# GEOMORPHOLOGICAL ANALYSIS OF DRAINAGE CHANGES IN THE NE APENNINES PIEDMONT AREA: THE CASE OF THE MIDDLE TAVO RIVER BEND (ABRUZZO, CENTRAL ITALY)

Scale 1:15,000

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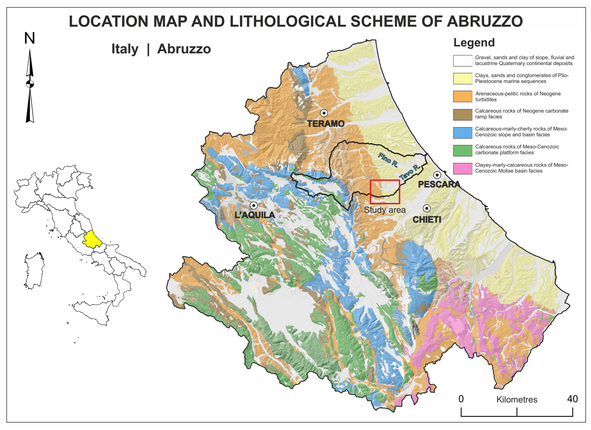
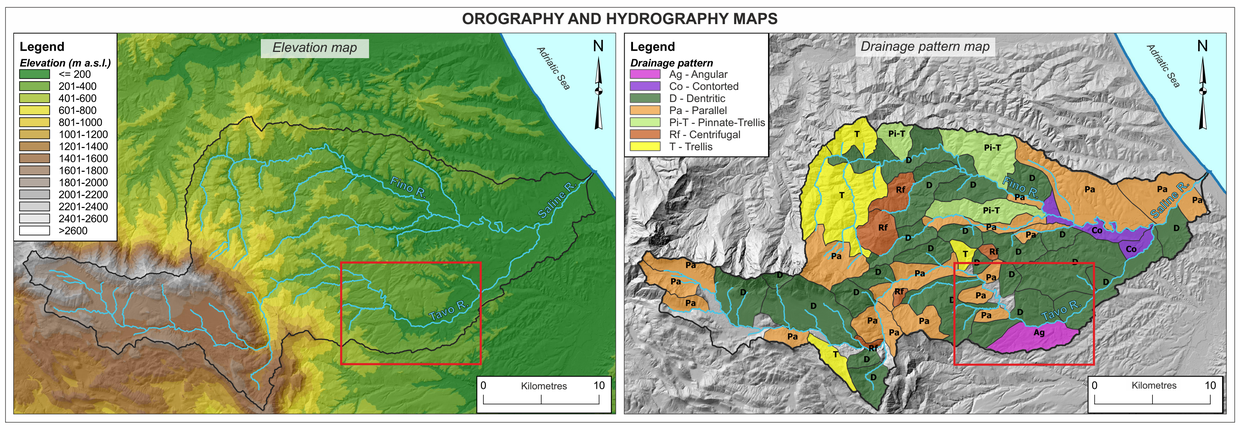
## LOCATION MAP AND LITHOLOGICAL SCHEME OF ABRUZZO




## OROGRAPHY AND HYDROGRAPHY MAPS




## LEGEND

### CONTINENTAL DEPOSITS (*near surface cover deposits*)

*Holocene*

- **Landslide deposits (1)** — Chaotic accumulation of different materials according to the landslide source rocks. May include especially pelitic-arenaceous, clayey and gravel deposits. Holocene
- **Eluvial-colluvial deposits (2)** — Chaotic deposits made up of clay and silt, with heterometric (1-10 cm) calcareous clasts. Observed thickness is highly irregular and ranging from 1 to 5 m. Holocene
- **Alluvial plain deposits (3)** — Heterometric fluvial gravels, consisting of 1-10 cm size, sub-angular to well-rounded, calcareous clasts. Sand and silty levels and lenses are interbedded. Thickness in < 3 m. Holocene
- **St. Pellegrino sands and gravels (4)** — Lenticular gravels in sandy matrix are observed in the lower part, while massive sands are present in the upper part. Clasts are heterometric and well-rounded. Thickness 8-10 m. Upper Pleistocene / Holocene

