EGU21-12932
https://doi.org/10.5194/egusphere-egu21-12932
EGU General Assembly 2021

Toward an improved characterisation of climate and environmental changes during warm periods of the past: First results from the MOPGA HOTCLIM project

Etienne Legrain, Emilie Capron, and Frederic Parrenin
Institut des Geosciences de l'Environnement, Grenoble, ICE3, France (etienne.legrain@univ-grenoble-alpes.fr)

The current and future anthropogenic-induced high-latitude warming will have global climatic implications due to polar ice mass loss, sea level rise and ocean circulation changes. However, uncertainty remains on future climate projections mainly due to an incomplete understanding of climate, cryosphere and carbon cycle feedback processes occurring at centennial to millennial-timescales. Progress can be achieved by exploring climate and environmental changes that occurred in the past. In the HOTCLIM project, we are studying past warm periods, also referred to as interglacials, which exhibit a polar warming comparable to that projected by 2100 due to specific combinations of orbital and CO_2 forcing. Especially, we are investigating the link between the carbon cycle dynamics and climate changes. To do so, we are combining (i) new analyses on the air trapped in Antarctic deep ice cores to inform on past changes in Antarctic climate and atmospheric CO2 concentrations (ii) climate and environmental data synthesis looking into the lower latitudes using terrestrial and oceanic archives (sea surface temperature, hydrological cycles, ocean circulation) (iii) an evaluation of outputs from climate models using the new comparison of the paleoclimatic datasynthesis and models output. The HOTCLIM project will improve our understanding of the natural climate variability and the processes involved during past periods associated with temperature changes comparable to projected future warming, hence helping improve climate projections

Here, we present the first results from the HOTCLIM project which is a multi-archive synthesis focused on the warm interval occurring between 190 and 243 ka BP, also refered to as Marine Isotopic Stage 7 (MIS 7). This warm period is of special interest because it follows the fastest transition between a cold (glacial) and a hot (interglacial) period of the last 800 000 ka, with a polar warming of 10 degrees in less than 5ka. We have compiled more than 30 oceanic cores, 9 speleothems and 3 ice cores covering the MIS 7 period. To compare them, we are now building a common chronology to these records. The use of combined continental (ice cores, speleothems) and oceanic (sediment cores) archives located on the whole surface of the Earth will allows to characterize (i) the amplitude and the temporal structure of the surface warming across the globe (ii) the contrast between oceanic and continental warming.