Intricate oceanic plate boundaries revealed in the first World Seafloor Map

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The detailed configuration of divergent oceanic plate boundaries records information on the processes that interact along these plate boundaries, such as the different regimes of seafloor and oceanic lithosphere formation. In spite of being one of the Earth's major tectonic features, the geometry of mid-ocean ridges at high resolution (~10 km), its segmentation by non-transform offsets vs transform faults, is not yet available at global scale. Existing plate boundary compilations are provided at coarser resolutions (e.g., Bird, 2003), usually suitable only for plate-scale studies.

With the increasing extent of high-resolution bathymetry data publicly accessible in addition to a growing body of literature, it is now possible to map in detail the geometry of divergent plate boundaries, and their segmentation, along a significant proportion of the mid-ocean ridge system. While <20% of the seafloor has been mapped with multibeam shipboard systems, the ridge axis is relatively well-surveyed owing to research focused on ridge processes during the last few decades.

Through the World 5M project of the DDE Geological Mapping group, supervised by CGMW and CAGS, we publish the first World Seafloor Map at scale 1:5M. In this map, where we report seafloor structures and include up-to-date datasets of oceanic features, we have compiled a detailed cartography of the mid ocean ridge geometries, including individual ridge segments, globally. We also performed the digitization of all fracture zones, which localize strike-slip deformation along well-defined transform plate boundaries linking ridge segments that are laterally offset. In the this new digital dataset, we have also identified several segments that are not offset by transform faults, and which define zones of diffuse deformation accommodated through heterogenous and complex transfer zones with no localized deformation. Our high-resolution map reveals the variability in the nature and distribution of both ridge segmentation and types of ridge offsets, and their possible dependence on spreading rate. This mid-ocean ridge system digitization is based on of the compiled shipboard bathymetry GMRT v3.9 (Ryan et al., 2009), available through www.gmrt.org and existing published literature. The map also includes other available datasets, such as seafloor magnetic anomalies, age of the oceanic crust, hydrothermal vents, IODP drill sites, sediment thickness, hot spots and large igneous provinces.

The World Seafloor Map is built in a GIS environment, and all features are associated with specific metadata (attributes). All the digital data and associated data sources will be made available upon validation and verification to encourage contributions to improve, update, and correct the existing datasets.

Mots-Clés : World Seafloor Map, Plate Boundaries, Mid-Ocean Ridge, Fracture Zone, Database

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.