*Pleistocene*

- **Cartiera sands and gravels (5)** — Tabular gravels in sandy matrix especially in the lower part, while massive sands are present in the upper part. Gravel clasts are heterometric and well-rounded. Observed thickness 10-15 m. Upper Pleistocene
- **Re Martello gravels (6)** — Dense clast-supported gravels in silt-sandy matrix. They are arranged in medium to coarse gravels alternation. Calcareous concretion is present in the upper part. Thickness is commonly 10 m. Upper Pleistocene
- **Farina gravels (7)** — Clast-supported coarse gravels with silt-sandy matrix. Fine gravels are observed in the lower part while parallel laminated fine sands are present in the upper part. Observed thickness of about 10 m. Late Middle Pleistocene
- **Paterno sands (8)** — Very fine sands in massive layers, with medium to fine conglomerate in sandy matrix in the lower part. Pelitic and conglomerate alternation in the upper part. Thickness 15-20 m. Middle Pleistocene
- **Loreto Aprutino gravels (9)** — Very fine gravels with sandy matrix and with conglomerate layers up to a maximum of 50 cm of thickness. Observed thickness 15-20 m. Middle Pleistocene
- **C.le Fiorano gravels (10)** — Clast-supported heterometric gravels with sandy matrix, consisting of 1-15 cm size rounded calcareous clasts. Thickness is commonly 25-30 m. Middle Pleistocene

### MARINE DEPOSITS (*bedrock*)

*Pliocene*

- **Pelitic unit (11)** — Massive pelitic-arenaceous layers, with arenacous intercalations in medium layers. Upper Pliocene - Lower Pleistocene
- **Arenaceous unit (12)** — Massive to thin arenaceous banks, with pelitic intercalations. They are generally bedded into tabular sets. Lower Pliocene
- **Pelitic-arenaceous unit (13)** — Predominantly pelitic-arenaceous deposits with arenaceous-pelitic intercalations in medium layers. Along the slopes predominance of parallel laminated sandy levels. Lower Pliocene

### MORPHOLOGICAL FIELD EVIDENCE OF TECTONICS

*Ridges*
- Saddle
- Isolated relief
- Straight symmetric ridge
- Straight asymmetric ridge
- Altimetric discontinuities of ridge
- Planimetric discontinuities of ridge

*Valleys*
- Asimmetric valley
- V shaped valley
- Concave valley
- Flat bottom valley
- Beheaded valley
- Hanging valley

*Slopes*
- Structural scarp (< 5 m)
- Structural scarp (> 5 m)
- Counter slope
- Structural surface
- Triangular facet
- Fluvial erosion scarp
- Fluvial surface

