



Current deformation of Okavango rift: a coupling between regional tectonics and groundwater accumulation

Olivier Dauteuil (1), Mike Murray-Hudson (2), frederique Moreau (1), piotr Wolski (2), Nolwenn Portier (1), and Alain Crave (1)

(1) CNRS, INSU, Rennes, France (olivier.dauteuil@univ-rennes1.fr), (2) 2: Okavango Research Institute, University of Botswana, Maun, Botswana

Located in northern Botswana, the Okavango Delta is the second largest inland delta in the world of which global dynamics is controlled by a graben, climate and sediment transport. Currently the Okavango delta is an endoreic system in which each year about 11,000 km³ of water irrigates 15,000 km² of desert. The delta is located in graben controlled by two sets of faults trending N070. The origin of the graben is commonly interpreted as related to a migration of East African Rift. However the seismicity is low and the topography associated to the graben activity is slightly pronounced. Therefore, we determined the current deformation of the delta to better constrain the processes acting.

The current deformation is recorded thanks a geodetic network of GPS receivers. This network includes 9 sites located both inside and around the delta. Two sites are permanent, allowing monthly the ground deformation to survey, and 7 sites were investigated twice, in 2010 and in 2012. The data were processed in a regional setup relative to permanent station assumed fix, using double difference method. The accuracy ranges from 2 to 6 mm.

The displacement field between 2010 and 2012 displays value up to 4 cm that is an unexpected rate. The horizontal component is roughly consistent with NW-SE opening of the graben, except on the northern border, which displays an eastward motion. The vertical component corresponds to a subsidence larger at east and at north of the delta than inside the southwest part of the delta.

The high deformation rate and the displacement field are partially inconsistent with a simple open dynamics of the graben. The high subsidence both inside and outside the graben reveals that another process controls the ground deformation of the delta. GRACE data (Ramillien et al, 2008) indicate a significant ground water accumulation in this region, which could influence the deformation pattern of the delta in addition to the geodynamic input.