



Geochemistry of Central Atlantic Magmatic Province (CAMP) sills from deep boreholes in the Amazonas and Solimões basins, Brazil

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The Central Atlantic Magmatic Province (CAMP) is one of the most extensive Large Igneous Provinces (LIPs), and is associated with the breakup of Pangea and the subsequent opening of the central Atlantic Ocean. A large part of the province, including > 1 M km² basins containing sill intrusions, is located in Brazil but has received limited attention due to the lack of outcrops. We have studied CAMP sills from seven deep boreholes (up to 3100 m deep) in the Amazonas and Solimões basins, northern Brazil. The boreholes contain up to ~ 482 m of sills (18 % of the stratigraphy), with a maximum individual sill thickness of 140 m. The sills were partly emplaced into thick Carboniferous evaporites. The main mineral phases of the sills include plagioclase and pyroxene, with accessory apatite, biotite, ilmenite and quartz. The majority of the sills are low-Ti dolerites (TiO₂ < 2 wt.%), with the exception of four samples (with 2.2 - 3.3 wt.% TiO₂). The low-Ti rocks range from basalt to basaltic andesite and plot in the tholeiitic field defined within the total alkali versus silica (TAS) classification. C1 chondrite normalized Rare Earth Element (REE) patterns for both Ti-groups show increasing LREE compared to HREE (La/Lu = 2.2 - 4.1) with no major anomalies, and attest to a relatively evolved nature (La = 17-65 ppm). Primitive mantle normalized patterns for low-Ti rocks show negative anomalies for Nb, Ta, P and Ti and positive for K, whereas the high-Ti rocks show generally opposite anomalies. Late stage patches in the dolerites contain apatite, quartz and Cl-bearing biotite, suggesting the presence of halogens that may partly derive from the host sedimentary rocks.