Notes for Table S1, S2, S3, S4 and S5

For the submitted paper

**Climatic and Societal Impacts of Volcanic Eruptions in the Western Han Dynasty (206 BCE- 8CE): A Comparative Study**

Investigator: Zhen Yang & Francis Ludlow

Translation: The references for the translations are provided in the relevant columns in the tables, where applicable. Records without information in the 'Translation Reference' column are translated by Zhen Yang.

Description and Notes:

Table S1 is the dataset of climate anomalies in historical sources of Western Han dynasty.

1) The events in those records are summarized in the summary column.

2) Translations of records of the two periods under study 180-150 BCE and 60-30 BCE are provided.

3) Translations from Ban G, Dubs HH (1938) The History of the Former Han Dynasty. Vol. 1: Waverly Press use the Wade–Giles system. To maintain consistency throughout the paper and all tables, the spelling of names and place names has been changed to pinyin, the current official system used in China. Small adjustments and corrections have also been made where necessary.

4) This chronology of climatic records of the historical period under study is compiled by using both established datasets of climatic events and historical sources. We first re-examined several widely used compilations of Chinese meteorological records, including the extensive A Compendium of Meteorological Records of China in the Last 3000 Years by Zhang et al (2004), The General History of Natural Disasters in China-Volume of Qin and Han by Jiao et al (2009), and the Table of Natural and Human Disasters in Chinese Dynasties by Chen et al (1933), and two specific studies (Chen 2016, Chen 2001) on Han climate that provide lists of records. These datasets are slightly different regarding what events are included and excluded. Building on this, the dynastic histories, especially Shiji (史記, Records of the Grand Historian, by Sima Qian, completed in 91 BCE) and Hanshu (漢書, Book of Han, by Ban Gu, completed in 82 CE) are investigated. The records of climate events and atmospheric optical phenomena are mainly in the Annals, the Treatise on the Five Elements and the Treatise on Astronomy in Hanshu, but also scattered in some biographies. Thus, all volumes of Shiji and Hanshu, have been examined, together with other relevant historical sources, such as Zizhi Tongjian (資治通鑑, Comprehensive mirror to aid in government, by Sima Guang, a chronicle recording Chinese history from 403 BCE to 959 CE) and Wenxian Tongkao (文獻通考, a comprehensive examination of existing literature). For more source information see the "source" column of each record. Some entries found in the compilations have been expanded by incorporating relevant context from the original sources where necessary.

5) In our annual chronologies (for SEA), when multiple records refer to the same events (based on context, timing, locations, etc.), they are counted only once. Every “river overflow” event occurred alongside a flood, it is considered a sub-event of flooding and, therefore, not counted separately. Similarly, the one case of river drying was accompanied with a drought event, and it is not counted as a separate event as well. Records of earthquakes, frost, hail, landslides, rain, snow, thunder, and wind are categorized as "other" events. When these events occurred individually, they are counted as one "other" event. However, if an event was recorded alongside a main event, for example, frost came with extreme cold, it is not counted repeatedly. When two “other” events were documented in the same entry, if the two events are clearly related based on the text (e.g., simultaneous rain and thunder), they are counted as one single “other” event. When the two events are unrelated, for instance, an earthquake and a hail event, they are considered two “other” events.

6) Although we have carefully examined the historical sources mentioned above, this dataset may not cover the complete climate records of the Western Han. It only represents all climate records we can find in the historical documents and compilations we used.

7) Texts in () are additional information or context. Texts in [] are parts omitted in classical Chinese but necessary for the translations to make the sentence complete.

Table S2 contains texts regarding the major political and administrative changes during 180-150 BCE.

Table S3 presents the major political and administrative changes during 60-30 BCE.

1) The Chinese texts are from historical sources. The English texts are translations of the Chinese texts. Some records are quotes from literature, and these are specified with notes and references. The rest of the records are summaries made by the author, and the sources are provided as well.

2) Translations of records follow the same rules as in table S1.

3) Here we only include changes that we consider might affect or relate to the social impacts and responses to climatic anomalies. a) Texts in grey are records listed to provide the political and socioeconomic context of the periods under study. They are not directly related to natural disasters. b) Some records are listed with necessary context, so the core acts are highlighted in bold. c) The reasons for issuing edicts and amnesties are underlined. If there is no underlined text and no additional explanation in the note, the reason is not mentioned in the historical record and its context.

4) Some columns, for instance, societal responses like sending officers to the disaster-affected areas for inspection and relief, are recorded several times in the latter period but not earlier. Thus, they are included only when available.

Table S4 and S5 are records of harvests and population changes in the Western Han Dynasty. Although we have carefully examined the historical sources mentioned above, this dataset may not cover the complete records of the whole dynasty. It only represents all relevant records we could find in the historical documents and compilations we used. In Table S5, columns B–F (“direction”– “cause”): If a serial number is provided, it means the information refers only to that specific record of the year. If more than one serial number [e.g., 1) & 2)] is provided, it means the related records and information refer to the same event. If no serial number is provided, the information in the cell refers to all records of that year.