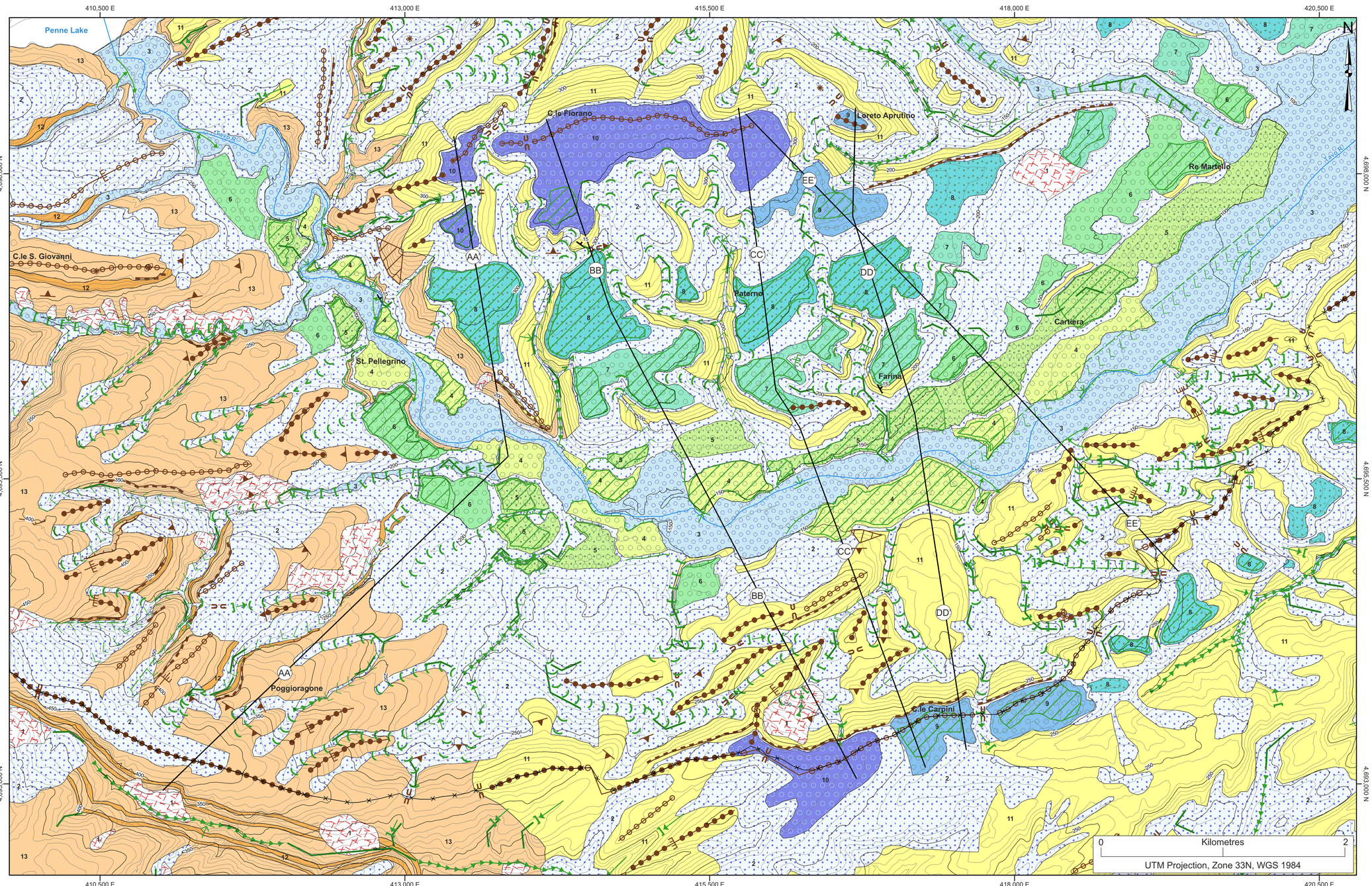
*Hydrography*
- Rectilinear fluvial segment
- Entrenched fluvial segment
- River step
- River bend
- Counterflow confluence
- 90° confluence

### SYMBOLOGY

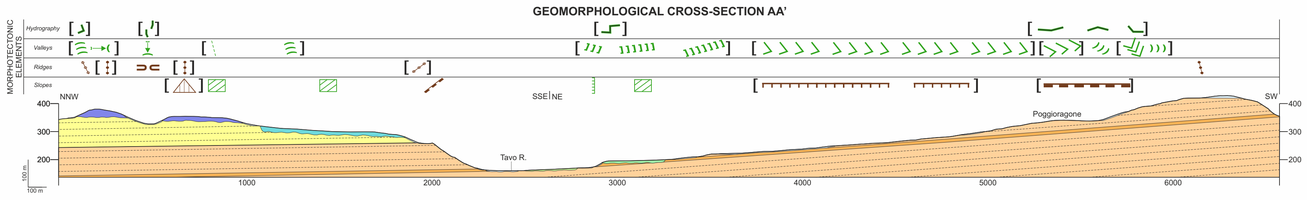
- Bedding
- Watershed
- Cross-section trace

**ACKNOWLEDGEMENT**

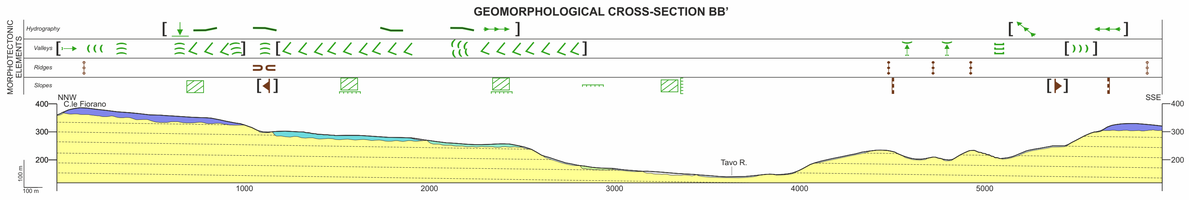
"Topographic data are provided by Struttura Speciale di Supporto Informatico Regionale of Abruzzo Region (http://www.regione.abruzzo.it/xcartografia/)"



