Introduction

International Collaborative Experiments for Pyeongchang 2018 Olympic and Paralympic Winter Games (ICE-POP 2018)

To assimilate the GPM-retrieved ocean surface 2-m temperature, 2-m specific humidity, 10-m wind speed into WRF simulation of snow storm events during ICE-POP campaign.

Objectives and Methodology

To assess the impact of the retrieved meteorology product on short-term high resolution forecast and better understand the influence of ocean fluxes to winter storms.

Model and Data Assimilation System:

WRF ARW V3.7
Community GSI v3.6

Experiments:

Nested domains with 9, 3, and 1-km resolution
Case studies:
Heavy snow storm 00 UTC 7 – 00 UTC 9 March 2018
Heavy snow storm 00 UTC 27 – 00 UTC 1 March 2018
Observation data: GPM retrieved 2-m temperature, 2-m specific humidity, and 10-m wind speed
Observational errors: 2 °C in temperature, 1 g/kg in specific humidity, 2 m/s in wind speed
DA cycles: 00, 06, 12, 18, and 21 UTC on 03/07/2018 and 03/08/2018; 06, 09, 12, 15, 18, and 21 UTC on 02/27/2018 and 02/28/2018

GPM Retrieved Ocean Surface Product

As part of NASA Winter Focus Area and GPM support of the ICE-POP 2018 program, near-real-time ocean surface turbulence flux retrievals were produced based on Roberts et al. (2010) taking advantage of the GPM constellation passive microwave radiometers SSMS, AMSR-2, MADRAS, SAPHIR, MHS, ATMS, etc.

Besides surface turbulent fluxes, the GPM brightness temperatures were used to estimate the ocean surface meteorology — wind speed, sea surface temperature (SST), air humidity and temperature.

Result

1st Data Assimilation Cycle 06 UTC 03/07/2018
2nd Data Assimilation Cycle 12 UTC 03/07/2018

Data Impact – Precipitation Forecast

Conclusion and Discussion

1. The GPM-retrieved marine surface meteorology data has been successfully assimilated using the GSI data assimilation system. Significant impact of the retrieval product has been found in temperature and moisture initial condition and forecast.
2. Assimilation of GPM surface retrieval product shows positive impact on precipitation amount and location for the heavy snow events 7-8 March and 27-28 February 2018. Validation of model result with ICE-POP field data as independent dataset will be conducted for a thorough understanding of the impact of the GPM retrieved product.

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