Plinius Conference Abstracts
Vol. 13, Plinius13-40, 2011
13th Plinius Conference on Mediterranean Storms

Saturation fraction and gross moist stability in an evolving Mediterranean environment

A. Comellas (1), Z. Fuchs (2), L. Molini (1), and A. Parodi (1)

(1) CIMA Research Foundation, Savona, Italy, (2) Physics Department, The University of Split, Split, Croatia

Deep moist convection is a threatening phenomenon that recurrently hits both the Mediterranean and tropical seas. For this reason, many attempts have been made to try to characterize and predict it, and with this objective several physical indices have been proposed in literature during the last decade. Among these and for tropical environments, saturation fraction and gross moist stability, which are a measure of the atmospheric columnar saturation and an estimation of the convective behavior through the relation of the convective forcing and the convection response, respectively, have been proposed.

For the midlatitude, Mediterranean convection, the convective adjustment time-scale τ_c has been introduced, which is an estimation of the convective equilibrium of the environment through the use of CAPE and its rate of change by convective heating. This paper hypothesizes with the idea of a potential suitability of the tropical indices in a continuously-warming Mediterranean atmosphere, by testing them for the set of severe rainfall events over Italy during January 2007-February 2009. In another study, they had already been successfully classified into two categories of events showing non-equilibrium or rather equilibrium conditions, by using the convective adjustment time-scale τ_c. Our results indicate that such classification based on the equilibrium criterion as function of the episodes' duration does not show consistency for the saturation fraction, while the events' mean normalized gross moist stability is widely negative, the meaning of which for the midlatitude environment is not clear yet and remains an open debate within the scientific community.