DEEP-SEATED GRAVITATIONAL SLOPE DEFORMATION IN CENTRAL SARDINIA. INSIGHTS INTO THE GEOMORPHOLOGICAL EVOLUTION

Scale 1:10.000

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Legend

Lithology

- *Travertine (f)* — **Holocene**
- *Slope deposits (dp)* — **Holocene - Present**
- *Alluvial deposits (al3)* — **Holocene - Present**
- *Active rock fall deposits (df3)* — **Holocene - Present**
- *Terraced alluvial deposits (al2)* — **Upper Pleistocene**
- *Paleo-rock fall deposits (df2)* — **Upper Pleistocene**
- *Cemented palaeo-rockfall deposits (df1)* — **Middle Pleistocene**
- *Cemented alluvial deposits (al1)* — **Middle Pleistocene**
- *Red earth deposits (tr)* — **Inner Pleistocene - Holocene**
- *Dolostone (DOR)* — **Middle - Upper Jurassic**
- *Fluvial and deltaic conglomerates, sandstones and mudstones (GNS)* — **Middle Jurassic**
- *Porphytic-microgranite dikes (fy)* — **Upper Carboniferous - Permian**
- *Undifferentiated low-grade metamorphites (Metasandstones, quartzites, phyllites and metavolcanites) (GEN-MSV)* — **Middle Cambrian - Middle Ordovician**

Tectonics

- *Buried fault*
- *Fault*
- *Fracture*
- *Thrust*
- *Transcurrent fault*
- *Trench*
- *Fold axis*
- *Horizontal strata*
- *Main foliation*
- *Strata attitude*

Slope landforms

- *Deep-Seated Gravitational Slope Deformation (DGSDs)*
- *Rockfall head*
- *Rotational slide*
- *Rocky gully with debris discharges*
- *Rock avalanche*

