

Seamless reanalysis: from paleoclimates to the 21st century

Hugues Goosse[†]; Elisabeth Crespin; Svetlana Dubinkina; Yoann Sallaz-Damaz; AurÉlien Mairesse; Pierre Mathiot; Violette Zunz

[†] Universite catholique de Louvain, Belgium

Leading author: hugues.goosse@uclouvain.be

The spatial structure of the decadal and centennial climate variability is complex. Its characterization needs a large amount of accurate data on many state variables (temperature, precipitation, wind velocity, ocean currents, etc). This is only possible for the recent past, at best. However, in order to study processes with a characteristic period from some decades to several centuries, this period is much too short. It is therefore necessary to use paleoclimatic data, which provide longer time series. Nevertheless, those data have too low a spatial and often temporal resolution to describe precisely the decadal to centennial variability. A better description and understanding of decadal to centennial climate variability requires to analyze recent observations and paleoclimatic data in a coherent framework, as they provide complementary information. This is achieved here thanks to a data assimilation procedure, based on a particle filter, applied to a coupled climate model of intermediate complexity. Because of the data availability, the goal is not to reproduce adequately local daily to monthly variability but rather to focus on longer time-scales and on large scale averages. The procedure has been applied to the last 150 years, the last 1500 years and the mid-Holocene (6000 years BP). Simulations covering the whole Holocene are expected in the coming months. The presented examples underline the role of the atmospheric circulation changes at mid-latitudes in the transition between the so-called Medieval Climate Anomaly (around 950-1250) and the Little Ice Age (around 1400-1700) and the influence of the variability of the atmospheric circulation in the Southern Ocean for the mid-Holocene.