

Mélanges and mélange-forming processes: a historical overview and new concepts

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Mélanges represent a significant component of collisional and accretionary orogenic belts and occur widely around the world. Since its first introduction and use, the term has evolved to cover both processes (tectonic, sedimentary, and diapiric) and tectonic settings of mélange formation. The meaning and significance of various terms referring to the origin of ‘block-in-matrix chaotic rocks’ are still subject to debate. This study presents a historical overview of the evolving mélange concept and investigates the relationships between mélange types and their tectonic settings of formation. We investigate the contribution of mass-transport versus contractional deformation processes at the onset of mélange formation and throughout the evolution of different mélange types, and the nature of the continuum and transition from broken formations to true tectonic mélanges. A mélange is a mappable chaotic body of mixed rocks with a block-in-matrix fabric whose internal structure and evolution are intimately linked to the structural, sedimentary, magmatic, and metamorphic processes attending its origin. On the basis of a comparative analysis of exhumed, ancient on-land mélanges and modern tectonic environments, where mélange-forming processes are at work, such units are classified into those related to extensional tectonics, passive margin evolution, strike-slip tectonics, subduction zones, collisional tectonics, and intracontinental deformation. Sedimentation and contractional deformation contribute significantly to mélange formation in all these tectonic environments, although the internal structure of deposits is strongly controlled and overprinted by processes that prevail during the last stages of mélange formation in a single tectonic setting. Tectonic mélanges are commonly subordinate to broken formations and are restricted to narrow, elongated-to-coalescent fault zones, large-scale fault zones, and plate boundaries.

Keywords: mélanges; broken formations; olistostromes; mud diapirs; subduction processes; obduction

Introduction

Mélanges (French – ‘mixtures’) are mappable units or bodies of mixed rocks including blocks of different ages and origin, commonly embedded in an argillitic, sandy, or ophiolitic matrix, or more rarely in a carbonatic, evaporitic, or volcanic matrix (block-in-matrix fabric). Reflecting the lack of internal continuity of strata and/or contacts because of high stratal disruption, these units are interpreted as ‘chaotic’. Mélanges represent a

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