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Geochronology and geochemistry of Cretaceous magmatic rocks of Arctic Chukotka: An update of GEOCHRON2.0

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Field work near and along the Arctic cost of Chukotka (Pevek to Cape Schmidt) contributes new data on the geology of this remote area which belongs to Arctic Alaska-Chukotka terrane or microcontinent which lies to the south of the vast and unexplored East Siberian Shelf, providing better constraints on basement ages and the magmatic and tectonic evolution of this part of the circum Arctic.

U-Pb SHRIMP RG zircon ages from eight largest granitoid plutonic complexes intruded across this region are: Velitkinay (105-100 Ma), Kuvet (104±1 Ma), Pegtymel (108±2 Ma), Lootaypin (107±1 Ma), Inroginay (109-104 Ma), Pevek (108-105 Ma), Severny (88±1 Ma), Pyrkanay (92±1 Ma). Two last plutonic complexes are coeval with calc-alkaline volcanic rocks of the suprasubduction Okhotsk-Chukotka volcanic belt (Arctic Chukotka segment). Earlier plutons have extension-related geochemical signatures (monzonite trend and medium negative Nb-Ta anomalies) and Nd model ages of 1.0-1.8 Ga.

The Velitkinay migmatite-granite complex, south of Cape Billings extends 150 km in a NW-SE direction. Along the southwest flank of the Velitkinay complex, poorly fossiliferous, metamorphosed Devonian (?), Carboniferous, Permian and Triassic strata are involved in regional W-NW-E-SE trending folds with steep axial planes. Country rocks to the plutonic complex dip steeply to gently SW and are intruded by variably deformed K-spar megacrystic biotite granites (102-106 Ma) in turn intruded by variably deformed medium- grained sphene and biotite bearing granites (∼100 Ma, with zircon-core inheritance of 600-630 Ma) related to the migmatitic core of the complex.

Precise U-Pb and Ar-Ar dates such as those above have been collected across North East Russia in the last decade and allow more modern regional synthesis of the age of main magmatic events in order to correlate them with the evolution of the Arctic Ocean basins. Our updated GEOCHRON data base documents important Jura-Cretaceous magmatic provinces and events: (1) 160-145 Ma granitoids of Kolyma batholith belt and coeval Uyandino-Yasachnaya volcanic arc (partly coeval with closure of the Anyui Ocean around c. 160–145 Ma); (2) 142-145 Ma syenites of Egdegkych alkaline complex, and volcanics of subduction related Nutesyn margin continental arc in the South Anyui suture zone; (3) 130-135 Ma Northern belt granites and oldest granitic complexes in Eastern Chukotka (coeval with beginning of HALIP volcanism); (4) 118-122 Ma Tytylveem continental volcano-plutonic belt in Chukotka (5) 100-109 Ma extension-related granite-metamorphic core complexes along Arctic cost of Chukotka (coeval with WPB alkaline basalts of De-Longy archipelago) (6) 90-88 Ma subduction-related Central Chukotka segment of Okhotsk-Chukotka volcanic belt (coeval with opening of the Labrador Sea and Baffin Bay between 90 and 55 Ma, which may have affected the Central Arctic region); (7) 54 to to 37 Ma alkali basalts in the Chersky seismic belt triggered by extension and thinning of the lithosphere combined with adiabatic upwelling of the underlying mantle (coeval with opening of the Eurasia oceanic basin at 55-33 Ma).