The Pannon LitH_2Oscope project: developing the 'pargasosphere' concept

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'Water' is a fundamental component of life, but also essential for making Earth a geologically 'living'planet. The core of plate tectonics is that the Earth' rigid outermost layer, the lithosphere, 'floats' on the underlying asthenosphere. The explanations for their distinct physical properties are still controversial, therefore, the more precise understansing of the lithosphere-asthenosphere boundary (LAB) and mid lithosphere discontinuities (MLDs) remains important goals for the Earth Science community. The new 'pargasosphere' theory may provide an alternative reason how only minute amount of 'water' and its constitution in the Earth interior explains the variations in physical and geochemical properties at the LAB under young extensional basins and oceanic plates and at MLDs under older continental plates in ~90 km depth (Green et al., 2010; Kovács et al., 2017). The Pannonian Basin (a young extensional basin in Central Europe) is an excellent natural laboratory to develop and trial the 'pargasosphere' theory. The core of the idea is that the 'water' is locked in pargasite and nominally anhydrous minerals (NAMs) where pargasite stable at temperatures less than ~1100 °C and pressures less than ~ 3 GPa. In contrast, at temperatures and pressures exceeding these thresholds 'water' is usually present in NAMs and/or fluid/melt phase. Ultimately it is probably the lower concentration of 'water" in NAMs in the 'pargasosphere' which make the lithosphere rheologically strong.

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