Meteorological applications of a continuously-operating micropulse lidar in Barcelona, Spain <u>Robert F. Banks¹</u>, José M. Baldasano¹, and Marco Pandolfi²

Contact robert.banks@bsc.es www.itars.net

Earth Sciences Dept., Barcelona Supercomputing Center, Barcelona, Spain² Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, Spain

In this study we show the potential of a continuously-operating micropulse lidar (MPL) for the purpose of regional mesoscale model validation and physics testing. **Complementary objectives include** evaluation of the PBL height diurnal cycle and an analysis of Spring 2015 PBL heights estimated from the MPL and radiosoundings.

1) Data and Methods **1.1 Micro-pulse lidar (MPL)**



wavelet covariance

transform (WCT)

- (Fully automated, designed fo unattended operatior
 - I Barcelona is a new MPLNET site, the federated lidar network run by NASA
 - Uses same telescope to transmit/receive signal
- 532 nm with 15-m and 30-s resolution



1.2 Weather Research and Forecasting (WRF) model





<u>2.2</u> Bias (lidar – sonde) grouped according to synoptic clusters arriving at 3 different altitudes over Barcelona





¹ Banks, R.F., J. Tiana-Alsina, J.M. Baldasano, F. Rocadenbosch, A. Papayannis, S. Solomos, and C.G. Tzanis (2015), Sensitivity of boundary layer variables to PBL schemes in the WRF model based on surface meteorological observations, lidar, and radiosondeseduring the HygrA-CD campaign, Atmos. Research.



2) Results

2.1 PBL heights estimated from lidar (WCT method) versus 12:00 UTC radiosonde (parcel method)









<u>2.3</u> Diurnal cycle of PBL height \land , cloud top height \forall , and top of aerosol layer (*) for early and late periods in May 2015

ITARS Initial Training for atmospheric Remo



3) Conclusions \Box Over Spring 2015 the mean PBL height was 0.91 ± 0.34 km, with a minimum of 0.37 km and a maximum of 2.0 km

- heights towards late May
- recirculations and south-west flows
- accurate simulations of the PBL height

Acknowledgements The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013): People, ITN Marie Curie Actions Programme (2012-2016) in the frame of ITaRS under grant agreement n° 289923. Also, we acknowledge grant agreement CGL2013-





□ PBL height shows a flat linear trend, with an increase in

Largest bias between lidar and radiosonde with regional

Concerning the WRF model, non-local schemes offer more