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¹⁰Be data on erosional surfaces in the Mayombe massif (SW Congo)

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Erosional surfaces, mainly in quartzites of Neoproterozoic age, have been sampled for ¹⁰Be Cosmic Ray Exposure (CRE) dating in different places of the Mayombe Massif (SW Congo). Four types of occurrences have been studied: 1/ denuded and abraded horizontal surfaces sampled at different altitudes along the flanks of the Kouilou valley; 2/ vertical cliffs at different heights in the topographic profile; 3/ incised river banks; 4/ large boulder in a surficial breccia (Stone line).

Three groups may be distinguished according to their ¹⁰Be concentrations. A first group of ten samples displays ¹⁰Be concentrations ranging from ~18 000 to 60 000 at/g. These samples were collected from erosional surfaces on the Kouilou valley and incised bank on a secondary river. A second group displays ¹⁰Be concentrations ranging from ~ 80 000 to 330 000 at/g. These samples are from vertical cliffs located in the summit part of an abrupt mountain and massive rocks forming the bed and banks of the Loukoula river. A third group with a ¹⁰Be concentration of ~ 1 500 000 at/g includes the unique quartzite boulder sampled in the Stone line.

After correction of the topographic shielding effect, the equation expressing the ¹⁰Be concentration as a function of the CRE duration and of the denudation rate has been solved for each sample assuming no inherited ¹⁰Be. For the first group, this calculation implies a recent (i.e. < 30 ka) denudation event and/or high denudation rates (> 30 m/Ma). For the second group, it is consistent with steady state conditions operating under moderate denudation rates (~ 5-10 m/Ma). For the quartzite boulder, the ¹⁰Be concentration implies that this rock was exposed to cosmic rays for at least 1 Ma.

The results on the first group are consistent with the occurrence of a very efficient and recent denudation event having affected the valley flanks and caused incision along the hydrographic system. It is suggested that this event should be the same that caused the formation of the Stone line by erosion and reworking of pre-existing alteration profiles less than 10 ka ago. The results obtained from the second group suggest that this event did not affect some parts of the landscape. The result obtained from the boulder shows that this rock fragment was probably displaced a long time ago, with no relation with the recent denudation event.

