**Characterising seaward-dipping reflectors from the volcanic margins of South America**

*Speaker - C. McDermott*

*Supervisors - J. Collier, L. Lonergan*

Whilst our understanding of volcanic passive margins has improved in recent years, it still lags behind that of magma-poor margins. This is in part due to the presence of large volumes of layered sub-aerial basalts, known as SDRs, along the continent–ocean transition zone, which have hampered seismic imaging. Despite this, an ever-increasing number of successful hydrocarbon discoveries are driving further exploration on magma-rich margins.

SDRs form during the final stages of continental breakup and mask the transition from tectonic to magmatic extension from conventional seismic surveys. Here, long-offset (10.2 km) 2D seismic reflection data are used to document the along-strike variation in SDR geometry offshore Argentina, Uruguay and Brazil. Detailed velocity analysis of high-quality pre-stack seismic gathers, along three seismic profiles, has been used to constrain the geological interpretation of the reflection data and has yielded novel insights into SDR formation. Three types of SDRs are recognised that vary in distribution both across and along the strike of the margin.

*Type I* SDRs form first, are fault-bounded and associated with anomalously high-velocity bodies (6.5-7 km/s) both beneath and at the down-dip end of their diverging wedges. *Type I* SDRs are identified along the entire margin. Outboard of the Type I, we find another set of the SDRs (*Type II*) which are not fault-bounded and are not associated with high-velocity anomalies. To the south, these SDRs are short and chaotic (*Type IIa*) with average lengths of 3 ± 2 km. Moving northwards, closer to the Tristan de Cunha hotspot, the *Type II* SDRs are long (30 ± 25 km) and continuous and occur in packages on the order of 20 km thick.

*Type I* SDRs are interpreted as lava flows confined within continental rift basins and sourced from intrusive magmatic bodies while *Type II* packages are erupted from sub-aerial spreading centres. *Type IIa* SDRs result from lava flow into standing bodies of water which causes the flows to freeze while *Type IIb* packages are constructed in areas with no water-level control. The marked increase in the SDR volume moving northwards reflects the proximity to the plume. It is suggested that the transition between *SDR Type I & II* marks the end of mechanical rifting and the onset of magmatic-controlled extension, and thus, represents a key point in the breakup of continental margins.

**Biography**

Carl McDermott is a current PhD student within the Geodynamic Core to Surface research group at Imperial College London. Carl’s research focuses on the construction of magma-rich (volcanic) passive margins and how their breakup history differs from that of their magma-poor counterparts. He uses a combination of deep seismic reflection mapping, potential field data and calculated interval velocity models to investigate these complex margins.

Before coming to Imperial, Carl obtained a first class Geology degree from Trinity College Dublin, Ireland. After which, he worked as a research assistant with the ‘Fault Analysis Group’ in University College Dublin, Ireland.