Holocene Landscape Dynamics in the Southern Italian Interior: Analogues for Modeling Future Trends Under Global Warming, and Implementing Mitigation and Restoration

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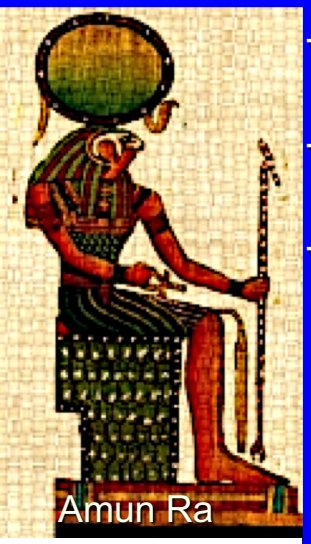
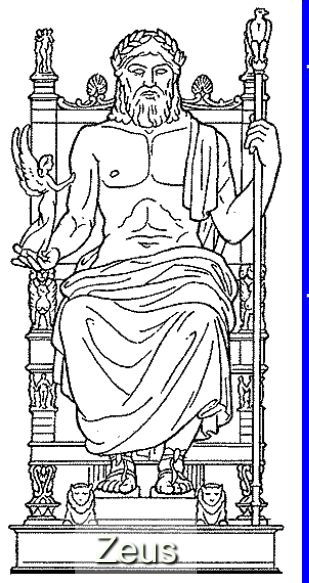
Climate Change, a HOAX?

Pre-Modern Climate Explanations

- Supernatural
  - Ancient gods - seen as source and controllers of weather - a way to punish and reward people
    - Egypt - Amun Ra - dung beetle rolling the sun across the sky
    - Middle East - Gilgamesh Epic – Utnapishtim's tale = the flood of Noah
    - Greek and Roman mythology is full of gods that control the weather and use it to reward and punish people
      - » Zeus (Jupiter) storm and thunder
      - » Helios rode a fiery chariot across the sky and caused droughts when he got too close to the earth
    - Norse Mythology
      - » Thor the god of thunder (hammer)
      - » Balder the sun god
      - » Frost giants -cold and evil
    - Middle America
      - » Tlaloc the rain god


Amun Ra


Zeus

The Epic tale of Gilgamesh (tablet above) is an ancient poem written in Mesopotamia more than four thousand years ago.


Balder


Helios


Thor


Tlaloc

Pre-Modern Climate Explanations

- Aristotle
  - Fires inside the earth (volanoes) caused climates to warm or cool by giving off heat (today we know that volcanic ash changes the climate)
- Meteorology, Aristotle (Written 350 B.C.E) Book I, Part 14
  - *The same parts of the earth are not always moist or dry, but they change according as rivers come into existence and dry up. And so the relation of land to sea changes too and a place does not always remain land or sea throughout all time, but where there was dry land there comes to be sea, and where there is now sea, there one day comes to be dry land. But we must suppose these changes to follow some order and cycle....Here the causes are cold and heat, which increase and diminish on account of the sun and its course.*

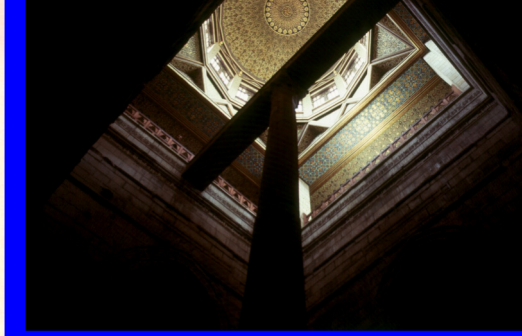
Human recognition of environmental change

- Importance of floods to human populations
  - Hydraulic Civilizations Karl Wittfogel
    - Early agriculture (fertile crescent and adjacent areas)
      - Anatolian Peninsula (Catal Huyuk) and Iranian plateau rainfall agriculture...fan agriculture
      - Jericho...irrigation tethered to a spring by 10 ka
      - Southeastern Jordanian sites
      - Movement to the Tigris and Euphrates
    - Egypt - Nile
    - Petra and rainfall dependent cistern irrigation
    - Yellow River China
    - New World - irrigation systems
    - Religion ----> Catastrophism
    - Greek travelers and scientists (Herodatus, Aristotle)

