Evaluation of the wind forecast from CPTEC-AGCM during the Catarina hurricane

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Since the advent of the meteorological satellites the occurrence of a hurricane had not been registered in the South Atlantic Ocean. However, in March 2004 the occurrence of the first hurricane, named Catarina, was registered at South Atlantic. The system begun as an extratropical cyclone and remained quasi-stationary some days over the South Atlantic. Later, the system displaced to the west, acquiring characteristics of an hurricane and hit mainly the Brazilian State of Santa Catarina (SC) between 27^{th} and 28^{th} March, causing destruction and deaths. According to studies, the transition from an extratropical cyclone to a tropical cyclone happened mainly because the low wind shear between 850-200 hPa and a strong mid-to-high latitude blocking. The objective of this paper is evaluating the performance of the Atmospheric Global Circulation Model (AGCM) from the Center for Weather Prediction and Climate Studies (CPTEC) in predict some synoptic patterns associated with Catarina. The surface wind and reduced sea level pressure (SLP) were analyzed. Moreover, 10 meter wind forecasts (V10m), which was not available in the CPTEC-AGCM during the Catarina occurrence, are compared with the wind at the first sigma-level that is near to 40 meters high. The CPTEC-Eta reanalysis were used to evaluations. From the reanalysis field was observed that between 20^{th} and 23^{nd} March, a cyclogenesis followed by a frontogenesis occurred over South Atlantic, near the Southern Region of the Brazil. The extratropical cyclone displaced southeastward and cut off from the synoptic wave and remained quasi-stationary intensifying up to 23^{rd} March. From day 24^{th}, the cyclone already with tropical characteristics started displacing westward, reaching SC between the night of 27^{th} and 28^{th} March. According to reanalysis, more intense winds was observed mainly in northwest, south and southwest edges of the cyclone. It was verified that the system was not predicted by the CPTEC-AGCM forecasts longer than 24 hours, then analysis was carried through only for 24 h forecasts. In general, the forecasts underestimate the intensity of the cyclone and the magnitude of the wind. The low pressure was forecasted more horizontally expanded and the values in the eye of the system are higher. The formation of the system that gave origin to the Catarina and its displacement southeastward between 20^{th} and 21^{st} was well represented by the model. The CPTEC-AGCM presented deficiencies to forecast the intensity of the system, but in short-range forecasts (24 hours) it was possible predict the formation and atypical trajectory of the system.