



## **Zuñiga's weather diary: dry-spell length from 1775 to 1785 in Mexico**

Fernando Domínguez-Castro (1), Ricardo García Herrera (2,3), José M. Vaquero (4,5), Sergio Vicente-Serrano (1), M.Cruz Gallego (4,5), César Paradinas Blázquez (2), Ana Gavilán Febrel (2), Marina Peña-Gallardo (1), and Makki khorchani (1)

(1) Instituto Pirenaico de Ecología, Consejo Superior de Investigaciones Científicas (IPE-CSIC), Zaragoza, Spain (f.dominguez.castro@gmail.com), (2) Departamento de Física de la Tierra II, Facultad de Ciencias Físicas, Universidad Complutense de Madrid, Spain, (3) Instituto de Geociencias (IGEO, CSIC-UCM), Madrid, Spain, (4) Departamento de Física, Universidad de Extremadura, Badajoz, Spain, (5) Instituto Universitario de Investigación del Agua, Cambio Climático y Sostenibilidad (IACYS), Universidad de Extremadura, Badajoz, Spain

Documentary sources provide detailed climatic information during the colonial period in Latin-America. Nevertheless, it is common that this information does not overlap with instrumental series, which in this region usually start in the 20th century. For this reason, the comparison of the colonial and present time climates is a challenge. In this work we have compared an observational record during 1775-1786 with the instrumental period. Felipe Zuñiga y Ontiveros recorded daily weather conditions from 1st January 1775 to 31st December 1786 for Mexico City in his manuscript "Ephemérides astronómicas calculadas al meridiano de México, años 1775-1785" [Astronomical ephemerides calculated to the meridian of Mexico, years 1775-1785]. Zuñiga belongs to the enlightenment new Spaniard community of Mexico and had interest in astrometeorology. The daily weather observations inform about temperature, cloudiness, precipitation and other meteorological phenomena as storm, fog, hail, snowfall or frost. The daily descriptions are short and concise but allow to construct a presence/absence precipitation index and to compute dry-spells length. The longest dry-spell length was in 1780-1781 and 1785-1786 and had important impacts in the agriculture and society. The probability distribution of dry-spells length has been studied in the instrumental period to estimate the return periods of those identified in the documentary sources. The analogues between both periods are discussed. The atmospheric circulation during the instrumental analogues shows that positive ENSO and the intensification of the Caribbean Low Level Jet are the most important factors in the occurrence of the long dry-spell.