GROUP ON DATA ASSIMILATION DEVELOPMENT / CENTER FOR WEATHER FORECAST AND CLIMATE STUDIES / BRAZILIAN NATIONAL INSTITUTE FOR SPACE RESEARCH

Assessing the AMSU-A impacts in the CPTEC / INPE regional ensemble prediction system

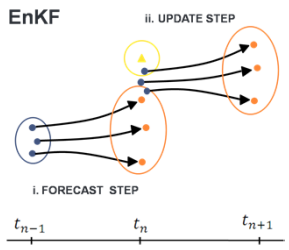
Camila Cossetin Ferreira, Luis Gustavo Gonçalves de Gonçalves, Luiz Fernando Sapucci, Eder Paulo Vendrasco, João de Mattos, Eduardo Georges Khamis, Bruna Barbosa Silveira, Simone Sievert da Costa

INTRODUCTION

The Center for Weather Forecast and Climate Studies from the Brazilian National Institute for Space Research (CPTEC/INPE) has tested the EnKF DA cycle over South America using WRF/ARW to initialize its Ensemble Regional Modeling System (ERMS). This work aims to assess the impact of the brightness temperatures from AMSU-A into this system. We evaluate critical regions such as tropical Amazonia and semiarid areas in northeast Brazil. The current EnKF algorithm makes use of 19+1 ensemble members, in a resolution of 9 km and 31 vertical levels, with a DA cycle intermittent every 6 hours. In the experiments a fully observational dataset is first assimilated followed by another set of runs where microwave AMSU-A channels were denied.

DATA ASSIMILATION METHODS

- Based on NOAA EnKF Beta Release v1.0 compatible with GSI v3.3 provided by DTC/NOAA.
- After performing GSI Observer for observations innovation, the Ensemble Square Root (EnSRF) described in Whitaker and Hamill (2002) and a Local Ensemble Kalman Filter (LETKF) described in Hunt et al. (2007) were tested.



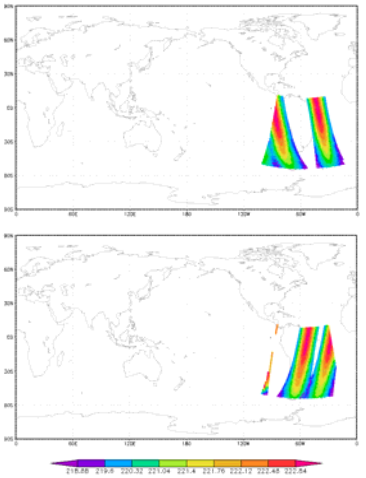
REGIONAL MODELING SETUP

Two sets of runs were performed during July 2015 with and without AMSU-A to assess its impact in the EnKF system over South America with two nested domains over tropical Amazonia and semiarid Northeast Brazil NCEP/GFS and alternatively CPTEC/INPE MCGA lateral boundary conditions.

OBSERVATIONAL DATASETS

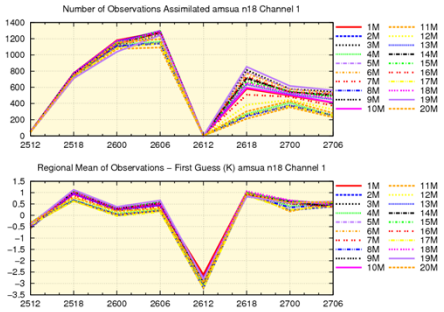
- Ensemble backgrounds are based on random perturbations on T, P, U, V, q.
- Observations in DA cycle:
  - Conventional: T, P, U, V, q.
  - Radiances from n15, n18 and metop-a.

→ see de Gonçalves poster for more detailed information on datasets used

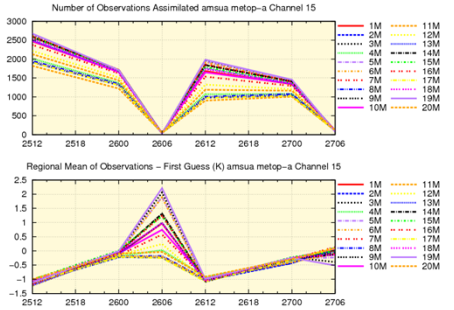


Brightness temperatures from Noaa-15, Noaa-18 and metop-a, channel 6, 00Z and 12Z.

RESULTS



Total number of radiance observations per ensemble member, from Noaa-18, channel 1 (top panel) and temporal evolution of OMF after satellite bias correction (bottom panel).



Total number of radiance observations per ensemble member, from metop-a, channel 15 (top panel) and temporal evolution of OMF after satellite bias correction (bottom panel).

CONCLUSIONS

Results from the recently implemented ERMS were presented in this work. Two sets of runs were performed during July 2015 in order to asses the impact of AMSU-A microwave radiances in the GSI/EnKF data assimilation scheme. The temporal evolution of EnKf system presented in this work shows that despite the low OMF spread, there is clear change in the number of observations assimilated depending on the ensemble member. It was also noticeable that the number of conventional observations assimilated change in the presence of assimilated satellite radiances or not. Further studies will focus on specific channels in order to investigate the impacts of satellite radiances in the ensemble spread for the tropical and semiarid regions of South America.

ACKNOWLEDGEMENTS

The authors thank the "20th International TOVS Scientific Conference" for the financial support and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). We finally thank all members from the Group for Data Assimilation Developments.

E-mail: camila.ferreira@cptec.inpe.br