[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS02]Large-scale moisture and organized cloud systems

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Water vapor plays a significant role in regulating the global atmospheric circulation, especially in the troposphere. The overturning circulation is directly driven by the longwave radiative cooling of water vapor and the latent heating/cooling through microphysical processes to balance it. This global circulation is composed of diverse atmospheric phenomena with various spatial and temporal scales. Developments of some significant turbulent motions such as 3D isotropic turbulence in clouds, stratocumulus and cumulus convection, squall lines and tropical cyclones, and the Madden-Julian oscillation, are essentially associated with moisture anomaly in each scale. Moisture is accumulated relatively slowly in larger horizontal scales, but is consumed relatively quickly in smaller ones. This significant scale gaps between the accumulation and consumption may be one of the causes of the long-lasting difficulty in developing the theory of the moist atmosphere. The aim of this session is to share the recent researches about the relationships between moisture and organized cloud systems in wider spatial and temporal scales to enhance collaborations between modeling, observational, and theoretical approaches in tackling this challenging task.

[AAS02-P01]**Analyses and Numerical Tests of an Explosive Cyclone over the Northwestern Pacific**

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In this paper, the Final Analysis (FNL) data from National Centers for Environmental Prediction is utilized to analyze an explosive cyclone occurred over the Northwestern Pacific from 11 to 13 January 2012. Weather Research and Forecasting model (WRFV3.5) is employed to simulate the explosive cyclone. This cyclone generated in the east of Japan Islands around 18 UTC 10 January 2012. It deepened explosively from 00 UTC 11 to 18 UTC 12 January, and weakened near the Kamchatka Peninsula around 00 UTC 13 January. The FNL analyses showed that there was a distinct frontal structure. The high potential vorticity of the upper troposphere extended downward to the surface. This condition would be beneficial to the cyclone development.

In order to examine the development process of this cyclone in detail, we conducted a 54-h WRF simulation initialized at 18 UTC 10 January 2012. The model domain has a horizontal resolution of 45 km, 150×100 grids in horizontal, and 44-σ levels in vertical. The model top is 50 hPa. For model physics, a five-class microphysics scheme (Lin scheme) and Yonsei University planetary boundary layer scheme (YSU scheme) are used. The Kain-Fritsch cumulus scheme, which has both deep and shallow sub-grid convection, is employed for the cumulus parameterization. The change of sea surface temperature (SST) indicates that SST may affect the cyclone intensity significantly , but has little effect on the moving path of cyclone. The SST tests show that warmer SST (SST+2K) may increase the cyclone intensity than that of control run, whereas cooler SST (SST-2K) may weaken the cyclone intensity. It seems to suggest that SST plays an important role in the development of cyclone. However, all WRF simulations exhibit much weaker trend of central pressure than that of FNL analysis.