Geophysical Research Abstracts
Vol. 16, EGU2014-7575, 2014
EGU General Assembly 2014

Accurate assessment of Congo basin forest carbon stocks requires forest type specific assessments

Pieter C.J. Moonen (1), Siege Van Ballaert (1), Bruno Verbist (1), Faustin Boyemba (2), and Bart Muys (1)

(1) Department of Earth and Environmental Sciences, KU Leuven, Leuven 3001, Belgium (pieter.moonen@ees.kuleuven.be), (2) Faculté des Sciences, Université de Kisangani, BP 2012 Kisangani, Democratic Republic of Congo

Due to a limited number of field-based studies estimations of carbon stocks in the Central Congo Basin remain highly uncertain. In particular, more information is needed about the variation in stocks between forest types and on the factors explaining these differences. This study presents results from biomass and soil carbon inventories in 46 0.25ha old-growth forest plots located in three study sites in Tshopo District, Democratic Republic of Congo. Four forest community types were identified using cluster and indicator species analysis based on the plots' large tree (>30cm DBH) species composition. Carbon stocks were calculated using newly established forest type specific tree height-diameter relationships to prevent errors related to the use of inappropriate regional relationships from literature. Using the Akaike criterion it became clear that for one site and a few forest types separate tree height-diameter relationships gave a robust and significant better fit, showing that there was a clear and significant interaction effect between sites and forest type. Mean above-ground carbon stocks were estimated at 165 $\pm$44 Mg ha-1. Significant differences were found between forest types, but not between sites for a given forest type. Largest stocks were found in monodominant Gilbertiodendron dewevrei forests (187 $\pm$ 37 Mg C ha-1), which occurred in all sites. Smallest stocks (91 $\pm$ 14 Mg C ha-1) were found in the Margaritaria discoidea mixed forest type, which occurred only in one site, while two other mixed forest types showed intermediate stocks (148 $\pm$ 28 Mg C ha-1 and 160 $\pm$ 36 Mg C ha-1 respectively). The observed differences in aboveground stocks between forest types could be explained by forest structure related variables including number of large trees (DBH>70cm), average wood density and dominant height. When comparing the G. dewevrei monodominant type with mixed forest types within each study site, the former showed equal basal area and sometimes higher carbon stocks despite poorer physical and chemical soil properties. Soil organic carbon stocks (0-100cm) did not significantly differ between forest types and were estimated at 109 $\pm$ 35 Mg C ha-1. Our results confirm recent findings of significantly lower carbon stocks in the Central Congo Basin as compared to the outer regions and of the importance of local tree height-diameter relationships for accurate carbon stock estimations.