

Multicentury GCM simulations - a laboratory to test the performance of statistical methods in reconstructing historical climate.

Hans von Storch and Eduardo Zorita

Institute for Coastal Research, GKSS Research Center, Geesthacht, Germany

A series of multicentury simulations with the global climate model ECHO-G have been performed to generate a realistic mix of natural and externally (greenhouse gases, solar output, volcanic load) forced climate variations. Among others, these simulations are used to examine the performance of empirically based methods to reconstruct historical climate. This is done by deriving from the model output "pseudo proxies", which provide incomplete and spatially limited evidence about the global distribution of a variable. These pseudo proxies serve as input in reconstruction methods – the result of which can then be compared with the true state simulated by the model.

The questions we have dealt with are:

- a) Is the MBH method (commonly known as hockeystick method) reliable in reconstructing low-frequency variability?
- b) Is the phenomenon that an EOF analysis of a field of spatially incoherent, time wise red noise variables sometimes returns artificial hockey sticks when the time centering is done for a sub-period, relevant when applied to historical situations?
- c) Is the skill of the reconstruction on multi-decadal and centennial time scales significantly increased if the spatial density of proxy data is increased?
- d) Can a reconstruction be improved when longer time series are available?