Geophysical Research Abstracts
Vol. 20, EGU2018-19593, 2018
EGU General Assembly 2018

Precipitation trends in the Medina del Campo Aquifer region (Spain) towards implementing Nature Base Solutions for drought and flood events

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The Medina del Campo Aquifer is a water body located 150km NW of Madrid under great pressure, with decreasing piezometric levels since available record. The aquifer is recharged only after precipitation whereas water is used mainly for agriculture.

Average annual precipitation in the area since 1931 is 468.03 mm, which is similar to the precipitation figures characterizing the Tabernas Desert (Southern Spain), the driest area in Europe. Annual precipitation records range from 92.4 mm in 1955 to 2,123.7 mm in 1964 in singular rain gauges within the area. Daily maximum precipitation is, on average, 36.39 mm for the same period, with a maximum record of 223 mm in April 1988. Uniquely high daily precipitation values account, on average, for 7.7% of annual precipitation. In June 1990, a single day record of 137mm accounted for 37% of that year total precipitation.

Even though such huge precipitation contrasts, trends can be seen after an appropriate treatment of daily values. The average daily maximum precipitation shows a clear sinusoidal-like behavior, characterized by 7- to 9-year cycles with a general decreasing trend. Annual precipitation shows larger cycles of about 17 to 22 years, again within a decreasing trend. This will in turn result into more severe droughts and flood events for the near future with socio-economic and ecological impacts in the region. Hence nature based solutions both for near and far future should focus on optimizing water demands and increasing the resilience of the system to extreme hydrological events.