

Circum-Arctic Lithosphere Evolution (CALE) Project: Origin and evolution of the Arctic-Alaska–Chukotka Microplate (AACM) – links between paleo-Pacific margin tectonics and opening of Amerasia Basin

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Integration of newly available data with published regional geological constraints refines the crustal identity, limits, and history of the AACM. We propose a new plate tectonic model in which the AACM originated within a re-entrant in the paleo-Pacific margin. The AACM comprises parts of the pre-Devonian platforms of Baltica and Laurentia, along with the intervening Devonian “Arctic Caledonian” orogen, an important constraint for Arctic plate restoration. Pacific marginal arc subduction first migrated into the re-entrant during Jura-Cretaceous back-arc convergence and then, following arc-continent collision, migrated away again with back arc extension. The AACM moved to its present position during this Pacific-driven back-arc extension, opening Amerasia Basin in its wake. Although Arctic rifting began in Jurassic, timing and kinematics of Amerasia Basin opening are controversial. Most agree AACM crust on the Pacific side of Amerasia Basin must restore to Lomonosov Ridge and/or the Canada Arctic margin prior to opening. A re-entrant geometry explains the delayed timing of arc-continent collision with the AACM during closure of the Slide-Mountain–Angayucham–Anyui marginal oceanic basins. We propose that the AACM did not move away from Lomonosov Ridge and Arctic Canada until Aptian, driven by post-collisional southward retreat of paleo-Pacific subduction. Our model thus suggests ~125 Ma onset of Amerasia Basin opening is a coeval kinematic back-arc response to Pacific margin retreat facilitated by crustal heating associated with the High Arctic Large Igneous Province (HALIP).