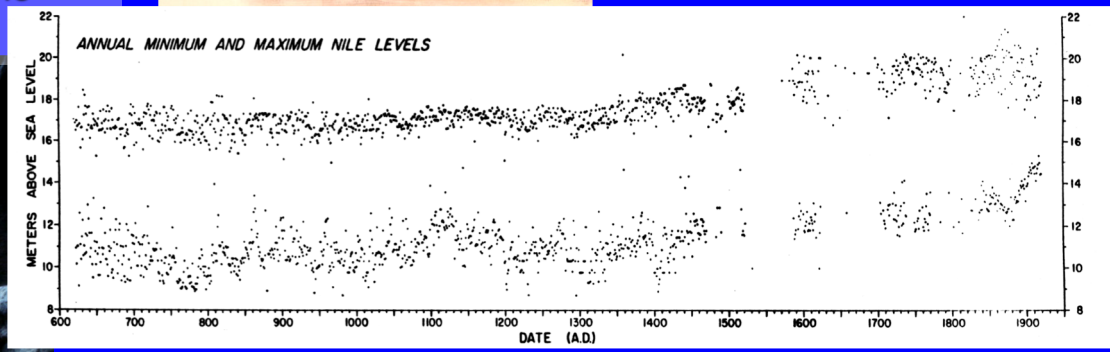
Nile River, NE Africa

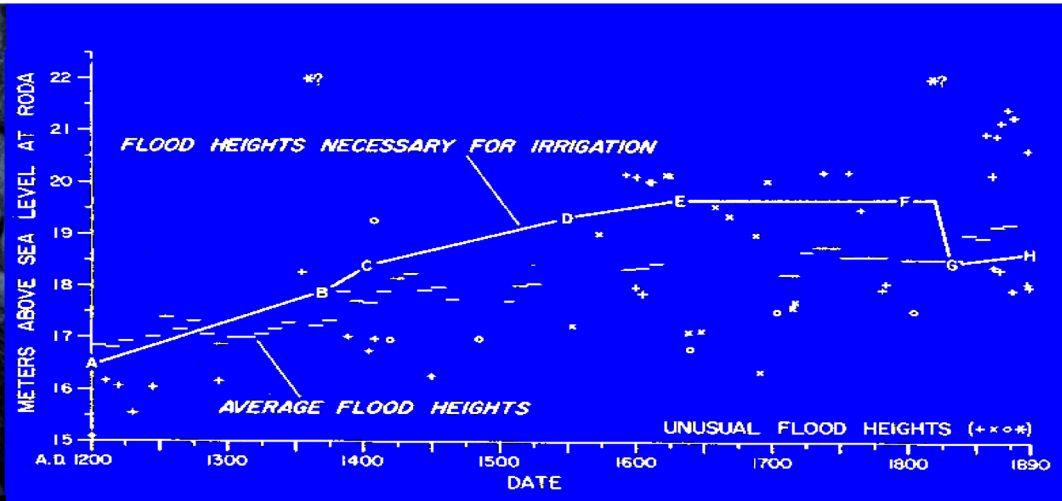
Nilometers, such as the ones at Aswan and Cairo, were used to track the magnitude and progress of the annual Nile floods. Information garnered from the Nilometers were used to assess the flood, and then even to predict crop yields and potential tax assessments. Elaborate procedures and engineering were used to take advantage of the annual floods.

