



## **Modelling internal Reef Chronology and virtual Drill Logs using a spreadsheet-based Reef Growth Model (SEALEX)**

**M. Koelling** (1), J.M. Webster (2), G.F. Camoin (3), and Y. Iryu (4)

(1) MARUM, Bremen, Germany , (2) JCU Townsville, Qld, Australia , (3) CEREGE, Aix-en-Provence, France , (4) Tohoku University, Sendai , JAPAN. (koelling@uni-bremen.de)

A reef growth model has been developed using an Excel spreadsheet. The 1D forward model is driven by a user definable sea level curve. Other adjustable model parameters include maximum growth rate, the coral growth depth dependence and light attenuation, subaerial erosion and subsidence. A time lag for the establishment of significant reef accretion may also be set. During the model run, both, the external shape and the internal chronologic structure of the growing reef are continuously displayed and recorded. We tested the model and the effects of different sea level curves on fossil reef systems growing on both, a subsiding island like Tahiti (subsidence rates of 0.25 m ka<sup>-1</sup>) and on uplifting coastal situations like Huon Peninsula (uplift rates of 0.5 to 4 m ka<sup>-1</sup>). The model runs show the sensitivity of the resulting overall morphology and internal age structure to different model parameters. Additionally the water depth at the time of deposition is recorded. This allows the constructions of virtual borehole logs, with both, the coral age profiles and the paleo water depth at the time of growth displayed and recorded. Single model runs take a few minutes to half an hour on a modern Windows desktop or laptop computer. The model may be used to investigate the effects of different boundary conditions such as maximum reef growth, erosion rates subsidence or uplift on both, the general morphology of the reefs, and the internal chronologic structure. These results can then be compared to observed data allowing different hypothesis concerning reefs evolution to be tested. The model will also be used to assist in finding sampling locations in reef bodies that are likely to contain critical information for sea level studies.