FIGURE DR1 - LOCATION MAPS

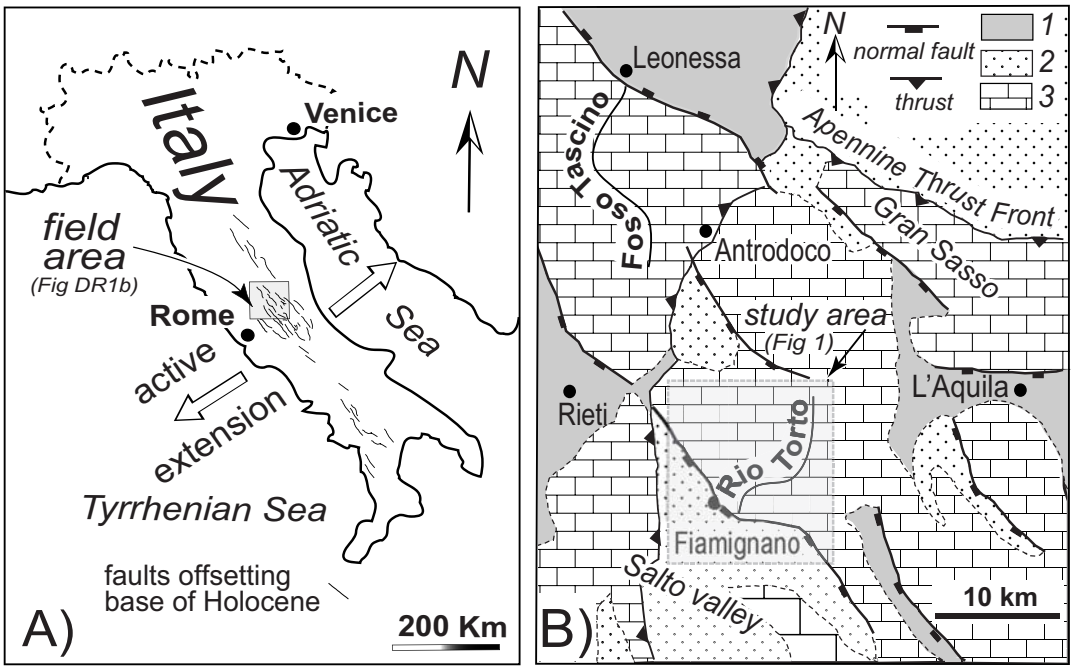


Figure DR1. A: Location map of Italy showing currently active normal faults B :Geological and structural map of the field area. (1) Plio-Pliestocene continental deposits, (2) Miocene Flysch (3) Mesozoic Limestones. Grey box shows detailed study area (Fig. 1) for the Rio Torto and Fiamignano Fault. The Fosso Tascino near Leonessa is highlighted in the North-Western sector of the diagram, 20km away from Fiamignano.

