Update on the evolution of the West Philippine Basin

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Improved gridded geophysical data sets for the region, including free air gravity (FAA19.1, Sandwell, 2012), magnetic anomaly (EMAG2, Maus et al., 2009) transformed to the pole, and bathymetry (particularly new swath data in the NW and SE quadrants of the basin), reveal a complex history of WPB seafloor spreading in the Eocene. The WPB seafloor fabric is discordant at a high angle to the surrounding provinces in the north (Oki-Daito Ridge), west (Gagua Ridge) and south (Mindanao Fracture Zone) and formed by WPB spreading propagating into older terranes (105-125 Ma, Albian-Aptian). The oldest magnetic chron in the WPB may be C22r in the northeast (~50-51 Ma using the PEAT timescale of Helike et al., 2009). Thus opening of the WPB is younger than that of the South Daito Basin (54-59 Ma), which separated the Oki-Daito from the Daito Ridge (Ozima et al., 1983). It overlaps with all but the first million years of eruptions of the IBM forearc basalts (FAB, 48-52 Ma) that signal the initiation of IBM subduction (Reagan et al., 2010; Ishizuka et al., 2011). These results confirm that (1) Eocene IBM (fore)arc now at 16°-26°N formed on contemporaneous, orthogonally-spreading WPB crust, (2) initial IBM subduction did not nucleate along a pre-existing weak zone but instead cut across numerous tectonic elements and therefore (3) models of subduction initiation need to break the lithosphere as well as overcome substantial resistive forces before negative slab buoyancy makes the subduction process self-sustaining (Taylor and Goodliffe, 2004).