



Observations of drainage systems of NE Sicily

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The landscapes of southern Italy provide an opportunity to observe the response of drainage systems in a Mediterranean climate to variations in bedrock erodibility and uplift rate. The area of NE Sicily studied is mainly composed of granite, high-grade gneiss, limestone and meta-pelite. Published Late Pleistocene to Holocene uplift rates from bedrock terraces and erosional notches in the study area were compiled to characterise the pattern of uplift. Drainage basins were extracted from a 90m DEM and consequent longitudinal channel profiles were prepared. The profiles show generally concave upward trends with many locally steep reaches (knickpoints). Some of the large scale knickpoints (150-200 m height), at drainage areas less than 106 m², are interpreted to lie above the critical drainage area representing the transition from debris-flow dominated colluvial channels to stream-flow dominated fluvial channels. Log-log plots of gradient versus area were used to characterise the concavity and steepness indices of the channels. Previous workers have suggested that in both detachment- and transport-limited erosion, steepness indices of the longitudinal profile are effected by the uplift rates. Provisional results found here suggest a positive but weak correlation between channel steepness and uplift rates. When channels are subdivided into segments along their length, a strong positive correlation between steepness and uplift rate near the drainage divide was revealed, followed by weaker correlation for the segments downstream. Field studies revealed a major shear zone near and parallel to the coast, which generally reduces the bedrock resistance irrespective of its lithology. This is corroborated by Schmidt Hammer readings. Furthermore, the higher uplift rate areas appeared to be associated with unstable hillslopes. Recent enhanced supply to channels by landsliding has infilled valley outlets and is developing coastal deltas of deposited material.