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Distribution of landslides in the Upper Tiber River basin, central Italy

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A comprehensive analysis of the distribution of landslides was completed in the Upper Tiber River basin (UTRB), Central Italy. Landslide occurrence was ascertained through a large-scale inventory obtained through air-photo-interpretation (API) and local field surveys. The obtained landslide inventory map shows 18,578 landslides classified as relict, old and recent. A degree of uncertainty was attributed at the mapped landslides. A total of 16,934 landslides were classified as certain. Lithological and bedding information was obtained through photo-geological and field mapping, aided by the review of existing geological maps and reports. Topographic information was obtained from a DEM with a ground resolution of 25 m Œ 25 m. Statistics of terrain elevation and slope were found different in stable and landslide areas. In particular, landslides reduced mean terrain slope from 17.1° to 14.9°. Analysis of the landslide and the slope areas revealed that a relationship exists between the size of the slope and the size of the most common landslide. The probability density of landslide areas was found comparable to statistics obtained by investigators in other areas of the world, and allowed inferring the degree of completeness of the landslide inventory. Adoption of empirical relationships to link landslide area and volume allowed estimating the total volume of landslide material in the 4098 square kilometres catchment from 8.3Œ108 to 8.7Œ109 m3. In the Tiber River basin, sediment yield measurements are available for two gauging stations, both located outside the UTRB. The Corbara station, located 38 km downstream from the outlet of the UTRB, was active for an 11-year period from 1951 to 1962. The Ripetta station, in Rome, was active for a 34-year period from 1935 and 1985. Based on sediment yield records, the estimated landslide volume can be eroded in 9.9ś1.4 kya. Analysis of the spatial relationship between landslides and the geological setting revealed that slope failures are most abundant

where soft and weak rocks crop out, and where bedding is chaotic or disorganized. Where rocks are regularly bedded, landslide abundance is largest in dip-slopes. The new findings are important to understand the long-term evolution of the Upper Tiber River basin, and may prove useful in the assessment of landslide hazard and risk.