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Lithological mapping for landslide hazard assessment: an example from the Three Gorges, China, using ASTER imagery data

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Lithology is a major factor controlling terrain susceptibility to landsliding, since different lithologies have been associated with different landslide types, sizes and frequencies. Remote sensing is an effective tool for regional lithological mapping at low cost and high accuracy. Only a few examples exist of the use of ASTER imagery data for lithological mapping, however, despite ASTER's higher spatial and spectral resolution over commonly used image types like Landsat ETM+.

Lithological mapping has been an integral part of our studies on landslide hazard in the Wushan-Zigui region of the Three Gorges area, China. We have used (a) ASTER short-wave- (SWIR) and thermal-infrared (TIR) bands to discriminate between sandstone, carbonate and shale/mudstone lithologies; and (b) ASTER visible-near-infrared (VNIR) bands to map Quaternary deposits and alluvial sediments, and identify structures, like sandstone ridges and karst limestone, diagnostic of local lithologies.

Our work has correctly identified the main lithological groups and geological structures encountered in Wushan-Zigui, and has shown ASTER imagery to provide more lithological information compared to published geological maps, mainly in terms of refined lithological boundaries and the delineation of unmapped rock units and geological structures (folds, faults).

This study highlights the VNIR, SWIR and TIR ASTER bands as a source of complementary data for lithologic mapping, gives a clear view of the lithological distribution in Wushan-Zigui, and indicates ASTER as a valuable source of information for the mapping of landslide-related parameters such as lithology for areas where reliable

published geological information is not readily available.