

U-Pb zircon ages of the Alto Paranaíba and Juína kimberlitic provinces, Brazil

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This work presents a set of zircon U/Pb ages of kimberlitic and akin rocks of the Alto Paranaíba (Minas Gerais – Goiás) and Juína (Mato Grosso – Rondonia) provinces. The Alto Paranaíba province is composed of hundreds of Cretaceous bodies intrusive in the southwestern border of the São Francisco Craton. The Juína Province is in the NW portion of the Mato Grosso State.

Ten zircon concentrates from APP corresponding to the Mata da Corda Group conglomerate and 74 zircon concentrates from intrusive bodies of kimberlitic affiliation of the Coromandel region were studied. Sixteen fractions corresponding to nine intrusive bodies yield ²⁰⁶Pb/²³⁸U ages around 87.36 ± 0.75 Ma. Two younger bodies yielded ages around 80 Ma. Ten analyses corresponding to three kimberlitic bodies of the Juína Province present older ²⁰⁶Pb/²³⁸U ages of 93.69 ± 0.43 Ma. Whole-rock isotopic studies (Sr, Nd and Pb) suggest that the Alto Paranaíba Province kimberlitic-type rocks show signatures distinct from those that characterize the South-African bodies. The whole-rock Sm-Nd age of 850 Ma is similar to the zircon U-Pb ages of most of the juvenile granites that characterize the initial phases of the Goiás magmatic arc. It is possible that this value indicates the time of an important mantle melting associated with the Neoproterozoic subduction process that led to the generation of the arc. This frozen lithospheric mantle coupled to the base of the São Francisco Craton would be the source of the Cretaceous kimberlites of the Alto Paranaíba Province.

Seepage of subsurface brines into a major lake system using Ra and stable isotopes of oxygen and hydrogen: A case study from Lake Huron

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Exchanges of water between major reservoirs such as groundwater and lake water that are common can alter the biogeochemical cycling of chemical species and thereby affect relevant ecosystems. Recently discovered sinkhole vents in Lake Huron were found to discharge highly anoxic, reducing, high-sulfate and -chloride waters with strikingly different chemical signatures.

We collected and analyzed a suite of water samples from three sinkhole vents and adjoining waters from Lake Huron for $\delta^{18}\text{O}$, δD , ^{223,224,226,228}Ra and a suite geochemical ancillary parameters. Our results show: i) Ra concentrations in the vent waters are 1 to 2 orders of magnitude higher than that of the lake water; ii) A plot of δD vs $\delta^{18}\text{O}$ show considerable deviation from the Global Meteoric Water Line indicating mixing of different water masses that have undergone different evaporation cycles; and iii) The variations in the ²²³Ra/²²⁶Ra and ²²⁴Ra/²²⁸Ra activity ratios in the vent waters is related to the time-scales involved in the vertical movement of the vent waters. We also have modeled the variations in the Ra activity ratios in the vent waters to obtain time scales of transport from the source waters to the place where the vent water is discharged.