Monday, November 12, 2007

HGS Joint General and International Dinner Meeting

Sponsored by University of Houston Department of Geosciences and UH Geoscience Alumni Association

Westchase Hilton • 9999 Westheimer
Poster Judging 4:30–5:30 p.m.
Poster Viewing during Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $30 Preregistered members; $35 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476 (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

by ***Christopher Beaumont, Markus Albertz, Steven Ings***
Department of Oceanography, Dalhousie University
Sofie Gradmann
Department of Earth Science, Dalhousie University
and ***John Shimeld***
Geological Survey of Canada

Salty Tales: Numerical Investigations of Continental Margin Salt Tectonics

The study of continental margin salt tectonics has a long and illustrious history. Major advances in our understanding have come from the direct interpretation of data supported by analogue laboratory models. Numerical modeling of salt tectonics has to some degree lagged behind. We will show applications in which 2D finite element numerical modeling of salt tectonics, driven by gravitational spreading and gliding, can test mechanisms proposed from data interpretation and provide insight beyond that of analogue models. The models are not designed to simulate or mimic particular geological examples. Instead we are using simplified examples to understand the underlying mechanical controls. Armed with this understanding we can predict the styles of salt tectonics that will develop under differing sedimentation regimes and explain the variations among natural salt tectonic provinces. The models also act as "intuition enhancers" and can help explorationists visualize just how dynamic salt tectonic systems can be.

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Starting from the basic problem of the large-scale failure of frictional-plastic overburden above viscous salt and the seaward translation of the failed margin sediments, we investigate the requirements **Joint General and International Dinner** *continued on page 13*

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for failure, the ensuing flow velocity and the way in which structural components of this system evolve. We will consider a set of archetypal problems:

1) A dynamic model for initiation and early evolution of mini-basins (when the basin sediments are less dense than the salt);
2) An explanation of the basic styles of salt tectonics of the Scotian Basin, eastern Canada; and
3) The conditions required for the development of toe-of-salt fold belts, such as the Perdido Fold Belt of the Gulf of Mexico, by gravitational spreading.

We use the finite element models to calculate the large-scale deformation of the system during progradation and aggradation of frictional sediments above salt. Additional factors included in the models are the syn-rift geometry of a rifted continental margin with the associated thermal subsidence and tilting, the loading of the margin by seawater, and finally the isostatic response to the water and sediment loads which then modifies the margin geometry. Within the sediments the effects of pore-fluid pressure, which reduces their strength, and compaction, which modifies density and accommodation, are also shown to be important.

The lecture addresses the critical controlling factors for each of the problems listed above and includes some neat animations of the models. ■

Biographical Sketch

Dr. Chris Beaumont is the Canada Research Chair in Geodynamics at Dalhousie University. His research interests include deformation of the lithosphere in orogens (e.g., Himalayas-Tibet), the mechanisms of burial and exhumation involved in ultra-high-pressure metamorphism, rifting of continents and the evolution of continental margins, subduction zones and back-arc basins, and salt and shale tectonics. A theme in his research has been the interplay between surface processes and tectonics, including the response of orogens and their foreland fold-and-thrust belts to erosion and sedimentation, and recently how sedimentation drives salt tectonics.

He has a BSc from the University of Sussex and PhD from Dalhousie University. Following a position as Cecil and Ida Green Fellow at the Institute for Planetary Physics UC San Diego, he joined the Earth Physics Branch in Ottawa and then Dalhousie University. He is a member of the Earth System Evolution program of the Canadian Institute for Advanced Research.