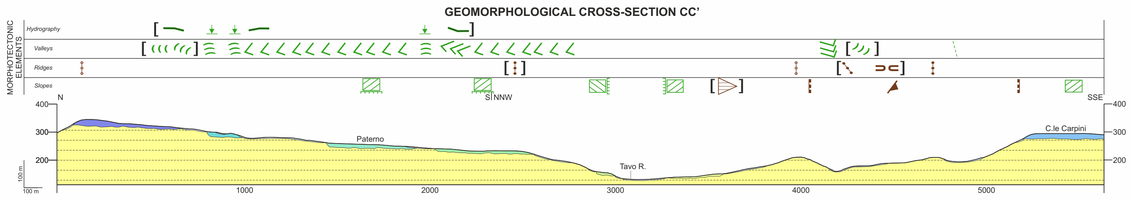

## GEOMORPHOLOGICAL CROSS-SECTION AA'



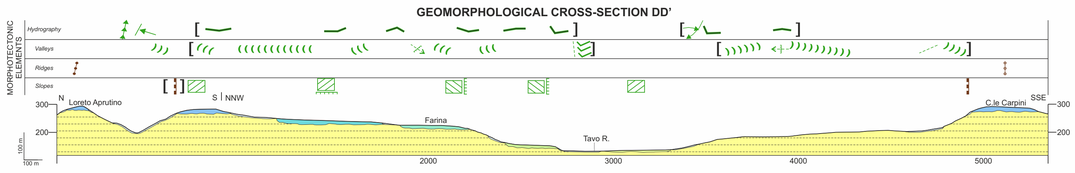

## GEOMORPHOLOGICAL CROSS-SECTION BB'



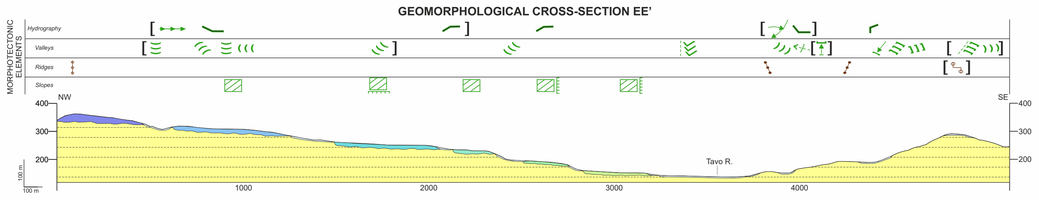

## GEOMORPHOLOGICAL CROSS-SECTION CC'




## GEOMORPHOLOGICAL CROSS-SECTION DD'

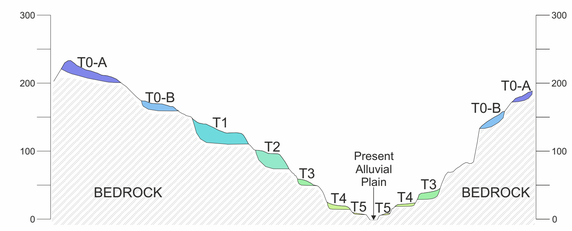



## GEOMORPHOLOGICAL CROSS-SECTION EE'




[In the square brackets are represented the morphotectonic elements projected above the geomorphological cross-sections]

