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Climatology of the sea breeze and its micro-scale structure at a coastal Mediterranean site

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We present a study on the characteristics and importance of the sea breeze flow at a coastal site located at the west coast of the peninsular Calabria region, the southern tip of Italy, in the centre of the Mediterranean basin. Modeling the adjustment of the marine air flow inland from the coastal discontinuity in meso-scale models is still a challenge being limited by the resolution of the model grid and by the availability of comprehensive databases; this study is finalized to add new data on breeze circulations over an unique experimental coastal site characterized by sea-land contrast in a flat area but also influenced the complex orography of the region. We analysed two years of hourly data of wind speed and direction, temperature, radiation and humidity from a surface meteorological station located at about 500 m from the coast and compiled the yearly and seasonal climatology of the coastal flow and of the sea-land breeze system. We then selected periods of continuous summer breezes during several days to characterize the evolution of the vertical structure of the sea breeze using profiles of wind speed and direction derived by a SODAR and a wind profiler and of air temperature by a RASS. Meso-scale models are used to analyze the role of the large scale circulation on the development of the coastal flow. Breezes dominate the local circulation playing a major role for the local climate and in the precipitation processes in the internal mountainous areas.