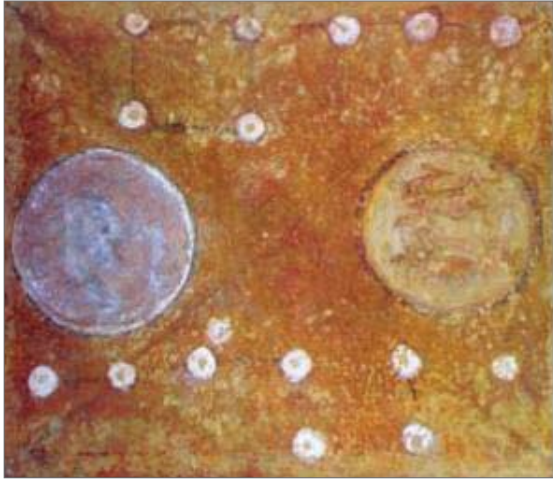
[A dolmen in Korea with cupmarks on the southern side]

gathered in ancient times, that which can be confirmed is the identification of constellations and astronomical directions.

The origin of Korean astronomy dates back to the prehistoric Stone and Bronze Ages. Korea is a land of dolmens. Dolmens found concentrated in the territory of ancient Korean kingdoms, as well as stone chamber tombs and burial items therein, are representative scientific relics that show the application of astronomical observations to real life.

Astronomical knowledge from prehistoric times not only had a decisive influence on the development of astronomy in the three kingdoms (Goguryeo, Baekje and Silla) after the 1st century

Ancient Koreans developed a systematic understanding about the kinds of heavenly bodies and their motions by observing, over a long period, the sun and the moon, the five visible planets (Mercury, Venus, Mars, Jupiter and Saturn), and numerous stars. Of the astronomical knowledge



[Constellations drawn on the ceiling of a 5th century tomb of Goguryeo dynasty located in Manchuria]

B.C., but also became a unique feature of traditional Korean astronomy through the ages. With the advent of the historical era, primitive astronomical lore gave rise to the creation of star maps, the core knowledge of astronomy. Such star maps, found in the tomb murals of Goguryeo, which occupied the northern part of the Korean peninsula and much of southern Manchuria, indicate how traditional astronomical knowledge was systematized and firmly established in Korea by the 4th century A.D. The three ancient kingdoms of Korea established a cultural connection with China and Japan, thanks to their proximity, through the exchange of human and material resources, creating an environment where

Korea and China mutually influenced each other in the field of astronomy. Hence the deep influence of Chinese elements is one of the distinguishing characteristics of traditional Korean astronomy.

Once observational data was accumulated and a systematic understanding about the heavenly bodies developed, a cosmological model was developed to give reasonable explanations for astronomical

phenomena. Cosmological models have their roots in myths about the origin of the universe or the heavenly bodies and their motions. Traditional Korean astronomy, however, delineates a few unique structural models for the universe that either give reasonable explanations for or make comparatively accurate predictions of the movements of the heavenly bodies. It is probable that Korea had no need to create its own model for the origin and structure of the universe, since diverse models had been introduced from China before Korea's astronomical knowledge developed to the level of formulating independent theories. Hence classical Chinese cosmological theories, mainly the "canopy heaven theory" (蓋天說 gaitianshuo) and the "enveloping heaven theory" (渾天說 huntianshuo), served as the framework for Korean intellectuals' understanding of the universe until the 17th century, when Western astronomy was introduced to the country.



[An astronomical observatory of the Silla Kingdom in Gyeongju, built in A.D. 632.]

Traditional Korean astronomy can be found in numerous classical materials and cultural relics, such as: the tombs of the Goguryeo

Kingdom; Cheomseongdae (Silla's royal observatory) in Gyeongju; ancient star maps and sundials; ancient observational records on astronomical phenomena; astronomical events and knowledge or interpretations of them written in historic texts and anthologies; and intangible astronomical tradition inherited through folk tales, proverbs and customs. From the modern perspective, information from these



[Part of the record detailing the appearance of Halley's Comet in April 1759.]

Cheomseongdae; and the culmination of astronomical science under the reign of King Sejong (r. 1418-1450) during the early Joseon Dynasty. Along with China and Japan, Korea played a major role in leading the development of world astronomy.

sources can be reorganized into the following seven categories: 1) observational data, 2) observatories and astronomical instruments, 3) astronomical philosophy, 4) calendrical science, 5) astronomers, 6) astronomical systems, and 7) astronomy in folk culture. Based on these extant cultural properties, we can infer the way in which traditional Korean astronomy developed in each field and the level that it reached. Classical Korean astronomy is mainly characterized by abundant observational data collected over two millennia; knowledge of the constellations and the star maps of the dolmen age and the Three Kingdoms period; the world's oldest surviving observatory,

Dates	Period	Astronomical Heritage
30C B.C. - A.D. 2C	Stone, Bronze & Iron Ages	Petroglyphs; directions and constellation marks of dolmens, menhirs and burial items
24C B.C. - 2C B.C.	Dangun Joseon	12 records on astronomical phenomena; <i>astronomical</i> observatory in Mt. Manisan, Gwanghwado
57 B.C. - A.D. 935	Silla	Over 240 records on astronomical phenomena in Samguk Sagi and Samguk Yusa; 25 Goryuryeo tomb murals depicting star maps; Cheomseongdae observatory in Gyeongju; Relics such as sundials and statues of four directional animals and 12 zodiacal animal deities
37 B.C. - A.D. 668	Goguryeo	
18 B.C. - A.D. 660	Baekje	
A.D. 689 - A.D. 926	Baekje	
918 - 1392	Goryeo	Over 5,000 records on astronomical phenomena in Goryeosa; Cheomseongdae observatory in Gaeseong; 9 Goryeo tomb murals depicting star maps
1392 - 1910	Joseon	Over 15,000 astronomical records in Joseon Wangjo Sillok, Seungjeongwon Ilgi and Ilseongnok; Astronomical relics, e.g. observatories, armillary spheres, and celestial globes; Astronomy books, astronomical charts; Clocks such as sundials, deysydrae, and astronomical clocks; Intangible astronomical elements in myth and folk customs