



## INTRODUCTION

It is noteworthy that satellite information is of utmost importance in Numerical Weather Prediction. In addition to the massive amount of remote observations produced, satellites also reach areas such as oceans, deserts and high latitudes, difficult for measurements. The Center for Weather Forecast and Climate Studies (CPTEC from its Portuguese acronym) from the Brazilian National Institute for Space Research (INPE, Instituto Nacional de Pesquisas Espaciais) recently implemented a new three-dimensional variational data assimilation system based on the GridPoint Statistical Interpolation (GSI). The new DA scheme replaces the former operational PSAS (Physical-space Statistical Analysis System), mainly due to its capacity of ingesting a much larger number of observations, particularly satellite radiances. A set of Observing System Experiment were done. These experiments show how the incorporation of radiances affect CPTEC/INPE weather prediction as well as the impact and interaction between three different types of observations.

## METHODOLOGY

The Observing System Experiment (OSE) is a technique where one or more observation systems are retained (or added) in the data assimilation process in order to assess the impact of the exclusion (or inclusion) of a particular observation on the quality of Numerical Weather Prediction (NWP). In this research nine experiments were performed using the CPTEC/INPE G3DVar. This system runs using a GCM from CPTEC/INPE (T299L64) corresponding to a horizontal resolution of approximately 44 km. Each experiment was taken during the month of January 2013, for up to 108 hours forecasts. These experiments were done according to the Table 1. In Table 2 are shown the regions that were evaluated in study and in Table 3 are the satellites and sensors that were used.

Table 1. Data used for each experiment.

	CONV*	SAT	GPS	RAD
CTRL				
NO_SAT				
SAT				
RAD				
GPS				
RG				
GS				
RS				
SRG				

\*except radiosondes data

Table 2. Areas of study.

Northern Hemisphere	20°N – 80°N
Southern Hemisphere	80°S – 20°S
South America	0°-120°W and 60°S -12°N

Table 3. Satellites and sensors.

	n15	n18	n19	METOP-A	AQUA
AMSU					
MHS					
HIRS-4					
IASI					
AIRS					

## RESULTS AND DISCUSSION

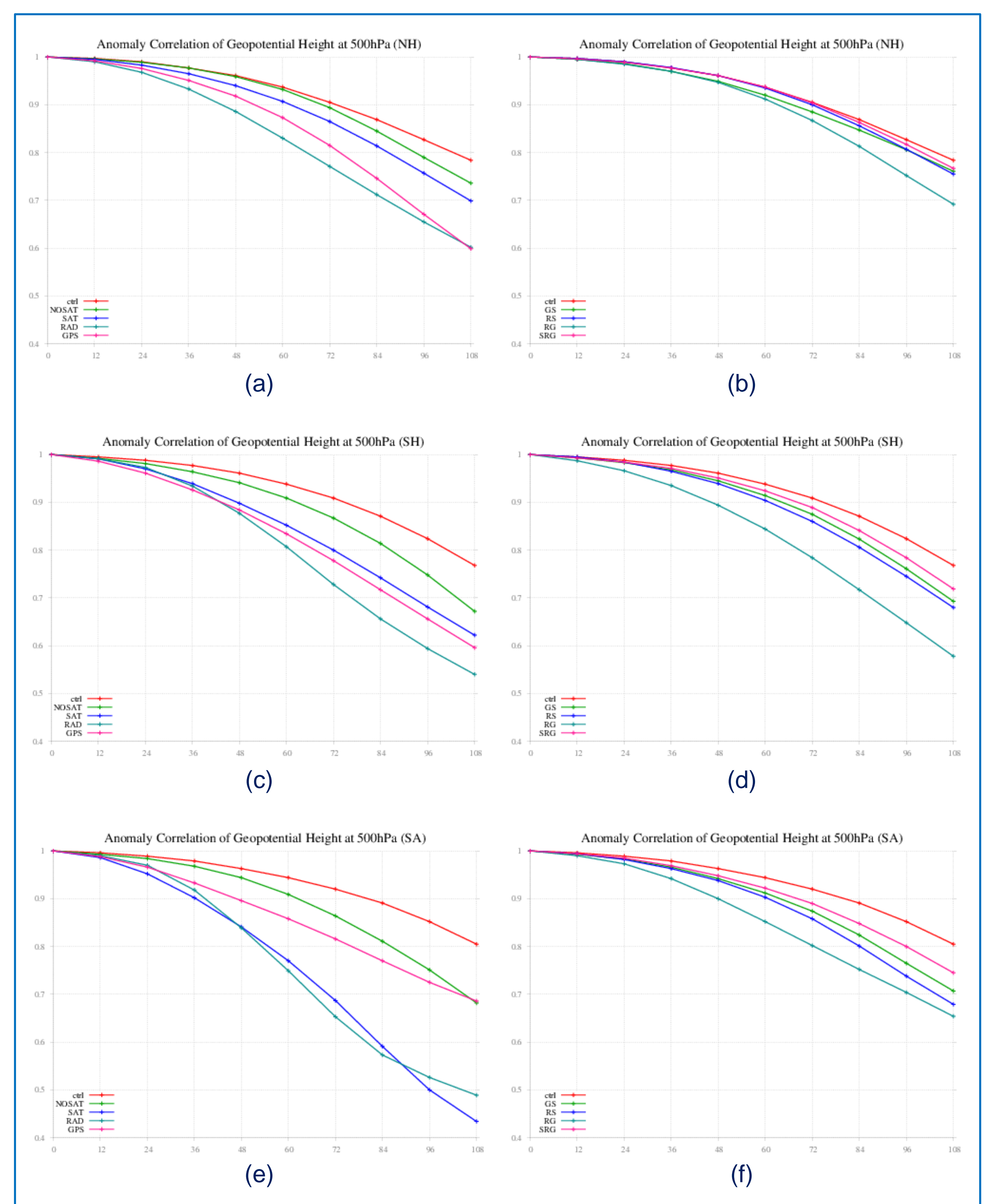


Figure 1. Anomaly correlation graphics for the nine experiments and the three areas of study: (a) and (b) for Northern Hemisphere, (c) and (d) for Southern Hemisphere and (e) and (f) for South America. The x axis shows the forecast time and on the y axis the correlation values.

In Figure 1 is possible to observe that the control experiment (red lines) have a better performance in South America, and for the three regions the combination of GPS and radiosonde (RG) does not have a good result. In Southern Hemisphere and South America when only these data are assimilated, radiosondes degrade the quality of GPS. However when these data are combined with other conventional data (NO\_SAT) the system have an improvement on its forecasts performance, showing that the aircrafts, buoys, ship, etc. When a more complete data set is assimilated, there is an improvement in performance shown by the pink line next to the red line in the figures on the right. For the Northern Hemisphere there was no major impact on this data set, except when isolates assimilated. In South America, GPS and SAT correlation lines was the worst experiments, but when they are assimilated together (GS), it have a greatest improvement.

## CONCLUSIONS

This study showed preliminary results of a forecasts impact of the CPTEC/INPE Global 3DVar data assimilation system. The control experiment was shown a better skill in the region of greatest interest from CPTEC/INPE. Results confirm some of the most common findings from previous works with different systems where satellite data assimilation is of great importance over the Southern Hemisphere, including South America.