Geophysical Research Abstracts
Vol. 18, EGU2016-18260, 2016
EGU General Assembly 2016

Water vapor retrieval by LEO and GEO SAR: techniques and performance evaluation.

Alessandro Fermi (1), Frank Silvio Marzano (2), Andrea Monti Guarnieri (3), Nazzareno Pierdicca (2), Eugenio Realini (4), and Giovanna Venuti (1)

(1) Politecnico di Milano - DICA , (2) DIET - Sapienza Univ. di Roma, Roma, (3) Politecnico di Milano – DEIB, (4) GReD - Geomatics Research & Development srl

The millimetric sensitivity of SAR interferometry has been proved fruitful in estimating water-vapor maps, that can then be processed into higher level ZWD and PWV products. In the paper, we consider two different SAR surveys: Low Earth Orbiting (LEO) SAR, like ESA Sentinel-1, and Geosynchronous Earth Orbiting SAR. The two system are complementary, where LEO coverage is world-wide, while GEO is regional. On the other hand, LEO revisit is daily-to weekly, whereas GEO provides images in minutes to hours. Finally, LEO synthetic aperture is so short, less than a second, that the water-vapor is mostly frozen, whereas in the long GEO aperture the atmospheric phase screen would introduce a total decorrelation, if not compensated for.
In the paper, we first review the Differential Interferometric techniques to get differential delay maps – to be then converted into water-vapor products, and then evaluate the quality in terms of geometric resolution, sensitivity, percentage of scene coverage, revisit, by referring to L and C band system, for both LEO and GEO.
Finally, we discuss an empirical model for time-space variogram, and show a preliminary validation by campaign conducted with Ground Based Radar, as a proxy of GEO-SAR, capable of continuous scanning wide areas (up to 15 km) with metric resolution.