

## Arroyo Italiano 2 Exposure: Evidence of Modern and Past Erosion



This stream bank exposure lies close to the flood plain of the Basentello River. Gravels and coarse sands have been deposited upstream. Ongoing arroyo cutting is exposing deeper and deeper deposits. In 2013 when this photo was taken about 8,400 years of sediment was exposed. This past year this channel had been deepened by over 2 meters of erosion.

The summer of 2013 Arroyo Italiano 2 was sampled by my colleagues. With regards to the impact of current global change we have noted that in most cases, although there have been erosional cycles in the past, the current cycle of down cutting far exceeds any which is recorded in the any stream bank in the area during the last 20,000 years.



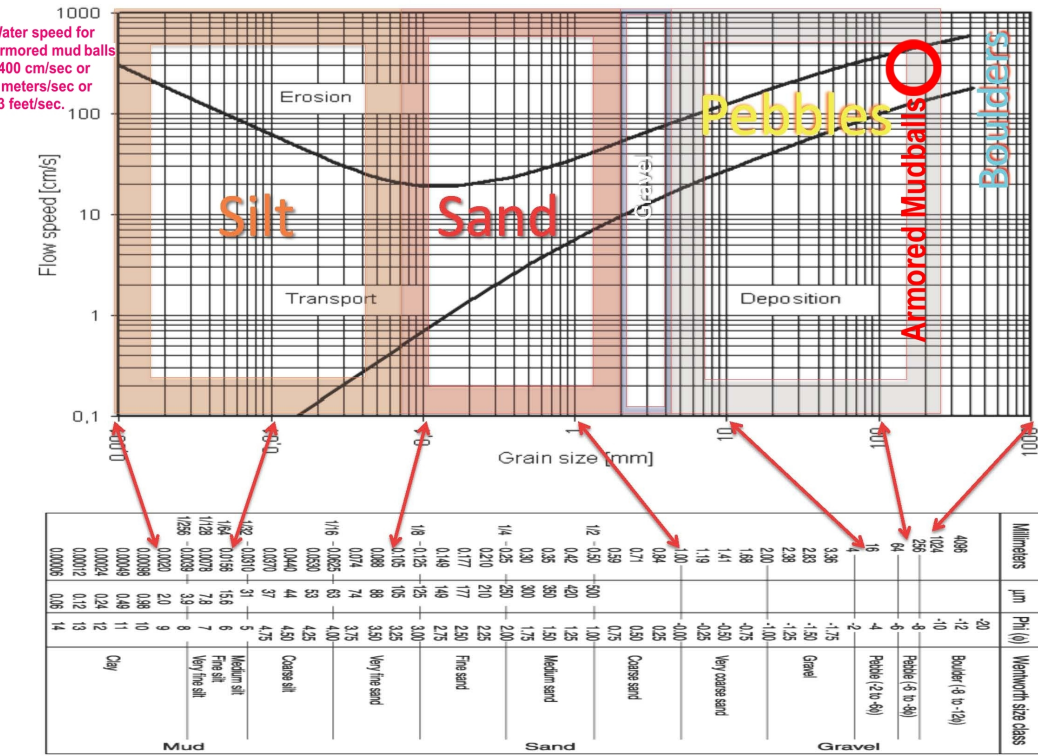
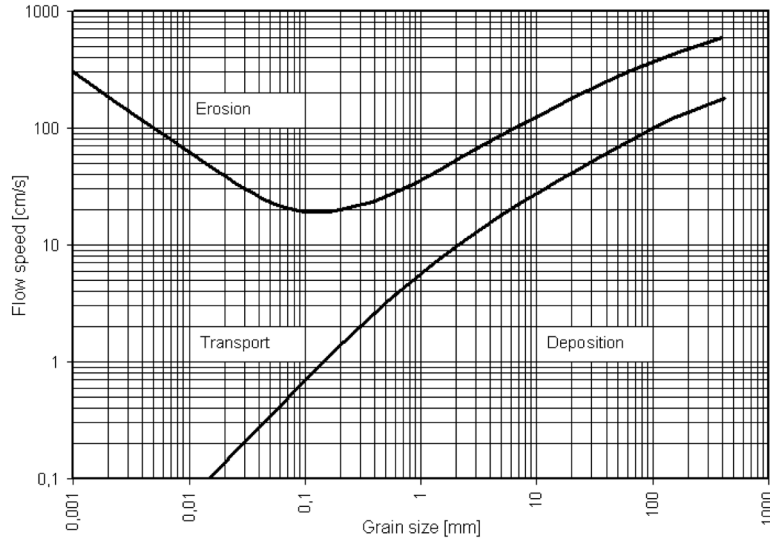
# Arroyo Italiano 2 after the Winter of 2013 to 2014 Rains

In the Summer of 2014 an additional 2 meters of profile had been exposed by stream erosion, and flood related armored mud balls filled the stream bed.



