



## Geomorphic processes on coal tips in Belgium

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Coal tips are composed of various materials, essentially sterile rock but also detritus such as wood, scrap metal as well as scoria from surface installations. Rocks found in Belgian coal tips belong to the Westphalian and Namurian (approx. 320 Ma) and comprise psammites and schists.

Several studies have focused on the factors controlling the magnitude of geomorphic processes on coal tips, such as type of slope material, vegetation type and cover, the role of self-ignition and combustion, time and slope gradient.

In the international literature, research gaps concern particular processes, such as causes and consequences of the widespread tree toppling and root throw, rock fragment movement at the surface, or gully control by check dams. Neither spatially distributed erosion rates for the various processes operating on coal tips, nor sediment budgets have been established. The same holds for regional (subcontinental) variability in slope processes on coal tips.

The large number of Belgian coal tips that have not been levelled nor reworked provide a unique opportunity for geomorphological studies. Detailed field measurements, the use of Digital Elevation Models (DEM) and Level-2 ASTER 08 Surface Kinetic Temperature imagery allowed to demonstrate the existence of:

- correlations between the intensity of observed geomorphic processes and bio-physical explanatory factors, particularly slope aspect;
- strong and reciprocal influences between the vegetation of coal tips and the morphology of the colonised slopes;
- absence of relations between geomorphological processes (such as gully erosion) and slope angle, resulting from the narrow range of slope gradients on coal tips;
- landslide occurrence controlled by coupled criteria of (1) slope gradient, derived from DEMs and (2) spontaneous self-combustion as evidenced by thermographic imagery.