Tectonic controls for high magmatic fluxes within continental arcs: The Jurassic and Paleogene magmatic record of the Sierra Nevada de Santa Marta, northern Colombia

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Magmatic fluxes in continental arcs have shown to include major flare-ups episodes during their evolution. These episodes reflect catastrophic events which may be connected to major plate tectonic reorganizations. U-Pb zircon crystallization from plutonic rocks (30 U-Pb LA-ICP-MS) and detrital zircons (ca. 2000 U-Pb LA-ICP-MS detrital zircon analysis) from northern Colombia have revealed the existence of two major continental magmatic flare ups in the Middle Jurassic (ca. 190-180 Ma) and the Paleogene (60-45 Ma). Their tectonostratigraphic relations suggest that these two episodes are related to different periods of subduction initation along the Pacific margin of South America. The older is related to an extensional type subduction formed after the break-up of Pangea, whereas the younger Paleogene reflect subduction initiation after arc- continent collision in the Late Cretaceous. These tectonic correlations suggests that the early episodes of subduction in continental margins are responsible for the compositional modification of significant segments of the continental crust.

Pre-eruptive history and longevity of felsic magma in Iceland illuminated by *in situ* U-Th dating and trace-element analysis of zircon from historical eruptions

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We are investigating zircons from silicic volcanic rocks from recent (primarily historical) eruptions in different tectonic regions of Iceland: Torfajokull ~7500 and ~3100 BP and 871 and 1477 AD (rift-tip); Hekla 1104 AD (transitional to rift); and Oraefajokull 1362 AD (off-rift). Precise knowledge of these eruption ages, combined with relatively high precision U-Th disequilibrium ages of zircon (*in situ* SHRIMP-RG) that date crystal growth, permit us to elucidate longevity of and processes within these felsic magma systems. While zircon age distributions from individual eruptions are variable, all display evidence for extensive growth that predates eruptions by >10 k.y. Seventy percent of Hekla and Torfajokull ages are older than 10 ka, with 60% of model ages falling at 10-30 ka and reaching a maximum of 50 ka. The predominance of older ages, the general paucity of <10 ka ages, and observation of near-eruption age crystallization of major phases (e.g., Torfajokull [1]) suggests that these zircons experienced a history separate from that of magma in which they erupted. Zircon morphology (presence of rounded centers and grain boundaries), compositional zoning (core-to-rim complexities in Ti, Hf concentrations) and U-Th ages together point to growth at relatively low temperatures, subsequent storage in a subvolcanic, silicic mush or recently solidified rock, and entrainment by the hotter erupting magma. While Oraefajokull zircons are dominantly <10 ka, grain morphology and trace-element zoning suggest a similarly complex history. The erupted materials were likely ascending magmas that entrained a pre-existing zircon cargo.

[1] Zellmer *et al*. (2008) *EPSL* **269**, 387-397