

PLIO-QUATERNARY PALEOENVIRONMENTAL EVOLUTION ACROSS WESTERN UMBRIA AND TUSCANY

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ABSTRACT: Bizzarri R., Baldanza A. & Argenti P., *Plio-Quaternary paleoenvironmental evolution across Western Umbria and Tuscany*. (IT ISSN 0394-3356, 2011)

The area across western Umbria and Tuscany records a complex evolution, from Early Pliocene to Late Pleistocene, due to the interaction among coastal marine and continental environments, and among tectonics and sedimentation. Throughout Pliocene, the extensional Valdichiana Basin underwent marine conditions, but marine deposits encompass different ages across the area. From Late Pliocene to Early Pleistocene, a continental, river-dominated environment developed; the Gelasian-Santernian Città della Pieve deltaic deposits belong to the "Chiani-Tevere" cycle and are related to this continental evolution. The Trasimeno Basin development and the NE tilt of both Città della Pieve deltaic deposits and Valdichiana continental deposits are due to Early - Middle Pleistocene regional tectonics.

RIASSUNTO: Bizzarri R., Baldanza A. & Argenti P., *Evoluzione paleoambientale plio-quadernaria tra l'Umbria occidentale e la Toscana*. (IT ISSN 0394-3356, 2011)

L'area compresa tra l'Umbria occidentale e la Toscana ha avuto una complessa evoluzione durante il Pliocene e il Pleistocene, legata agli articolati rapporti esistenti tra ambienti marino - costieri e continentali, nonché alla tettonica. Nel Pliocene, la Valdichiana meridionale ospita una sedimentazione marina, ma tali depositi non hanno ovunque la stessa età. Un ambiente fluviale si sviluppa tra il Pliocene superiore e la fine del Pleistocene inferiore; i depositi deltizi di Città della Pieve appartengono tutti allo stesso ciclo ("Chiani-Tevere") e possono essere facilmente correlati, su base sedimentologica e stratigrafica, ad almeno parte dei depositi fluviali della Valdichiana. L'impostazione del Bacino del Trasimeno e la generale inclinazione verso NE dei depositi deltizi di Città della Pieve e continentali della Valdichiana, tra il Pleistocene inferiore e medio, dipendono dalla tettonica regionale.

Key words: Sedimentology, Paleoenvironmental restoration, Pliocene, Pleistocene, central Italy.

Parole chiave: Sedimentologia, Ricostruzione paleoambientale, Pliocene, Pleistocene, Italia centrale.

The present-day area across western Umbria and Tuscany, among the southern *Valdichiana* Basin, the *Trasimeno* Lake and the *Tavernelle-Pietrafitta* Basin, underwent a complex evolution from Messinian-Early Pliocene to present day, not yet completely defined. Its earliest evolution phases reflect the interaction between marine and continental environments, both referable to *Valdichiana* Basin, whereas the successive phases have been strongly influenced by tectonics, such as for the development of *Trasimeno* Basin. The aim of this work is to provide data collected during the last years (BIZZARRI, 2006, 2007; BIZZARRI & BALDANZA, 2009; ARGENTI *et al.*, in press) and to compare it with previous interpretations (VERRI, 1885, 1918; PASSERINI, 1965; JACOBACCI *et al.*, 1967, 1969; AMBROSETTI *et al.*, 1977, 1978, 1987; CATTUTO *et al.*, 1983; COSTANTINI & DRINGOLI, 2002; ARUTA *et al.*, 2004; BARCHI *et al.*, 2007), in order to propose some reasoned paleoenvironmental and stratigraphic schemes for the study area, mainly for the Late Pliocene - Late Pleistocene interval (Fig.1). The better stratigraphic definition for both *Città della Pieve* deltaic deposits and *Valdichiana - Trasimeno* continental deposits, as well as the sedi-

