*Géologie et minéralogie du nord de la zone du Portjengrat (Saastal, VS)

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The studied area is situated in the Saastal (VS) and has an area of 20 km2. From West to East it extends from Saas Fee to the Zwischbergenpass. It comprises the Portjengrat gneisses and the metasediments that are sometimes considered to mark the continuity between the Zermatt-Saas and the Antrona zones. A lithostratigraphic and tectonometamorphic study tied to a detailed mapping has been lead with the intention of resolve the problem of an eventual tectonic limit between the Portjengrat element and the Siviez-Mischabel nappe.
The covers present in the studied area can be brought together into three zones that are the Zwischbergenpass zone, the Grundbärg zone and the Triftgretji zone. They represent the autochtonous cover of the Portjengrat nappe that begins in the Triassic and ends probably in the upper Cretaceous or in the Tertiary.
The study of the thin sections showed that the basement and the cover of the Portjengrat had undergone a high-pressure metamorphism, characterised by the presence of omphacite and glaucophane (blueschist or eclogite facies). The mineralogical assemblages of different sequences indicate a well-constricted temperature of 500 to 520°c for the second medium-pressure metamorphic event. The thermobarometry investigation did not result in good constraints on the temperature of the peak of the second medium-pressure metamorphic event, but provided a pressure of about 5 kb (4,8 1,7 kb).
The white micas study by RX diffraction proved that the 3T polytype has a 0° 2V angle but that the 2M1 polytype has a 2V angle of about 45°. The 3T polytype is still partially present in the Portjengrat zone, which is a good argument in favour of a high-pressure metamorphism.
A white micas chemical study revealed two metamorphic events, the first of which is a high-pressure event. The pressure encountered during this event was estimated to about 16 kb. This metamorphism affected the post-triasic sediments from the Portjengrat cover, which prove that it is from alpine age. The chemism study lead parallel to the polytypism study showed the correlation existing between the celadonitic content variation and the polytypic transformation. Furthermore, the 3T polytype and a high celadonitic content are two consequences of the high pressure, very likely independent of each other.
Five deformation phases have been pointed up in the field. They occurred during the second medium-pressure metamorphic event; no structure from the high-pressure event has been preserved. The phases D1 and D2 are prograde and correspond to the NW overthrusting of the alpine nappes; the phases D3 to D5 are retrograde. The very strong deformations D1 and D2 generate sheath folds that can be responsible for the apparent lack of geometric continuity between the three cover zones present in the area.
This work proved that the Portjengrat rocks underwent the high-pressure metamorphism event. This involves that the tectonic history of the Portjengrat is different from the Siviez-Mischabel one and imposes a tectonic limit between the two elements. As the Portjengrat zone is tectonically distinguishable from the adjacent units, the autochtonous gneisses and covers composing it must be considered as an

independent nappe. The problem of the exact position of the tectonic limit between the Portjengrat nappe and the Siviez-Mischabel nappe has unfortunately not been resolved.