Geophysical Research Abstracts,
Vol. 11, EGU2009-8322, 2009
EGU General Assembly 2009

Combining discrete element modelling and process-based models: syntectonic sedimentation in a thrust fault propagation.

A. Carmona (1), R. Clavera-Gispert (2), O. Gratacós (1), S. Hardy (1,3)

(1) GEOMODELS, departament de Geodinàmica i Geofísica, Universitat de Barcelona, Spain (anacarmona@ub.edu), (2) ABTEILUNG GEOLOGIE, Facultat für Biologie, che ime und Geowissenschaften, Universität Bayreuth, Bayreuth, Germany, (3) ICREA,(Institució Catalan de Recerca i Estudis Avançats), Catatonia, Spain

Numerical modelling has recently become a fundamental tool in structural geology. Numerical models provide information which may assist the understanding of geometries, architectures and processes difficult to otherwise observe and may also be used to validate other methods.

The work presented here introduces a new numerical computer programme designed to combine discrete element and process-based sedimentation models. Combining these two methods allows us to include the simulation of both sedimentation and deformation processes in a single and more effective model.

The new code has been developed from two previous published works: simsafadim_clastic and discrete element modelling. The former simulates sub-aquatic clastic transport and sedimentation in three dimensions, including process of interaction, production and sedimentation of carbonates; moreover it is also powerful tool for the 3D prediction of stratigraphic structures and facies in sedimentary basins. The latter deals with the simulation of the deformation in sedimentary rocks in 2D and 3D. This deformation is a consequence of the interaction of many individual elements according to mechanical rules.

Merging these two models offers a more complex and realistic study of the evolution of the structure and the deformation in sedimentary materials produced by faults and folds since better approximations of the structures and geometries in the nature are obtained as a result of the capability of the programme in reproducing these two processes simultaneously.

As a result much more complex depositional structures (syntectonic geometries) can be studied, together with more complex analysis of the evolution of the deformation.
Deformation of the sedimentary cover, as a consequence of tectonic movements, is included and conditioned by the presence of the new syntectonic sediments.
The analysis of the evolution of the deformation of these new syntectonic materials can also be performed.

As an illustrative example, the analysis of the evolution of a thrust fault together with its associated sedimentation will be shown.