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The weather diary of Felipe de Zúñiga (1775-1786): A key documentary source to understand the hunger year in Mexico

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The weather diary of Felipe de Zúñiga y Ontiveros (FZO) (Oaxtepec, 1717–Mexico City, 1793) provides daily meteorological information for rain frequency, temperature, frost, hail, thunderstorms, and windy days, from January 1775 to December 1786. It is the earliest observational data collection with daily resolution retrieved in the region so far and it has higher time resolution than any other climate proxy available for this period. Some of the meteorological information provided by FZO could be compared with current meteorological records i.e. frequency of rain, hail, and thunderstorm. The seasonal distribution of these variables corresponds well during the FZO period and the present climate. 1781 was the warmest year in the FZO record while 1785 and 1778 were the coldest. FZO also identified a wet period (1782/1783) and two dry periods (1780/1781 and 1785/1786). The later coincides with the hunger year. It is considered the worst famine in Mexico during the colonial period (1521–1821). A combination of adverse climate, lack of food, and an outbreak of typhus epidemic killed around 300,000 people. During these years a drought event extended over almost all the Mexican territory and was particularly severe over the central and northeastern regions. During the period 1785/86 FZO only recorded 188 rainy days. A similar record of low rainy days only occurred two times in the instrumental period: i) 1909/10 (188 days) and ii) 2010/11 (189 days). Both episodes with harmful consequences to the country e.g. water shortages, important losses in agriculture, farming, and forest fires. However, the climate during the hunger year was worse than during the instrumental droughts due to the high frequency of early killing frost. During 1785, frost events happened on April, August and September. FZO describes the impact of the frost and the attempt of the government to alleviate the famine *“the frosts since August 28th have been so general that the fruits have been lost throughout the Kingdom, with the exception of the warm lands; the government has asked them to sow corn, beans and other seeds in the irrigated lands immediately so that they can be harvested by March 1786 and partially remedy the hunger that threatens”*. Nevertheless, this decision was not useful because 1786 was drier than the 1785 impeding the growing of any crop. The annual summary of FZO for 1786 was, *“It has been an*

unfortunate year due to scarcity of rain, supplies and everything needed for life, also in misfortune and public diseases". The FZO's diary is a good example of a documentary source that allows understanding the climate situation and the socio-economic response in detail during an extreme event.