Geophysical Research Abstracts
Vol. 20, EGU2018-4887, 2018
EGU General Assembly 2018

The demise of the West Antarctic rift system: new magnetic constraints

Roi Granot (1) and Jerome Dyment (2)

(1) Ben Gurion University, Israel (rgranot@bgu.ac.il), (2) Institut de Physique du Globe de Paris, Geosciences Marines, Paris, France

The motion between East and West Antarctic Plates during the last 26 million years (post-Adare seafloor spreading) is loosely constrained, and although it is often considered negligible, accumulating observations from along the rift system suggest that significant faulting and transtensional motion have occurred in the western Ross Sea during that period. Part of the reason for this uncertainty is the complicated kinematic evolution of the oceanic crust found northwest of the Ross Sea and the lack of proper magnetic anomaly data at key tectonic locations. We have conducted a series of two cruises (TACT project) aboard M/V L'Astrolabe, the supply ship of Dumont d'Urville French Antarctic station, in February-March of 2012 and 2016. We have acquired total field magnetic profiles oriented along flowline direction and straddling the Tasman spreading corridor, located between Tasmania and the Balleny Islands and the Tasman and Balleny FZs. The new data allow us to refine the motion of the Macquarie Plate relative to Australia. After correction of this motion, the Tasman corridor, lying west of the Balleny FZ uncovers the Australia-East Antarctic plate motion, and the Balleny corridor, lying east of the FZ uncovers the Australia-West Antarctic plate motion. The data show consistent pattern of decreasing mismatch for the anomalies younger then 26 Ma and older then 11 Ma, observed only at the Balleny corridor. This mismatch can only be explained by Neogene relative plate motion between East and West Antarctica. We combine these new observations with geological constraints from within the West Antarctic rift system to compute new rotation parameters that describe the relative plate motion between West and East Antarctica for the last 26 million years. These results indicate that the rift had undergone through major plate organization at 26 Ma that led to a change in direction of relative plate motion and a decrease in the velocity, leading to the final kinematic unification of the Antarctic plate at 11 Ma. The results have important implications for the observed variable structure of the Transantarctic mountains and the evolution of the subice basins and troughs.