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To what extend can Alpine landforms be predicted by remotely sensed imagery (Reintal, Bavarian Alps)?

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Whilst many high alpine valleys are only accessible to a certain extent, remotely sensed imagery is available for any region in the world. However, high mountain regions represent difficult terrain for remote sensing applications (e.g. shadows).

This study investigates the suitability of remotely sensed data for detecting rock and sediment storage areas. By means of ASTER satellite scenes and a digital elevation model (DEM), the Reintal subcatchment (17 km^2) east of the Zugspitze was studied thereupon.

In a first step characteristic features of alpine landforms such as curvature, process coupling or kind of deposited sediment were assembled. This information then served for a remote landform classification, which provides further knowledge about the spatial distribution and associations of sediment stores in the Reintal. An ASTER scene of May 2001 was classified in a multiscale eCognition project comprising four levels. Based on a complex decision tree hierarchy largely founded on fuzzy membership functions and to a lesser extent on the hard nearest neighbour classifier, a meaningful classification algorithm could be developed.

The final landform classification scored very high in the accuracy assessment with an overall accuracy of 92% and a kappa coefficient to 91.5%. User´s and producer´s accuracy generally obtained high values, too. Fuzzy classification stability comes out lower, but best membership assignments score high. Yet these values have to be viewed critically. The results show that both an identification of the present-day pattern of storage types and the classification of geomorphologic units, also with regard to their

activity status and complexity, is largely possible by remote sensing. Moreover, the methodology developed in this study permits a first assessment of the upper regions of the study area which could not be included in any previous survey because of their inaccessibility.

Coherent landform classification from remote sensing data and DEM using remote sensing methods as developed in this study seems to be a promising scientific approach, especially in regard to the enhanced spatial resolution of modern satellite systems (IKONOS, QUICKBIRD).