

Neotropical Ecosystems



WAVES

Water Availability, Vulnerability
of Ecosystems and Society
in the Northeast of Brazil

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edited by
Reinhard Lieberei
Helmut Bianchi
Vera Boehm
Christoph Reisdorff

Editors

Reinhard Lieberei ¹, Helmut K. Bianchi ², Vera Boehm ¹, Christoph Reisdorff ¹

¹ Universität Hamburg, Institut für Angewandte Botanik, Ohnhorststr. 18, 22609 Hamburg, Germany

² GKSS-Forschungszentrum Geesthacht GmbH, Max-Planck-Straße 1, 21502 Geesthacht Germany

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Seasonal Variation of ^{18}O , Deuterium, and Nutrients in Water from Wells, Stream, and Rainwater in Eastern Amazonia

Feitosa, J. R. P.¹, Sá, T. D. de A.², Sommer, R.³ and Victoria, R. L.⁴

¹ CNPq/SHIFT Embrapa Amazônia Oriental, Belém, Brazil

² Empresa Brasileira de Pesquisa Agropecuária da Amazônia Oriental, Belém, Brazil,

³ Universität Bonn, Bonn, Germany,

⁴ Centro de Energia Nuclear para Agricultura, Piracicaba, Brazil

An exploratory study of water quality was performed in Igarapé-Açu, northeastern Pará state, as an attempt to orient a further study to validate the fire-free land preparation in a watershed scale. The isotopic assessment was conducted between July 1997 and December 1998, in the Igarapé Cumarú basin, including monthly sampling of water from: rainfall (local weather station); a well; and a nearby Igarapé, and the analysis of oxygen 18 ($\delta^{18}\text{O}$) and deuterium (δD) performed in CENA/USP, aiming to get information about the hydrological cycle and the understanding of the interaction between surface and sub-surface water. The assessment of nutrient concentration in water was performed by collecting samples in nine wells during the dry (November 1997) and rainy (April 1998) seasons, and analyzing the concentration of nitrate, phosphate, potassium, calcium and manganese. The results from the analysis of $\delta^{18}\text{O}$ in the water from the Igarapé and well exhibited low variation during the observed period, with a minimum of -4.2% and a maximum of -3.0% . A different pattern was observed in rain water, with a sharp gradient, reflected in the amplitude from -5.2 to $+1.3\%$. A similar behavior was observed with the values of δD , however, with a more evident gradient than the found for $\delta^{18}\text{O}$, with an amplitude between -26.1 and 12% for the samples from the Igarapé and well, and of between 24.8 and 20.1% for the rain water. It is important to point out that the maximum

amplitude was observed when rainfall was low, while the minimum amplitude values was observed when rainfall tended to raise. This behavior apply for both, $\delta^{18}\text{O}$ and δD . These two variables were closely related ($R^2 = 0.85$). With respect to the results of the concentration of nutrients in the water from the wells, they have shown the influence of the nutrient released by the burning of the vegetation during land preparation. This becomes more evident with respect to nitrate, phosphate, potassium and calcium. For nitrate, the concentration during the dry season was 1.05 mg(N)/l , while during the rainy season reached 1.91 mg(N)/l , representing an average increase of 82% . For the phosphate, these values were 0.07 mg(P)/l during the dry season and 0.14 mg(P)/l during the rainy season, representing an increase of 120% . The concentrations of potassium and calcium reached even higher values, with 0.36 mg(K)/l and 1.63 with 0.36 mg(K)/l , and 1.28 mg(Ca)/l and 8.96 mg(Ca)/l , respectively for the dry and rainy seasons, with correspondent average increases of respectively 348 and 598% . With respect to manganese, the concentration found were, 0.0001 mg (Mn)/l in the dry and 0.004 mg (Mn)/l in the rainy dates, corresponding to a even greater proportional increase (3000%). The interpretation of these results will be more consistent when they will be compared to the results of soil solution analysis for the same periods.