**We should always remember the TWO MAIN messages:**

**1: Climate-change velocities vary across time, space and species**

**2: fast changes have a greater effect than slow changes**

**Fast climate change drives pronounced changes in species’ genetic diversity**

Numerous species responded to past climate change by tracking suitable environments and consequently altering their genetic diversity make-up *1,2*. Future climate change velocities will likely outpace species dispersal abilities *3*, leading to further changes in the distribution of genetic diversity *4*, local extirpations (REFS) and ultimately extinctions (REFS). Under different forecasted climate change scenarios species lacking genetic variability to survive in remnant isolated populations will appear particularly threatened *5*. It is expected that species under stable climatic conditions -slow climate change velocity, reach stationary demographic conditions and stable levels of genetic diversity. Counterintuitively, it is also expected that fast range contractions better preserve species levels of genetic diversity *6*. These opposite expectations hinder our ability to predict responses of genetic diversity to future climate change. For these reason, analysis of the differences in the response of species’ genetic diversity to slow and fast climate changes are the critical importance.

Megafaunal replacements and extinctions in the Northern Hemisphere have been linked to abrupt climate changes based on Greenlandic ice core records (Cooper). Although informative, the use of extrapolated hemispheric trends contradicts recent studies showing that species with different ecological strategies experience climate change differently (Parmesan). And furthermore, that a high variance in the velocity of climate change is expected at broad spatial and temporal scales, and also across species (Serra-Diaz 2014). In order to evaluate the response of intraspecific genetic diversity to past climate change variability at broad spatial, temporal and at the species level must be accounted for. The use of global paleoclimatic reconstructions for consecutive time bins during the last 50,000 years, the now extensive fossil record and ancient DNA sequences available can be used to better understand species genetic dynamics during the Late Quaternaty. To our knowledge species’ genetic response to climate change has not been related to the pace climate change analyzing ancient DNA and fossil record from multiple species.

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