Geophysical Research Abstracts
Vol. 12, EGU2010-10325-1, 2010
EGU General Assembly 2010

Multiscale GPS tomography during COPS: validation and applications

Cédric Champollion (1), Cyrille Flamant (2), Frédéric Masson (3), Pascal Gégout (4), Karen Boniface (1), and Evelyne Richard (5)

(1) UM2 / CNRS, Géosciences Montpellier, France, Montpellier, France (cedric.champollion@univ-montp2.fr), (2) Laboratoire Atmosphère, Milieux,Observations Spatiales, CNRS/UPMC/UVSQ, Paris, France, (3) CNRS - Université de Strasbourg - Institut de Physique du Globe de Strasbourg, Strasbourg, France, (4) Observatoire Midi-Pyrénées, Toulouse, France, (5) CNRS / Laboratoire d'Aerologie, Toulouse, France

Accurate 3D description of the water vapour field is of interest for process studies such as convection initiation. None of the current techniques (LIDAR, satellite, radio soundings, GPS) can provide an all weather continuous 3D field of moisture. The combination of GPS tomography with radio-soundings (and/or LIDAR) has been used for such process studies using both advantages of vertically resolved soundings and high temporal density of GPS measurements. GPS tomography has been used at short scale (10 km horizontal resolution but in a 50 km^2 area) for process studies such as the ESCOMPTE experiment (Bastin et al., 2005) and at larger scale (50 km horizontal resolution) during IHOP_2002. But no extensive statistical validation has been done so far.

The overarching goal of the COPS field experiment is to advance the quality of forecasts of orographically induced convective precipitation by four-dimensional observations and modeling of its life cycle for identifying the physical and chemical processes responsible for deficiencies in QPF over low-mountain regions.

During the COPS field experiment, a GPS network of about 100 GPS stations has been continuously operating during three months in an area of 500 km^2 in the East of France (Vosges Mountains) and West of Germany (Black Forest). If the mean spacing between the GPS is about 50 km, an East-West GPS profile with a density of about 10 km is dedicated to high resolution tomography. One major goal of the GPS COPS experiment is to validate the GPS tomography with different spatial resolutions. Validation is based on additional radio-soundings and airborne / ground-based LIDAR measurement. The number and the high quality of vertically resolved water vapor observations give an unique data set for GPS tomography validation. Numerous tests have been done on real data to show the type water vapor structures that can be imaging by GPS tomography depending of the assimilation of additional data (radio soundings), the resolution of the tomography grid and the density of GPS network. Finally some applications to different cases studies will be shortly presented.