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# Mineralogy model of the deep interior of Triton

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Objective:

- Describe the mineralogy of the deep interior of Triton as a function of temperature, pressure, and the chemical variables.

Methodology

- The Perple_X algorithm was used to model the stability fields of minerals in the deep interior of Triton.
- Chondrite (CI,CM,CV) material precursor was assumed (Orgueil, Murchison, and Allende).
- The results for the Orgueil chondrite (CI) precursor are presented here.
- We considered both an anhydrous and a hydrated evolutionary scenario.

| ELEMENTAL COMPOSITION | wt (%) |
|---|---|
| MgO | 15.87 |
| $SiO_2$ | 22.69 |
| CaO | 1.36 |
| $Na_2O$ | 0.76 |
| $Al_2O_3$ | 1.70 |
| FeO | 4.63 |

Measured mass-amounts from Orgueil chondrite (Jarosewich, 1990)

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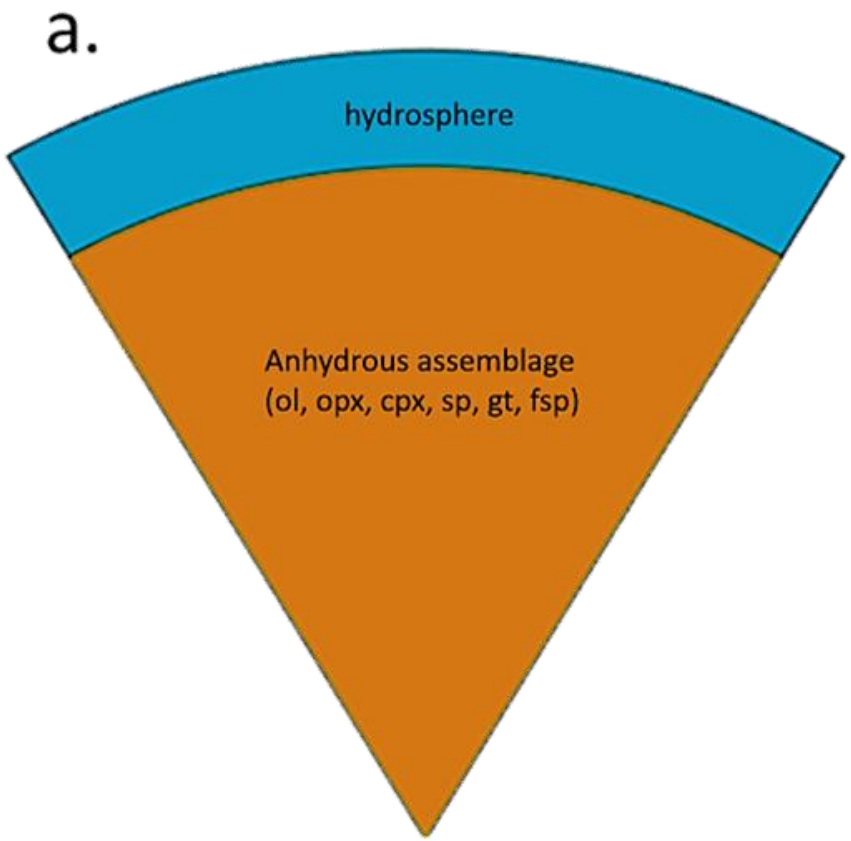


