

## Proposed Studentship

### Stratigraphic forward models and multi-point geostatistics

**Supervisor (s): Dr David Waltham & Prof Pete Burgess**

#### Project Description:

This project will develop a new technique for interpolating data (e.g. from wire-line logs) using the output from computer simulations of sedimentary processes. The classic approach is to use krigging to produce contour plots which honour the data whilst predicting values at intermediate locations. Alternatively, mathematical inversion methods can be used to find parameters for stratigraphic forward models which accurately reproduce the data. Both techniques have severe limitations: Krigging is not constrained, as it should be, by the physics of the underlying sedimentary processes whilst inversion is slow, expensive and does not always find sufficiently accurate solutions.

Multi-point statistics (Strebelle, 2002) takes a very different approach in that training images are first produced which characterize the spatial relationships between facies. Multi-point statistics are then determined from these images and sub-surface predictions made which honour the data and statistics. In this project, stratigraphic forward models will be used to produce training images which are highly-tailored to the specific case under consideration. This department has an international reputation in stratigraphic forward modelling of shallow and deep marine sediments. It is anticipated that initial studies will concentrate on modelling of shallow marine carbonate systems using developments of our existing Carb3D+ (Patterson et al, 2006) and CarboCAAt (Burgess, 2011) algorithms.

The project will benefit from the involvement of Ikon Science Ltd who have extensive experience with petrophysical data and software. It is anticipated that the project will lead to software which will be incorporated into RokDoc (Ikon's world-leading quantitative-interpretation package).

#### References:

- Burgess, P, 2011. CarboCAT: A cellular automata model of heterogeneous carbonate strata. *Computers & Geosciences*, 35, 129–140.
- Patterson, R, Whitaker, F, Jones, G, Smart, P, Waltham, D & Felce, G, 2006. Accommodation and the sedimentary architecture of isolated icehouse carbonate platforms: Insights from forward modeling with CARB3D+. *J Sed Res*, 76, 1162-1183.
- Strebelle, S., 2002. Conditional simulation of complex geological structures using multiplepoint statistics. *Mathematical Geology*, v. 34, p. 1-22.

#### Potential funding:

We currently have a vacant NERC studentship available for the **2013 academic session** following a withdrawal of a previous student, which has a maximum funding of 3 years. The NERC studentship will be awarded to the best candidate over a range of PhD topics on offer.

**Eligibility:**

Eligibility for this studentship is restricted to UK citizens and applicants who have been ordinarily resident in the UK throughout the 3-year period preceding the date of application for an award, and has settled status in the UK within the meaning of the Immigration Act 1971 (i.e. is not subject to any restriction on the period for which he/she may stay). Further information can be found from the National Environmental Research Council website <http://www.nerc.ac.uk/funding/eligibility.asp>.

**How to Apply:**

Please use the **online application system**

(<http://www.rhul.ac.uk/studyhere/postgraduate/applying/home.aspx>) to submit an application for this project. Applications should include 2 letters of reference, a cover letter and CV- applicants are also requested to email a copy of their CV directly to the lead supervisor of this project. Please ensure you complete your application **by Friday 23<sup>rd</sup> August 2013**.

**Interviews will be in the week commencing 2<sup>nd</sup> September (most likely the 2<sup>nd</sup> or 3<sup>rd</sup>) and offers will be made soon after.**

*For administrative queries please email [info@es.rhul.ac.uk](mailto:info@es.rhul.ac.uk) and for project queries, contact the Lead Supervisor- staff contact details will be on the website:*

<http://www.rhul.ac.uk/earthsciences/staffdirectory/home.aspx>