mentological and paleoenvironmental reconstruction, allow to fix some points. Marine deposits show a different age across the area, the older being confined on eastern *Cetona* Mt. side and buried under continental units in the *Trasimeno* area. They represent the first depositional cycle (Pliocene cycle: AMBROSETTI *et al.*, 1977, 1987). The *Città della Pieve* coastal marine deposits, related to a deltaic environment, are younger and belong all to the same successive depositional cycle ("Chiani-Tevere" cycle: AMBROSETTI *et al.*, 1977, 1987); moreover, they are sedimentologically and stratigraphically related to the *Valdichiana* fluvial deposits (BIZZARRI 2006, 2007; BIZZARRI & BALDANZA 2009).

Deposits belong to a braided river dominated environment, where thick gravel and sand channels alternate to sandy-silty plain massive sediments (BIZZARRI, 2006; ARGENTI *et al.*, in press). This high-energy environment was associated to the *Città della Pieve* deltaic environment evolution (BIZZARRI, 2006, 2007; BIZZARRI & BALDANZA, 2009). The local recovery of *Anancus arvernensis* remains into river channel gravels (*Vaiano*: ARGENTI, 2004; *Cetona*: BOSCATO *et al.*, 2008) docu-

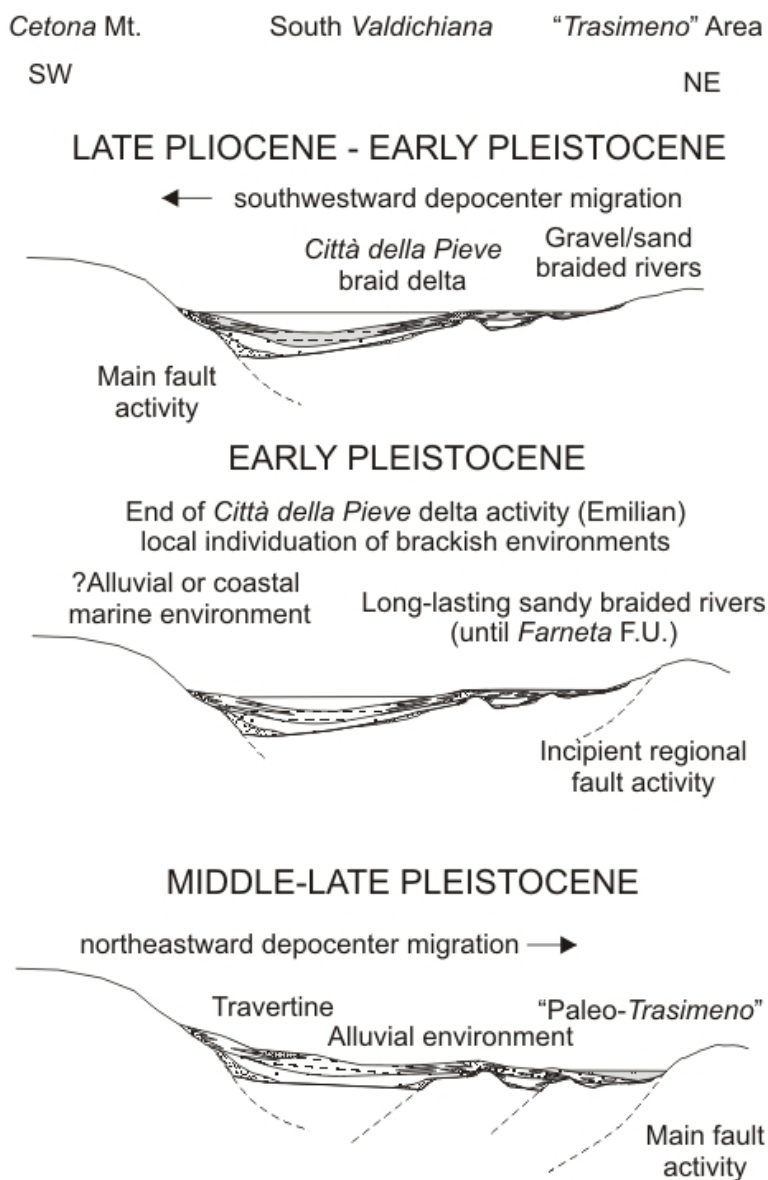


Fig. 1, Evolution of the study area from Late Pliocene to Late Pleistocene.

