Project title: **Global high-resolution climate reconstructions.**

This project is an “Integrated Activity” of the Cluster of Excellence “Integrated Climate System Analysis and Prediction” (CliSAP), and has been reviewed as part of the Exzellenzcluster CLISAP.

Due to overall reductions of funding of CLISAP, also this “Integrated Activity” has been reduced (by 50%), and the originally actively involved MPI has withdrawn (for meeting overall reduction levels, not because of scientific reasons) so that the project is now completely associated with the Institute of Coastal Research of the Helmholtz-Zentrum Geesthacht (HZG).

Project leader is Hans von Storch (HZG); a steering committee has been established with Bjorn Stevens, Jin-Song von Storch (MPI) and Frauke Feser (HZG). This request for computing time is supported by the steering committee. A full-time person will be available for setting up and running the simulation for 2.5 years.

As a result of the reduced funding, also the scientific scope has been reduced.

It is planned to run additional to the AMIP runs another NCEP driven, 65 year simulation with prescribed lower boundary conditions (as in AMIP) plus internal “spectral nudging” (e.g., wind above 750 hPa, with increasing strength for higher levels). The result will be a mostly homogeneous global “analysis”, which coincides with NCEP on larger scales (say 1000 km and more), and additional detail on smaller scales. Homogeneity will be reasonable for most of the Northern hemisphere throughout the 60 years, while on the Southern Hemisphere the homogeneity will be compromised prior to 1979. Part of the data, in particular on the surface, will be stored hourly.

The model set-up will allow a comparison with conventional AMIP runs (without internal nudging).

The methodology of internal scale-selective constraining has been developed at HZG. So far, the method was implemented in regional models, and the resulting “analyses” have been widely used, both scientifically and commercially.

The data from the 65-year (1948-2013) dynamical downscaling plus derived descriptions of multi-decadal variability of regional ocean wave statistics and coastal sea hydrodynamics have been stored in the data set CoastDat. In a series of papers the added value of the dynamical downscaling procedure has been documented (at medium scales, geographically at the vicinity of physiographic detail (in particular coasts), additional meso-scale phenomena (such as polar lows). Independent studies have demonstrated that spectral nudging is not associated with damping extreme events.

Later, the idea has been implemented to apply the spectral nudging concept in global models for, so to speak, running a global regional model. Two such simulations have been reported in the scientific literature, however with coarser resolution and with shorter periods.
We intend to run the system with T255 and 95 levels using ECHAM 6; we expect that the simulation will be completed in early 2014; after that the output of this simulation will be made available not only for CLISAP but for other interested parties as well. The HZG will use the data to run ocean wave models, and regional ocean models dealing with upwelling, coastal currents and storms surges. As part of B4 in CLISAP the simulation will be examined with respect to the formation of meso-scale storms (polar lows, medicanes, typhoons). At MPI a global ocean model will be run for studying the effect on meso-scale turbulence. Other applications likely will emerge at a later time, when first subsets of data have become available.