

## **International Conference on Regional Climate-CORDEX 2019**

Theme: Coupled Models

Session: B" Ocean, Ice, Atmosphere

Day and time: 16 October 2019, 15.00-18.00

Chairs: Annette Rinke & Gregory Nikulin

Rapporteur: Andrea Lira Loarca

This session highlighted the role and importance of coupled Regional Climate Models (RCMs) for the simulation of major spatio-temporal variability and small-scale processes on regional climate such as monsoon characterization and wind field variability. In addition, this session pointed out that the characterization of local dynamic processes and extreme events can be improved with the inclusion of the coupling of ocean, wave, ice and atmosphere allowing for very high resolution simulations that Global Climate Models (GCMs) are not able to provide.

A set of oral and poster presentations from scientists around the globe featured the latest developments on the role of air-sea-waves coupling, regional feedback processes and regional seas.

Pankaj Kumar from the Indian Institute of Science Education and Research Bhopal (India) highlighted that the Indian summer monsoon rainfall (ISMR) is going through an enhancement period due to the land-warming trend and therefore, an improved characterization of its regional variability is done by using a regional coupled ocean-atmosphere model within the CORDEX framework. The results showed that although the mean rainfall does not change, the distribution within the season varies as well as showing a large spatial variability.

Ramón Fuentes-Franco from Rossby Centre - SMHI (Sweden) presented the changes in tropical cyclones and the associated precipitation over North and Central America. The process-based evaluation relevant for tropical cyclones highlights that the RCM provides a good representation of tropical cyclones spatial variability with a higher concentration in the North subtropical Atlantic Ocean and a decrease over the Tropical Atlantic for future scenarios and the associated precipitation increases over Northwest Mexico. In the Pacific region, a higher concentration of cyclones is found offshore than in coastal regions.

Jan Polcher from LMD/IPSL (France) presented the regional Earth system model of the Institut Pierre Simon Laplace (RegIPSL) which couples atmospheric, land surface and ocean models in the Mediterranean region with fully coupled water cycle and vegetation feedbacks, a critical aspect of semi-arid regions of the Mediterranean which allows a detailed analysis of the surface and ocean processes and an improved representation of extreme events which in addition,

represent the impact of the vegetation. The results also feature the need for a more thorough assessment of the regional water and energy cycle.

Wei Zhang from the University of Miami - RSMAS (United States) outlined the advances in decadal climate predictability in the North Atlantic where coupled RCMs with resolved ocean features improve the representation of decadal variability and provide the potential for improving decadal prediction skills of precipitation at regional scales. The results also feature the challenges in decadal predictability due to the lack of understanding in sources and mechanisms, driven by both internal dynamics and external forcing where model resolution is key. The decrease of internal atmospheric noise directly affects the decadal sea surface temperature predictability depending on background air-sea coupling and dynamics.

Fulden Batibeniz from the Istanbul Technical University (Turkey) presented the results from a coupled Regional Earth System Model (RegESM) with wave model to assess the temporal and spatial variability of significant wave height. The results highlight the importance of atmosphere-ocean-wave coupling at high resolution for an accurate representation of the physical processes that influence seasonal wave dynamics in the Mediterranean region where the coupled model offers a better representation of magnitude and direction of significant wave height, and more so for extreme events. In addition, the coupled model is able to capture the rainfall caused by medicanes.

Liwei Zou from the Institute of Atmospheric Physics, Chinese Academy of Sciences (China) presented the performance of a high-resolution ocean-atmosphere RCM over the Western North Pacific Region which allows for an improved monsoon characterization and highlights the need for RCMs intercomparison projects which would allow a better understanding of the local physical processes.

Marine Hermann from LEGOS/IRD (France) presented the results on sea surface wind speed over Southeast Asia from a RCM which show a better spatial and temporal characterization when compared to GCM simulations. Regional simulations adequately correct the underestimation of sea surface wind speed given by GCM at all time scales. The simulations in a climate change scenario show a decrease of wind speeds during summer associated with a decrease of typhoons and driven by the wakening of the mean and the variability of sea level pressure gradient.

Clea Denamiel from the Institute of Oceanography and Fisheries (Croatia) presented the advances of a high resolution ocean-atmosphere coupled RCM with the aim of characterizing physical processes and climate change impacts in coastal areas. The challenges of the methodology such as modeling speed and computational effort and the low temporal and spatial resolutions available as boundary conditions were highlighted and compared with the added value of the approach which allows for a very high resolution characterization of extreme events and coastal impacts.

The poster session featured works of coupled models for the characterization of El Niño Southern Oscillation, Indian summer monsoons, asymmetries in the sea surface temperature anomalies, tropical cyclones, among others. In summary both the oral and poster sessions featured very high-quality research regarding the added value of coupled RCM and highlighted the need for more components moving towards RESMs as well as the need for high-resolution observations for validation and comparison.

#### **Presentations:**

- [Spatiotemporal variability characteristics of Indian Summer Monsoon Rainfall in the twenty-first century – a regional ocean-atmosphere coupled climate model perspective.](#) **Pankaj Kumar**
- [Changes in tropical cyclones and their associated precipitation over North and Central America from a set of RCA simulations under the RCP8.5 scenario.](#) **Ramón Fuentes-Franco**
- [Assessing the water cycle in the MED-CORDEX simulations of the IPSL regional Earth system model.](#) **Jan Polcher**
- [Advancing Decadal Climate Predictability in the North Atlantic.](#) **Wei Zhang**
- [Coupled long-term wave simulations based on regional earth system model over the Mediterranean sea.](#) **Fulden Batibeniz**
- [Performance of a high resolution regional ocean-atmosphere coupled model over western North Pacific region: Sensitivity to cumulus parameterizations.](#) **Liwei Zou**
- [Impact of climate change on sea surface wind speed over the Southeast Asia : results from a RegCM4 dynamical downscaling of CNRM-CM5 in the CORDEX-SEA framework.](#) **Marine Hermann**
- [Can ocean-atmosphere climate change at the coastal scale be achieved? The example of the Adriatic Sea.](#) **Clea Denamiel**