The Nilometer at Rhoda in Cairo



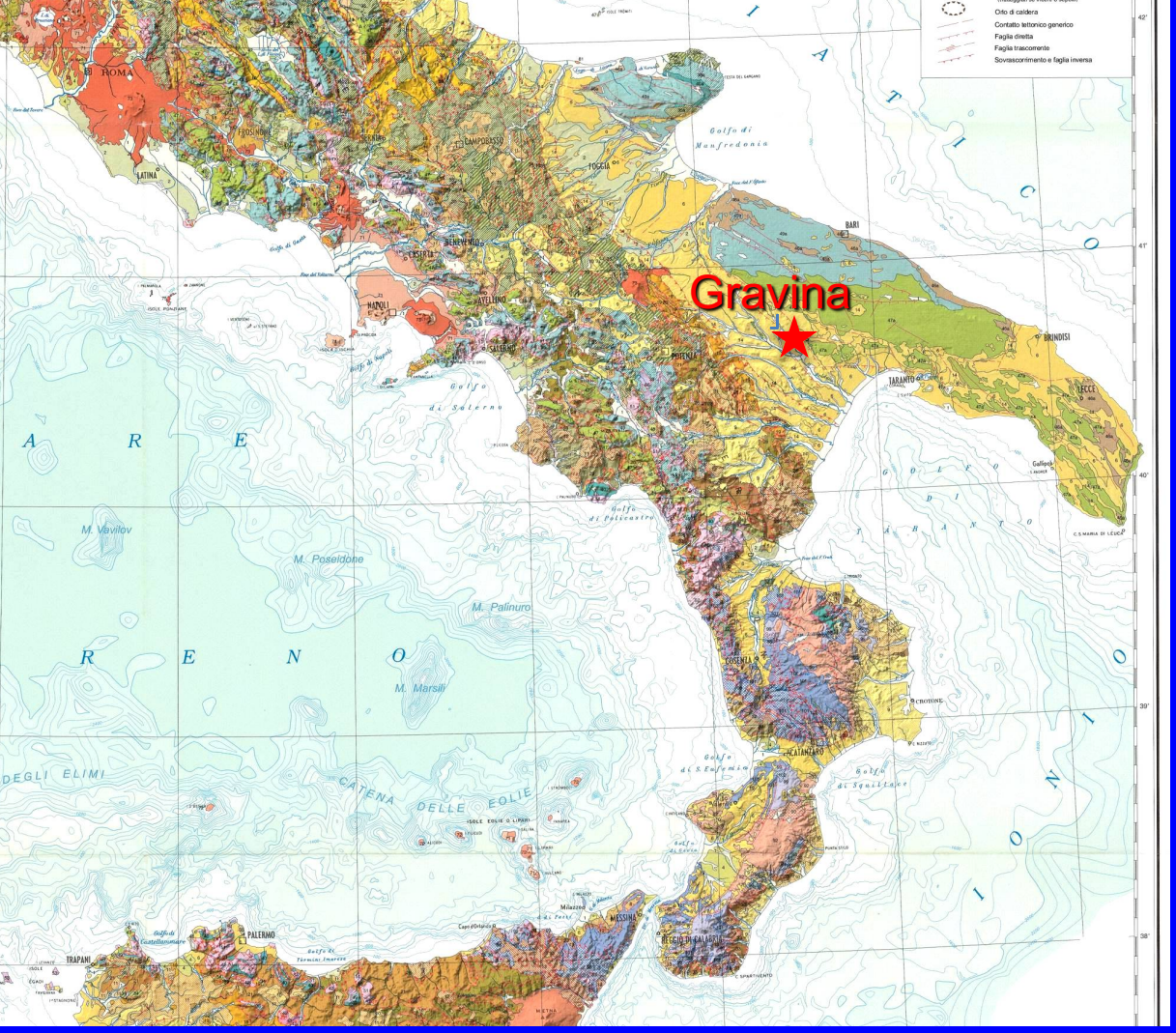
Nile River levels recorded at the Island of Rhoda since the Muslim Conquest (A.D. 641)





Global Warming in the Mezzogiorno of southern Italy, a land on the verge of disaster: Using evidence of past and modern climate change from Geomorphic and Archaeological studies as tools to mitigate its Impacts

Study Area: Regional Geology & Early Imperial Setting



The Basilicata and Puglia region is part of the Bradanic Foredeep, an area that was a shallow sea until the end of the Pliocene. Geologicallyit is Pliocene marine marls overlain by early Pleistocene coastal sands and conglomerates. Subsequent regional tectonics lifted the NW by 300 to 500 m, but plunges in the SE beneath the Gulf of Taranto at Metaponto. This area lay on the boundary between Italic and Messapian language speakers and Magna Graecia 2,000 B.P., and was the boundary between Byzantines and Lombardi 900 B.P. when Normans began their domination.

