Mineral metastability and effective bulk composition: The effect of grain sizes and modal mineral amounts

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Large staurolite porphyroblasts (up to 2 cm) were recognized in quartz-mica schist of the Sierra de Ancasti (west-central Argentina) [1] with the mineral association: Crd-And-St-Grt-Bt-Ms-Pl-Qtz-Chl-Op. Textural relations suggest that the assemblage St-Grt-Bt was present in the metamorphic peak. Growth of late And or Crd porphyroblast is recognized as well. Two post-peak textural domains were indentified: a) St being replaced by And without Crd, and b) Crd rich domains lacking And. A P-T pseudosection in the MnNCKFMASH system using XRF bulk composition allowed to estimate conditions of 590°C and 5.2kb for the St-Grt-Bt assemblge but post-peak textures and mineral compositions where not predictable. We assumed that the original XRF bulk composition was not valid during post-peak conditions not only because the cores of metastable porphyroblasts such as staurolite could have been isolated and excluded of the effective bulk composition [2] (EBC), but also, because heterogeneous distribution of staurolite could have affected the local EBC. Accordingly, post-peak textural relations (~580°C-3.5kb) developed during decompression were modeled using two bulk compositional domains defined on the basis of observed differences in staurolite mode. Two extreme cases were modelled: a) St poor - Crd rich domains lacking And; b) And + St rich domains lacking Crd. Results approximate real compositions and modal amounts observed in both post-peak textural domains. Thus, variation of EBC and generation of EBC domains through the PT path is a critical factor to consider for correct interpretation of metamorphic mineral and textural evolution and particularly for discrimination between polymetamorphic and single metamorphic episodes.

[1] Willner (1983) In Aceñolaza *et al*. 1983 (eds) *Münst. Fors. zur Geol. und Pälaont*. **59**, 31–100. [2] Stüwe (1997) *Contrib. Mineral. Petrol*. **129**, 43–52.

Evaluation of contaminant transport parameters at Leningrad Atomic Power Plant drain area

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The Leningrad Atomic Power Plant (Leningrad APP) drain area was studied. A hydrological study has been performed to demonstrate how contaminant transport proceeds in case of hypothetical disasters.

Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model was chosen for the simulation of radionuclide and chemical transport. GSSHA is a physics based, fully distributed, hydrologic and sediment transport model. The distributed nature of the model confers significant potential advantages for the analysis of non-point source pollutant fate and control.

Precipitations falling on the watershed contain specified concentrations of contaminants for hypothetical disasters at Leningrad APP. As rainfall accumulates on the land surface, ponded surface water infiltrates, providing a source of contaminants into the soil column, and move as surface runoff to adjacent territory. Concentrations of contaminant are affected by decay and transformations.

The most part of the water ponded on the land surface infiltrates, removing contaminants. Water that infiltrates is assumed to contain the same concentration of dissolved contaminants as the ponded water. Infiltration was simulated using traditional Hortonian Green and Ampt (GA) approach.

Additionally, field experiments for testing the values of the Green and Ampt infiltration equation parameters were done for prevailing at the drain area soil types. The determined parameters were the effective capillary suction and the effective hydraulic conductivity.

Comparison of the model outputs with the experimental data indicates that the model can successfully describe cumulative infiltration in different soil types and contaminant transport.