4.1 Oceanic plateaus, submarine ridges, and seamounts: general setting

Oceanic plateaus, submarine ridges, and seamounts (Figures 4, 5) are mafic igneous regions with crust that is thicker than the surrounding oceanic crust, and are often difficult to differentiate from one another as accreted terranes (Kerr, 2003). Oceanic plateaus, submarine ridges, and seamounts all form due to excess magmatism breaching the oceanic plate. Historically, the term "oceanic plateau" has included a large range of geographic features, from extinct mid-ocean ridges, continental plateaus, remnant island arcs, oceanic flood basalts, submarine ridges, seamount chains, to hot spot tracks in the global compilations of Ben-Avraham et al. (1981); Schubert and Sandwell (1989); Marks and Sandwell (1991). Now, oceanic plateaus are defined as a type of large igneous province (LIP) formed on oceanic crust. They are vast, wide regions of anomalously thick igneous crust and are submarine analogues to continental flood basalts (Kerr, 2003; Kerr and Mahoney, 2007). LIPS are large igneous regions on continental or oceanic crust that were rapidly emplaced (within short pulses of 1 - 5 Myr) over areas of more than 100,000 km^2 (Coffin and Eldholm, 1992, 1994; Bryan and Ernst, 2008). The origin of oceanic plateaus has been a point of vigorous discussion in the literature in terms of whether the feeder magmas originate from deep plumes or in the upper mantle based on geochemical signatures and geodynamic models (Richards et al., 1989; Foulger, 2007; Campbell and Kerr, 2007; Hastie and Kerr, 2010; Hoernle et al., 2010). Several modern oceanic plateaus were emplaced during the Cretaceous and were later rifted apart at triple junctions, such as the Kerguelen-Broken Ridge (Frey et al., 2000), Manihiki-Hikurangi-Ontong Java (Taylor, 2006; Davy et al., 2008), and Agulhas-Maud Rise-Northeast Georgia Rise plateaus (Parsiegla et al., 2008). The accreted Sorachi plateau is related to the Shatsky Rise oceanic plateau (Ichiyama et al., 2012), and thus could be another possible triple junction-related oceanic plateau (Sager, 2005).

Even though the seismic crustal structures of oceanic plateaus and submarine ridges appear similar, their origins are different and submarine ridges are volumetrically smaller (Bryan and Ernst, 2008). In this review, we follow the definition of oceanic plateaus as outlined by Kerr (2003), Kerr and Mahoney (2007), and Bryan and Ernst (2008) for differentiating between oceanic plateaus versus submarine ridges. Some submarine ridges, such as the Nazca Ridge, Cocos Ridge, and the Tuamotu Plateau have been previously classified as oceanic plateaus, but based on the definition of Bryan and Ernst (2008), these mafic regions are not voluminous enough nor formed due to rapid magmatism and therefore must be classified as submarine ridges. Submarine ridges are the result of significant magmatism produced at hot spot tracks, leaky transforms, or now-extinct mid-ocean ridges.

In addition to oceanic plateaus and submarine ridges, we include large seamounts and seamount chains in this grouping (Figure 5). In general, seamounts are submarine volcanoes, smaller in areal extent to oceanic plateaus and submarine ridges, with geochemical signatures that suggest different sources for different seamount chains. The number of seamounts $>$1.5 km in height currently on the ocean floor is estimated to be more than 13,000 based on satellite altimetry (Wessel et al., 2010), and these numerous features often alter subduction zone by blocking the subducting interface or

causing uplift in the accretionary prism (Watts et al., 2010). Seamounts can be formed by various processes: they can be the result of upper mantle mini-convection cells under mid-ocean ridges or transforms (Buck and Parmentier, 1986), deep mantle upwellings, short-lived hotspot volcanism, upper asthenospheric upwelling, and lithospheric cracking (Forsyth et al., 2006; Briais et al., 2009; Sandwell and Fialko, 2004). The geochemical signature of mafic accreted terranes is important in helping to determine if the accreted terrane was originally a plume-derived oceanic plateau, hot spot track submarine ridge, or the product of excess upper mantle magmatism.