# WHAT WE KNOW ABOUT MAGNETIC AND OTHER PHYSICAL BULK PROPERTIES AT CURIE DEPTH?

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The ferro(i)magnetic-paramagnetic transition, taking place in a few degree wide temperature range at the critical (Curie or Néel) temperature is a second-order magnetic phase transition. A possible extreme (theoretically infinite) enhancement of magnetic susceptibility (the Hopkinson peak, or the "lambda-type" anomaly) of magnetic materials around this temperature has been known for a long time. If the enhancement is sufficiently high, it is able to cause important geomagnetic and magnetotelluric anomalies (Kiss et al., GRL, 2005). Theoretically, and according to solid state physics experiments, it does have reality, and we think, at mid-crustal depths the temperature stability and homogeneity would be able to maintain such a phenomena. At the same time, the disordered nature of real earth materials and rock physics experimental results (where the Hopkinson peaks have not exceeded 3-4) make this phenomenon questionable. Hopkinson-peak measurements are usually carried out to determine precisely the Curie temperature, not the intensity of the peak itself. In order to be able to determine the peak's magnitude, the temperature sampling should be much denser, the heating (cooling) rate and the external field should be much lower than in routine rock physics measurements. The required heating (cooling) rate limit may be further constrained due to an enhanced specific heat capacity and a diminished thermal conductivity around the critical temperature. Moreover, as we have found in various publications about such solid state physics experiments, significant changes in electrical resistivity and elastic constants may also occur at the critical temperature. The second-order magnetic phase transition, if it is really accompanied with abnormal bulk parameters at Curie depth, might deeply improve our knowledge about structures and processes at mid-crustal depths. The magnetotelluric consequences are discussed in a companion poster presentation in session I.06. Acknowledgement: Hungarian Scientific Research Fund, T68475.

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