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Geomorphological processes in a semiarid badland area using new technologies: TLS, terrestrial and aerial SfM photogrammetry

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We used three different methods Terrestrial Laser Scanner (TLS), terrestrial Structure from Motion photogrammetry (SfM) and aerial SfM photogrammetry with an Unmanned Aerial Vehicle (UAV) to analyse geomorphological processes in a semiarid badland landscape. Los Aguarales badlands, located in the Ebro Depression (Spain), occur in the Holocene sediment accumulated in a wide valley infilled with silt and clay. The morphology of Los Aguarales badlands is complex, making the geomorphological interpretation a difficult task. Los Aguarales badlands are characterized by the sequence of incision and piping processes developing an abrupt and complex landscape.
Three different representative and small study sites were selected to carry out a detailed analysis of the geomorphological processes. Moreover, the capability of the three methods to produce high resolution point clouds was evaluated.
The obtained topographical changes were very low during the first 6 months (March-October 2016). Measured topographical changes, with TLS and terrestrial SfM, were very low, and these values fall within the range of the acquisition error of the devices used (2-6 cm). The preliminary results indicated the possibilities of a multiscale approach using new technologies to study geomorphological and erosion processes, although long-term studies will be necessary to obtain erosion rates in this semiarid badland area.

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