Evoluzione dell'area tra il Pliocene superiore e il Pleistocene superiore.

ments the occurrence of Middle Villafranchian faunas. As the southern *Valdichiana* was characterized by high energy rivers, draining toward the near marine coast and building a large and steady fan-delta in the *Città della Pieve* area, the *Tavernelle-Pietrafitta* area represented an intermountain closed basin.

In the *Valdichiana* continental basin, a stable alluvial plain environment persists until the end of Early Pleistocene (Fig. 1). The majority of fossil record regards *Tasso* and, principally, *Farneta* F.U.s (ARGENTI, 2004 *cum biblio*). Three main depositional continental environments are documented in the area through the end of Middle Villafranchian and the Late Villafranchian (BIZZARRI, 2006; PAZZAGLIA, 2007; BARCHI *et al.*, 2007; BIZ-

ZARRI *et al.*, 2008; ARGENTI *et al.*, in press). In the *T. Tresa* area, alluvial fan to piedmont deposits outcrop, and their occurrence seems to be confined to *Tasso* F.U..

In the *Tavernelle-Pietrafitta* area, a progressing transition from lacustrine to swampy deposits took place during the *Tasso - Farneta* interval. Finally, sandy and silty-clayey deposits are widely diffused in the area from the *Farneta* Abbey to the *Città della Pieve* hills. Deposits are still related to a fluvial environment: the prevailing sandy sedimentation, with common St and Sp cross-laminations, testifies of a less energetic and more organized river pattern. Sandy channel deposits are intermingled to clay, the latter bearing paleosoils and sheetflood deposits and indicative of a wider and more stable alluvial plain. As at the *Tasso* F.U. interval occasional communications occurred among the *Tavernelle* Basin and the sea nearby, the *Pietrafitta* swamp environment can be imagined as a lateral and temporary abandoned river branch, now clearly related to *Valdichiana* continental environment.

Difference in age among deltaic deposits related to *Valdichiana* rivers suggest a progressive shift southward of basin depocenter (Fig. 1), presumably related to a tectonic activity of eastern *Cetona* master fault (BARCHI *et al.*, 2007).

The on-set of the *Trasimeno* Basin is related to NE rotation of the area between Early and Middle Pleistocene, that is also responsible for the northeastward inclination of both *Città della Pieve* deltaic deposits and *Valdichiana* continental deposits (Fig. 1). The evolution model underlines a progressive

sea-retreat south-westward during Early Pleistocene, probably representing the first indication of the regional extensional tectonics, which deeply modified the area from Middle Pleistocene onwards. This main event is about 1 My younger than what thought by AMBROSETTI *et al.*, (1977, 1987) and CATTUTO *et al.* (1983): in fact, it is not due to the so called "*Acquatraversa*" phase (Piacenzian: AMBROSETTI *et al.*, 1977, 1987) but represents the consequences of a successive regional tectonics, as inferred by BARCHI *et al.* (2007). In our reconstruction, the main unconformity separating, on seismic sections, *Valdichiana* marine and continental deposits (U1 unconformity of BARCHI *et al.*, 2007) can be referred to "*Acquatraversa*": in that case, this phase represents the moment of diffuse

Valdichiana continentalization. The data here proposed provide a paleoenvironmental characterization of *Valdichiana* from Early Pliocene to Holocene, according to both literature data on *Sarteano-Cetona* area (COSTANTINI & DRINGOLI, 2002), and to seismic sections (BARCHI *et al.*, 2007).

Though, some minor adjustments are needed, and the studies are still in progress.

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