Geophysical Research Abstracts
Vol. 17, EGU2015-2630, 2015
EGU General Assembly 2015

Oscillatory growth in Larger Benthic Foraminifera: problems, interpretations and possible solutions.

Antonino Briguglio (1,2), Wolfgang Eder (2), Julia Woeger (2), Shunichi Kinoshita (2), Carles Ferrandez-Canadell (3), and Johann Hohenegger (2)

(1) Universiti Brunei Darussalam, Faculty of Science, Petroleum Geoscience, Brunei Darussalam, Brunei Darussalam (antonino.briguglio@ubd.edu.bn), (2) 1Universität Wien, Department of Palaeontology, UZA II Geozentrum, Althanstraße 14, 1090 Vienna, (3) 3Universitat de Barcelona, Departament d'Estratigrafia, Paleontologia I Geociències Marines, Martí Franqués, 08028 Barcelona

The possibility to investigate cell growth and its oscillations through time in Larger Benthic Foraminifera (LBF) by means of Micro Computed Tomography (microCT) is a recent and well known methodology. However, the search for factors of oscillations around undisturbed growth – the latter can be modelled by theoretical growth functions (e.g. Gompertz and generalized logistic growth function) – is hampered by a number of factors which have been recently discovered and not yet published. Cycles are obtained based on a mean chamber building rate gained from specimens cultured in the laboratory because punctual data available in the literature are too incomplete to gain a more realistic growth model. The mean chamber building rate can be also modeled (e.g. Power-, Michaelis-Menten- and Bertallanffy function). The periodicity of the cycles observed in LBF is mostly concentrated around a prominent 29 to 30 days cycle. Other cycles, proportions and multiples of this dominant cycle are common, but probably should be considered as calculation effects in case of their inconsistency. The 30 days cycles are present in almost all specimens investigated, which may be a hint to a correlation between cell growth and the light intensity variation of lunar cycles, which can affect the photosynthetic activity of the endosymbionts in LBF tests. However, this correlation is challenged by a number of issues, which need to be further investigated. One of these problems is represented by the recent discovery of similar cycles in LBF tests, which have been laboratory-cultured and should therefore not show any environmental effects. A focused analysis of growth cycles observed in these laboratory tests showed that even if the periods are constant and significant at 30 days, their phases show a much broader variance compared to naturally grown specimens. Epigenetic signals and their influence on the oscillatory growth of cultivated organisms can be considered to play a major role in the preservation of environmentally controlled cycles in a stable laboratory environment. Furthermore, out of all cultivated specimens investigated during this study, the majority of chambers build after the initial stadium show massive effects of abnormal chamber building processes and dissolution effects. However, if this can be considered as the cell's response to a non-oscillating environment or secondary dissolution events, possibly due to imperfect alteration of the cultivation environment, is still open.