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Structural evolution of the southern Molucca Sea, Indonesia: Insights from multibeam bathymetry

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High resolution multibeam bathymetric data from the southern Molucca Sea, eastern Indonesia, provides an exceptionally detailed view of seafloor geomorphology close to the triple junction between the Eurasian, Indo-Australian, and Pacific/Philippine Sea plates. Both small- and large-scale structures associated with features such as the termination of a major strike-slip system, an extruding collision complex, and kilometre-scale slope failures, are clearly imaged on the seafloor. In combination with 2D seismic lines, these data enable a new insight into the structural history of this tectonically active and complex area. Major continuous faults such as the Sula Thrust and the North Sula-Sorong Fault, previously interpreted to bound and pass through the area are not seen. The south-verging Batui Thrust, previously interpreted offshore east of Sulawesi island, cannot be identified. In the areas where the thrust was interpreted there is a north-vergent thrust and fold zone overlain by almost undeformed sediments. Gently dipping strata of the Banggai-Sula microcontinent in the south can be traced northwards beneath younger, strongly deformed rocks. In the east, young, poorly stratified rocks are deformed by multigenerational folds, thrusts and strike-slip faults, as they are extruded away from the Halmahera-Sangihe arc-arc collision above the double-subducting Molucca Sea. There is a series of small thrusts between the leading edge of the collision complex and the foot of the Banggai-Sula microcontinent. Large, bedding-parallel slope failures of the microcontinental slope have spread debris 10's of kilometres across the deformed basin floor. In the west a zone of transpression close to the island of Sulawesi is the termination of the dextral strike-slip Balantak Fault. The sharply defined seafloor expression of many of these features suggests that they are active at present. However, the scarcity of shallow earthquakes means that they may be old but well preserved, or aseismic.