The Relative Contributions of the Various Observing Systems in the CPTEC Global Data Assimilation/Forecast System

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A series of data withholding experiments was conducted with the Global Physical-space Statistical Analysis System (GPSAS) - a combination of the Spectral Atmospheric Global Circulation Model (CPTEC/COLA) with the Physical-space Statistical Analysis System (PSAS) -, with the purpose of assessing the relative contributions of the several types of observation within the context of the CPTEC data assimilation system. In these experiments one or more type of observation is removed from the assimilation cycle and the impact on the forecast skill indicates the effectiveness of that source of observation in the system. The major observing system included the conventional data (SYNOP, BUOY, SHIP, radiosonde, aircraft, pilot balloons), and satellite data (ATOVS and AIRS/AMSU retrievals, QuikScat wind, Cloud Track Wind and Total Precipitation Water from SSM-I sensor). The experiment including all these data is called control experiment and it is used as reference. The experiments involving "data denied" indicated that conventional data including all surface observations (SYNOP, SHIP, BUOY), rawinsonde and aircraft data, are the primary source of information utilized by GPSAS in the Northern Hemisphere. The largest impact in the Southern Hemisphere (SH) was obtained when all satellite-derived retrieval data were removed. Additional experiments were performed to assess the impact of removing ATOVS and AIRS/AMSU retrievals data individually. The results showed that withholding the AIRS/AMSU retrievals has a greater impact than withholding the ATOVS retrievals data. This disparity may be associated to fact that the AIRS/AMSU retrievals are reported in assimilation cycle as it independent observation of the model, while ATOVS retrievals were anchored in the first guess field generated by model. Over the South America, AIRS/AMSU retrievals and conventional data present similar contribution and have a positive impact on all range forecast (1-5 days). Besides it is found that all the types of observations generally contribute in a positive way to the overall improvement of the CPTEC forecast system. However, is important to note that the impact of several observations varies depending on the chosen verifying variable, vertical level or forecast period.

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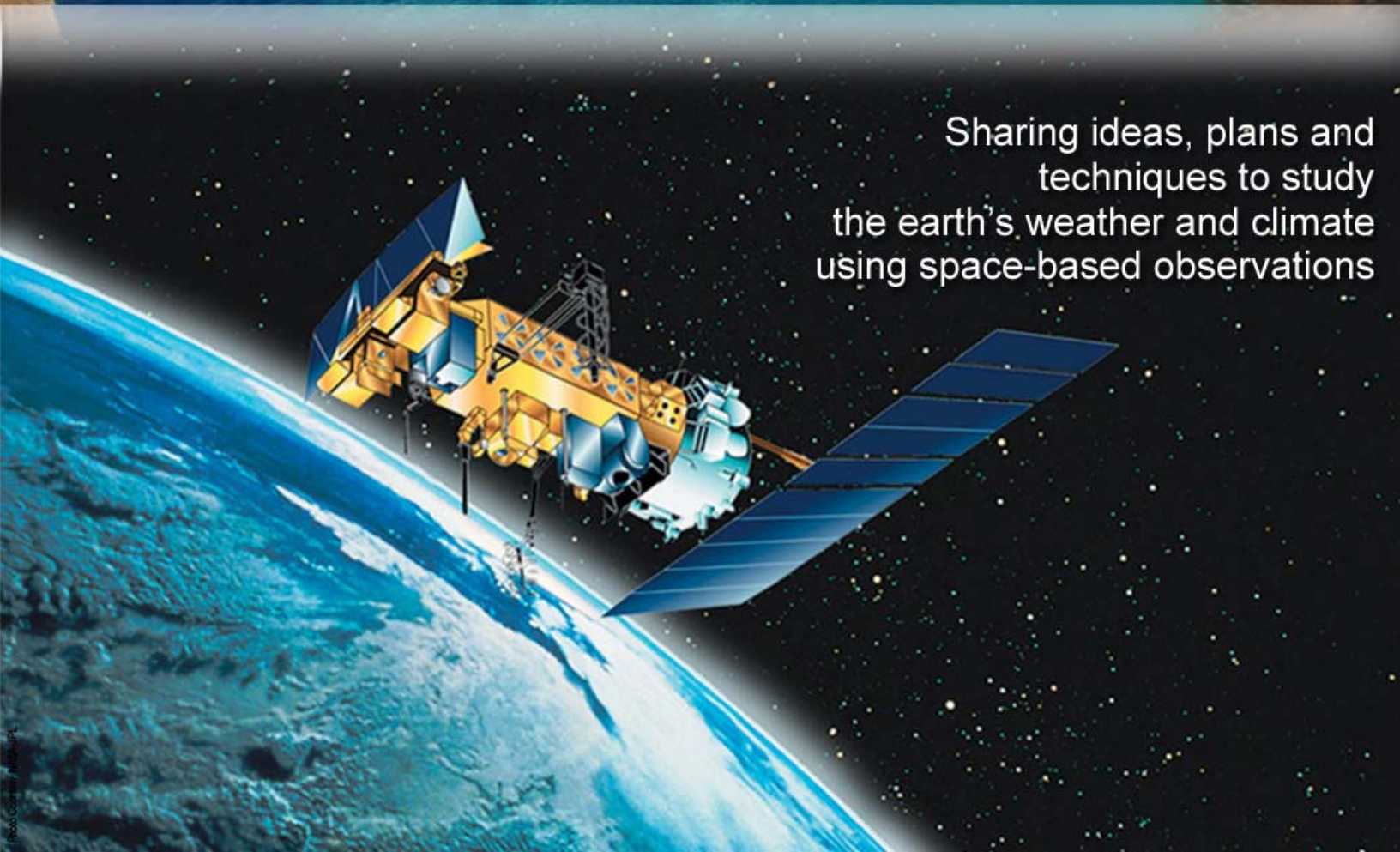

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