MR21A-01: Ice-VII inclusions in diamond as indicators for deep mantle fluids (Invited)

Tuesday, 11 December 2018
08:00 - 08:15
Marriott Marquis - Capitol/Congress

Most of the chemically bound water in subducted slabs is released at shallow depth and takes an essential role in generating arc volcanism. Rock-forming minerals of the transition zone are capable of binding large amounts of water. It has been one of the prominent questions in geochemistry and -physics of the mantle to assess how much residual water is carried into the transition zone or beyond, how long it remains there, and how it is released upon upwelling of mantle material. Experimental and seismologic studies (1,2) have indicated subduction of residual water into the transition zone and into the shallow lower mantle. More recently, the discovery of hydrous ringwoodite (3) and ice-VII (4) as inclusions in diamonds from the transition zone and shallow lower mantle provide direct mineralogical evidence for such processes. Not only can we now identify dense hydrous phases that formed in the deep Earth, we can even determine their residual pressure and constrain the depth of entrapment in diamond fairly accurately. Inclusions in diamond represent regional metasomatic processes that generated the host diamond. In this talk we describe the method of constraining the pressure and temperature of the source regions of ice-bearing diamonds and we present mineralogical data which constrain the type of environment where these diamonds grew. 1: Bercovici&Karato
Nature
425, 39, 2003; 2: Schmandt et al. *Science* 344, 1265, 2014; 3: Pearson et al., Nature 507, 221, 2014; 4: Tschauner et al., *Science* 359, 1136, 2018.

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