Drought regimes influenced social interaction in the US Southwest

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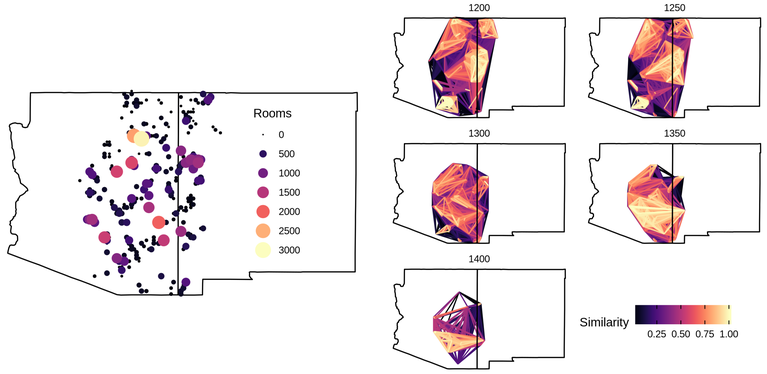
Introduction

When droughts and floods struck ancient societies, **complex networks** of exchange and interaction channeled resources into affected settlements and migrants away from them. Did such networks evolve in part to **connect populations living in distinct drought and flood regimes?**

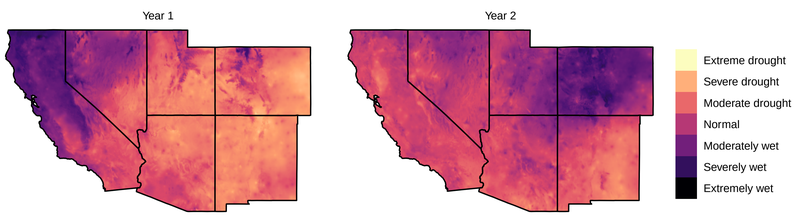
Methods

Analyze **7.5 million artifacts** from a **250-year** period at nearly **500 sites**. Estimate how the flow of **social information** changed over time, and measure how the intensity of social interaction varied as a function of distance and several regional **climate patterns**.

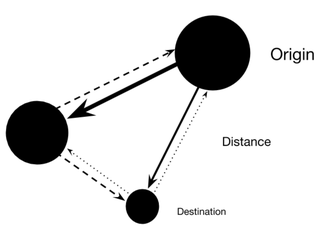
Southwest Social Networks



Standardized Precipitation-Evapotranspiration Index



Spatial Interaction Model



Model 1:

$$logit\left(S_{ijt}\right) = f(dist_{ij}) + \tau_{it} + \tau_{jt} + \epsilon_{ijt}$$

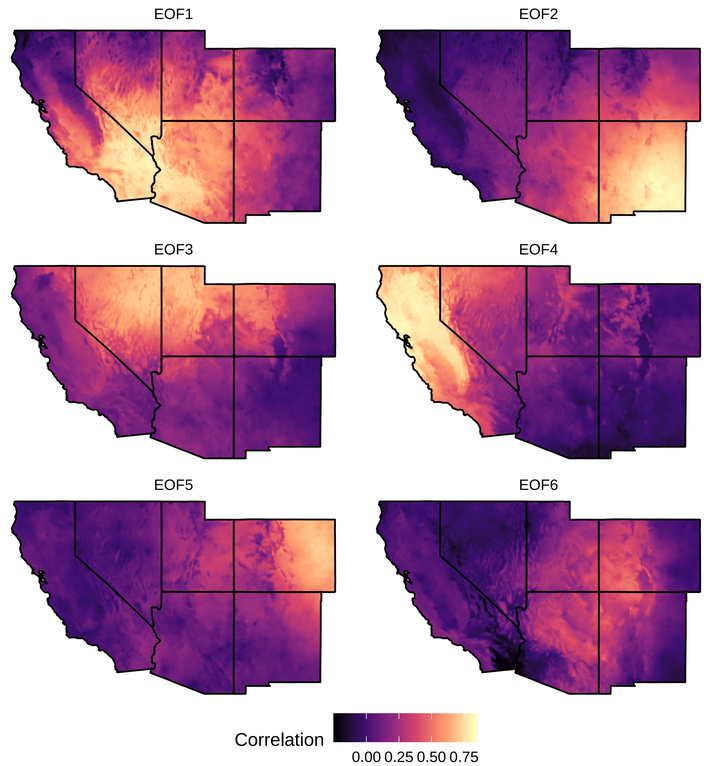
Model 2:

