



## **High-resolution simulations of a very stable boundary layer using the WRF and COSMO models: A Comparative Study**

Ines Cerenzia (1), Sukanta Basu (2), Tony Christian Landi (3), and Giovanni Bonafè (4)

(1) Department of Geophysics, Bologna University, Italy (icerenzia@arpa.emr.it), (2) Department of Marine, Earth and Atmospheric Sciences, North Carolina State University, USA (sukanta\_basu@ncsu.edu), (3) CNR-ISAC, Institute of Atmospheric Science and Climate, Bologna, Italy (t.landi@isac.cnr.it), (4) Arpa Servizio-Idro-Meteo-Clima, Bologna, Italy (gbonafe@arpa.emr.it)

The simulation performance of two state-of-the-art mesoscale models (WRF and COSMO) is tested in a case of very stable boundary layer (VSBL). A three day synoptically quiescent period is considered and a dataset collected at San Pietro Capofiume station in the middle of the Po Valley, Italy, is used as a reference.

Both models are nested in ECMWF's operational analysis (initial and boundary conditions) and their configuration in terms of grid size, domain, spin-up time is set as similar as possible. Additional sensitivity tests are performed in order to check the remaining differences in the models in dynamics. The spatio-temporal evolution and various simulated statistics of the VSBL are compared with a focus on the turbulence modelling. In this sense, the most evident differences are expected from the diverse boundary layer schemes applied by the models (Yonsei University scheme in WRF and Mellor Yamada level 2.5 scheme with scale separation approach in COSMO). The impacts due to the different radiation and land surface modelling are tackled as well.