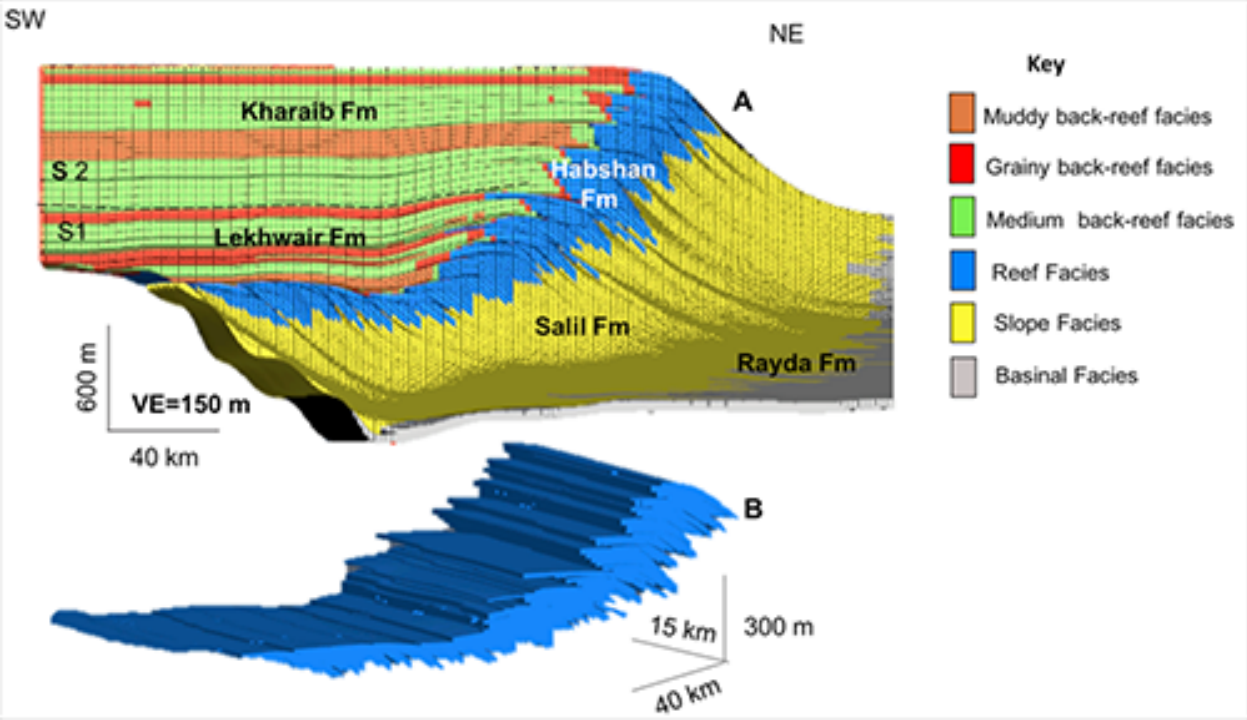
Modelling modern carbonates (Bahamas, Great Barrier Reef) using numerical approaches

Being able to predict the lateral distribution and connectivity of rock bodies is challenging, notably in carbonate reservoir units. One approach to bridging this problem is to use outcrop analogues: at outcrops, the lateral dimensions and spatial arrangement of carbonate bodies can be reconstructed. However, even this information is incomplete, as the third dimensions is never available in the volume of rock explored.

Another approach is to use forward numerical simulations of sedimentology to be able to predict based on geological constraints what the pattern of sedimentation should be, and compare this to control data (wells, outcrop, seismic). This powerful approach is commonly used, but questions remains as to what the limits are, what the best applications of these deterministic models could be, and how to assess uncertainties.



In this project, the PhD candidate will use a diffusion-based forward numerical model called "DionisosFlow". Dionisos has proven to be very effective at modelling regional to field-scale carbonate and clastic lithologies. Here, we want to apply Dionisos to well constrained modern systems such as the Bahamas and the Great Barrier Reef. This is because (a) the paleo-topography of the system and the resulting geometries of the carbonate bodies is relatively well constrained at the 10's of meters to the 10's of kilometre scale. However, gap exists in our understanding of the continuum of geometries, and the processes that governed deposition of these rocks. One of the goal will be to do a series of nested models from the very small (500 m to 1000 m) to the large (>100 km) scale. In addition, the PhD project will also try to explore the suitability of Dionisos and other models as predictive models for diagenesis and for rock properties.

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Group website: www.carbonateresearch.com
Minimum requirement for candidates: *1st class* UG degree in geology, Computer sciences, Math or physics, UK citizen only
Good to have skills (but not essential): a master's degree, proven ability to publish papers by being lead or co-author on a paper, experienced with carbonates, some experience in math/modeling/numerical methods.