GROUND WIND CONVERGENCE AS DEEP CONVECTION TRIGGER

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I. INTRODUCTION

The problem of the triggering of deep convection in atmosphere is a challenging matter for forecasting activity, as depicted by Doswell, 1985 and Wilson and Mueller, 1993. Many physical descriptions, observations and simulations have been attempted inside the scientific community. This work aims to an observative approach to the problem of the relationship between ground wind convergence and deep moist convection development as measured by meteorological radar.

II. DIVERGENCE AND VERTICAL MAXIMUM INTENSITY

The ground wind 2-dimensional divergence has been computed from 5' time resolution meteorological records of a net of stations owned by OSMER-ARPA FVG over the plain and the coast of Friuli Venezia Giulia region, in the north eastern Italy; the Vertical Maximum Intensity (hereafter VMI) has been obtained from the OSMER's C-Band Doppler Polarimetric Radar operating over the FVG and neighbour areas. The topic is search for a strong correlation between the wind convergence (intended as the negative divergence) occurred 60' to 180' in advance with respect to a convective event occurred in a region of the whole area of interest as pointed out by VMI. The continuity equation in Boussinesq approximation has been considered and the 2-dimensional divergence has been calculated with triangles method. Chi-square test has been performed to check the non-flat 2-dimensional distribution of the divergence with respect to the VMI. Time integration of the vertical component of divergence has been applied to compute the maximum lift a parcel may forcefully undergo in a purely dynamic sense, to be compared in few selected cases with the intensity of the convective activity according to the VMI value.

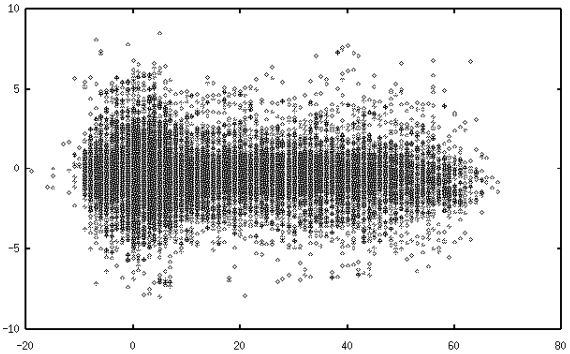

FIG. 1: VMI (dBZ) vs 180' integrated ground divergence (s^{-1}). The sample is obtained from a selected number (around 20) of stormy days in 2001 and 2002 years.

III. RESULTS AND CONCLUSIONS

The result of the work shows that it is not possible to point out a statistical correlation between ground wind convergence and thunderstorm triggering because the noise pertaining the environment not involved in convective development seems to shade the local effects of wind forcing. In particular, ground wind divergence fluctuations over the area of sampling have the same magnitude of the local effects that ought to trigger convection. Some encouraging results seem to emerge in the analysis of forced lift restricted to the only regions of thunderstorm development.

IV. AKNOWLEDGMENTS

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V. REFERENCES

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