Geophysical Research Abstracts
Vol. 12, EGU2010-12038, 2010
EGU General Assembly 2010

Water vapor climatology by geodetic VLBI

Robert Heinkelmann, Michael Schmidt, and Manuela Seitz
DGFI, Deutsches Geodätisches Forschungsinstitut, Munich, Germany (heinkelmann@dgfi.badw.de)

Water vapor plays an important role as a greenhouse gas and acts as a significant energy transportation and storage medium within the global water cycle. According to the Clausius-Clapeyron relation, rising temperatures enable the absorption of increasing amounts of water vapor, a mechanism known as the water vapor feedback. Already in the 90ths it has been shown by various groups that analyzing GNSS ground based as well as radio-occultation observations can deliver valuable input for weather prediction or numerical weather models of the meteorological community. Since the MARK-III VLBI system, i.e. beginning in about 1984, the international geodetic VLBI program coordinated by the IVS provides homogeneous series of observations by its networks of global extension. These about 25 years of observations along with in-situ atmosphere pressure registrations enable a unique, global, and consistent determination of water vapor. Accurately and homogeneously derived time series of zenith wet delays, and consequently of precipitable water, provide the basis for the water vapor climatology discussed in our paper. Results are interpreted in terms of spatial and temporal representability; their accuracy is empirically assessed by evaluation of analysis-noise. Since the measurement of atmospheric water vapor has always been problematic and insufficiently covered by established techniques, the VLBI derived results might be of interest for the climatological community.