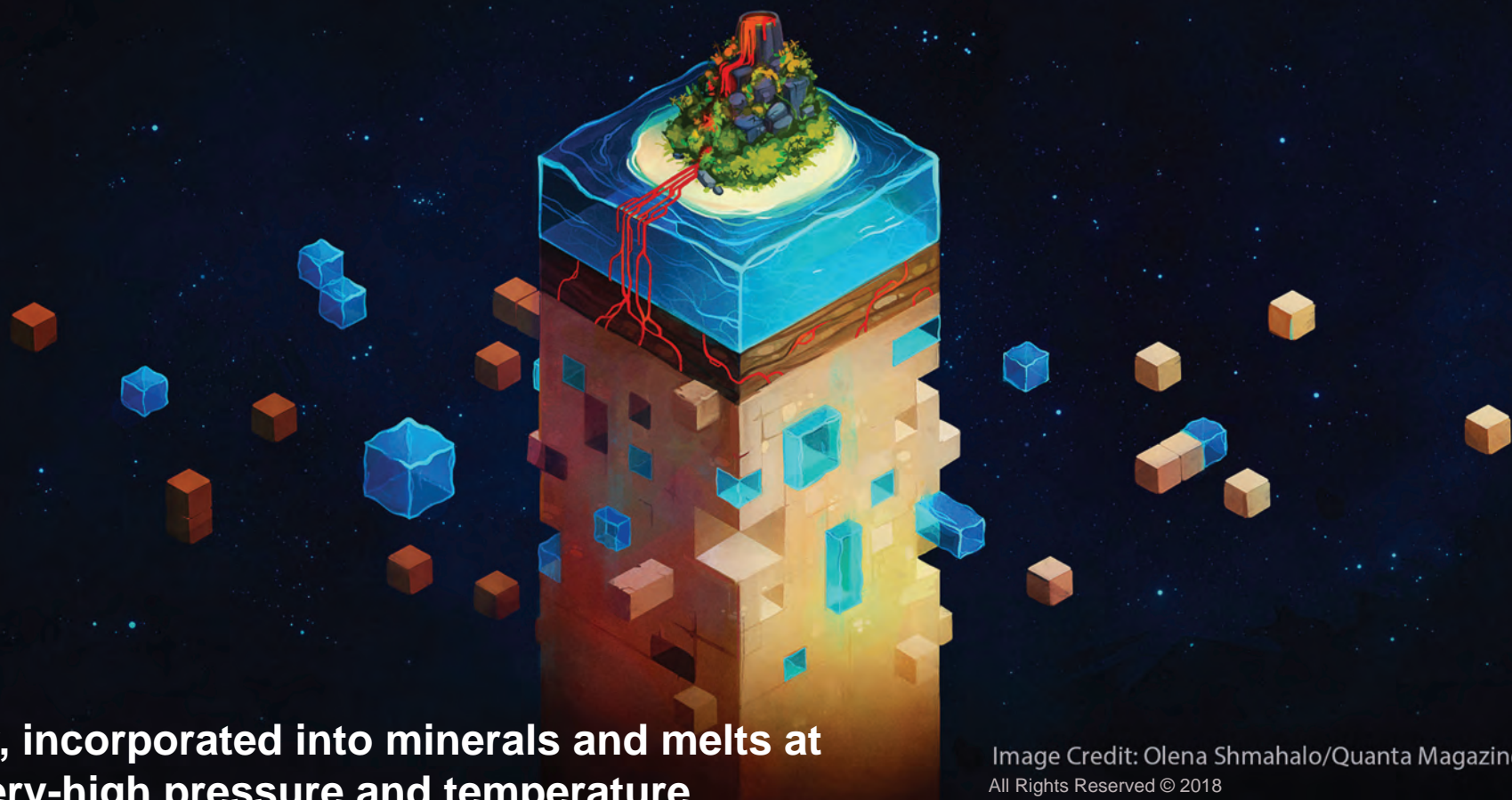


Steve Jacobsen

The Earth's Hidden Ocean



Water, incorporated into minerals and melts at the very-high pressure and temperature conditions of Earth's deep mantle, may constitute the planet's largest geochemical reservoir of H₂O. Hidden from view, the mantle transition zone (410-660-km depth) may contain several oceans worth of water. At the atomic scale, hydration modifies the structure and physical properties of minerals through associated defects. At mesoscopic scales, water influences diffusion, rheology, and lattice preferred orientation. At geophysical scales, water cycling through the solid mantle plays a critical role in melt generation, plate tectonics, and may have acted to buffer the volume of Earth's oceans over geologic time. Jacobsen's talk will focus on recent laboratory experiments, naturally occurring inclusions in diamond, and seismological observations that reveal clues about the distribution and origin of water in our habitable planet.

Image Credit: Olena Shmahalo/Quanta Magazine
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Steve Jacobsen is Professor of Earth and Planetary Sciences at Northwestern University, where he frequents the APS to use synchrotron radiation for exploring the structure and dynamics of Earth and planetary materials at extreme conditions. He received a Presidential Early Career Award through the National Science Foundation, a Packard Fellowship for Science and Engineering, and a Distinguished Teaching Award from Northwestern. Jacobsen currently serves on the Committee for Seismology and Geodynamics at the National Academy of Sciences and is Editor at *Geophysical Research Letters*. He received his Ph.D. from the University of Colorado and was a Barbara McClintock postdoctoral fellow at the Carnegie Institution for Science, Washington D.C.

Wednesday, January 9, 2019 | 3:00 p.m.

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