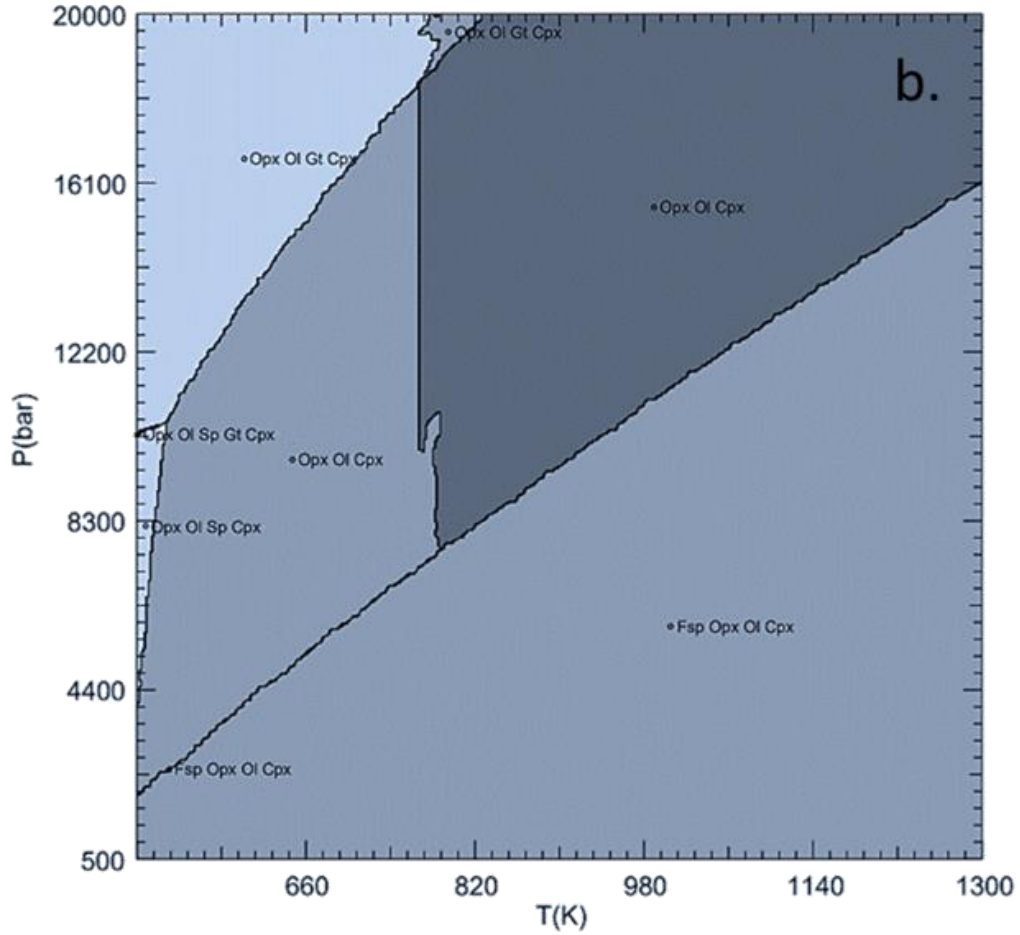


- Internal structure of an anhydrous deep interior of Triton.
- Mean density: 3309.06 kg $m^{-3}$.

- Pseudosection for CI precursor material with anhydrous mineralogy assemblages.
- Primary phases are olivine *(Ol),* clinopyroxenes *(Cpx),* and orthopyroxenes *(Opx)*. Accessory phases are garnet *(Gt),* spinel *(Sp),* and feldspars *(Fsp).*

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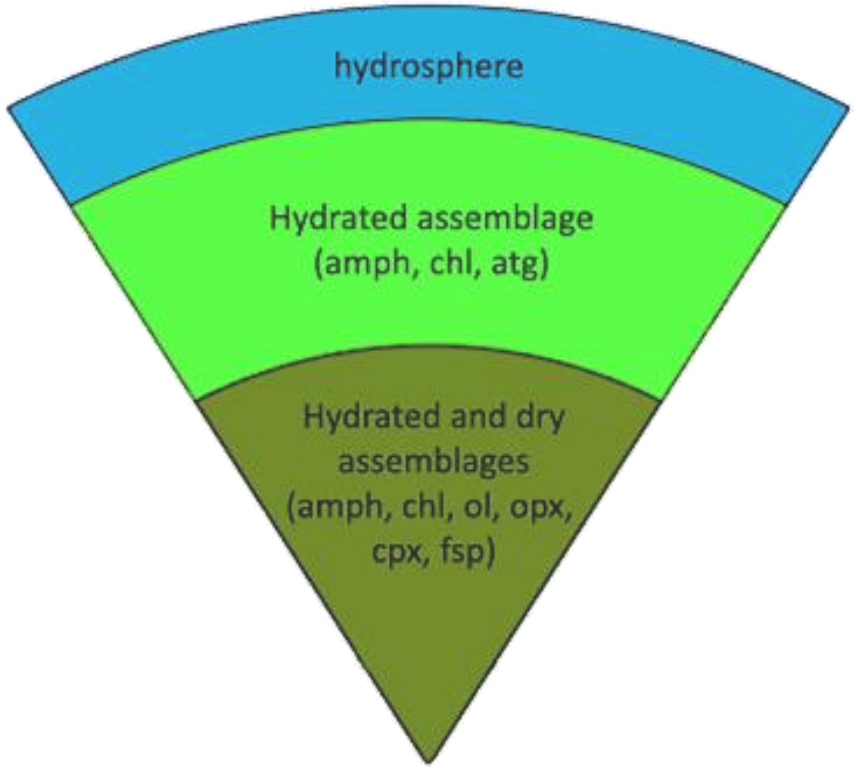


