



## **Clear and cloudy boundary layer in Southern Portugal: EDMF results**

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The recently proposed Eddy-Diffusivity Mass-Flux parametrization scheme is here tested against 3D case studies of clear and cumulus boundary layers. This turbulence/convection scheme combines the usual eddy-diffusivity closure and the mass-flux concept. Due to its integrated nature, the parametrization avoids the need to switch between the two schemes in the case of cloudy convective boundary layer. At the same time, it allows for the benefits of the mass-flux approach to the representation of dry convection and, in cloudy conditions, guarantees consistency in the fluxes between the sub-cloud and cloud layers. Previously, the EDMF scheme was evaluated in the 1D framework, using LES results, as those of the Nieuwstadt and the ARM cases. For both the dry and the shallow cumulus boundary layer the scheme presented important improvements in the representation on the mean boundary layer properties and cloud variables. The CICLUS field experiment (Climate Impact of Changes in Land Use) was performed in Southern Portugal in 1997-99 to better characterise the atmospheric circulations in the region. The Southern Portuguese coast is a rather interesting case for the study of boundary layer processes, due to a complex pattern of surface heating. Two cases taken from the CICLUS experiment are used to evaluate the performance of the MesoNH model, where the EDMF scheme is implemented. The first study focus on two days of intensive observations, with 3 hourly radiosondes in clear sky conditions, when the regional atmospheric circulation is dominated by a Heat Low associated with the sea breeze in the Iberian Peninsula. A shallow cumulus diurnal cycle is considered to discuss how the new scheme improves the description of the complex interaction between the regional thermal circulations and the cumulus cloud pattern.