1

Submarine Landslide Deposits in Orogenic Belts: Olistostromes and Sedimentary Mélanges

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ABSTRACT

Olistostrome and sedimentary mélange are two synonymous genetic terms referring to the "fossil" products of ancient submarine mass-transport processes exhumed in orogenic belts. Lithology, stratigraphy, lithification degree, and structural anatomy of these units reflect the synergic and combined action of different mass-transport processes leading to composite deposits developed through multistage deformation phases. The general depositional physiography, tectonic setting, and the type, scale, and rate of slide mass transformation mechanisms during the downslope motion and emplacement and postdepositional processes are the main factors controlling the final internal anatomy of olistostromes and sedimentary mélanges. These features are commonly progressively reworked by subsequent burial, diapiric, and tectonic processes and may be eventually almost completely obliterated by metamorphic processes during orogenic belt and/or subduction complex evolution. The correct recognition of olistostromal units and their intrinsic features in different orogenic belts needs extensive and careful fieldwork and ultimately provides excellent proxies for the timing of various tectonic-sedimentary events interacting during the Wilson cycle. The basic concepts of structural geology, sedimentology, stratigraphy, and basin analysis should be jointly applied in studying the internal structure, lithological arrangement, and formation-deformation mechanisms of olistostromes and sedimentary mélanges.

1.1. INTRODUCTION

Major sedimentary accumulations (basin wide) originated from large-scale submarine landslides and slope failures crop out widely within the sedimentary record of mountain belts throughout the world (Figure 1.1). These ancient "fossil" counterparts of the mass-transport deposits (MTDs) and mass-transport complexes (MTCs), which are commonly observed in the geophysical profiles of present-day continental margins (see, e.g., Hampton et al., 1996; Weimer & Shipp, 2004, and further discussed in Part II), are also known by the synonymous names "olistostrome" or "sedimentary mélange." Such units are invaluable tools for the study of the internal anatomy of submarine landslide deposits across different scales (Lucente & Pini, 2008; Ogata et al., 2012a; Festa et al., 2016).

Present-day MTDs are commonly characterized by great internal heterogeneity and deformation, resulting in two-dimensional (2D) and three-dimensional (3D) seismic imagery characterized by acoustic artifacts and transparent zones. For this reason, apart from some exceptions (see, e.g., Gamboa et al., 2010; Strasser et al., 2012; Ogata et al., 2014a; Alves, 2015), including the most representative ones discussed in this book, the complex internal structure of MTDs usually has been overlooked.

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Submarine Landslides: Subaqueous Mass-Transport Deposits from Outcrops to Seismic Profiles, Geophysical Monograph 247, First Edition. Edited by Kei Ogata, Andrea Festa, and Gian Andrea Pini.