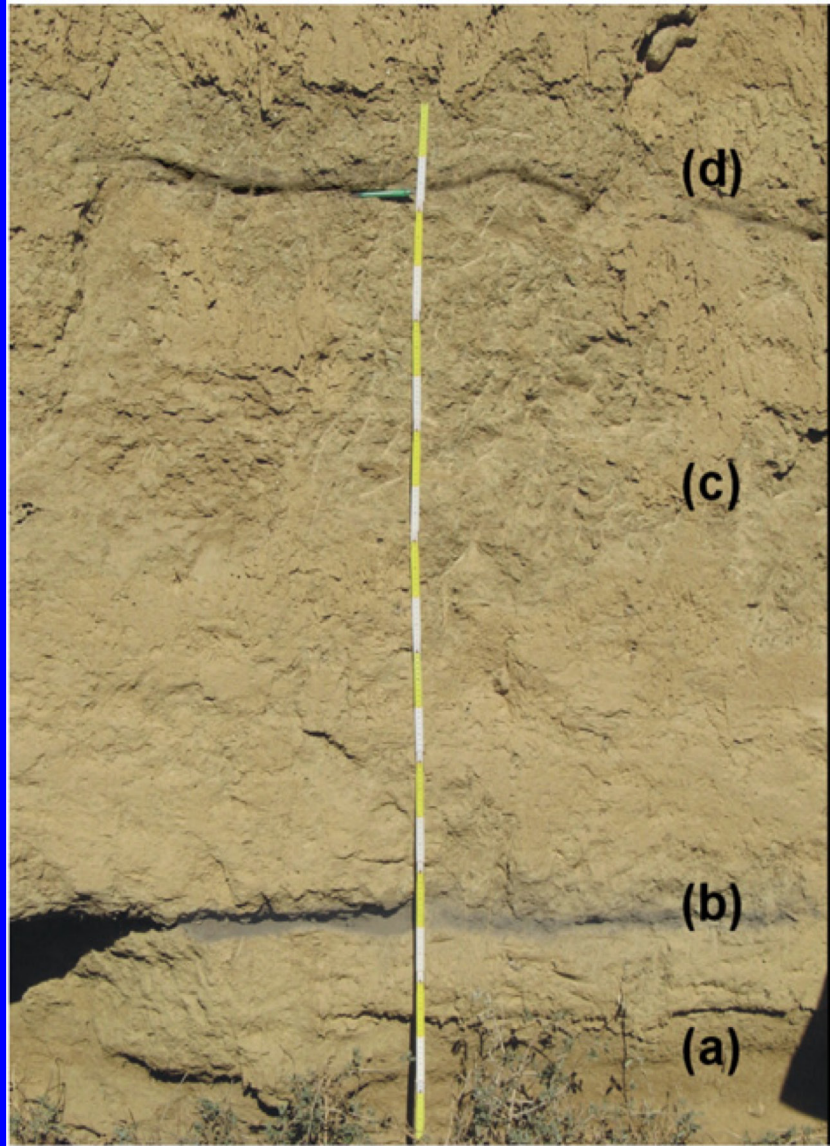
# Hjulstrom' s Diagram (Filip Hjulström1935):

- The upper curve shows the critical water velocity in cm per second as a function of particle size in mm for erosion to occur. Cohesion is the dominating force preventing erosion of small particles, and friction is the dominating force preventing erosion of larger particles
- The lower curve shows water velocity as a function of particle size for deposition to occur. Deposition depends upon the settling velocity, which decreases with decreasing grain size



## Flood Water Velocity:

- The size of the largest armored mud balls lies within the range of the red circle in the diagram. For an object of that size, the water velocity is about 4 meters/second. The other possibility is that the flow was very viscous.



**d AP3 tephra (2800 cal yr Bp)**

**c Laminated loamy sands**

**b Avellino tephra (3700 cal yr Bp)**

**a Laminated loamy sands**

Regionally there are three to four volcanic ashes that have been reported from alluvial exposures. F. Boenzi et al. / *Geomorphology* 102 (2008) 297–306 report in their Fig. 6. Holocene tephra layers in Fosso La Capriola. We have found none of these so far. These may have been eroded from our sequences, or the volcanic ash clouds did not cross Italy further south or north of our area.

# The Irsina Exposure:



# Irsina Exposure



Several soils within this exposure are over 1.5 to 2 m thick, and are truncated by flood events with only a few fine gravel units.

# The Exposure with Irsina in the Background



Three soils are clearly visible in this exposure. The lowest one conforms to an ancient stream channel that seems to date to the maximum of the last ice age when sea level was much lower. The 9 m of erosion in this channel has occurred in less than 25 years.