

Seismo-stratigraphic study of the Plio-Pleistocene foredeep deposits of the Central Adriatic Sea (Italy): Geometry and characteristics of deep-water channels and sediment waves

Roberto Tinterri^{a,*}, Lorenzo Lipparini^b

^a Department of Earth Sciences, University of Parma, Viale Parco Area delle scienze, 157/A, 43124 Parma, Italy

^b Medoilgas Italia S.p.A. (MOG Plc Group), Italy

ARTICLE INFO

Article history:

Received 27 February 2012

Received in revised form

1 November 2012

Accepted 4 November 2012

Available online 29 November 2012

Keywords:

Plio-Pleistocene

Adriatic sea

Foredeep turbidites

Seismo-stratigraphy

Meandering channels

Sediment waves

Bottom currents

ABSTRACT

An integrated 3D Seismo-Stratigraphic study was carried out in the Central Adriatic Sea (Italy), off the coast of the Abruzzi region, aiming at a detailed description and interpretation of the Plio-Pleistocene foredeep deposits, onlapping on top of the Adriatic foreland substratum, represented, in this area, by the flexed Apulia carbonate Platform and its northern margin.

The Plio-Pleistocene stratigraphic succession shows a general shoaling upward trend, in which the vertical evolution from deep water deposits into deltaic and nearshore strata is related to the progressive eastward shift of the main depocentres, produced by thrust propagation towards the outer margin of the Apennine foredeep.

The analysed succession has been subdivided into five informal stratigraphic units, in which the main erosional features, probably associated with sequence boundaries, have been highlighted; moreover, a comparison with the main regional stratigraphic schemes available in the literature, has also been proposed.

A detailed seismic analysis has allowed the identification and interpretation, from a depositional point of view, of several deep water seismo-depositional elements organised in a complex vertical stacking pattern. In particular, possibly for the first time in this area, different types of deep water meandering channels and well-developed sediment waves, probably related to bottom currents, have been recognized and described.

© 2012 Elsevier Ltd. All rights reserved.

1. Introduction

An integrated 3D Seismo-Stratigraphic study was carried out on a portion of the Central Adriatic Sea (Italy), off the coast of the Abruzzi region (see Fig. 1), aimed at a detailed definition and interpretation of the Plio-Pleistocene stratigraphic succession, the sedimentary evolution of the area over this time interval and the implication in terms of possible reservoir distribution.

Although several works have already described and discussed the Plio-Pleistocene stratigraphic succession in portions of eastern-central Apennines (Ori et al., 1991; Artoni and Casero, 1997; Carruba et al., 2006; Centamore and Nisio, 2003; Di Celma et al., 2010), detailed subsurface studies of these deposits in the Adriatic foredeep are relatively rare in the literature (see for example Ori et al., 1986, 1991; Dattilo et al., 1999).

This study is part of a more extended technical effort, which also includes petrophysical studies, 3D seismic interpretation, seismic re-processing, elastic inversion and 3D geological modelling, and is a result of the collaboration between the University of Parma and Medoilgas Italia S.p.A. (Mediterranean Oil & Gas Plc. Group).

The main objective of this paper is to summarize some of the results of this collaboration, describing the stratigraphic evolution of the area in the Plio-Pleistocene time and more specifically the seismo-depositional characteristics of the depositional elements recognized. In particular, the studied stratigraphic succession shows a complex stacking of different depositional elements among which, possibly recognized in this area for the first time, well-developed Pliocene deep water meandering channels and sediment waves (see also Lipparini and Tinterri, 2010, 2011).

2. Data and methodology

The data used in this area are covered by various vintages of 2D seismic lines and by a 3D survey, NW/SE oriented, and covering an

* Corresponding author. Tel.: +39 0521 905363; fax: +39 0521 905365.
E-mail address: roberto.tinterri@unipr.it (R. Tinterri).

