EGU22-11141, updated on 16 Aug 2022
https://doi.org/10.5194/egusphere-egu22-11141
EGU General Assembly 2022

Stochastic Resonance between Climate Variability and Hominin Migration in an Agent-Based Model

Danielle Lemmon[1], Axel Timmermann[1], Elke Zeller[1], Jiaoyang Ruan[1], Kyungsook Yun[1], and Pasquale Raia[2]

[1]IBS Center for Climate Physics, Busan, Korea, Republic of (danielle.lemmon@colorado.edu)

[2]Università di Napoli Federico III

There are many interdisciplinary theories as to how climate variability impacted hominin migration, and subsequently human evolution. One such hypothesis concerns so-called “green corridors,” in which climate and biome variability periodically opened vegetated corridors between habitable areas. The periodic opening of these corridors may have acted as a pump through uninhabitable barrier regions, allowing for more wide-spread dispersal. We present results from a climate-forced agent-based model that furthers the green corridor hypothesis to include the effect of stochastic resonance in penetrating barrier regions. In other words, while it intuitively makes sense that hominins would explore and disperse as green corridors opened up, the potential for green corridors to act as a dispersal pump likely depended on having the right amount of stochasticity (randomness) in hominin movement to resonate with orbitally-paced climate signals, effectively penetrating these corridors and dispersing into other regions. We integrate data from a 2-million-year CESM model, from the BIOME4 vegetation model, and from archaeological archives to create a map of habitat suitability based on a species-specific climate envelope. This habitat suitability forces the agent-based hominin migration model, in which agents seek more habitable areas and the added randomness in that agent movement is varied. While our conclusions are largely independent of species, we show results from a *Homo erectus* migration simulation. In my presentation I will discuss how stochastic hominin movement, the opening up of green corridors, and climate variability affected hominin dispersal throughout the Plio-Pleistocene.