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Reconstruction of a sediment cascade on the north eastern Tibetan Plateau

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Different geomorphological archives, such as dunes, loess and fluvial sediments, have been studied in the catchment of the lake Donggi Cona on the north-eastern part of the Tibetan Plateau. The lake is situated at an elevation of 4090m and is influenced by the Asian Summer monsoon during summer times while during winter times cold and dry climatic conditions prevail. Research focused on a large alluvial fan in the eastern part of the catchment which is connected to the Anymachqin Mountains with elevations up to more than 6,000m asl. During the late Quaternary aeolian and fluvial are the dominant geomorphological processes in the basin and the lower mountain ranges. In addition periglacial and glacial processes are the main processes in the higher mountain areas. The alluvial fan consists of fluvial gravels which have been deposited during the late Pleistocene. Large ice wedge casts are frequent in these sediments. The gravels are covered by silty and sandy sediments. Small dunes and sand sheets are frequent on the central part of the fan while the accumulation of sand gets large at the foothills of the neighboring mountains. The formation of dunes at the foothills started in the early Holocene and the sands originate from the fluvial sediments on the fan. A period of loess sedimentation in the neighboring mountains ranges started around 2000 years later. The wetter climatic conditions of the Asian monsoon during the early Holocene related to stronger fluvial erosion with destruction of the aeolian landforms and the deposition of sand on the fan and in the Lake. During the late Holocene the climate became dryer resulting again in a development of small dunes on the surface of the alluvial fan. In addition, the larger dunes on the margins of the fan showed continuous accumulation during this time period. However, geomorphological processes strongly differ between the seasons. During summer times torrential rainfall caused by the still active monsoonal influence lead to the erosion of the aeolian landforms. The sand is then transported by the wind again and is deposited after a short transport distance on the fan surface and the neighboring slopes. Falling lake levels of the Donggi Cona produced new sediment sources during the late Holocene, which have also been incorporated into the sediment cycle. These sediments can be identified by their geochemical composition, especially the higher carbonate content.
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