

# Contribution to the understanding of the Ionian Basin sedimentary evolution along the eastern edge of Apulia during the Late Cretaceous in Albania



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## ABSTRACT

Integrated in the peri-Adriatic domain, the Ionian Basin extended along a NW-SE direction during the Late Cretaceous, limited on its sides by the Apulian and the Kruja platforms. The basal/slope succession was studied in seven outcrops exposed in the Albanian fold-and-thrust belt. Sedimentological investigations, supported by bio- and chronostratigraphy were performed on calcareous Upper Cretaceous hemipelagites, gravity-flow deposits and slumps. The western part of the basin was studied, revealing a strong influence of the Apulian margin, alternatively shedding sediment basinward, by means of a tectonically controlled edge. The Late Albanian to Cenomanian period is characterized by the settling of muddy debrites along the margin. A deep basinal environment characterizes this period which prolongs until the Santonian, with no significant influx of the platform basinward. This sedimentary setting abruptly changed at the end of the Santonian, with an important influx derived from both platforms. Coarsening and thickening upward sequences show a progressive increase in sediment shedding during the Campanian. The Late Campanian-Early Maastrichtian period points out a major change on the resedimentation processes with the settling of several slumped units reworking thick sediment packages. The latter can be traced along the Apulian margin, testifying of instabilities along the edge of Apulia.

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## 1. Introduction

Characteristic features of carbonate platform margins have for a long time instigated scientific investigations (Cook et al., 1972; Read, 1982). Modern and ancient systems investigated throughout the world revealed significant differences when compared with their siliciclastic counterparts in terms of facies, morphology and dynamics. Among the characteristics of carbonate systems, common features are i) the “sheet-like” character of resedimented deposits (Crevello and Schlager, 1980; Schlager and Ginsburg, 1981; Mullins and Cook, 1986; Drzewiecki and Simó, 2002; Etienne, 2012), ii) the “line-source”, or apron-like morphology of many carbonate slopes (Mullins and Cook, 1986; Playton et al., 2010), and iii) the “highstand shedding” of carbonate platforms basinward (Droxler and Schlager, 1985; Eberli, 1991; Schlager et al., 1994; Bernet et al., 2000). The Late Cretaceous paleogeography of the Neo-Tethys, dominated by a framework of carbonate platforms and basins (Channell et al.,

1979; D'Argenio et al., 1980; Zapatero, 1994), is adequate for the study of carbonate margin evolution. During this period, the Apulian and Gavrovo–Tripolitza (Kruja) platforms developed in the peri-Adriatic region, separated by the Ionian Basin. The latter exposes resedimented deposits that have been extensively studied by a number of authors in a small area, i.e. the Gargano promontory, exposing an example of a platform-to-basin relation (Borgomano, 1987, 2000; Bosellini et al., 1993, 1999; Graziano, 2000, 2001; Hairabian et al., 2014-in this volume). In contrast, little information exists with regard to the sedimentary processes involved in the sedimentation of a thick succession of about 300 m of Upper Cretaceous deposits outcropping in Albania. Dewever et al. (2007), Vilasi (2009) and Rubert et al. (2012) recently gave a first overview of the resedimented facies composing the basinal succession. Nevertheless, little assessment was provided regarding the sediment distribution along the Apulian carbonate margin and the basinal characteristics.

The aim of this paper is to understand the sedimentary dynamics of the Ionian Basin during the Late Cretaceous. Special attention is given to the identification of specific sedimentation stages related to the interplay between eustacy, tectonics and sediment supply governing the evolution of this carbonate system. The studied successions give new

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insights for the geometrical characterization of sediment accumulations along the Apulian edge at a reservoir scale. This architectural framework is potentially of high interest, considering that the Upper Cretaceous to Paleocene interval is recognized as the main oil bearing reservoir unit in Albania.

## 2. Geological setting

The Albanides (Channell et al., 1979; Meço et al., 2000; Robertson and Shallo, 2000) are composed of seven litho-tectonic units or zones (Fig. 1) integrated in the Albanian fold-and-thrust belt (Swennen et al., 2003; Vilasi, 2009) which extends along the country following a NNE–SSW orientation (Fig. 1). This structural framework is inherited from several phases of deformation that affected the deposits during the Alpine Orogeny from Late Eocene to Pliocene, following a westward propagation of the thrust front (Aubouin, 1959; Meço et al., 2000; Robertson and Shallo, 2000). In the south of Albania, the external

Albanides are broadly exposed, revealing from east to west, the Kruja, Ionian and Sazani zones (Fig. 1B, C). These zones are respectively related to the Kruja Platform, the Ionian Basin and the Apulian Platform (Fig. 1A, B) which developed during the Mesozoic in the peri-Adriatic region (Channell et al., 1979; Robertson and Shallo, 2000).

