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Potential of Terrestrial and Airborne LiDAR in Geomorphology - A Geomorphological Perspective

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The number of studies using Terrestrial or Airborne LiDAR, also referred to as laser scanning, in geomorphology is significantly increasing. Both techniques can deliver high resolution digital terrain models (DTM) or digital surface models (DSM) but on different scales. Whereas resolution and accuracy for Airborne LiDAR are currently in the submeter range, respective values for Terrestrial LiDAR are at centimeter scale. Especially, the high resolution DTM provides a sound basis for geomorphological mapping, process modeling and subsequently for hazard assessments. Multitemporal laser scanning can significantly improve the monitoring of geomorphological processes.

Applications of the LiDAR techniques are available in all geomorphological fields (e.g. for studying glacial, periglacial, fluvial and aeolian processes, landslides and soil erosion). A review is given on the use of Terrestrial and Airborne LiDAR in geomorphology based on common technologies. Since LiDAR technology is progressing and new techniques and data is already available (e.g. full-waveform LiDAR systems) and are expected to become operational in the near future, geomorphological perspectives resulting from these technological developments are addressed.

Furthermore, beside the potential of Terrestrial and Airborne LiDAR, the specific limitations are discussed as well as the benefits which arise when both techniques are combined.

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