[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-OS Ocean Sciences & Ocean Environment

[A-OS08]Seasonal-to-decadal climate variability and predictability

convener:Takashi Mochizuki(Japan Agency for Marine-Earth Science and Technology), V Ramaswamy(NOAA GFDL), Yushi Morioka(海洋研究開発機構)

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Climate variability on seasonal-to-decadal timescale (e.g. ENSO, IOD, PDO, AMO) involves processes and multiple physical interactions among atmosphere, land, ocean and sea-ice. Many efforts have been made for understanding the underlying physical processes and its predictability, but there remain large uncertainties in model simulation and prediction results of the seasonal-to-decadal climate variability. This indicates that some important gaps still exist in our current knowledge which are not fully resolved in current climate models, for example, atmosphere-ocean-ice interaction, troposphere-stratosphere coupling, initialization, and role of anthropogenic forcings. This session aims to narrow the gaps in our knowledge and identify the unresolved issues for better understanding and prediction of seasonal-to-decadal climate variability. All the observations, theoretical, process-level and modelling research on seasonal-to-decadal climate variability and its predictability are greatly welcome.

[AOS08-P01]Decadal climate predictability in the South Atlantic and southern Indian Oceans

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Decadal climate predictability in the South Atlantic and southern Indian Oceans is investigated using a state-of-the-art coupled general circulation model with two initialization schemes: one assimilates sea surface temperature (SST) only, and the other is additionally assimilating subsurface ocean temperature and salinity. Previous studies suggest that the decadal SST variability in the South Atlantic slowly propagates eastward as quasi-stationary oceanic Rossby waves along the eastward Antarctic Circumpolar Current and induces decadal SST variability in the southern Indian Ocean. Since the SST variability is strongly accompanied with the sea-level pressure variability above, it exerts great influences on southern African rainfall through modulation of moisture transport from the southern Indian Ocean. Considering socio-economic impacts over southern Africa, skillful prediction of decadal climate variability in the South Atlantic and southern Indian Oceans is greatly important.

Decadal reforecast experiments in which only the model SST is initialized with the observed SST show moderately high skills in predicting the decadal SST variability in the southern Indian Ocean, in particular, the Agulhas Return Current region. This is mostly due to reasonable representation of eastward-propagating decadal SST anomalies from the South Atlantic, suggesting that the SST-nudging initialization may perform well in the regions where the local air-sea interaction takes place on decadal timescale. On the other hand, the decadal SST variability in the South Atlantic is more skillfully predicted in the other experiments in which both the SST and subsurface ocean temperature/salinity in the model are initialized with the observation. Analysis of upper-ocean heat content reveals that a significant improvement of meridional ocean heat transport from the subtropics leads to skillful prediction of decadal SST variability, particularly in the Southwest Atlantic. These results demonstrate potential roles of subsurface ocean assimilation in the skillful prediction of decadal climate variability over the South Atlantic.