Karst landforms

- *Doline*
- *Cockpit*
- *Fengcong*
- *Karren*
- *Polje*

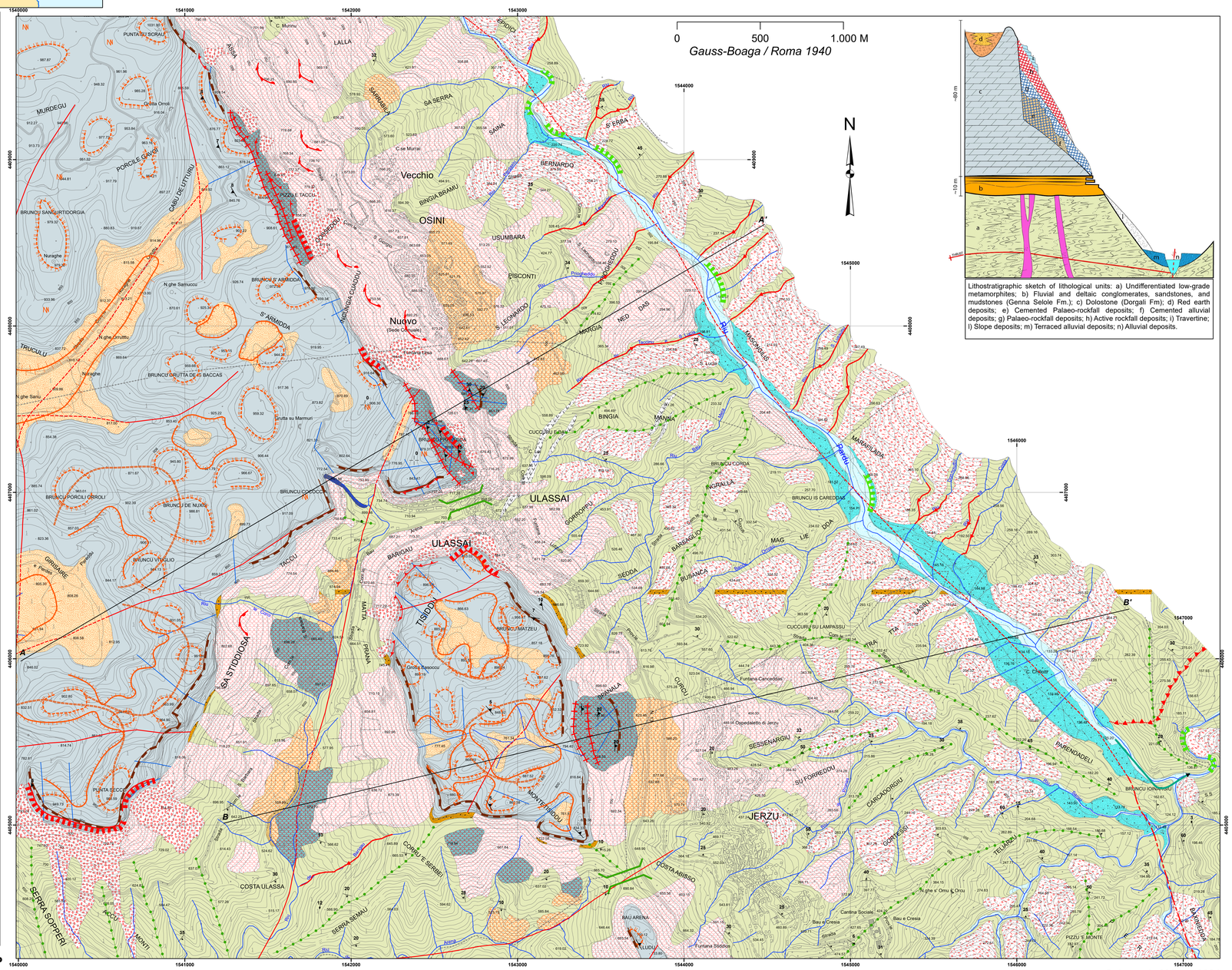
Structural landforms

- *Structural scarp*

Fluvial landforms

- *Lateral bank erosion*
- *Ridge*
- *Saddle*
- *River capture elbow*
- *Stream*

TECTONIC SKETCH MAP



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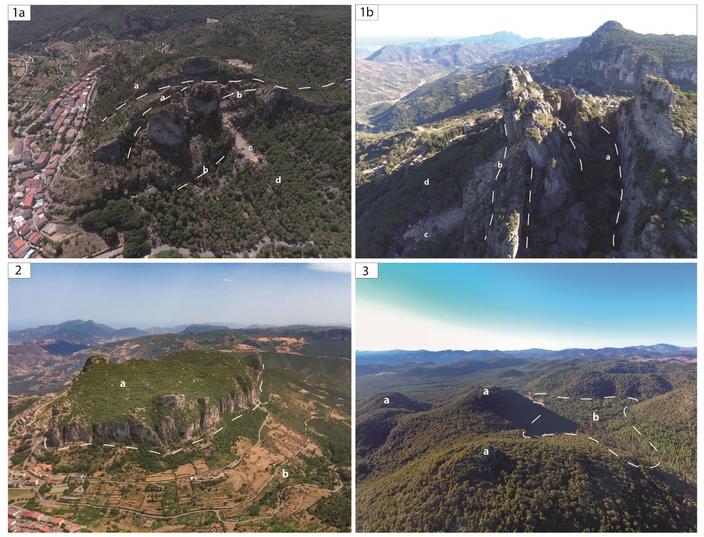
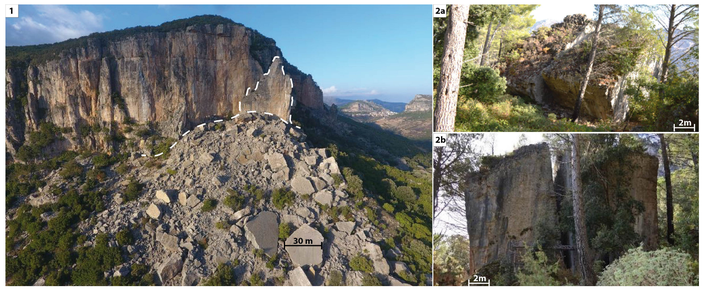
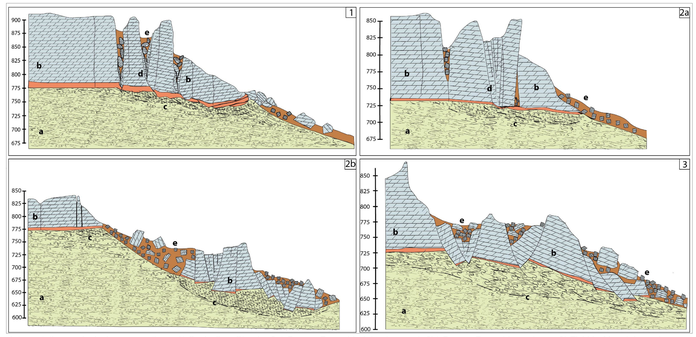
Lithostratigraphic sketch of lithological units: a) Undifferentiated low-grade metamorphites; b) Fluvial and deltaic conglomerates, sandstones, and mudstones (Genna Selole Fm.); c) Dolostone (Dorgali Fm); d) Red earth deposits; e) Cemented Palaeo-rockfall deposits; f) Cemented alluvial deposits; g) Palaeo-rockfall deposits; h) Active rockfall deposits; i) Travertine; l) Slope deposits; m) Terraced alluvial deposits; n) Alluvial deposits.



