



Drought as a Catalyst for Early Medieval European Subsistence Crises and Violence

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Tree-ring records provide one of most reliable means of reconstructing past climatic conditions, from longer-term multi-decadal fluctuations in temperature and precipitation to inter-annual variability, including years that experienced extreme weather. When combined with written records of past societal behaviour and the incidence of major societal stresses (e.g., famine, disease, and conflict), such records hold the potential to shed new light on historical interactions between climate and society. Recent years have seen the continued development of long dendroclimatic reconstructions, including, most recently the development of the Old World Drought Atlas (OWDA; Cook et al., 2015) which for the first time makes available a robust reconstruction of spring-summer hydroclimatic conditions and extremes for the greater European region, including the entirety of the Dark Ages. In this paper, we examine the association between hydroclimatic extremes identified in the OWDA and well-dated reports of severe drought in early medieval European annals and chronicles, and find a clear statistical correspondence, further confirming the accuracy of the OWDA and its importance as an independent record of hydroclimatic extremes, a resource that can now be drawn upon in both paleoclimatology and studies of climatic impacts on human society. We proceed to examine the association between hydroclimatic extremes identified in the OWDA and the incidence of a range of major societal stresses (scarcity and famine, epidemic disease, and mass human mortality) drawn from an exhaustive survey of early medieval European annals and chronicles. The outcome of this comparison firmly implicates drought as a significant driver of major societal stresses during early medieval times. Using a record of the violent killings of societal elites recorded on a continuous annual basis in medieval Irish monastic annals, we further examine the role of hydroclimatic extremes as triggers in medieval violence and conflict.