

T13C-04: New Insights into the Formation and Evolution of the Aleutian Arc

Monday, 10 December 2018

14:25 - 14:40

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The early Eocene marked a major Pacific-wide tectonic reorganization with initiation of the Izu-Bonin-Mariana (IBM) and Tonga subduction zones (52-50 Ma, Reagan et al. 2013; Meffre et al. 2013) and the formation of the famous Hawaiian-Emperor Bend (HEB, ~50-47 Ma, O'Connor et al. 2013). Since the oldest reported Aleutian $^{40}\text{Ar}/^{39}\text{Ar}$ ages are 46 Ma (Jicha et al. 2006; Layer et al., 2007), we question whether the Aleutian subduction zone also formed during this plate-wide event or earlier. Here we summarize preliminary U/Pb zircon and Ar/Ar ages (~50) and geochemistry of samples from Aleutian forearc canyons, the reararc Kresta Ridge and the Komandorsky Block, obtained during German R/V *Sonne* cruises and field work on the Komandorsky Islands. In the Central Aleutians, our ages for samples from Adak (38-31 Ma) and Amatignak (41-33 Ma) canyons largely overlap the published Ar/Ar age range for these canyons and nearby islands (38-26 and 7 Ma, Jicha et al. 2006; Schaen et al. 2016) but extend it to 41 Ma. In the Western Aleutians, ages for Murray Canyon samples (38-22 Ma) largely fill the gap between previously dated samples (46 and 22 Ma, Jicha et al. 2006), whereas Attu Canyon (64?, 48, 15 and 6 Ma) and Kresta Ridge (49-26 Ma) ages extend the age range of this part of the arc to ≥ 49 Ma (based on zircon age). Ages from the Komandorsky Block islands and margins record nearly continuous magmatism from 69-11 Ma. The ages of the Komandorsky samples show good positive correlations with initial Pb and Sr and a negative correlation with Nd isotope ratios. Hence, we propose that the sediment input into the westernmost Aleutian magmas decreased through time, possibly reflecting increasing obliquity of subduction with decreasing age since the Cretaceous, as postulated for the present-day arc going from east to west (Kelemen et al., 2003). Our results point to Aleutian subduction initiation in the Late Cretaceous, ≥ 20 Ma before formation of the HEB, ≥ 15 Ma before initiation of IBM and Tonga subduction, and while the Beringian Margin (NE of the Aleutians) was still volcanically active (until 50 Ma, Davies et al. 1989). Finally, the age data suggest that the Aleutian Arc may have initiated in the west and propagated eastwards, opposite previous proposals (e.g. Scholl 2007), or that the former forearc was further east and was transported westwards via oblique subduction.

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