$$logit\left(S_{ijt}\right) = f(dist_{ij}) + f_t(EOF_{ij}) + \tau_{it} + \tau_{jt} + \epsilon_{ijt}$$

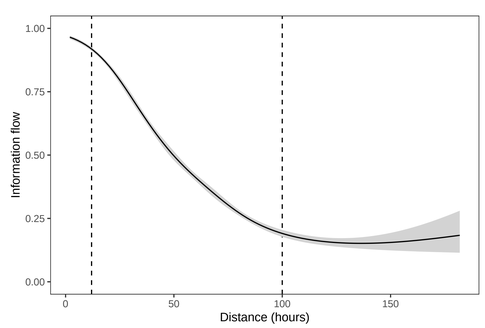
Results

Social interaction **decayed with distance**, but ties between sites in **differing oceanic and continental climate regimes** were often **stronger than expected by distance alone**.

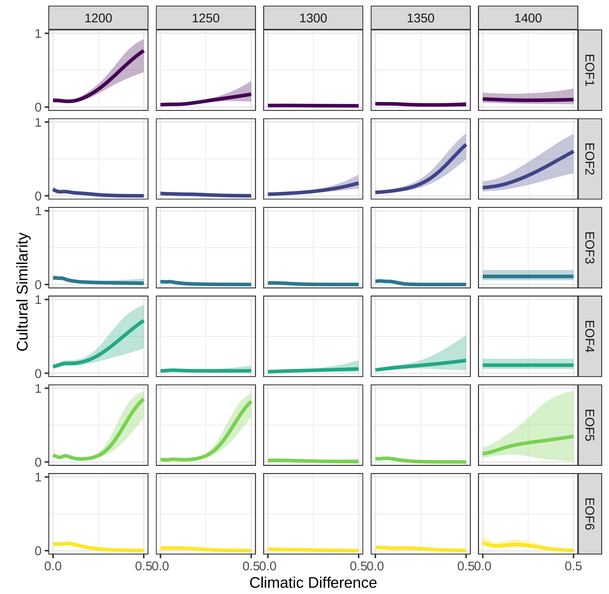
Six recurring patterns explain 83% of observed drought and flood variability



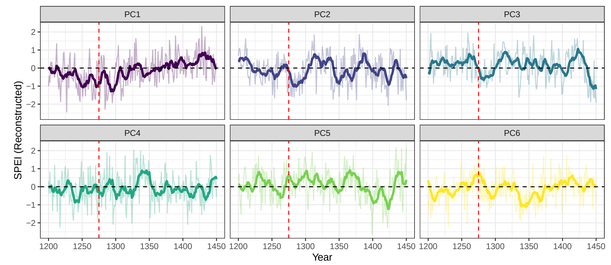
The intensity of social interaction decays nonlinearly with distance



Drought *patterns* explain some changes in the intensity social interaction



Drought *amplitudes* don't explain changes in the intensity social interaction



Next Steps

Accounting for these different **regional drivers** of local climate variability will be crucial for simulating the **dynamic** social impacts of droughts and floods in the past and present.

Preprint

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Acknowledgements

Archaeological data were provided by the **Southwest Social Networks Project**, present-day climate observations were obtained from the **West Wide Drought Tracker** and **PRISM Climate Mapping Program**, and paleoclimate reconstructions were derived from the **Paleo Hydrodynamics Data Assimilation product**. A full list of references is available in the linked preprint: https://osf.io/preprints/socarxiv/shp68.