# SYNCHROTRON XRF ANALYSES OF ELEMENT DISTRIBUTION IN FOSSILIZED SAUROPOD DINOSAUR BONES

A.R.Pyzalla[1], M. Dumont[1], N.Zoeger[2], C.Streli[2], P.Wobrauschek[2], G.Falkenberg[3], P.M.Sander[4]
[1] Max-Planck-Institut für Eisenforschung GmbH, Max-Planck-Straße 1, D-40237 Düsseldorf, Germany
[2]Atomic Institute of the Austrian Universities, Stadionallee 2, A-1020 Wien, Austria
[3] Hamburger Synchrotronstrahlungslabor HASYLAB am Deutschen Elektronen-Synchrotron, DESY, Notkestrasse 85, D-22603 Hamburg, Germany
[5]University of Bonn, Institute of Palaeontology, Nusseallee, D-53115 Bonn, Germany

Sauropod dinosaurs were typically one magnitude larger than any other living or extinct terrestrial animal. This sheer size of the sauropod leads to scale effects in their biology and physiology that still are only inadequately understood. The only remnants of the sauropods are their fossilized bones. These fossilized bones have sustained burial for some hundred million years and thus may have experienced significant diagenetic changes. These diagenetic changes often are not affecting bone preservation on the histological level, but, lead to significant alterations of the bone microstructure.

We investigated the influence of diagenesis on the microstructure of fossilized sauropod bones using bone cross-sections of Brachiosaurus brancai and Barosaurus africanus long bones (femuri and humeri) that were excavated in the Tendaguru beds in Tanzania. The change in chemical composition due to interactions between bone and sediments was characterized by synchrotron X-ray fluorescence analyses. The high spatial resolution achievable using this microanalysis technique provided us with two-dimensional images of the distribution of U, Sr, Pb, Fe, Cu, Mn, V, Cr, Co in the fluorapatite of the fossilized bone and in the calcite filling the bone cavities (e.g. Lacunae, Havers systems). The results reveal distinct differences in the spatial distribution of theses elements. U and Sr are mainly present in the fluorapatite and show a similar distribution in all samples investigated. Fe, Cr and V distributions show maxima in the same locations near the fluorapatite-calcite interfaces. The inhomogeneities of the element distribution observed in the dinosaur bone thus give some indications about the interdiffusion between the bone and its environment.