Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02396, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02396
EGU General Assembly 2008

Simulating the climate of the Arctic during the last millennium in a coupled climate model including data assimilation

E. Crespin (1), H. Goosse (1), **T. Fichefet** (1), M.E. Mann (2)

(1) Université Catholique de Louvain, Institut d'Astronomie et de Géophysique G. Lemaître, Belgium, (2) Department of Meteorology and Earth and Environmental Systems Institute, Pennsylvania State University, University Park, USA (Email address: crespin@astr.ucl.ac.be; tel.: +32 10 47 24 08; fax: +32 10 47 47 22)

A simulation is performed over the last millennium using a three-dimensional climate model of intermediate complexity that is forced to follow temperature histories obtained from a recent compilation of well-calibrated surface temperature proxies. This is achieved using a simple data assimilation technique that could briefly be described as follows. For each year, a large ensemble of simulations is performed (96 here). The member of the ensemble that is the closest to observations is then selected as representative for this particular year and used as initial condition for the subsequent year. The distance between the model results and the proxy record is measured by a cost function using reconstructed and simulated temperatures at the locations where the proxies are available. The best simulation retained is the one that minimizes this cost function. The simulation obtained by this technique provides a continuous record over the past millennium that is compatible with model physics, with the forcing applied and with the available proxy records.

The simulated patterns of anomalies are analysed as well as the mechanisms responsible for the climate changes in the Arctic. We will mainly focus our analysis on a relatively warm period covering the 15th century. This one will be compared to other periods displaying cold conditions, in particular the early 18th century. We will pay a special attention to modifications in the oceanic circulation, which are able to explain

some important changes at those latitudes.