LA ICP-MS analysis of growth rhythms in stromatoporoid skeletons

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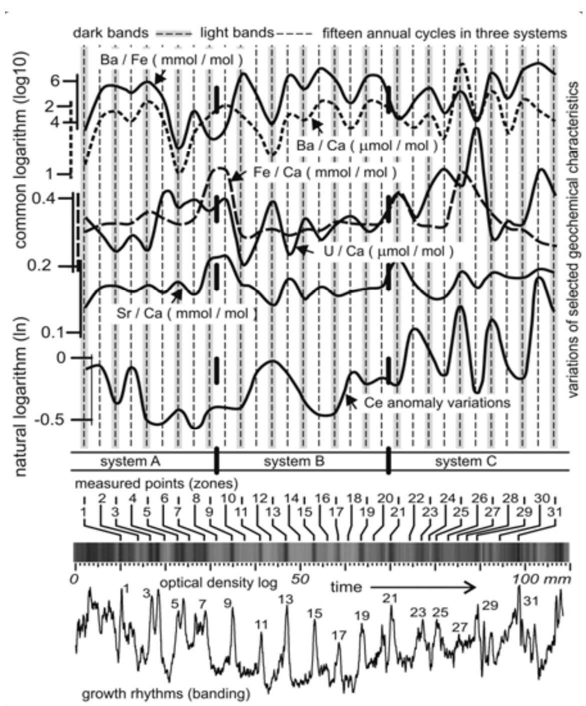
The Devonian stromatoporoid Actinostroma clathratum (early Middle Givetian, Moravian Karst area, Byci Skala cave) provided the growth band series which fluctuated among three climatic systems. Particularly the origin of dark and light bands, DBs and LBs, is different.

The system A is introduced as "hot, humid, of monsoon type, with dark band doublets". The system B is extremely regular, having a unimodal yearly rhythm. The system C corresponds to periods with wild and strong atmospheric-ocean circulation patterns.



In general, it can be suggested that the geochemical fluctuations on DBs and LBs are less strictly modulated by quasi-regular yearly patterns than it would be inferable from the optical density records. The results give us the warning, that hot and cold, as well as yearly and multiple DBs structures can take effect alternatively, and in extreme so fast as during several years or in decadal scale.

The compatibility of He during mantle melting – Constraints from noble gas systematics of OIBs and MORBs

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The noble gases are one of the most important tools for understanding basic planetary processes such as Earth accretion or mantle formation and evolution. Basic concepts on mantle structure and evolution are primarily based on the interpretation of mantle ^{3}He and ^{22}Ne reflecting primordial, undegassed mantle material. Deviations from primordial He and Ne isotopic compositions have increased during Earth's history due to the coupled production of radiogenic ^{4}He and nucleogenic ^{21}Ne. Thus He and Ne isotopic ratios in the mantle are controlled by the ratios of [primordial ^{3}He]/[U+Th] and [primordial Ne]/[U+Th], respectively. In this context, OIBs with high $^{3}He/^{4}He$ ratios denoting high ratios of [primordial ^{3}He]/[U+Th] and solar-like Ne isotopic compositions implying high ratios of [primordial Ne]/[U+Th], relative to MORB, are mainly thought to reflect undegassed lower mantle material. This interpretation of noble gas data is largely based on the long-established view that noble gases behave as highly incompatible elements. Essential to any model on mantle formation and evolution is the partitioning behaviour of the elements making up the mantle. Previously published experimental data on the partition of noble gases between melt and crystal are quite contradictory, suggesting that the noble gases are either highly incompatible or approach compatible behaviour. In this contribution we present He, Ne and Ar isotope and abundance data of basaltic glasses from various ocean island settings indicating that He behaves more compatible during melt formation than Ne, Ar, Th and U. Basically, the melts generated by the various plumes investigated show $^{3}He/^{22}Ne$ below current estimates of solar composition and $^{4}He/^{21}Ne^{*}$ and $^{4}He/^{40}Ar^{*}$ lower than the theoretical production ratios, indicating that He has been fractionated from Ne and Ar. As magmatic degassing results in a preferential enrichment of He in the melt compared to Ne and Ar the He fractionation must be caused by a predegassing process, leaving the melt formation as such as the only process. However, to fractionate He from Ne and Ar during melt formation He must be more compatible than those other two gases. In addition, melt modelling also suggests that He might be more compatible than U and Th.