



An investigation of the Ora del Garda wind in the Alps by means of kriging of airborne and surface measurements

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On summer clear-sky days a coupled lake and valley thermally-driven circulation, known as Ora del Garda, arises in the late morning over the northern shorelines of the Lake Garda, in the southeastern Italian Alps, and then channels northward into the Sarca Valley and the Valley of Lakes. After flowing over an elevated saddle, in the early afternoon the Ora del Garda wind breaks out into the nearby Adige Valley, where it mixes with the local up-valley wind, producing a strong and gusty flow in the area. Flights of an instrumented motorglider, exploring specific sections in the valleys where this breeze blows, were performed in order to investigate the fine-scale structure of the Atmospheric Boundary Layer (ABL) associated to the circulation development. A Residual Kriging (RK) mapping technique was applied to the airborne dataset to obtain high-resolution 3D fields of potential temperature and mixing ratio, including also surface observations from automated weather stations disseminated along the valley floor. RK-interpolated fields revealed not only the characteristic vertical structure of the ABL occurring in connection with the Ora del Garda wind, but also fine-scale features of the thermal structure of the valley atmosphere, like a lake-breeze front structure at the shoreline, cross-valley asymmetries due to the presence of a small lake present on the valley floor or to the valley axis curvature, and an hydraulic jump structure in the outflow area.