
WATER INCORPORATION IN TRANSITION ZONE MINERALS, WADSLEYITE AND RINGWOODITE: A STUDY USING ERDA (ELASTIC RECOIL DETECTION ANALYSIS)

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Abstract

The transition zone is potentially an important water reservoir within the Earth. Indeed, transition zone minerals, namely wadsleyite and ringwoodite, can contain up to 3.2 wt% H₂O by weight (Inoue et al., 1995). In recent years, we have been working on extending the capabilities of measurements of water in minerals using other techniques than Fourier Transform Infrared spectroscopy (FTIR) like Raman spectroscopy (Bolfan-Casanova et al., 2014) that allows the use of very small probing beams under reflection geometry, but also ERDA (Elastic Recoil detection Analysis, Bureau et al., 2009; Withers et al., 2012) that allows quantification without the use of any standards. The main problem of using FTIR on wadsleyite and ringwoodite is that these phases are often too absorbing to allow proper quantification of water. Also, whenever working on realistic, i.e. complex, compositions, samples end up having small grain sizes that are difficult to deal with FTIR when the samples are polyphasic. Thanks to ERDA, we calibrate the Raman spectroscopy for quantifying water in wadsleyite and ringwoodite. We will also discuss the incorporation mechanisms of H in both phases.

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