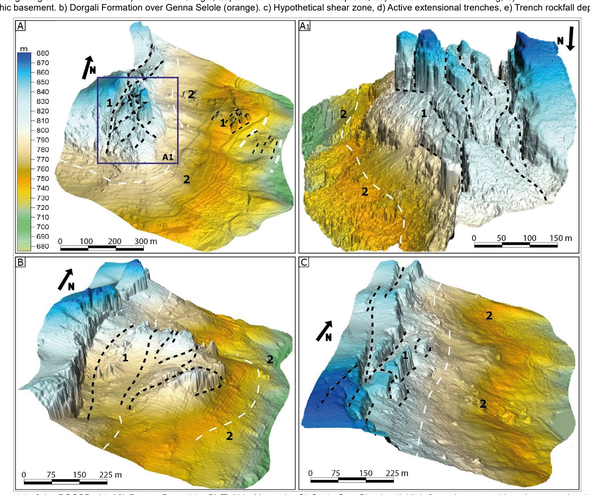
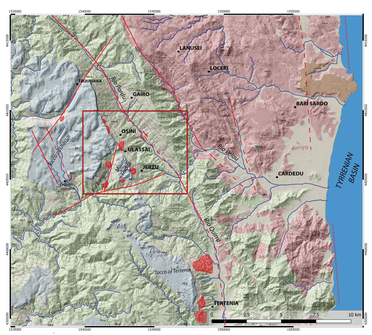
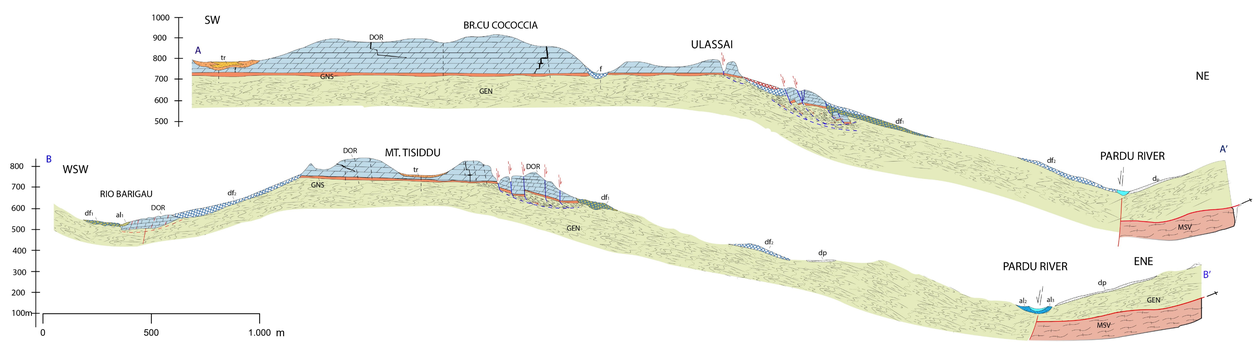
1a-1b) UAV images of Bruncu Pranedda DSGSD. The white lines indicate the ridge-top decompression trenches in the Dorgali Formation. Trenches have lengths of several hundreds of metres and a decametric opening and depth . a) Open trenches. b) Lower open trench. c) Collapse deposits of rock avalanches d) Metamorphic basement. 2)In the foreground Tisiddu Mountain near Ulassai village. a) Jurassic dolomitic plateau with vertical edges. b) Metamorphic Paleozoic basement. Dashed line indicate angular unconformity. 3) Dolomitic plateau surface modeled by karst processes in warm humid climate. a) Karst Fengcong reliefs. b) Cockpit type doline.



Evidences of collapse deposits of rock avalanches. 1) Recent collapse near Ulassai village. 2a, 2b Palaeo-collapses of mega-blocks, 20–40 m for each side.



Interpretative geological cross sections. 1) Scala San Giorgio, 2a) Bruncu Pranedda lateral spread; 2b) Bruncu Pranedda sackung; 3) Tisiddu Mountain sackung. a) Metamorphic basement. b) Dorgali Formation over Genna Selole (orange). c) Hypothetical shear zone, d) Active extensional trenches, e) Trench rockfall deposits.



LiDAR 3D model of the DSGSD. A1-A2) Bruncu Pranedda. B) Tisiddu Mountain. C) Scala San Giorgio. 1) High fracturing area with active extensional trenches. 2) Collapse deposits of rock avalanches. The black dashed lines represent the major extensional trenches. White dashed lines represent the major stratigraphic discontinuity between marine Mesozoic sequence and the metamorphic basement.