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AUTHORS (FIRST NAME, LAST NAME): Samuel Nahmani[1], Olivier Bock[1, 2], Marie-Noelle Bouin[3], Alvaro Santamaria[1, 4], Guy Wöppelmann[5], Jean-Paul Boy[6]

INSTITUTIONS (ALL):
1. LAREG, Institut Géographique National, Marne La Vallée, France.
2. LATMOS/CNRS, Université Paris VI, Paris, France.
3. Centre de Météorologie Marine, CNRM, Brest, France.
4. Instituto Geográfico Nacional, Madrid, Spain.
5. LIENSS, Université de La Rochelle, La Rochelle, France.
6. Planetary Geodynamics Laboratory /, NASA Goddard Space Flight Center, Greenbelt, MD, USA.
Title of Team:
ABSTRACT BODY:
A network of six GPS receivers has been established over West Africa, as part of the instrumental setup of the African Monsoon Multidisciplinary Analysis (AMMA) and the Gravimetry and HYdrology in AFrica (GHYRAF) projects. The receivers are located in Djougou (Benin), Niamey (Niger), Gao (Mali), Tamale (Ghana), Ouagadougou (Burkina-Faso), and Timbuktu (Mali). The former three are in operations since June 2005 and the latter since May 2006. GPS data were initially processed using the GAMIT scientific software within a regional network to get hourly precipitable water vapour (PWV) estimates. PWV series are used to study climate and meteorological processes at different time scales (from diurnal cycle until inter-annual variability) in the framework of AMMA. The perspectives for GHYRAF concern the estimation of the hydrological loading related to the seasonal cycle of the West African Monsoon. Therefore, accurate GPS station height solutions are required and it is mandatory to process the data using a global network to obtain coordinates within a well defined reference frame. The AMMA GPS data were thus reprocessed as part of the TIGA GPS analysis at Université de La Rochelle (ULR). Several tests were carried out to understand the impact of the GPS processing strategy on both station positions and ZTD estimates.
We compare ZTD estimates obtained using a regional network (fixed IGS orbits) or a global network (re-estimated orbital parameters). The station positions and velocities obtained using these two strategies, as well as station position residuals, are compared. Hydrological and atmospheric loading signals are evidenced in the vertical component. Tropical stations such as Djougou are affected by a strong hydrological loading. GPS height residuals are well correlated with GLDAS hydrological loading simulations whereas the atmospheric pressure loading shows no significant impact. The hydrological loading signal at Sahelian stations (Gao, Timbuktu) is weak; in turn, the atmospheric pressure loading signal is significant there. Overall, the GPS height residuals are in good agreement with hydrological and atmospheric loading model simulations. The North and East component are less correlated with the model simulations. In conclusion, using a global network GPS processing strategy really improves the accuracy of GPS station coordinates.

INDEX TERMS: [1225] GEODESY AND GRAVITY / Global change from geodesy, [1211] GEODESY AND GRAVITY / Non-tectonic deformation, [1655] GLOBAL CHANGE / Water cycles, [1840] HYDROLOGY / Hydrometeorology.

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Sponsor **SPONSOR NAME:** Zuheir Altamimi
SPONSOR EMAIL ADDRESS: altamimi@ensg.ign.fr
SPONSOR MEMBER ID: 10172059