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The Morphology, Structure and Origin of Seamounts on the South-West Indian Ocean Ridge

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The South-West Indian Ridge (SWIR) between longitude 46 and 57° East is an ultra-slow spreading (∼16 mm/a) mid-ocean ridge system with a highly oblique (>50°) spreading direction and a large number of closely spaced transform faults. Previous swath bathymetry surveys onboard R/V Dr. Fridtjof Nansen in 2009 show that the ridge crest is characterised by a number of irregularly shaped seamounts which rise about 2500 m above the mean depth of the surrounding seafloor. However, the origin of these seamounts and whether they reflect passive cracking of the lithosphere or deep mantle processes is not clear. In November/December, 2011 we re-surveyed 5 of these seamounts onboard RRS James Cook using an EM120 swath bathymetry system, a Lacoste-Romberg air-sea gravimeter and a Remotely Operated Vehicle (ROV). Preliminary results show that the seamounts are highly fractured, with fault trends parallel and orthogonal to the spreading direction. There is evidence of both growth and collapse structures, including head scars, chutes and debris flows. We present here a preliminary analysis of the morphology, gravity field and rock sample data and its implications for tectonics, mass wasting and eruptive processes at young seamounts that have formed in an active extensional setting.