

Hillslope surface deformation on chalky landscape under the influence of Quaternary tectonics coupled with periglacial processes, Picardy (NW France)

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Chalky hillslopes observed in Picardy region (NW Paris basin, France) evidence specific surficial ridges and steps, of several meters high and several ten-meters length, roughly parallel oriented to slopes on some dry valleys. They are locally named "rideaux" or strip-lynchets. Their origin is still discussed among the communities of geology, geography, archeology and pedology.

Detailed observations of the Picardy coastal chalk cliffs using high resolution low-lying aerial LiDAR and field works allow us to precisely describe and understand ridges and steps formation. At Bois de Cise, a rectangular depression with ridges and steps was observed in 3D on the ground, due to its natural overlap by the cliff face. This structure proves to be a graben, controlled by conjugate normal faults, at the top of which the ridges and steps are developed. The set forms a "step-graben" composed of a system of faults in relay and ramps, involved in the superficial covering of quaternary loess. Steps formation will be discussed in relation with the tectonic context (paleo-constraint fields), the continental water circulation within the karst, the presence of break-up structures on the fault planes, the role of cryogenic processes during the last glacial epochs and the remobilization of loess surface deposits. Caves and temporary springs of fresh water along faults evidence a karstic behavior in the chalk and suggests step-graben structures as geological guides for hydrogeological circulation in the chalk of Picardy. In this context, chalky surficial step-structures appears as tectonically controlled and as the witness of a recent active tectonics in the NW european chalk basin.

In addition, the field of steps developed on a coastal fossil cliff tends to prove the occurrence of a fractured system, developed according to a paleo-field of NW-SE extensive stresses. Data from the CROCOLIT-Leg1 (Duperret, 2013) campaign carried out on the offshore subtidal platform (shallow bathymetry, THR Chirp seismic) help to better define the morphology and depth of penetration of this type of faults in the chalk and to answer the question of guidance by pre-existing fractures of the Picardy coastline orientation, on a kilometer scale.

DUPERRET Anne (2013) CROCOLIT_LEG1 cruise, RV Haliotis, <http://dx.doi.org/10.17600/13120080>