

ABRUPT CHANGES OF THE EARTH'S ROTATION SPEED IN ANCIENT TIMES

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ABSTRACT. In our recent work using ancient solar eclipse records we showed that the Earth's rotation rate changed abruptly in about AD 900 (Sôma and Tanikawa 2005). We show here that more abrupt changes in the Earth's rate of rotation occurred in about AD 500.

1. INTRODUCTION

For the past few years we have been deriving the changes of the Earth's rate of rotation using the solar eclipse records in ancient times (Tanikawa and Sôma 2002, 2004, Kawabata et al. 2004, Sôma et al. 2003, 2004), and in Journées 2004 we showed that the Earth's rotation rate changed abruptly in about AD 900 so that the ΔT (TT – UT) values decreased between the years AD 873 and 912 by more than 600 sec (Sôma and Tanikawa 2005). We concentrate here the changes in about AD 500.

2. CHANGE OF THE EARTH ROTATION RATE AROUND AD 500

Sôma et al. (2004) deduced the following ranges of the possible ΔT values from the multiple ancient solar eclipse records:

Date	Range of ΔT (sec)	Date	Range of ΔT (sec)
306 July 27	6529 – 7120	616 May 21	2278 – 2959
360 Aug 28		628 Apr 10	
516 Apr 18	3567 – 5085	702 Sept 26	2728 – 3254
522 July 10		729 Oct 27	
523 Nov 23		761 Aug 05	

On 454 Aug 10 there was a solar eclipse in China, and it was recorded as total. As discussed by Stephenson (1997, p. 242), this record was misplaced one calendar year. It can be assumed that this eclipse was observed at Jiankang (Chien-k'ang), the capital at the time.

The 484 Jan 14 solar eclipse was recorded at Athens. The record says that the day was turned into night and the darkness was deep enough for the stars to become visible, and therefore it is clear that the eclipse was total at Athens.

From the above two records, the range of the possible ΔT values can be obtained as follows:

Date	Range of ΔT (sec)
454 Aug 10	6027 – 7858
484 Jan 14	4490 – 5463

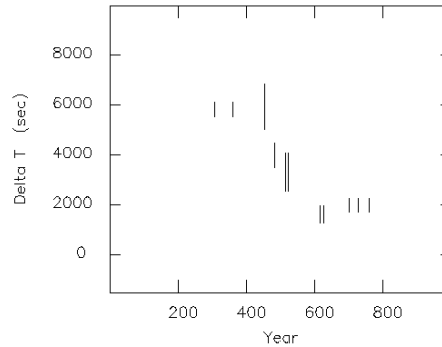


Figure 1: ΔT around AD 500

Fig. 1 shows the variation of the ΔT values in around AD 500. The figure clearly shows that the speed of the Earth’s rotation increased abruptly in around AD 450, and it gradually decreased until about AD 600.

3. REFERENCES

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