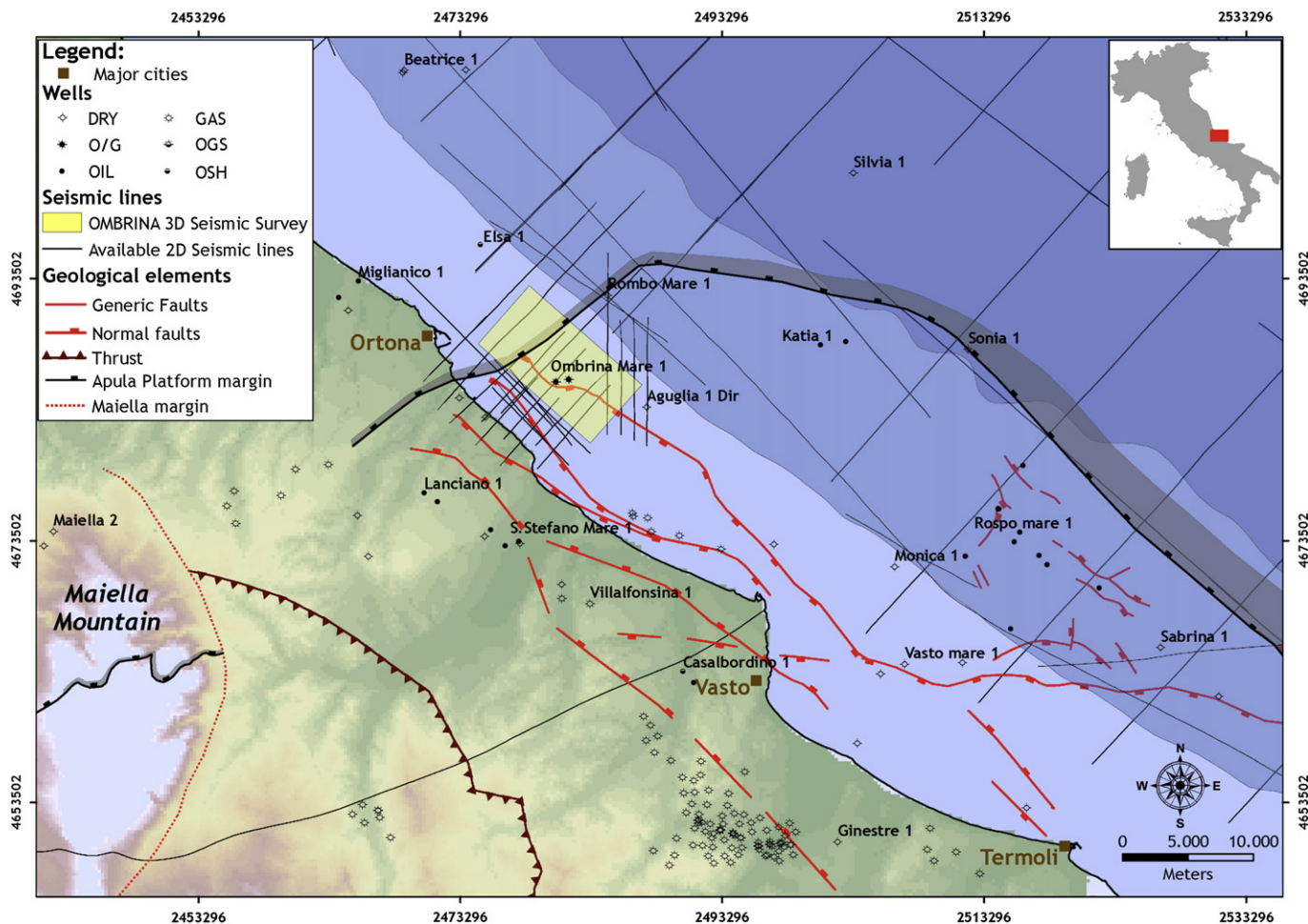


Figure 1. Base map of the studied area, Abruzzo Region, Italy, and its offshore – Central Adriatic Sea. Available 2D and 3D seismic data and wells are shown.

area of approximately 74 sqkm. This study is mainly based on these good quality 3D seismic data (acquired in 1987 by Elf Aquitaine and reprocessed in 2010), and some key wells in the area (Fig. 1).

The work is the result of an integrated seismo-stratigraphic interpretation effort that can be summarised in the following main steps:

1. Seismic sequence identification on the basis of regional continuous and well recognizable seismic markers. However, the main erosive features, which can represent tectonically-controlled sequence boundaries and consequently the main unconformity bounded stratigraphic units (UBSU) or depositional sequences, as meant by Salvador (1994) and Murphy and Salvador (1999), are also indicated.
2. Description and interpretation, through a classic use of amplitude and its basic derivate attributes ('Variance' in particular), of the main recognized seismo-depositional elements, as meant by Mutti and Normark (1987, 1991), i.e. basic mappable components of both modern and ancient turbidite systems that can be recognized in marine, outcrop and subsurface studies. Depositional elements are characterized by distinctive assemblage of similar facies associations that allow differentiation from adjacent strata that bound them laterally and vertically. In particular, as mentioned above, the stratigraphic interval analysed in this work is the result of a complex stacking of different seismo-depositional elements: several classes of these depositional bodies have been

identified, interpreted and described in detail from a sedimentological and seismic point of view.

3. Definition of the regional stratigraphic framework for the studied stratigraphic interval with particular focus on the vertical stratigraphic evolution and the comparison to the main regional studies available in the literature.

3. Geological and stratigraphic setting and previous works

The stratigraphic succession of the study area was deposited in the central Adriatic foredeep during the Pliocene and Pleistocene. Figure 2A shows the study area inserted in a simplified Italy structural scheme, where the peri-Adriatic foredeep bordering eastward the Apennine chain can be observed. The Plio-Pleistocene foredeep is the last of a series of foredeep basins developed from the Oligocene to the Neogene in front of the Apennine growing orogenic wedge characterized by eastward active thrust propagation (Fig. 2B), and where the accommodation was essentially provided by the subsidence of an outer Adriatic foreland plate under the load of the advancing orogenic wedge. In this setting, the sedimentary infills of the older foredeeps were progressively incorporated into the orogenic wedge. By contrast, in the studied area, the Plio-Pleistocene peri-Adriatic foredeep sediments have not been included in the Apennine thrust and fold belt and are, consequently, emplaced in a wide, almost not deformed, depositional basin. In particular, the Plio-Pleistocene stratigraphic

Download English Version:

<https://daneshyari.com/en/article/4695726>

Download Persian Version:

<https://daneshyari.com/article/4695726>

[Daneshyari.com](https://daneshyari.com)