Geophysical Research Abstracts
Vol. 12, EGU2010-6672-1, 2010
EGU General Assembly 2010

Types and Evolutionary Processes of Formation of the Ordovician Taconic Mélanges in the Central and Northern Appalachian Orogenic Belt, Eastern USA

Giulia Codegone (1), Andrea Festa (1,2), Yildirim Dilek (2), and Gian Andrea Pini (3)

(1) Dipartimento di Scienze della Terra, Università di Torino, 10125 Torino, Italy (giulia.codegone@unito.it), (2) Department of Geology, Miami University, Oxford, OH 45056, USA, (3) Dipartimento di Scienze della Terra, Università di Bologna, 40127 Bologna, Italy

We examined in eastern Pennsylvania, New York and Vermont (USA) various types of unmetamorphosed mélanges, which formed at an accretionary wedge-front of the Ordovician Taconic allochthon in the central and northern Appalachian orogenic belt. These mélange occurrences display structural evidence for progressive deformation of a middle-late Ordovician trench-fill succession during the subduction-accretion to collision tectonic episodes of the Taconic Orogeny. Mélanges and broken formations (mélanges s.l.) commonly represent the products of tectonic, sedimentary and diapiric processes during the evolution of accretionary wedges. Geologic mapping and stratigraphic-structural observations in the central and northern Appalachians indicate that different types of mélanges s.l. appear to have developed in different structural positions with respect to the wedge front, and that they show different types of chaotic arrangements and deformation intensities depending on their origin, evolution, and tectonic position. Mass-wasting deposits and/or olistostromes were emplaced at the wedge front as precursory olistostromes of the advancing allochthons, providing exotic material into a flysch succession. These sedimentary mélanges were then overridden by the advancing thrust sheet and were incorporated into the shear zone forming an olistostromal carpet. Shearing led to the juxtaposition and mixing of rocks (in some cases including exotic blocks) of various ages, and subsequently to the formation of boudinage, enucleation of isoclinals folds, and phacoidal microshear cleavages. Broken formations, mainly formed at the base of the wedge front and Taconic thrust fault systems, occur in a continuum ranging from originally coherent stratigraphic successions to variously disrupted strata, and finally to an entirely chaotic block-in-matrix fabric, which lacks a stratigraphic continuity. In-situ accretion-related deformation caused by tectonic loading and related increase of fluid pressure developed a progressive layer-parallel extension through the formation of boudinage and pinch-and-swell structures in the trench-fill deposits. Diapiric mélanges formed from under-consolidated and over-pressured sediments at the base of or within the accretionary wedge, and incorporated exotic and non-exotic blocks into a muddy matrix during its upward rise. Sedimentation and contractional deformation also contributed significantly to the Taconic mélange formation. The final mélange product generally preserves the artefacts of the only last mélange-forming process, but may represent the product of a complex interaction of superimposed processes that in many cases are reminiscent of a tectono-sedimentary evolution of a mélange developed in a single geodynamic setting.