HIGH P/T QUARTZ POLYMORPHS DUE TO ATMOSPHERIC DISCHARGE

Karfunkel, J., Banko, A., Addad, J., Dantas, M. S., Pimenta, M., Pinheiro, M., Krambrock, K., Hadrian, W., Hoover, D. UFMG, Brazil.

The quartz polymorph b-quartz, cristobalite and coesite form under very specific P/T conditions. We suggest a formation from a peculiar and considerable different natural environment on the earth surface - as a consequence of atmospheric discharges in mountain ranges. Gemmy quartz burried in colluvium, which is hit by lightning can pass the transition a-b-quartz, in a reversivel process, changing volume and consequently cracking. As b-quartz has a pronounced planar fracture cleavage paralel to the rhombohedral faces r and z, the intersection of both cleavages forms an X. The lightning path is thus marked by many Xs, which we can observed as damage on these quartzes, called by diggers flashstones. In high voltage laboratories we could reproduce these damage on quartz from the same region. Quartz crystals from colluvium hit by stronger atmospheric discharges show nuclei of cristobalite, indicating temperatures in excess of 1470°C. Melted barbed wire fence in the vicinity corroborate the high temperatures, with very little or no pressure. Microfractures in Precambrian quartzites are saturated with water during the rainy season. The shock due to lightning, rises the water temperatures in such confined system from around 20 to over 1500°C, resulting in an explosive expansion, which can blow rocks appart. The pressure is estimated in excess of 35 kbar, indicated by the presence of coesite, identified by RMP analyses.