Geophysical Research Abstracts
Vol. 13, EGU2011-8976, 2011
EGU General Assembly 2011

Environmental conditions associated to a subtropical cyclone development over the southwest of the Atlantic Ocean

Michelle Simões Reboita (1), João Rafael Dias Pinto (2), and Rosmeri P. da Rocha (2)

(1) Institute of Environmental Resources, Federal University of Itajubá, Itajubá, Brazil (reboita@model.iag.usp.br), (2) Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo, São Paulo, Brazil (jrdias@model.iag.usp.br; rosmerir@model.iag.usp.br)

Subtropical cyclones are systems that have a vertical structure with upper cold core and a near-surface warm core, that is, a hybrid structure. These systems can be hybrid since the earlier stages of formation or to develop during the process of extratropical (tropical) transition of a cyclone. During 06 to 11 March 2010, an unusual formation of a hybrid cyclone was observed over the Atlantic Ocean close to the south-southeastern Brazilian coast. Once this kind of system is poorly documented and studied in this region, this work aims to present some synoptic aspects of the environment in which the system occurred. It started through the dynamical forcing of an upper-level trough in a region with weak baroclinity, intense low level moisture convergence and vertical shear less than 20 m/s. Besides it is important highlight that the sea surface temperature under the cyclone was higher than 28° C during the genesis, and the latent heat fluxes probably were important at the initial phases. By 9 March the upper level trough evolved to a cutoff low system as the surface cyclone displaced to the southwestern and became barotropic equivalent. It was observed that an intrusion of potential vorticity in 300 hPa induced a geopotential pattern similar to a Rossby wave breaking, with the low pressure center located northward of a high pressure center. Besides this patter helped the cuttof low formation, it contributed to the reduction of the atmospheric vertical shear once the junction of the cyclonic circulation of the low pressure with the anticyclonic circulation of the high pressure produces an easterly flow opposite to the westerly winds. The surface cyclone kept propagating toward the southern of Brazil and the cutoff low began to weaken. By 10 the system reached the closest position of the coast and in the same period the National Hurricane Center (NHC) classified it as tropical storm. After that the cyclone displaced eastward, lost its hybrid features and evolved to extratropical system. Flow produced by similar patterns to atmospheric blockings can represent a problem to the inhabitants of the Brazilian coast because it may influence the displacement of the cyclones westward and so these systems could reach the continent. In fact this occurred with the Hurricane Catarina in March 2004, which caused large damage in the southern coast of the country. Some aspects of its formation resemble those presented in the system studied here, which are the Rossby wave breaking pattern in upper levels and the potential vorticity intrusion.