Numerical modeling of sedimentary and flexural processes in passive margins

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Surface processes alter the stress field in the lithosphere due to the erosion of the landscape. This erosion unloads the plate which is flexurally compensated. The way this occurs depends on the rigidity of the plate. On the other hand, flexure of the lithosphere modifies the topography and affects the surface processes. Therefore, the aim of this project is to numerically study the interaction between surface processes and flexure of the lithosphere.

In our model, the lithosphere is represented by a 3-D thin elastic plate and the equation of the deflection of the plate is solved numerically using the finite element method (Zienkiewicz and Taylor, 2000) with triangular elements developed by Specht (1988). The surface processes are based on the numerical models developed by Beaumont *et al.* (1992) and Braun and Sambridge (1997) that consider both short-range (diffusive) and long-range (fluvial) transports.

The numerical implementation allows us to consider the effect of lateral variation of the effective elastic thickness both in space and time and how this affects the deflection of the plate and consequently the surface processes.

Preliminary results show that, for the same climate conditions in passive margins with an initial escarpment, the larger the rigidity of the plate the faster is the retreat of the escarpment, as already observed by Kooi and Beaumont (1994).

This numerical model will be applied to study the evolution of the Brazilian continental margin. Due to the curvature of the Brazilian coast, the use of a three-dimensional plate with lateral variation of rigidity will better describe how the flexure and the surface processes shaped the landscape through time.

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