Field Guide to the Mesozoic Arc and Accretionary Complex of South-Central Alaska, Indian to Hatcher Pass

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INTRODUCTION

This field trip traverses exposures of a multi-generation Mesozoic magmatic arc and subduction-accretion complex that had a complicated history of magmatic activity and experienced variations in composition and deformational style in response to changes in the tectonic environment. This Mesozoic arc formed at an unknown latitude to the south, was accreted to North America, and was subsequently transported along faults to its present location (Plafker and others, 1989; Hillhouse and Coe, 1994). Some of these faults are still active. Similar tectonic, igneous, and sedimentary processes to those that formed the Mesozoic arc complex persist today in southern Alaska, building on, and deforming the Mesozoic arc. The rocks we will see on this field trip provide insights on the three-dimensional composition of the modern arc, and the processes involved in the evolution of an arc and its companion accretionary complex.

The field trip starts in the Late Cretaceous accretionary prism along Turnagain Arm and finishes in the roots of the Late Cretaceous arc at Hatcher Pass (Plate 1, fig. 1). The transect is divided into 5 parts, which we will visit in the following order: 1) the accretionary prism, consisting of Jurassic to Late Cretaceous sedimentary and volcanic rocks of the Chugach terrane, 2) the terrane boundary, marked by the Border Ranges and Knik Arm Faults, 3) the overlying oceanic arc terrane, consisting of Paleozoic to Jurassic metasedimentary, metavolcanic, and intrusive igneous rocks of the Peninsular-Wrangellia composite terrane, 4) the forearc basin, consisting of Cretaceous and younger deposits that unconformably overlie the Peninsular terrane, and 5) the plutonic underpinnings of the Late Cretaceous arc that was built on the Peninsular terrane after it was accreted to the continental margin (fig. 2).

In Part 1, we start in the youngest rocks of the Chugach terrane, consisting of thin-bedded graywacke and argillite turbidites of the uppermost Cretaceous Valdez Group, near Indian. We'll cross the Eagle River Fault near Falls Creek into an older phase of the accretionary prism, which consists of massive sandstone and conglomerate of the lower Upper Cretaceous part of the McHugh Complex, beautifully exposed at Beluga Point. West of McHugh Creek, we cross abruptly into Lower Cretaceous argillite-matrix mélange of the McHugh Complex, an older, more arcward component of the accretionary prism.

In Part 2, at Potter Marsh, we cross the Border Ranges Fault (BRF), which was the initial thrust contact between the accretionary prism (the Chugach terrane) and the base of the overlying arc (the Peninsular terrane). The BRF is truncated and offset in several places by the much younger, steep Knik Arm Fault, a zone several kilometers in width that we will cross on our way north.

In Part 3, at the South Birchwood exit of the Glenn Highway, we'll examine metamorphosed Mesozoic and Paleozoic sedimentary and volcanic rocks of the Chugiak area that are basement of the Peninsular terrane, an oceanic arc. We'll see parts of the Triassic-Jurassic Talkeetna arc that was built on the Peninsular terrane. Tonalite and gabbro associated with the Eklutna Ultramafic-Mafic Complex intruded metavolcanic and metasedimentary rocks of the Chugiak metamorphic complex, and two new zircon U-Pb ages reported in this guidebook for these intrusive rocks indicate Late Triassic magmatic

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