

## ECLIPSE RECORDS IN EARLY KOREAN HISTORY: THE *Koryo-sa*

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The following is a summary of recent research which I have undertaken on the eclipse records in the *Koryo-sa*. This work is based on a careful examination of the astrological treatise of the *Koryo-sa*. I have compared each of the many solar and lunar eclipse accounts with the results of computation and based deductions on these comparisons.

The *Koryo-sa* is the earliest extensive history of Korea and covers the period from AD 918 to 1392. Numerous astronomical observations (e.g. solar and lunar eclipses, sunspots, comets, temporary stars, lunar and planetary movements and aurorae) are contained in the astrological treatise (chapters 47-49) of this work. In all probability, these were largely based on the records of the court astronomers at the Koryo capital of Songdo (modern Kaesong). Analysis of the eclipse records yields valuable information on the completeness, reliability and dating accuracy of the *Koryo-sa* material.

Virtually no astronomical records of any kind are reported in the *Koryo-sa* before about AD 1000. Possibly the earlier material was destroyed during periods of political unrest. Commencing with the reign of King Hyonjong (AD 1010), eclipses and other celestial events appear to be systematically noted down to the end of the dynasty in AD 1392. This is the period covered by the present study.

The *Koryo-sa* contains about 135 separate reports of solar eclipses and 215 lunar eclipse records. In common with other celestial events, eclipses were regarded as significant astrological omens. However, solar eclipses in particular were important in maintaining the calendar. It should be stressed that the *Koryo-sa* only contains summaries of the original astronomical records; in most of the eclipse accounts, it is simply noted that on a certain date the Sun or Moon was eclipsed - without giving any further information. Occasionally, especially for lunar events, the eclipse was said to be total, but no additional descriptive details are included. Dates follow a standardised pattern: year of the appropriate king's reign, followed by the lunar month and day of the sexagenary cycle. For solar eclipses, the day of the lunar month (normally the first day) is also usually specified.

The eclipses cited in the *Koryo-sa* provide an interesting sample for astronomical and historical analysis. Thus, for example, when the recorded dates are converted to the Julian Calendar and then compared with the equivalent dates derived from modern computation, there is *exact* agreement in most cases. Errors of more than a single day are extremely rare. This same feature is likely to be characteristic of records of other celestial phenomena noted in the *Koryo-sa*. Computation of the local times of the various phases for lunar eclipses reveals that most recorded dates for these events correspond to the civil date when the night began - even when the computed local time of beginning was well after midnight. However, a small but significant proportion of the records give the immediately following date instead. This latter alternative is particularly common when - as indicated by computation - the Moon set eclipsed. However, the Koryo astronomers do not appear to have adopted strict rules for just when to change the calendar date during the night.

If the number of eclipses recorded reign by reign in the *Koryo-sa* is compared with the expected number visible in Songdo, an estimate of the efficiency of the observers is obtained. Obviously, bad weather would reduce the number of sightings, and no allowance can be made for possible omissions by the compilers of the *Koryo-sa*. The average efficiency for solar eclipses proves to be fairly high - around 70 per cent - although the actual figures vary very much from reign to reign. For lunar eclipses the general efficiency is much lower (mean around 50 per cent). It thus seems that - perhaps on account of their calendar importance - solar eclipses were more systematically observed than

their lunar counterparts. Or, could it be that the daytime observers were more diligent than the nighttime officials?!

Since lunar eclipses are fairly easy to observe, it may be inferred that the general record of nighttime celestial phenomena in the *Koryo-sa* - although extensive - is far from complete. Furthermore, marked variations in the frequency with which individual events are recorded might be expected from reign to reign. This result could have an important bearing on cometary and auroral statistics (the latter in the study of long-term solar variability) for example.

Interestingly, many recorded eclipses of both Sun and Moon (about 10 per cent of the total) prove to be invisible in Korea. Roughly half of these are specifically recorded as predictions (e.g. "The Sun should have been eclipsed but on account of cloud it was not seen"). In other cases there is no mention of prediction. Probably most of these latter examples are false reports. However, the overall conclusion is that some 90 per cent of the eclipse reports in the *Koryo-sa* are reliable. It seems reasonable to conclude that the large majority of records of other celestial events found in the same history are dependable.

The investigation outlined here will be submitted *in extenso* for publication - possibly to *Korea Journal* - in the near future.