A syn-rifting regime is attested from the Middle Jurassic till the Early Cretaceous (Channell et al., 1979; Zapatero, 1994; Borgomano, 2000; Karakitsios, 2013). It is characterized by the progressive settling of a monotonous basinal sedimentation within the Ionian Basin, while platform sedimentation took place on the adjacent Apulia and Kruja Platforms (Brahimi et al., 1992; Zapatero, 1994; Meço et al., 2000). A post-rifting regime is assumed from Early Cretaceous (Karakitsios, 2013) with an enhanced differentiation of the platform/basin system and a progressive influx of calciclastic material into the Ionian Basin provided from the Apulian and Kruja Platforms (Skourtsis-Coroneou et al., 1995; Karakitsios, 2013). In Greece, autochthonous basinal sedimentation is attested in the Vigla Formation (Aptian–Early Turonian) while

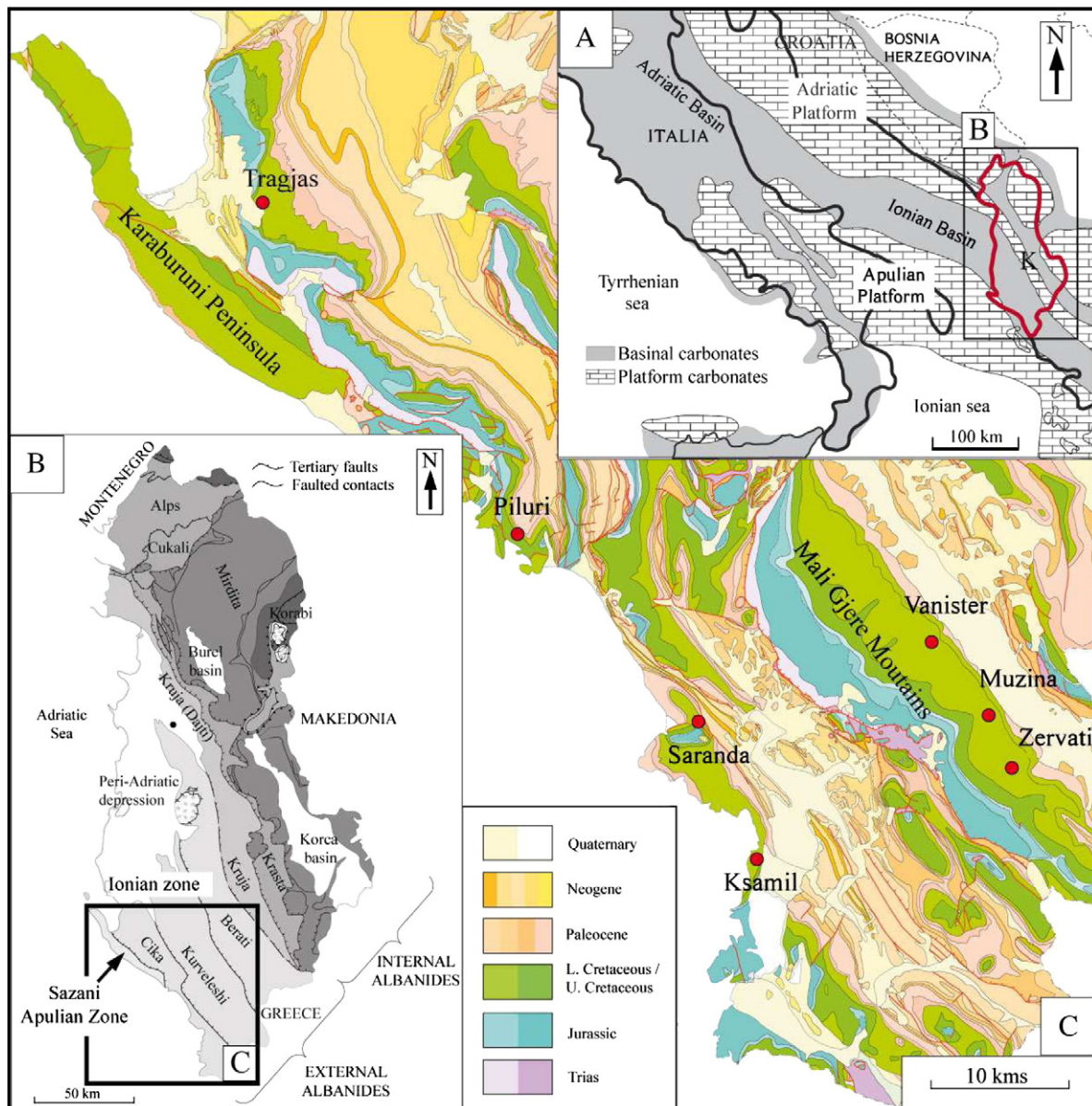


Fig. 1. (A) Middle-Late Liassic to Late Cretaceous facies map of the peri-Adriatic region, modified from Rubert et al. (2012) and Zapatero (1994). Abbreviations: K, Kruja Platform. (B) Simplified litho-tectonic map of Albania, with indication of the study area (rectangle), modified from Moisiu and Gurabardhi (2004) and Rubert et al. (2012). (C) Location of the studied outcrops, projected on the geological map modified from Moisiu and Gurabardhi (2004).

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