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Sediment transport on a vegetated parabolic dune (southern North Sea) – insights from UAV photogrammetry

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Topographic models obtained by means of unmanned aerial vehicle (UAV) photogrammetry and structure-from-motion (SfM) algorithms have been used to quantify sediment transport and to reconstruct sedimentation processes on an active parabolic dune located on the barrier island Sylt (Germany).

The study area is located in a temperate oceanic climate. The dune subject to this work is part of a coastal transgressive dune field, characterized by deflation plains and transverse and parabolic dunes up to 30 m high. In the area onshore winds prevail resulting in annual dune migration rates of about 4 m a^{-1}in average. The surveyed area is about 0.39 km^2 and was covered by 3 topographic surveys spanning a time period of about 1 year. Aim of this study is two-fold: 1) to see how vegetation patches affect sediment transport and deposition; 2) to determine if dune migration is rather linked to storm events or longer periods with constant blowing weaker winds. Vegetation on the dune mainly consists of *Ammophila arenaria,* European beach grass, which forms patches on the dune crest as well as on the slip face. Total vegetation coverage is about 10 – 20 % of the dune surface.

First results of this ongoing study show that vegetation and unidirectional sediment supply by prevailing westerly winds force sediment accumulation in the immediate lee of the vegetation patches. Resulting sedimentary structures show characteristics of single lee dunes, nebkhas, superimposed on the active parabolic main dune. Vegetation on the slip face acts as sediment trap and impedes avalanching, as such forcing the development of local depocenters, where sediment accumulation reaches up to 4 m during the observational period. Surface-distance computations between the three topographic models show about 1.5 m of vertical erosion on stoss slope and 2 – 3 m deposition on parts of the dune crest and the slip face.