## MORPHO-LITHOSTRATIGRAPHIC TRASVERSE PROFILE OF FLUVIAL DEPOSITS AND TERRACES OF THE MIDDLE TAVO RIVER VALLEY

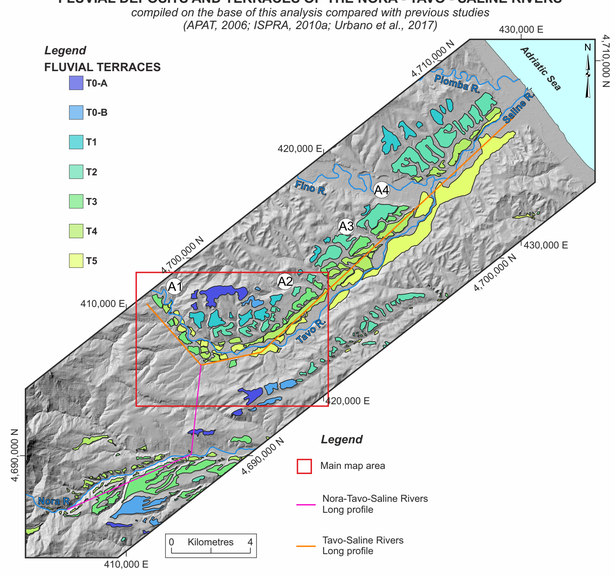



## FLUVIAL DEPOSITS AND TERRACES OF THE MIDDLE TAVO RIVER VALLEY

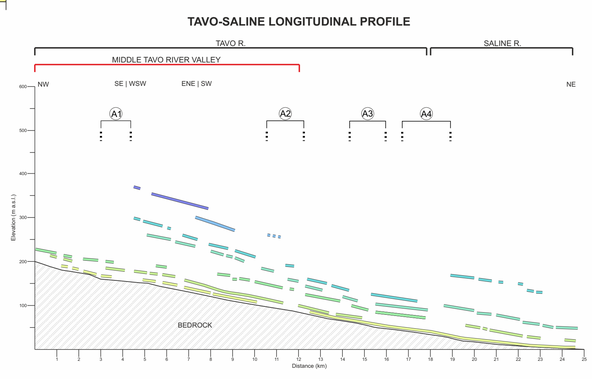
| Continental deposits | Elevation (m a.s.l.) *Left valley side* | Height above valley bottom (m) *Left valley side* | Elevation (m a.s.l.) *Right valley side* | Height above valley bottom (m) *Right valley side* | Terraces order | Chronological constraints | Age |
|---|---|---|---|---|---|---|---|
| Alluvial plain deposits | 200 - 90 | | | | AP | | Holocene |
| St. Pellegrino sands and gravels | 190 - 105 | 10 - 8 | 195 - 130 | 10 | T5 | 8.5 ky - 7.7 ky (Carrara, 1998) | Upper Pleistocene/ Holocene |
| Cartiera sands and gravels | 175 - 105 | 25 - 15 | 215 - 175 | 25 - 20 | T4 | 20 ky (APAT, 2006) | Upper Pleistocene |
| Re Martello gravels | 170 - 140 | 50 | 230 - 190 | 30 - 45 | T3 | | Upper Pleistocene |
| Farina gravels | 255 - 155 | 105 - 75 | / | / | T2 | ~ 150 ky (Agostini et al., 2001) | Late Middle Pleistocene |
| Paterno sands | 300 - 190 | 150 - 110 | / | / | T1 | | Middle Pleistocene |
| Loreto Aprutino gravels | 300 - 270 | 175 - 160 | 290 - 260 | 160 - 135 | T0-B | 480 ± 40 ky (Marcolini et al., 2003) | Middle Pleistocene |
| C.le Fiorano gravels | 370 - 320 | 220 - 200 | 340 - 310 | 190 - 175 | T0-A | ~ 630 ky (Urbano et al., 2017) | Middle Pleistocene |

## FLUVIAL DEPOSITS AND TERRACES OF THE NORA - TAVO - SALINE RIVERS

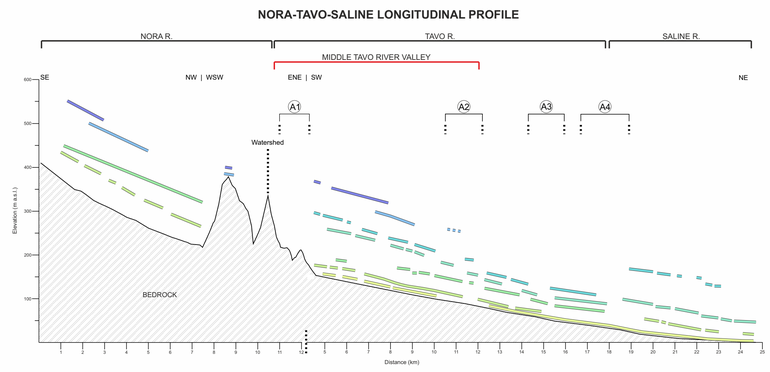
*compiled on the base of this analysis compared with previous studies (APAT, 2006; ISPRA, 2010a; Urbano et al., 2017)*




