Geophysical Research Abstracts
Vol. 15, EGU2013-13308, 2013
EGU General Assembly 2013

Summertime fronts in subtropical South America

Josefina Arraut (1), Prakki Satyamurty (2), and Jose Luis Arraut (3)
(1) Center for Ocean Land Atmosphere Studies, (2) Universidade do Estado do Amazonas, (3) Universidade de Sao Paulo

Fronts of extra-tropical origin affect South America all year round. Summertime events have rain production as their main effect, affecting both weather and climate. In spite of their importance, systematic studies of summertime fronts are lacking, and most of the knowledge about them comes from routine weather observation and forecasting. This paper contemplates only the summertime fronts that show a strong interaction with the Northwestern Argentinean Low (NAL), which is a local thermal low, forming over the subtropical plains east of the Andes. As a result of this interaction, the fronts become the southern limit of the continent's monsoonal air mass, they intensify and strong rainfall is produced. This is so important for their life cycle that they will here be called NAL-fronts. Two categories of NAL-fronts have been found, which can be distinguished by their displacement: either to the east or to the northeast. Their structure and complete life cycles are described. A little known feature of the continent's subtropical meteorology plays a role in the NAL-front incursions: the Argentinean Col (Arraut 2007), which separates the NAL from the westerlies to its south. When the NAL-fronts intensify over the continent this col becomes particularly frontogenetic and also a location for very strong rainfall. It is the large scale wind field resulting from association of the NAL with the transient trough that brings the tropical and extra-tropical air masses to the neighborhood of the col, where the deformation field can act to thrust them against each other producing the very strong frontogenesis and rainfall. This large-scale wind field is produced by geostrophic adjustment to the pressure pattern formed by the NAL and the transient trough to its south. This pattern is well summarized by the geometry of the separatrices of the col, the isobars that cross each other at the col. Bringing to light the role of separatrices for frontogenesis falls in the realm of the kinematics of frontogenesis, and extends the work done by Petterssen (1956) on this subject.