



Multiscale analysis of the West African Monsoon water cycle from GPS data and NWP models

O. Bock (1, 2), R. Meynadier (2), F. Guichard (3), J.P. Lafore (3), S. Janicot (4), M.N. Bouin (5), S. Nahmani (1), E. Doerflinger (6), F. Masson (7)

(1) Lab. Recherche en Geodesie, IGN, Marne-la-Vallee, France, (2) IPSL/Service d'Aeronomie, CNRS, Paris, France, (3) CNRM, CNRS & Météo-France, Toulouse, France, (4) IPSL/LOCEAN, CNRS & IRD, Paris, France, (5) CNRM, Météo-France, Brest, France, (6) Lab. Dynamique de la Lithosphere / CNRS, Montpellier, France, (7) IPGS/EOST, Strasbourg, France (Olivier.Bock@ign.fr / Fax: +33 1 4427 3776 / Phone: +33 1 4427 8445)

The time evolution of water cycle components is investigated for AMMA EOP years (2005-2007) over West Africa. We use precipitable water (PW) estimates from GPS, water vapour transport (WVT) computed from ECMWF model analyses and satellite precipitation products. The seasonal cycle in these terms is first analysed and monsoon phases are identified between April and October. Five distinct periods can be distinguished from the PW evolution. Active periods of moisture advection can be evidenced during the monsoon onset with significant delay along the climatological gradient of West Africa sampled with the GPS network (9.6 to 16.7 N, around 0 E). The comparison of the three EOP years reveals significant differences in the phasing of these periods. Intra-seasonal variability in precipitation can also be traced in PW and WVT between July and September (JAS). The pre-onset period (May-June) is marked by large variability in PW at 3-5 day periodicities, especially at the northern sites, which is linked to monsoon pulsations. The GPS data provide also unprecedented insight into the diurnal cycle of PW, which reveals distinct features between the Guinean coast and the Sahara and has a marked seasonal cycle. Finally, the link between moisture, convection and precipitation is investigated using a composite analysis based on the detection of Mesoscale Convective Systems.