

Supplementary Information

Seismic data were acquired in 2002 during *R/V Ewing* cruise EW0207 using a 6 km-long, 480 channel Syntron digital streamer with 12.5 m spaced receiver groups. Streamer depth and feathering were monitored with depth controlling and compass-enhanced DigiCourse birds, with a GPS receiver on the tail buoy. The sound source for the MCS survey was a tuned array of 10 air-guns with a total capacity of 3005 cubic inch (49.2 L), fired every 37.5 m, and towed at a nominal depth of 7.5 m. During ridge crest surveys, data were recorded at a sampling rate of 4 ms for 10.24-s-long records. Common midpoint (CMP) bin spacing is 6.25 m and the data trace fold is 81. Data are processed following a standard sequence including sorting in CMP gathers, trace editing, band-pass filtering, velocity analysis, normal moveout (NMO) correction, stacking, and migration, and a dip moveout (DMO) -based approach to suppress seafloor-scattered energy. The processing sequence was designed to enhance the stacking of two primary events; the turning energy from the base of layer 2A and the AMC reflection. Further details on the processing sequence as well as stacked and migrated sections are presented in Canales et al (in press).

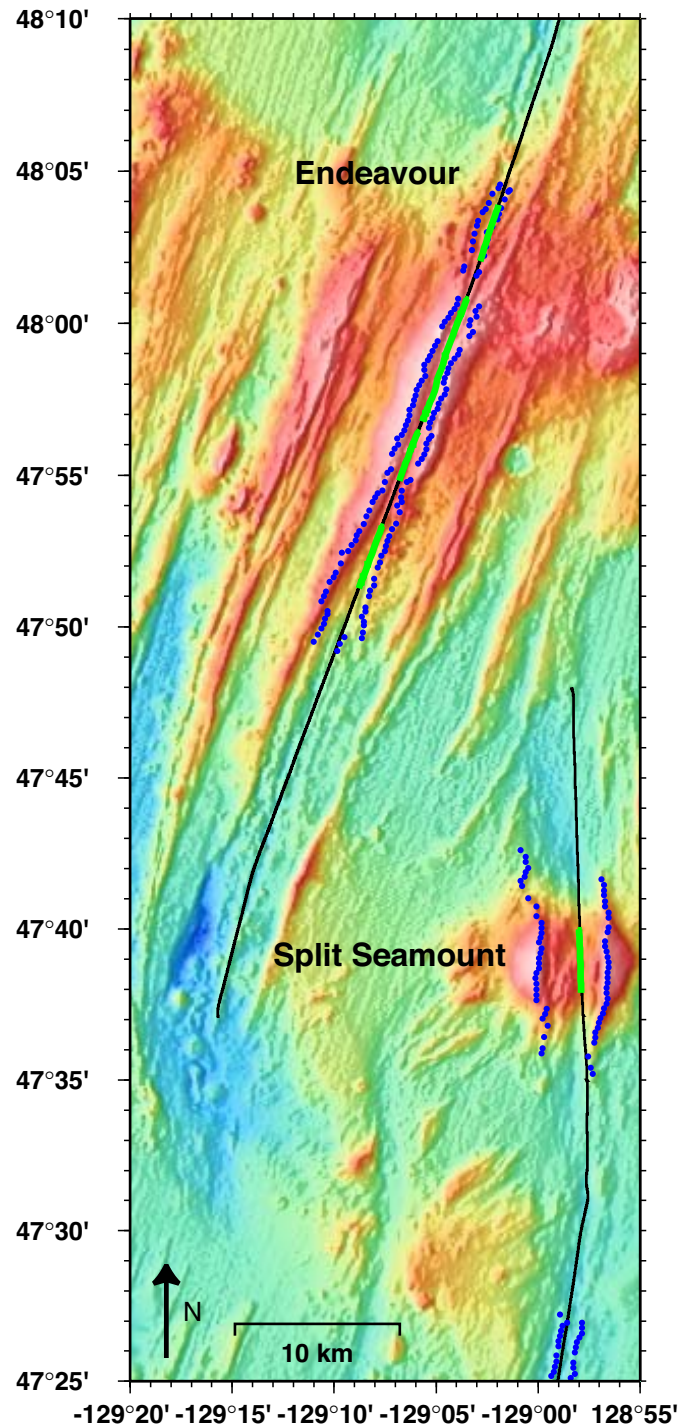


Figure DR1. Bathymetry map of Split Seamount and Endeavour segment showing spatial correlation between the axial graben and the AMC. Axial graben picks (blue dots) correspond with top of graben walls. We use an automatic method to detect the top of the graben walls based on inflection points in the bathymetry. Wide green line delineates the extent of the AMC reflection detected along seismic profiles (black lines). Note that AMC disappears north and south of Split seamount and Endeavour high as the prominent symmetric axial graben disappears. Misalignment of the survey track with the ridge axis may account for the absence of an AMC in some locations (e.g. for ~10km directly south of Split seamount), but elsewhere, the seismic profile is well centered on the axis and the AMC is absent.