Ensemble Forecast Sensitivity to Observations Impact (EFSOI) applied to a regional data assimilation system over Argentina.

Gimena Casaretto[1] , Maria Eugenia Dillon[2] , Yanina Garcia Skabar[3] , Juan Ruiz[4]

1 Servicio Meteorológico Nacional and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina, Departamento de Ciencias de la Atmósfera y los Océanos, FCEN, Universidad de Buenos Aires, Buenos Aires, Argentina.

2 Servicio Meteorológico Nacional and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina

3 Servicio Meteorológico Nacional and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina, Instituto FrancoArgentino para el Estudio del Clima y sus Impactos (UMI IFAECI/CNRS-CONICETUBA), Buenos Aires, Argentina

4 Departamento de Ciencias de la Atmósfera y los Océanos – Buenos Aires, Argentina, Consejo Nacional de Investigaciones Cientificas y Tecnicas - Cdad. de Buenos Aires, Argentina, Centro de Investigaciones del Mar y la Atmósfera (CONICET-UBA) – Cdad. de Buenos Aires, Argentina, Instituto Franco-Argentino sobre Estudios de Clima y sus Impactos (UMI-3351 IFAECI/CNRS-CONICET-UBA)

Observations that are assimilated into numerical weather prediction systems are conformed by numerous data sets and their impact should be objectively evaluated. This can be efficiently achieved by the Forecast Sensitivity to Observation Impact (FSOI) methodology. In this study we explore the application of the ensemble formulation of FSOI (EFSOI) in a regional data assimilation system over Argentina, a data sparse region, and evaluate the observation networks that result beneficial and detrimental for the forecast. We focus on the analysis of both conventional and nonconventional surface weather stations' impact.

To achieve this, the Weather Research and Forecasting model coupled with the Local Ensemble Transform Kalman Filter is used with 20 members. The experiment was carried out during 30 days of the intensive observing period of the RELAMPAGOCACTI field campaign that was conducted during the 2018-2019 austral warm season in the center of Argentina. 20 km resolution analyses were obtained every 6-h, assimilating data from soundings, aircrafts, GOES derived motion winds, AIRS retrievals and conventional and nonconventional surface weather stations (CSWS and NSWS). It is shown that, considering the entire period, all the observation sources had a positive impact on the 6-hour forecasts. However, when each variable is distinguished, a negative impact arises from the surface pressure observations from both CSWS and NSWS, on average.

This methodology was the first approximation to quantify the impact of each individual observation on the forecast over the region. The results of this (and future) work can help to identify observation data sources detrimental for the data assimilation system, suggesting data selection criteria to assess improvements in this regional system, which suffers from data sparse conventional networks but has many non-conventional networks.