



Tropopause fold contribution to formation and intensification of surface cyclone over the east coast of Southern Brazil

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Tropopause fold is characterized by stratospheric air intrusion into the middle troposphere, and it can be identified through potential vorticity (PV) field. This intrusion has been associated to the formation and intensification of some surface cyclones. There are several studies in Northern Hemisphere in which tropopause fold has played an important role to surface cyclogenesis. However, in South America few studies have assessed this process. This work is based on the following hypothesis: tropopause fold occurrence can be used as a prognostic signal to development and intensification of surface cyclone over the east coast of Southern Brazil. Synoptic and dynamic analysis of two surface cyclogenesis events was performed by using the National Center for Environmental Prediction reanalysis-2 data set. The first cyclone occurred between 15th and 23rd April, 1999, and the second, from 28th May to 01st June, 1999. The low-pressure system developed 24 h after the identification of a tropopause fold at 300 hPa level situated about 2,000 km to the southwestern of surface cyclone. Warm and cold temperature anomalies were identified above and below tropopause fold, respectively. These temperature anomalies induced sinking motion to the west and rising motion to the east of tropopause fold, contributing to deepen the low-pressure system to the east of the fold. The first event intensified 48 h after the beginning, when the fold core at the upper level approached to the low-pressure centre on surface, and weakened when the tropopause fold core was slightly to the east of low-pressure system. As in the first cyclone, the approach of tropopause fold caused pressure fall at centre of low-pressure system in the second cyclone after 42 h. But, unlikely the first event the second continued intensifying due to other tropopause fold approach. Therefore, this

study shows that tropopause fold can be an important prognostic signal for cyclone formation and deepening over east coast of Southern Brazil.