Geophysical Research Abstracts
Vol. 19, EGU2017-7726, 2017
EGU General Assembly 2017

Lagrangian dynamics of the mistral during the HyMeX SOP2

Philippe Drobinski (1), Bastien Alonzo (1), Claude Basdevant (1), Philippe Cocquerez (2), Nadia Fourrié (3), and Mathieu Nuret (3)

(1) LMD/IPSL, Université Paris-Saclay, Ecole polytechnique, Sorbonne Universités, UPMC Univ Paris 06, PSL Research University, Ecole normale supérieure, CNRS, Palaiseau, France, (2) CNES, Toulouse, France, (3) CNRM/GAME, CNRS and Météo-France, Toulouse, France

The mistral refers to a severe wind blowing over the Gulf of Lions after being channeled in the Rhone valley. It influences the western Mediterranean climate as it brings cold and dry continental air over the warm western Mediterranean, generating intense air-sea heat exchanges and sea surface cooling, inducing the formation of the western Mediterranean deep water that moves into the Atlantic Ocean. The mistral is frequently observed to extend as far as a few hundred kilometers from the coast, and its fine-scale dynamics over the sea is still only partially understood as finely resolved observations in time and space are lacking. The boundary layer pressurized balloons (BLPB) developed by the Centre National d'Etudes Spatiales and deployed during HyMeX SOP2 allowed the Lagrangian documentation of the mistral events that occurred between beginning of February to mid-March 2013. Analyzed in synergy with the AROME-WMED weather forecast model, all the terms of the Lagrangian formulation of the momentum conservation equation could be quantified showing three different regions: (1) an injection zone where the mistral flow is directed toward the center of the Genoa cyclone due to a strong zonal pressure gradient, enhanced friction, and entrainment in the mountain wake; (2) an ejection zone where the flow is deflected outward of the cyclone due to either the nonnegligible inertia pseudoforce or an inertial oscillation caused by a sudden friction decrease; and (3) a region of geostrophic deceleration due to the weakening of the pressure gradient.