## TAVO-SALINE LONGITUDINAL PROFILE



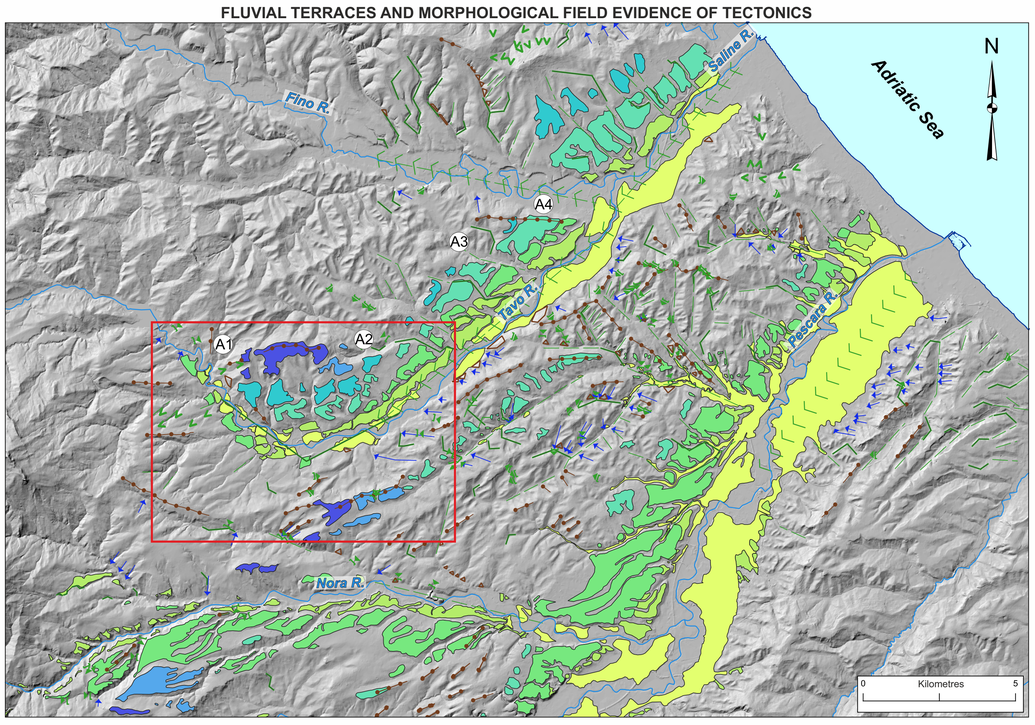

## NORA-TAVO-SALINE LONGITUDINAL PROFILE




**FLUVIAL TERRACES** T0-A T0-B T1 T2 T3 T4 T5 — A1 Terraces anomalies

[In the square brackets are represented the morphotectonic elements projected above the geomorphological cross-sections]

## FLUVIAL TERRACES AND MORPHOLOGICAL FIELD EVIDENCE OF TECTONICS




## LEGEND

*Fluvial terraces*
- T0-A
- T0-B
- T1
- T2
- T3
- T4
- T5

*Main morphological field evidence of tectonics*
- Straight ridge
- Triangular facet
- Asimmetric valley
- Beheaded valley
- Hanging valley
- Rectilinear fluvial segment
- River bend
- Counterflow confluence

*Morphotectonic elements*
- Principal
- Secondary

*Symbology*
- F — Main morhptectonic element
- A1 — Terraces anomalies and associated morphoneotectonic structures
- Main map area

*Data in the red box are provided by this study; data of Saline R., Nora R. and Pescara R. are modified from APAT (2006), ISPRA (2010a) & Urbano et al. (2017)*

## MORPHONEOTECTONIC SCHEME