FIGURE DR2 - SHIELDS STRESS DOWNSTREAM IN RIO TORTO

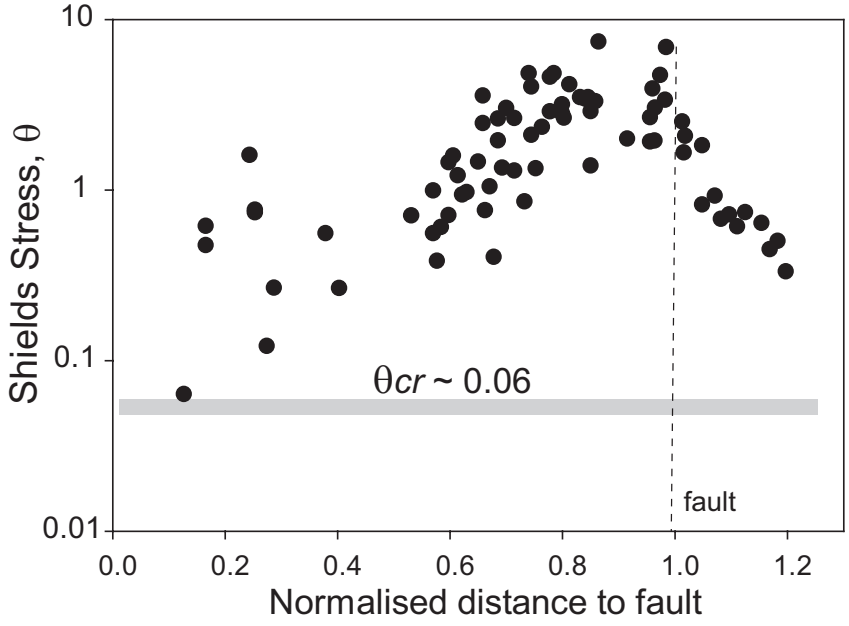


Fig. DR2 shows Shields stress, θ, in the Rio Torto - this is a dimensionless critical shear stress required for entrainment and transport. It is the ratio of the basal shear stress to the excess sediment density and size, and is evaluated as:

$$\theta = RS/\rho D_{50}$$

where R is the hydraulic radius of the channel, S is the local channel slope, $D_{50}$ is the median grain size, ρ is the excess density of the sediment compared to water (~1.65). Values are uniformly above the critical threshold for entrainment in transport limited rivers (0.06), suggesting that the river is likely to be detachment limited. Values peak near the fault, indicating that the river easily entrains the pebbles in the channel at bankful flow.

TABLE DR1 - STUDY METHODOLOGIES

| Measured Item | Measurement tool/precision | Criteria/Method | Comments/accuracy |
|---|---|---|---|
| **Bankful channel width, $W_b$** | laser range finder - precise to 1cm | Limits of active abrasion, vegetation boundaries, highest levels of bleaching on boulders and water-washed surfaces, and the remains of high stage flood debris. In gorges with no recognisable over-bank, we have measured the high-flow stage, as deduced from the same field tests. | Frequency of measurement > every 300m downstream, and every 100m within the gorge. This frequency means we are confident of having gauged a constant reference frame downstream |
| **Bankful channel depth, $H$** | Measuring tape - precise to 1cm | As above | As above |
| **Local channel Slope, $S$** | laser range finder and target - precise to 0.1 degrees | Measured over ~20m at each width measuring site. Measured point to point with target placed downstream. | Frequency as above. Empirically determined accuracy 0.2 degrees for hitting target. |
| **Valley Width, $W_v$** | laser range finder - precise to 1cm | Standard measurement at 2m above river bed surface, measuring distance between valley walls at that point | Frequency as above. Bankful depth < 2m in all cases. |
| **Rock Mass Strength** | Schmidt Hammer - R values precise to 1 point on the scale. | 20 readings on well consolidated bedrock. Average rebound (R value) is taken and incorporated within the Selby test which also considers joint spacing, width and orientation, weathering and ground water outflow: Full details in Selby [1980][1] | Schmidt hammer rebound calibrated on test anvil. Frequency - where accessible exposed bedrock was visible in the channel - typically every 500-600m downstream. |
| **Grain-size, $D_x$** | Wolman Point Count method [Wolman, 1954][2] for coarse fraction on bed | Wolman point measuring of the major/minor axes of 100 individual, randomly-selected particles mantling the surface of the channel; only particles greater than 1mm were considered, and measured with measuring tape/callipers. Accuracy of measurement 0.1mm. Median, $D_{50}$, and $D_{84}$ of particles calculated from cumulative frequency graphs. | Frequency every ~ 600m in gorge. Additional counting shows that estimates of $D_{50}$ fluctuate by less than ±0.5 mm with increasing number of measurements > 100 grains. Measurements are reach-representative for 300m above/below measuring site in gorge. For 2-4km downstream we extrapolate a $D_{84}$ of 10cm. |

[1]Selby, M. J., 1980, A rock mass strength classification for geomorphic purposes, with tests from Antarctica and New Zealand, *Zeitshrift fur Geomorphologie*, v. 24, p. 31-51

[2]Wolman, M.G., 1954, A method of sampling coarse river - bed material, *Transactions of the American Geophysical Union*, v. 35, p. 951-956.