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Past analogs of recent climate anomalies and impacts in Portugal. Droughts, storms and heat waves

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An indexed reconstruction of precipitation variability, based on documentary and instrumental data, has been done for southern Portugal starting in 1675. The descriptions of the extreme events in the documentary sources have also supplied information about their impacts. We will compare past and recent extreme weather events in Portugal, their causes and their impacts on society. We have selected periods of winter droughts, of storms that triggered great floods and of heat waves.

There are a number of documentary sources dating from 1693-94 indicating that that there was no rainfall from December 1693 to at least November 1694 with the exception of light showers in June. Several pro-pluvia rogations ceremonies took place all over the country, even in the Northwest that is generally rainy. There are numerous descriptions of the impact of droughts on agriculture, of shortage of cereals, of escalating prices and the subsequent generalised famine. An analogy will be made for the 20th century using the 1980-81 winter drought that lasted roughly the same time and which also had severe social and economic impacts. The decrease in production of hydroelectric energy (50% below average) between January and July 1981 is also pointed out. In both cases, the lack of rainfall was partly due to a ridge that stayed over the Eastern Atlantic and kept Iberia in aerologic shelter.

Apart from urban flash floods there are two types of floods in Portugal: (i) floods from the big river basins (Tagus, Mondego and Douro) that are due to the frequent passage of westerly frontal depressions during days or weeks; and (ii) floods of the small river basins due to convective depressions that affect small areas. The December 1739 flood, caused by the overflow of the great rivers, will be compared with the ones that occurred in February 1978. Both were caused by intensive precipitation all over the country at a time when the soil was already saturated with water from previous rainfall. The damages were vast in both occasions including loss of life. Two poems and other documentary sources supply detailed and credible information on the 1739 flood that hit Portugal from North to South.

A heat wave in June-July 1842 has been selected. There are already instrumental data available for the former (Franzini station), retrieved from medical journals as well as descriptions of impacts on several regions in the country. The 1842 heat wave will be compared with more recent heat waves like the June 1981 that had very serious impact on public health and on the country's economy. We will also analyse the heat waves of July 1991 and August 2003. The latter was particularly long-lasting with serious consequences ranging from extensive forest fires to losses in agriculture and impact on the population health, although the registered mortality was lower than in 1981 probably due to improved alert systems and Public Health Welfare State.