Spherulites in trachytic melts

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Spherulites are cluster of radiating crystals that occur commonly in rhyolitic melts under highly non-equilibrium conditions [1-2]. Textural data on spherulites of alkali-feldspar and pyroxene are shown in this study. Spherulites grew in trachytic melts during cooling and decompression experiments with water-saturated conditions. The aim of this work is to better understand the growth of spherulites as a function of undercooling (ΔT), P_{H2O}, time and superheating. Experiments were carried out using Cold Seal Pressure Vessel apparatus at pressure range of 30 ÷ 200 MPa, temperature range of 750 ÷ 850 °C and duration of 2 ÷ 16 hours.

This study presents preliminary quantitative data on spherulitic morphologies obtained both by electron microscopy (SEM) and phase-contrast synchrotron X-ray microtomography. Because experiments were performed at different experimental durations, the evolution of spherulites can be studied and furthermore the crystallographic misorientation, the changes in size and the aspect ratio can be measured.

Three kinds of spherulites occured during our experiments: (i) spherulites characterized by widely spaced crystals arranged radially around the nucleus, in agreement with previous observations [3-4]; (ii) spherulites characterized by acicular and tiny fibers radially aggregated; (iii) spherulites characterized by the transition from a single crystal into a polycrystalline spherulite (densely branched spherulitic morphology).

The preliminary results about alkali feldspar spherulites show that their growth rate is about 10^{-7} cm/s. Spherulites were grown between 100 and 200 MPa, thus at high water contents. Moreover, low ΔT along with large superheating can enhance the nucleation and growth of spherulites. Therefore, low ΔT, large superheating and high P_f conditions can trigger the crystallization of spherulitic morphologies.

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From death of a glacier to the beginning of life in soil: A case study in the Swiss Alps

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Pedogenesis starts just after deglaciation, with microbial primary succession playing a key role in soil ecosystem development. The progressively exposed moraines of the Morteratsch Glacier (Upper Engadine, Switzerland) offer a full time sequence, from 0 to 150 yrs [1]. We assessed geological, physico-chemical and microbiological parameters (microbial biomass, microbial community structure and selected soil enzyme activities) along the age gradient of the proglacial area. We set up a *double-nested-PCR-DGGE* approach on intracellular DNA extracted from the topsoil (0-10 cm) to monitor bacterial and fungal succession along the chronosequence, capable to detect also low numbers of target sequences occurring in early stage soils.

Increasing soil age was characterized by microbial biomass increase and, as expected, by a dynamic community succession. Both parameters displayed in turn a high positive correlation with SOM content (Ntot and Ctot) and pH decrease (0 yrs: pH 8.11 – 150 yrs: pH 5.64). High correlations with enzymes, biochemical markers reflecting soil activity, were also detected. Numbers of microbial phylotypes were lowest in the youngest soils (0-4 yrs), increased in the intermediate aged soils (4-110 yrs), and decreased again and plateaued in the oldest soils (110-150 yrs).

Our findings confirm that soil microbiota undergo drastic variations both in terms of biomass and community composition according to substrate availability, with interactive adaptation to the differing stages of soil development.

[1] Mavris *et al* (2010) *Geoderma* **155**, 359-371

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