Geophysical Research Abstracts
Vol. 20, EGU2018-2890, 2018
EGU General Assembly 2018

Last Millennium Precipitation Reconstruction over Asia: Pseudoproxy Experiments

Stefanie Talento (1,2), Lea Schneider (1), and Jürg Luterbacher (1)

(1) Justus Liebig University of Gießen, Department of Geography, Climatology, Climate Dynamics and Climate Change, Gießen, Germany (stefanie.talento@geogr.uni-giessen.de), (2) Universidad de la Republica, Uruguay

In this study we take a pseudoproxy approach to evaluate the skill of a Bayesian Hierarchical Model (BHM) in generating a boreal summer precipitation reconstruction over continental Asia.

As framework for the experiment we use one simulation of the Last Millennium Ensemble Project in which the Climate Earth System Model is forced with reconstructions for the transient evolution of: solar intensity, volcanic emissions, greenhouse gases, aerosols, land use conditions and orbital parameters.

The input for the reconstruction technique consists of 2 sets of data: pseudoproxy and pseudo-instrumental. To create the pseudoproxy network the locations of 57 available (real) proxies, which cover the region and time span of interest, are selected. The 1000 years pseudoproxy time series are generated by contaminating the model precipitation at the selected sites and grid points with different levels of Gaussian white noise mimicking real proxy/instrumental signal to noise ratios (the implemented noises are such that the correlations between the pseudoproxy and the true precipitation range between 0.5 and 0.9). To generate the pseudo-instrumental network we consider all the model grid points in continental Asia (366). The pseudo-observational time series are created, at each grid point, by adding a weak Gaussian white noise to the local simulated precipitation, considering only the last 150 years of simulation. The overlap between the pseudoproxy and the pseudo-instrumental time series in the last 150 years of simulation enables the reconstructing methodology.

To assess the skill of the reconstruction technique we perform various sensitivity experiments. First, we compare the results of the reconstruction when using either a single BHM or coupling the BHM with a hierarchical clustering method, in order to consider the variety of precipitation regimes in the area of study. The effect of the number of clusters considered is also investigated. Second, we evaluate the effect of the noise levels in the pseudoproxies record. Finally, the ability of the method to generate annually or decadally resolved reconstructions is analysed.

Preliminary results indicate that the coupling of the clustering scheme is successful, allowing the generation of skilled reconstructions. However, areas whose distance from the pseudporxy network points is high are arduous to reconstruct in most of the cases. The noise level and time resolution effects are as expected: worse reconstructions with increasing (finer) noise (resolution), although the annually resolved reconstruction obtained is still skilful in large parts of continental Asia.