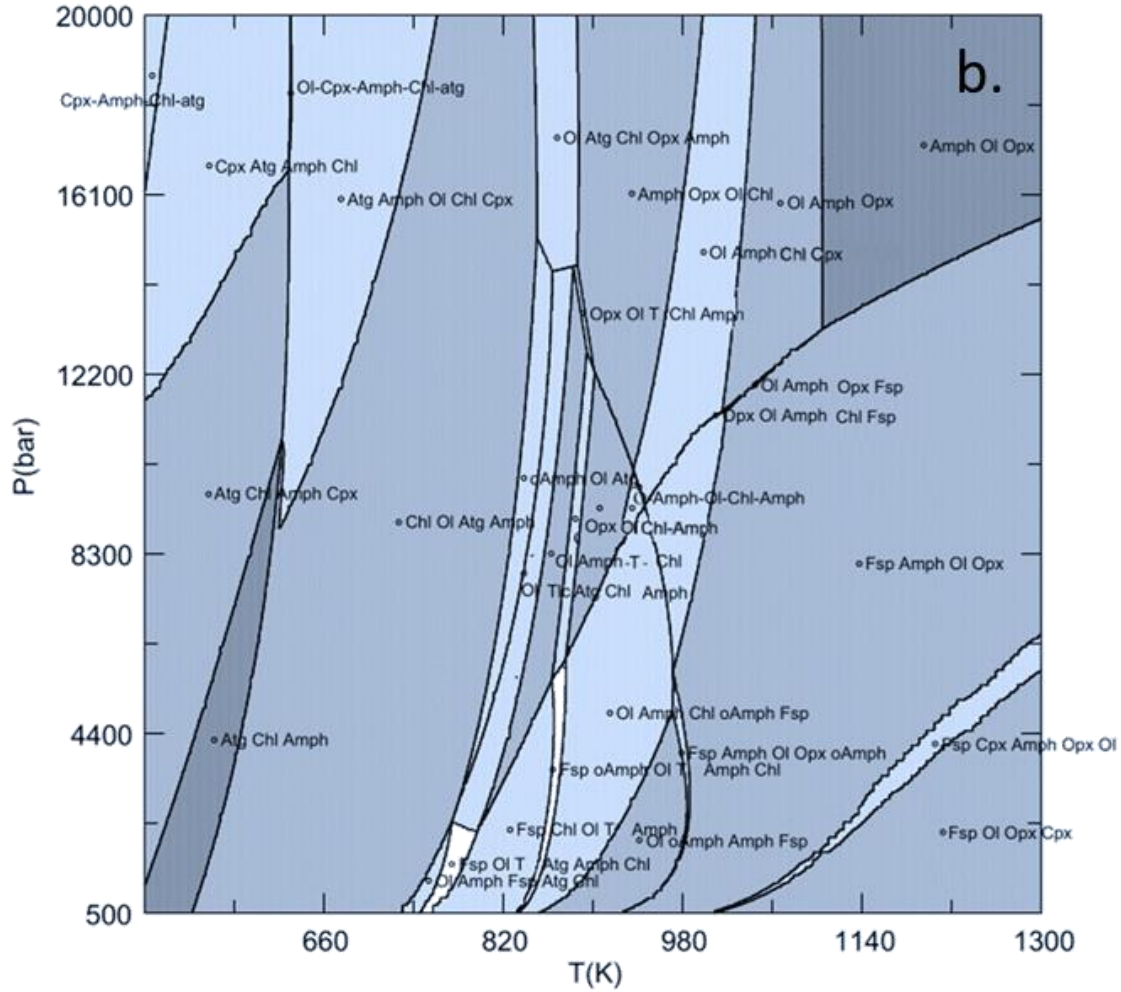


- Internal structure of a hydrated deep interior of Triton.
- Mean density: 2957.65 kg $m^{-3}$.
- Hydrate stability with presence up to 1300 K – 20 kbar.

- Pseudosection for CI precursor material with hydrated mineralogy assemblages.
- Primary phases are amphiboles *(Amph),* chlorite *(Chl),* antigorite *(Atg)*, talc *(T)* olivine (*Ol*), clinopyroxenes *(Cpx),* orthopyroxenes *(Opx)*. Accessory phases are garnet *(Gt),* spinel *(Sp),* and feldspars *(Fsp).*

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- We developed a mineralogy model of the deep interior of Triton assuming Orgueil chondrite (CI) as a precursor material.

- We derived two possible deep interior mineralogies:
  - Anhydrous deep interior (mean assemblage: olivine, clinopyroxenes, and orthopyroxenes). Mean density: 3309.06 kg $m^{-3}$.
  - Hydrated deep interior (mean assemblage: amphiboles, chlorite, antigorite, talc, feldspars, olivine, orthopyroxene, clinopyroxene). Mean density: 2957.65 kg $m^{-3}$ .
  - The hydrated model presented a more complex assemblage. In this model, the amphiboles group contains phases that are stable in every field of the pseudo-section while the presence of antigorite demonstrates that serpentinization has occurred.

- Future radio-science experiment results can constrain the mean density and the composition of the deep interior of Triton.

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