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ON THE ROLE OF SEDIMENT COMPACTION AND TECTONIC SUBSIDENCE IN RELATIVE SEA-LEVEL RECONSTRUCTIONS – A CASE STUDY FROM THE APUO-VERSILIAN COASTAL PLAIN (NW MEDITERRANEAN)

ABSTRACT: PAPPALARDO M., CHELLI A., BINI M., BRÜCKNER H., MORIGI C. & RAGAINI L., *On the role of sediment compaction and tectonic subsidence in relative sea-level reconstructions – a case study from the Apuo-Versilian coastal plain (NW Mediterranean)*. (IT ISSN 0391-9838, 2021).

This paper investigates the impacts of sediment compaction and tectonic subsidence on Mediterranean relative sea-level (RSL) reconstructions, using as a case study a coastal plain in NW Italy (Apuo-Versilian Plain). We coupled sedimentological and detailed micro and macrofaunal analyses on a 9-m-thick sediment sequence in order to produce two relative sea-level index points and two limiting points. The chronology of these sea-level data was based on a set of new radiocarbon dates performed on organic layers found within the sedimentary sequence. The new dataset allowed for better quantify the role of compaction-driven subsidence in the Apuo-Versilian plain providing evidence that its influence may be more pervasive than is commonly appreciated in medium-sized coastal plains dominated by minerogenic sediments. We discuss that the misfit of the RSL data with existing GIA models in these environmental settings should be accounted for considering the possible role of sediment compaction, so that neglecting to correct for this effect in reconstructing past relative sea levels from the sedimentary record may be critical.

KEY WORDS: Relative sea-level change, Vertical land movements, GIA models validation, Minerogenic sediments, Holocene, NW Italy.

RIASSUNTO: PAPPALARDO M., CHELLI A., BINI M., BRÜCKNER H., MORIGI C. & RAGAINI L., *Il ruolo della compattazione dei sedimenti e della subsidenza tettonica nelle ricostruzioni dei livelli relativi del mare – un caso di studio dalla pianura costiera Apuo-Versiliese (Mediterraneo Nordoccidentale)*. (IT ISSN 0391-9838, 2021).

Questo lavoro si propone di analizzare l'impatto che la compattazione dei sedimenti e la subsidenza tettonica hanno sulla ricostruzione delle variazioni relative del livello del mare lungo le coste del Mediterraneo, attraverso il caso di studio della Pianura Apuo-Versiliese (Italia Nord-occidentale). L'analisi sedimentologica e micro-macro-faunistica di una sequenza sedimentaria di 9 m di spessore ha consentito di porre quattro specifici vincoli altimetrici ai paleo-livelli del mare in un intervallo cronologico ben definito attraverso la datazione ¹⁴C di livelli organici presenti nella sequenza. I dati ottenuti consentono di stimare l'entità della subsidenza dovuta alla compattazione dei sedimenti nell'area di studio, dimostrando che il suo ruolo può essere più importante di quanto sinora comunemente creduto nelle pianure minori caratterizzate da sedimenti in prevalenza minerogenici. Si argomenta infine l'ipotesi che in questi contesti sedimentari le discrepanze tra le variazioni relative del livello del mare testimoniate dagli indicatori e quelle previste dai modelli possa dipendere in larga parte dal fatto che la compattazione dei sedimenti è spesso stata considerata trascurabile e quindi le quote dei paleo-livelli relativi del mare non sono state corrette per questo effetto.

TERMINI CHIAVE: Variazioni relative del livello del mare, Movimenti verticali del terreno, Validazione dei modelli glacio-idro isostatici, Sedimenti minerogenici, Olocene, Italia Nordoccidentale.

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INTRODUCTION

Holocene Relative Sea Level (RSL) records are often compared with geophysical models of glacial isostatic adjustment (GIA) in order to unravel the signal of ongoing vertical land movement (VLM, Engelhart & alii, 2009). The effect of VLM should, therefore, be disentangled and reliably quantified before cross-checking relative sea-level index points (SLIs, i.e. a point constraining the past sea levels in time and space, Hijma & alii, 2015) with geophysical predictions of sea-level change. Negative VLMs, generally known as subsidence, may be triggered by different fac-