LATE STRUCTURES AND STRAIN HISTORY ACCOMPANYING FLUID FLOWS IN THE WESTERN TACONIC OROGEN OF THE NEW YORK-VERMONT APPALACHIANS

and

STRUCTURAL GEOLOGY AND TECTONIC EVOLUTION OF THE NAMCHE BARWA REGION, TIBET

by

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ABSTRACT

Parts of two separate collisional orogens are investigated in this study. One is the Middle-Late Ordovician Taconic orogen in eastern New York and western Vermont, and the other is the active Himalayan orogen of southeastern Tibet. Part I through III deal with a strain history and associated fluid properties during the late Taconic event in the western margin of the orogen and adjacent foreland. Senses of slip along slickensided quartz-calcite veins in the melange belt and their field relationships suggest an extension event following the late Taconic thrusting (Part I). In Part II, oxygen isotope analysis of veins and host rocks, and fluid inclusion and stable isotope data from veins/vug-fillings are presented. I propose that metamorphic waters were expelled from the internal Taconic orogen and subject to a large-scale westward migration principally within the detachment zone. In Part III, orogen-parallel normal faults newly mapped in the Bald Mountain region also show the regional late extension of the orogen, induced by breakoff of the eastward-subducted slab. The extension probably started in the New York promontory and propagated northward. Strike-slip cross faults/veins were formed by differential motions induced by northward propagation of the tear point and a coupled marginal pull from the dangling slab edge. Part IV addresses structures and uplift/exhumation mechanism of the Namche Barwa massif, southeastern Tibet. The Namche Barwa massif is a dome-antiformal active basement uplift, where a part of the Higher Himalaya with the Tethyan-metasedimentary cover have been structurally uplifted through a tectonic half window marked by the Indus-Tsangpo suture. The western-northern massif margin predominantly contains the Himalayan fabrics locally overprinted by younger fabrics. The Nam-la Thrust Zone recording intense south- to southwest-directed thrust motion defines the southern boundary of the recently and rapidly exhumed massif core region. Anomalous lithospheric thickening is suggested as the most plausible mechanism causing the anomalous uplift/exhumation of the Namche Barwa massif.

To my mother who has been always dedicated to family

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