Cross-validation of GNSS tomography models and methodological improvements using CORS network

Hugues Brenot (1), Witold Rohm (2), Michal Kačmařík (3), Gregor Möller (4), André Sá (5), Damian Tondaś (2), Lukáš Rapant (3), Riccardo Biondi (6), Toby Manning (7), and Cédric Champollion (8)

(1) Royal Belgium Institute for Space Aeronomy, Belgium, (2) Wroclaw University of Environmental and Life Sciences, Poland, (3) Technical University of Ostrava, The Czech Republic, (4) Vienna University of Technology, Austria, (5) University of Beira Interior, Portugal, (6) beneficiary of an AXA Research Fund postdoctoral grant, National Research Council, Italy, (7) Royal Melbourne Institute of Technology University, Australia, (8) Geoscience Montpellier, University of Montpellier, France

Using data from the Continuously Operating Reference Stations (CORS) recorded in March 2010 during severe weather in Victoria (South East Australia), sensitivity and statistical scores of GNSS tomography retrievals (water vapour density and wet refractivity) from 5 models have been tested and verified considering independent observations from radiosonde and radio-occultation profiles. The impact of initial conditions associated with different time-convergence of tomography inversion have been studied illustrating that the quality of a priori in combination with iteration process is critical, independently of the choice of the model tomography. The use of data stacking and pseudo-observations has been tested illustrating a significant improvement of retrievals with better geometrical distribution and better scores for the mid- and low-troposphere. Finally a comparison of our multi-model tomography with numerical weather prediction from ACCESS-A model shows the relevant use of ensemble solution to improve the understanding of such severe weather conditions, specially about the initiation of vigorous convection. This work takes place in the frame of the COST Action ES1206 (GNSS4SWEC - Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate) and the International Association of Geodesy (IAG). This study is also part of the activity of the TOMOlab workshop (EGU Meetings Support).