

Stromatolite laminae (Lagoa Vermelha, Brasil) as archives for reservoir age changes

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As laminated biogenic or abiogenic sedimentary structures [1], stromatolites record environmental changes along growth profiles, revealing possible changes in reservoir ages due to input of older carbon. A modern stromatolite sample was collected in Lagoa Vermelha (100 km east of Rio de Janeiro, Brasil) an area known for upwelling of South Atlantic Central Water (SACW).

34 samples from a transect cutting the lamination were collected with a hand-driller for standard geochemistry and ^{14}C AMS analyses. Shells collected in 2015 were analysed for estimation of the present-day reservoir age. ^{14}C ages of laminae and the reservoir age were used to apply the age-depth model to the stromatolite transect with the OxCal depositional model (Marine13 calibration curve; [2]).

Small-scale changes in the composition of laminae report environmental changes, e.g. upwelling. The well-laminated middle part (laminated boundstone; ca. 4cm) of the stromatolite transect was found to have grown in a short time period of less than 100 years (1163-1210 ^{14}C y BP), with four excursions towards older ^{14}C ages (ca. 1200 ^{14}C y BP). To detect possible changes of marine ^{14}C , calendar years assuming a stable modern reservoir age were used to simulate atmospheric ^{14}C ages with the southern hemisphere IntCal13 atmospheric calibration curve [3]. The offset between the measured and simulated ^{14}C ages indicates a variability of the reservoir age between -99 and 268 ^{14}C y with highest reservoir correction found for the layers with indication of environmental changes (e.g. upwelling). Thus, this simulation confirms the occurrence of older carbon and points out the sensitivity of stromatolites for changing reservoir ages.

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