Study Area: Basentello/Bradano River Valley

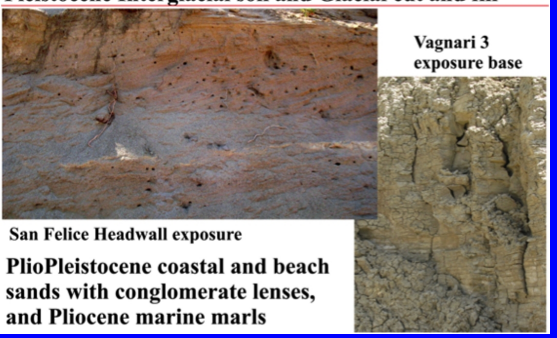
The flat-lying country side of the Bradanic Foredeep is incised by small streams that have cut through the weakly cemented coastal sands and conglomerates and exposed the easily erodible marine marls. In this view to the northeast and east from Irsina, the 200 m fault scarp east of Spinazzolla is evident. The immediate plateau is about 300 m above sea level.

Sedimentary Units in the San Felice Area

The regional geology is summarized on the left. Plateau tops are characterized by lower Pleistocene coastal deposits over lying Pliocene marine deposits. Sediments in stream valleys are comprised of Middle Pleistocene through recent alluvium and slope colluvium. To the right is the base of an alluvial channel cut into the Pliocene marine marls and filled with carbonate cemented gravels. A second cut into this contains the last Interglacial rubified alluvium. The direction of this channel is at a right angle to the Holocene channel. Since the last Interglacial there has been about 80 m of regional uplift.

Holocene Sediment sequence

Pleistocene Interglacial soil and Glacial cut and fill



San Felice Headwall exposure

PlioPleistocene coastal and beach sands with conglomerate lenses, and Pliocene marine marls

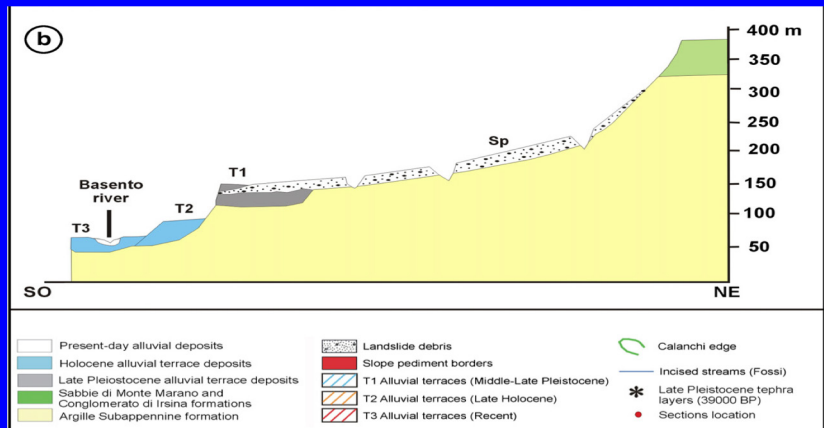


Diagram from F. Boenzi et al. / Geomorphology 102 (2008) 297–306 Fig. 2b. Schematic geomorphological profile (b).

Proxy Data Collection for Study of Past Erosion History

- **Geomorphology**
  - Sedimentary Structures and Grain Size Analysis for Determining Stream Velocity
  - Landforms for Sequencing Erosion and Deposition Events
- **Soils**
  - Radiocarbon Ages on Soil Formation Episodes
  - Strength of Soil Development for Duration Soil Formation Events
- **Springs**
  - Radiocarbon Ages of Timing, Magnitude and Duration of Discharge Events
- **Vegetation**
  - Pollen of Local Vegetation to Document Changes in Community Structure

Google earth

miles 10
km 20

Sites

PRE-HOLOCENE

Spinazzola Quarry Exposure - 563 m

Brandano River Exposure – 259 to 276 m

Bosco Exposure - 439 m

Irsina Exposure - 539 m

San Felice Exposure 481 m

Castello de Monteserico Vista Exposure - 363 m

Vagnari 3 Exposure 336 m

HOLOCENE

Vagnari 1 & 2 Exposure 336 m

Arroyo Italiano 1 Exposure - 259 m

Arroyo Italiano 2 Exposure - 252 m

Baron Spring - 252 m

Vagnari 1 Exposure – ~1,400 years exposed with soil at the top

Don Antonio…our American graduate student