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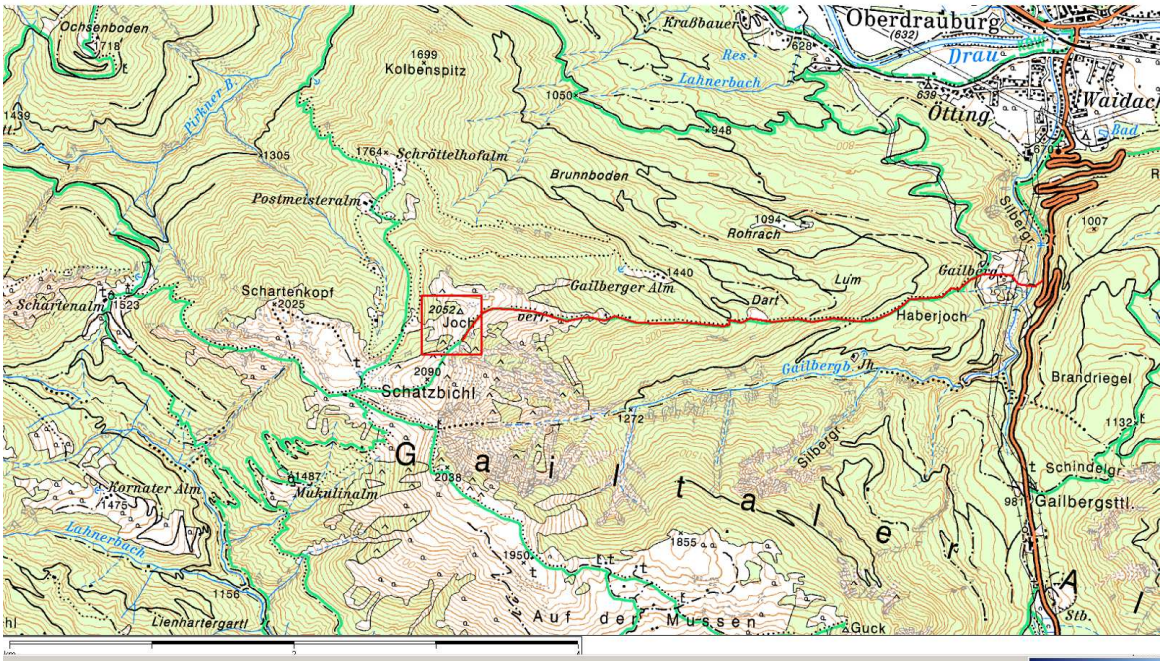
Geotope 79: Mussen/Schatzbichl – Girlande Soil



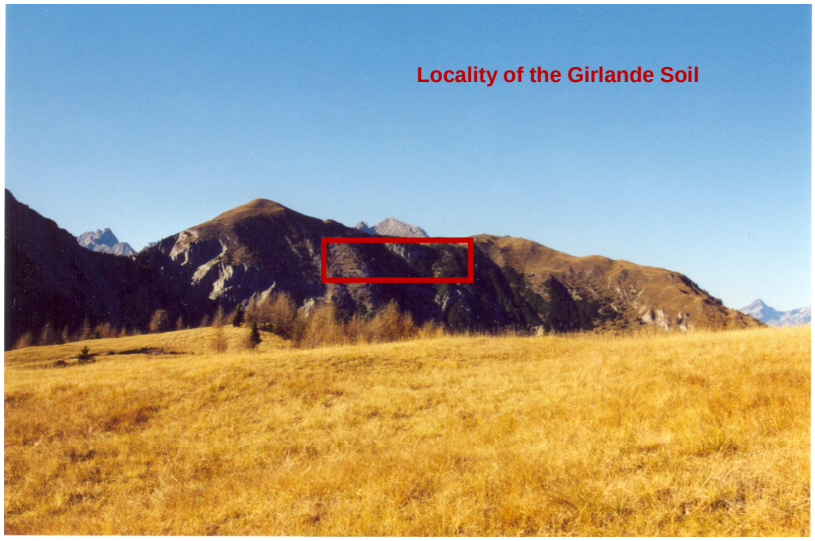
Red square: Location of the geotope; green tracks: hiking trails; ©BEV: Federal Office for Calibration and Measurement, 2005.

Access:

The marked trail should be followed leaving Gailberg Pass to the bus station and crossing the Silber Creek to “Gailbergbauer”. Further on to “Joch” (2,052 m) and following the trail to mountain Schatzbichl. Between Joch and Schatzbichl the Girlande Soil can be seen in the steep slopes of Silber Creek below the trail.

Description of the Geotope

The Girlande Boden or Soil provides a good insight into permafrost soils. Cryoturbation (= frost churning) refers to the mixing of materials from various horizons of the soil down to the bedrock due to freezing and thawing.



Cryoturbation occurs to varying degrees in most Gelisols (the term "Gelisol" comes from the Latine verb *gelare* meaning "to freeze", a reference to the process of cryoturbation that occurs from the alternating thawing and freezing characteristic of Gelisols). The cause of cryoturbation lies in the way in which the repeated freezing of the soil during autumn causes the formation of ice wedges at the most easily erodible parts of the parent rock. If the parent rock is hard, this can cause quite deep erosion of the rock over many years. As this process continues during summer when an active layer forms in the soil, this eroded material can easily move both from the soil surface downward and from the permafrost table upward.

The distinctive feature of the cryosols (gelisols) of mountain Mussen is the clear pattern. Nearby another lamellar soil can be observed (see Geotope no. 80).

As this process occurs, the upper soil material gradually dries out (because the soil moisture moves from the warm surface layer to the colder layer at the top of the permafrost) so that it forms a granular structure with many distinctive crystalline shapes. Separation of coarse from fine soil materials produce distinctive patterned grounds like girlandes, rings, nets or

lamellar-like types of soils. Unfortunately, this kind of pattern only occurs at altitudes of some 2,000 m.

Yet, the formation of gelisols (frost-generated soil) is not fully understood. In addition to the processes mentioned above also solifluction occurs, also known as soil fluction, which is a type of mass wasting where waterlogged sediment moves slowly downslope, over impermeable material. In Girlande Boden the influence of solifluction is dominating (adopted from Wikipedia).