

Field guide to the Accretionary Complex and Neotectonics of South-Central Alaska, Anchorage to Seward



by
Susan M. Karl, Dwight C. Bradley, Rodney A. Combellick, and Marti L. Miller

2011



Alaska Geological Society
Field Guide Series

Author affiliations:



Susan M. Karl, Dwight C. Bradley, and Marti L. Miller
U. S. Geological Survey
4200 University Dr.
Anchorage, AK 99508-4667



Rodney A. Combellick
Alaska Division of Geological and Geophysical Surveys
3354 College Rd.
Fairbanks, AK 99709-3707

Cover photo:

Imbricate thrust panels of graywacke of the McHugh
Complex northwest of Beluga Point, Turnagain Arm.

FIELD GUIDE TO THE ACCRETIONARY COMPLEX AND NEOTECTONICS OF SOUTH-CENTRAL ALASKA, ANCHORAGE TO SEWARD

by

Susan M. Karl, Dwight C. Bradley, Rodney A. Combellick, and Marti L. Miller

INTRODUCTION

This two-day trip traverses the accretionary complex of south-central Alaska (Fig. 1) from Anchorage to Seward. On Day 1, we stop at exposures of the Mesozoic accretionary complex and observe the effects of modern subduction zone earthquakes along Turnagain Arm and in Whittier, and then drive to Seward for the night. On Day 2, we tour the Seward waterfront on foot, and the Resurrection Peninsula ophiolite by boat. Each of the selected outcrops of the Mesozoic accretionary complex has been described in previous Alaska Geological Society guidebooks (Clark, 1981; Winkler et al., 1984; Bradley et al., 1997; Bradley and Miller, 2006). We visit exposures related to modern tectonism that have been described in guidebooks by Shennan et al. (2008) and Armstrong et al. (2008). The Resurrection Peninsula has been featured in three earlier guidebooks (Miller, 1984; Nelson, Miller, and Dumoulin, 1987; Nelson et al., 1989). Geologic maps that cover the area of the field trip include Clark et al. (1976), Winkler et al. (1981), Nelson et al. (1985), and Winkler (1992). Despite Alaska's vast size, roads are few, so the same places are revisited and we have opportunities to update the guidebooks with new information.

Turnagain Arm, just east of Anchorage, provides a readily accessible cross section through the Mesozoic part of south-central Alaska's accretionary complex. Nearly continuous exposures along the Seward Highway, the Alaska Railroad, and the shoreline display the two main units of the Chugach terrane: the McHugh Complex and Valdez Group. Turnagain Arm, an approximately east-west-oriented fjord, is subject to frequent adiabatic "Chinook" winds. In recent years, outcrops along the highway have often been free of snow and ice even in mid-winter. Turnagain Arm is also one of only about 60 bodies in the world to host a tidal bore. A tidal bore is a wave that forms at the leading edge of the incoming tide, and on a high spring tide, the Turnagain bore can be as high as 2 m and travel at 13 knots, or about 24 km (15 miles) per hour (<http://dnr.alaska.gov/parks/units/chugach/turnagain.htm>). On a typical day, Turnagain Arm has 8 to 10 meter (25 to 30 foot) tides and currents in excess of 5 knots, or about 10 km (6 miles) per hour. One outcrop of the first day will be in Whittier, a seaport at the end of the second longest highway tunnel in North America, which is 4184 m (2.5 miles) long, (the Ted Williams-I90 Tunnel in Boston is 4200 m long) (<http://lotsberg.net/data/USA/list.html>).

Resurrection Bay, a fjord south of Seward, features superb coastal exposures of the 57-Ma Resurrection Peninsula ophiolite. This ophiolite formed at a spreading ridge (Bol et al., 1992) which soon thereafter was subducted, leaving only a few preserved fragments. We believe that these are the last surviving pieces of the Resurrection Plate (Haeussler, Bradley, Wells, and Miller, 2003).