

Assessment of ^{238}U and ^{226}Ra activity concentration along the Amazon Tall Tower Observatory site

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The Amazon Tall Tower Observatory (ATTO) site is a region located within the Uatumã Sustainable Development Reserve (USRD), approximately 150 km northeast of Manaus city, in the Brazilian state of Amazonas. At the ATTO site, there are 3 tall towers, which are used for studies on the Amazon rainforest and its interaction with the soil and the atmosphere. The activity concentration of ^{238}U and ^{226}Ra was determined in soil samples collected in the footprint of the ATTO site by gamma spectrometry. The activity concentration of these radionuclides is important for understanding the ^{222}Rn exhalation rate and ^{222}Rn flux from soils. Knowledge of the ^{222}Rn flux at the ATTO site can be useful for applications in atmospheric research, e.g., the ^{222}Rn tracer method can be used to estimate local and regional emissions of greenhouse gasses; simulating ^{222}Rn transport is a powerful tool for evaluation and validation of transport schemes in atmospheric chemical transport models. In this study, 39 samples collected from 13 sampling sites along a transect from the ATTO site to the river were analyzed. The highest activity concentrations were found in the Igapó forest (69 ± 2 Bq/kg for ^{238}U and 47 ± 5 Bq/kg for ^{226}Ra), a region near the Uatumã river with prevailing flooded black-water forest, whereas the lowest activity concentrations occurred in the Campina (Savanna on white-sand soils) and Campinanara (white-sand forest) ecosystems (18 ± 1 Bq/kg for ^{238}U and 13 ± 2 Bq/kg for ^{226}Ra), a transition area located between river terraces and the Terra Firme forest.