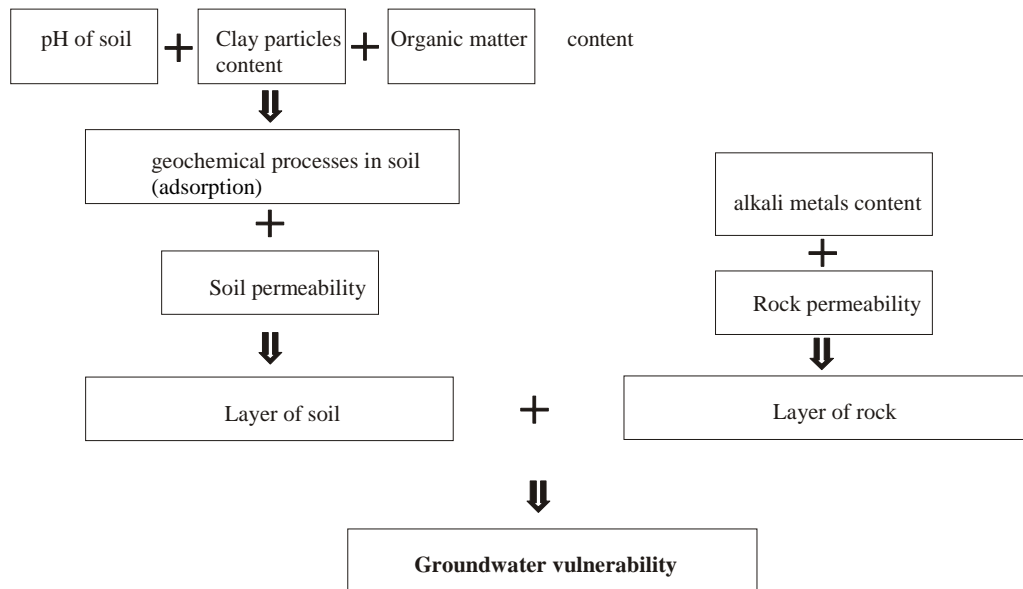


2. content of alkali metals and alkaline earths in soil and
 3. rock (neutralization of acid solution);
4. permeability of soil and rock;

HEAVY METAL GROUNDWATER VULNERABILITY



Extraordinary high Sm/Nd ratios of a Permian pegmatite garnet (Austroalpine Campo basement unit, Eastern Alps, Italy)

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In this study a single 3.5 cm sized Grt crystal and a 5 cm sized Kfs from a coarse-grained pegmatite from the Austroalpine Campo basement unit have been investigated by the Sm-Nd method. Primary minerals of the pegmatite sample are Qtz, Kfs, Ms, Tur, Grt and Ap. The garnet core was mechanically separated from the rim and HCl leaching was applied to both fractions. The analysed magmatic garnet gave extremely high Sm/Nd ratios of 10.7 to 13.01, which are among the highest ever reported worldwide. The results affirm the suitability of the Sm-Nd dating method for pegmatite/magmatic garnets.

Isochron calculations for the leached garnet fractions and Kfs yielded 255.4 ± 2.8 Ma for the garnet core and 250.4 ± 2.7 Ma for the rim, respectively. Both results are interpreted as crystallization ages. Three leachates and an unleached Grt rim fraction plot slightly but systematically off the isochrons, implying the presence of mineral phases, which are not in equilibrium with Grt and Kfs. Thin section and electron microprobe investigations revealed, that post-magmatic fine-grained Chl and white mica occurs in small cracks within the Grt. These secondary phases are interpreted to be responsible for the disequilibrium between leachate and leached Grt.

Crosscutting and overprinting relationships of Permian pegmatites and their host rocks indicate the presence of at least three tectonometamorphic events in this part of the Campo basement:

- i) a pre-intrusive (pre-Permian) metamorphic layering (probably of Variscan age),
- ii) an upper greenschist-lower amphibolite facies post-intrusive event, which is pervasive in the host rocks, and
- iii) a late, lower greenschist facies event, which is responsible for the growth of Chl and fine-grained white mica in very localized shear zones.

The youngest event might be attributed to activities on the Oligocene Giudicarie fault system (Viola et al., 2001), while the older overprinting event is possibly of eo-Alpine (Cretaceous) age, according to geochronological data from the literature of the wider area of investigation (cf. Thöni & Hoinkes, 1987).

Thöni, M. & Hoinkes, G., 1987: In: *Geodynamics of the Eastern Alps*; Flügel, H.W. & Faupl, P. (Eds.), 200-213
 Viola, G., Mancktelow, N.S. & Seward, D., 2001: *Tectonics*, 20/6, 999-1020