Palaeosol development and human disturbance of Mediterranean coastal sequences (SW Sardinia, Italy)

EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022
EGU22-11536, https://doi.org/10.5194/egusphere-egu22-11536, 2022.

Kathleen Nicoll
Department of Geography, University of Utah,,USA
email: kathleen.nicoll@geog.utah.edu

Guido Stefano Mariani
Rita Teresa Melis
Dipartimento di Scienze Chimiche e Geologiche
Università degli Studi di Cagliari,, Italy

Highlights

- **Soils have formed in some coastal Quaternary sediments of SW Sardinia.**
- **Oxidation-rubification, salt weathering and bioturbation are intense & persistent.**
- **Bedrock weathering exerts strong control on saprolite formation & clay formation.**
- **Clay translocation & horizonation characterize Inceptisols from Entisols.**

Some Primary Observations of the Study Area

In SW Sardinia, Quaternary coastal sediments reflect geomorphic processes – mainly alluviation, colluviation and weathering -- as well as human activities. Here, we present some preliminary observations and stratigraphic and pedological descriptions as part of a larger project about the geoheritage of the region. Our goal is to describe landscape evolution in the area and the effect of human agency within the larger environment, as well as document hydroclimatic change since the Pleistocene.

These Pleistocene-to-Recent coastal sequences lie disconformably on bedrock outcrops of Variscan basement composed of volcaniclastics, metasediments and schists. Locally, these appear intensely weathered and form saprolites, over which Late Neogene sediments have been deposited. The Quaternary strata include marine beach clastics (Qb) and carbonate-cemented fossiliferous beachrock (Qbr) as well as terrestrial fluvial, colluvial (Qal-Qcol) and aeolian facies (Qd) that display various amounts of salt weathering, oxidation, bioturbation and pedogenesis.

The dominant clay present reflects the local parent material lithology. Across the region, the basement metamorphic rocks -- dominantly schists, meta- sediments and hialoclastics -- weather quickly into heavy minerals as well as smectites and mixed-layer clays that impart popcorn textures and other shrink-swell attributes to the sediments. Less abundant along the coast, granitic clasts composed of quartz monzonite present in fluvial parent materials break down into gruus, and the feldspars slowly degrade into kaolinite.

S**oils in this region of Sardinia were originally mapped as Andisols**. Careful re-examination of sediments comprising the coastal sequences suggests this is an oversimplification. Work is ongoing to better characterize the variables that influence the styles and rates of erosion and pedogenesis at different locales (labels 1-5 on the map).

Human activities are evident and abundant in the region, including rock quarrying, settlements, trash-pits, and road building. Some sediments preserve included artifacts -- modern trash with plastics as well as artifacts from deeper time frames, including pottery, building materials and metal objects likely dating to the Iron Age – Roman period. Deciphering these records requires more precise chronological control.

Human activities and sea level rise impact these coastal deposits. Erosion is now progressively removing the sediments as the region becomes more developed and visited by tourists.

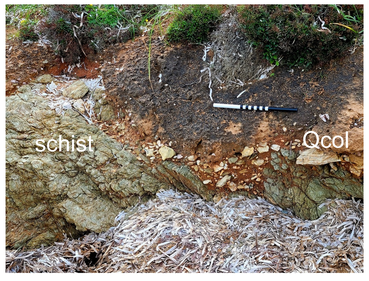
Gratitudes: Funding from project PON-AIM 1890410-3 "CULT-GEOCHIM;" Fondazione di Sardegna grant CUP F75F21001270007; USA Fulbright Foundation in Italia. Thanks to Andrea Melis for field assistance.

https://visibleearth.nasa.gov/images/65788/italy
And Google Earth TM

1 Pixcinni Beach (~N 38° 54'44", E 8° 46'53")

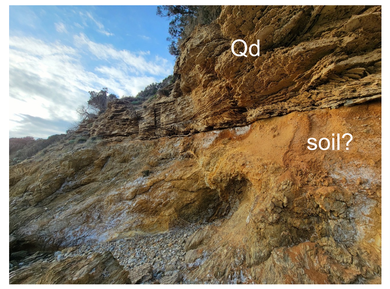
Archaeology: decorated pottery, bones, charcoal, metal objects, building blocks/walls, plastics in trash pit, strong bioturbation

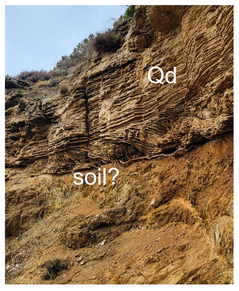
2 Capo Malfatano (~N 38°53'30.21", E 8°48'2.79")

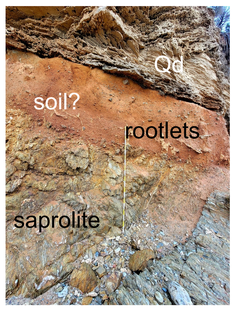


3 Isola Su Cardolinu Tombolo (~N 38° 53'55', E 8°53'23")

Thick unit if Qd preserves bioturbated foreset beds & is salt weathered



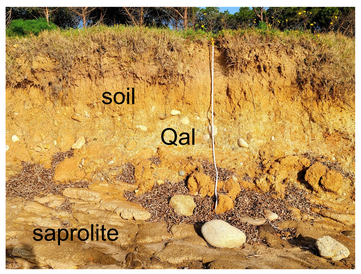




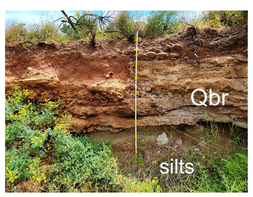
No Qbr in this area

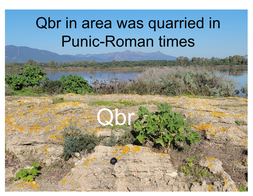
4 Santa Margherita di Pula, Domus de Maria (N 38.9603651° , E 8.9746432°)

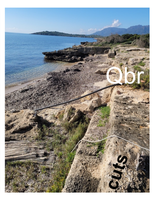
Highly disturbed & eroded



5 Fradis Minoris, Nora (N 38.9850268 ° , E 9.0021714 °)







CItation: Nicoll, K., Mariani, G. S., and Melis, R. T.: Palaeosol evolution and human disturbance on Mediterranean coastal pedosequences (SW Sardinia, Italy), EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-11536, https://doi.org/10.5194/egusphere-egu22-11536, 2022.