Real-Time Polar Sea-Ice Prediction with NCMRWF Coupled Model

NCMRWF has implemented a coupled climate model with sea-ice model as an interactive component. With advent of satellite data and high performance super computers, now it has become possible to include the large-scale processes of atmosphere, ocean, land-surface and cryosphere including the polar sea-ice of Arctic and Antarctic regions into high resolution numerical global simulation models. These high resolution coupled earth-system models are able to capture the short-term climate variability including the polar sea-ice in a reasonable way. The state-of-art coupled HadGEM3AO based model has been implemented at NCMRWF and is being run in real-time for polar predictions at short and extended range. The global coupled model has UM atmosphere, NEMO Ocean, CICE sea-ice and JULES land surface components as the respective sub-models for atmosphere, ocean, sea-ice and land surface respectively. Several years of hind-cast data having few ensemble members are also generated to study the skill of the model in various seasons of the Polar Regions. For south-Asian summer mean monsoon rainfall (variability) simulation and its tele-connection with many other remote atmosphere/oceanic parameters is still a challenge to world modeling community. Recent studies suggest a strong link of monsoon rainfall variability to polar sea-ice processes. Reduction of Arctic sea-ice in recent years is another cause of concern to climate community. It’s possible link to south-Asian monsoon has to be studied for a realistic prediction of monsoon rainfall in extended and seasonal time-scales. A version of the said coupled model is used to study the quality of sea-ice simulations for Polar Regions

at seasonal time-scale also. Using several years of hind-cast data from the said coupled model the sea-ice simulation for Arctic and Antarctic regions are evaluated against observed estimates from satellites. The model simulates the mean sea-ice concentration, extent and thickness in both the poles in a realistic way. The simulation of inter-annual variability of sea-ice is also seen to be realistic. The model has the potential to be used as a prediction model for sea-ice related parameters for both Arctic and Antarctic regions in real-time for seasonal scale also.