Geophysical Research Abstracts
Vol. 13, EGU2011-3685-1, 2011
EGU General Assembly 2011

Risk-based design principles for energy installations due to climate change effects in the North Sea: A first validation of the ADAPT-Petromaks WRF climate runs

Stephanie Mayer (1), Ulla Heikkilä (1), Michel d. S. Mesquita (1), and Helge Drange (2)

(1) Uni Research AS, Uni Bjerknes Centre , Bergen, Norway (stephanie.mayer@uni.no), (2) University of Bergen, Geophysical Institute, Bergen, Norway (helge.drange@gfi.uib.no)

The ADAPT-Petromaks project is a joint work between the Norwegian managing risk society Det Norske Veritas (DNV), the Danish Hydrological Institute (DHI) and the Bjerknes Centre for Climate Research/Uni Research in Bergen, Norway. The project will generate recommended practices (RP) combining results from state-of-the-art climate models with state-of-the-art structural design methods. In the main focus of interest are structures such as oil and gas platform installations in the North Sea. Such structures are designed and built for present climate conditions and possible hazardous events (e.g. storms, waves, icing). In a changing future climate such structures may face more challenging environmental conditions depending on their geographical location. To avoid global failure of structures, there is a need to adapt towards new environmental conditions. It is important to quantify if natural hazards will increase in frequency and intensity. Hence, the RP will provide a new guideline for the industrial construction sector.

For our model study, we use the WRF-climate version 3.1.1 (clWRFV3.1.1, developed at the University of Cantabria, Spain) as regional climate model on a horizontal grid of 30 km for the 'present period' 1961-1990 and the 'future period' of 2021-2050. The domain includes 303 x 183 grid points reaching from Northern America to the European continent. The model integrations include 40 vertical levels reaching up to 50 hPa. The Atmospheric General Circulation Model ARPEGE has been used as driving data. The experiment has been performed using the default setup of the WRF model for the physical parameterizations as much as possible to keep the runtime low.
High frequency (hourly) output of a fundamental sample of meteorological parameters has been generated for the 'present period'. They will be analyzed and validated with observational data (such as daily wind and pressure) from the Norwegian meteorological office (met.no). For the planned future projections the ARPEGE data, driven with bias corrected SSTs from the coupled model runs of ECHAM5, GFDL and HadCM will be downscaled to assess changes with focus on future wind climate.