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# Magnesite in the Eastern Alps

*A fresh start with modern methods*



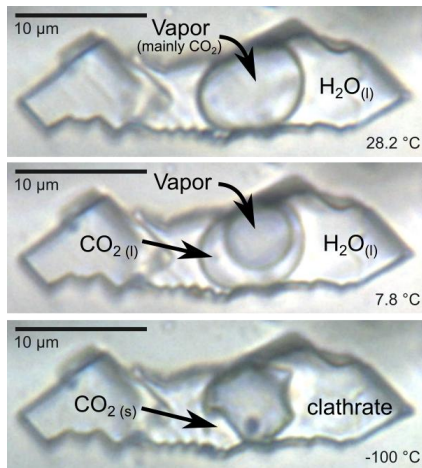
Carbonate-hosted magnesite is essential for the production of **refractories** and hence crucial for the heavy industry.



The **Eastern Alps in Austria** host significant magnesite deposits and Austria is the top producer in the EU.



The formation of this commodity is investigated in the **Horizon Europe project MultiMiner** and the **MRI\_Magnesit project**.



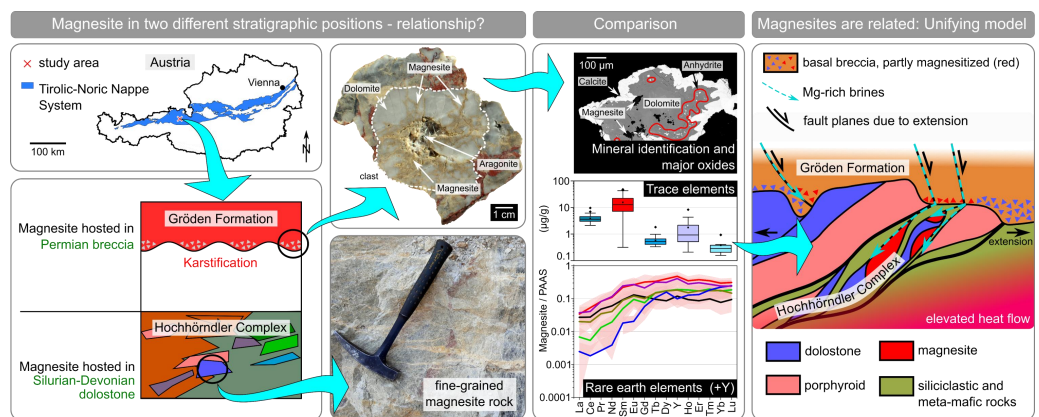
**Methods:** laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), electron probe microanalysis (EPMA), Raman spectroscopy, fluid inclusion analysis, U-Pb dating, clumped isotope thermometry

### Highlights:

- **First LA-ICP-MS study** on magnesite from the Eastern Alps.
- Fluid inclusion studies showed that **highly saline brines are the magnesite-forming fluids** and **other fluid inclusion generations disclose post-formational events**.
- Trace element analyses revealed that **magnesite groups in different stratigraphic positions are related by a common fluid** – this relationship portrays a mineralizing event during the Triassic.

↑  
Fluid inclusion in magnesite of the Häuselberg occurrence in Leoben (at 28.2 °C, 7.8 °C and -100 °C). *Hampf et al. (in prep.)*

→  
Graphical abstract of the research on carbonate-hosted magnesite in the Hochfilzen mining district (Tyrol, Austria). *Hampf et al. (in review)*



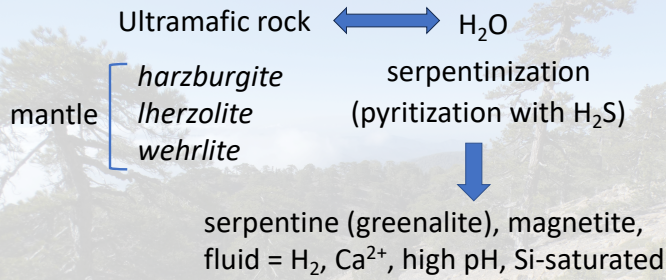
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# Natural Hydrogen in Ultramafic Rock

## Serpentinization, Rodingitization, Diopsidite formation, Methanation

Area of interest: Ophiolitic Complex (Troodos, Cyprus)



the serpentinization-derived fluid doesn't just alter its host ultramafic rock; it also triggers a second stage of alteration in neighbouring rocks, converting them into rodingite

### 1. rodingitization

*adjacent rock (gabbro, dolerite)  
(formation of grossular, diopside, vesuvianite)*

### 2. diopsidite formation

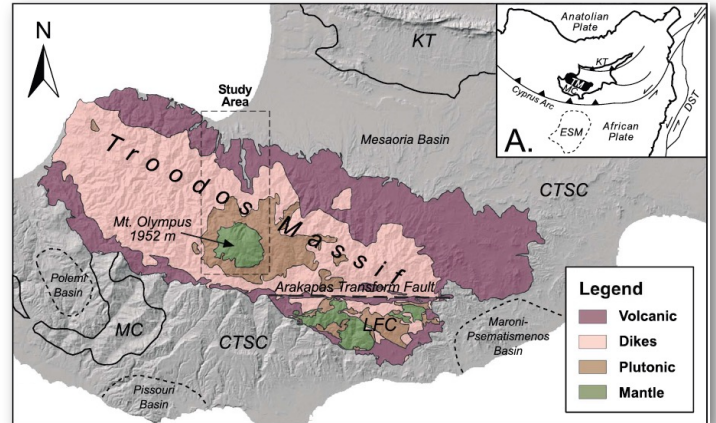
*in unaltered ultramafic rock (Al-poor)*

### 3. methanation

*reduction of CO<sub>2</sub> (Sabatier reaction)*

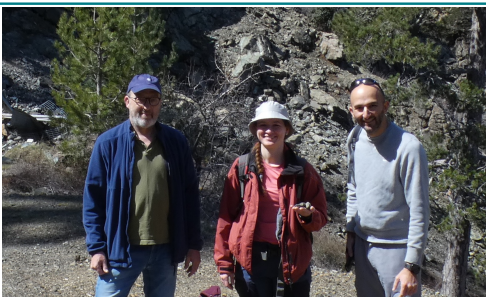
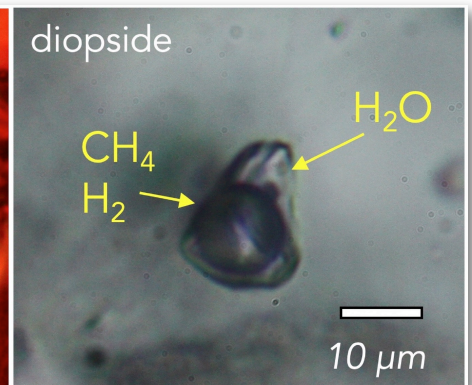
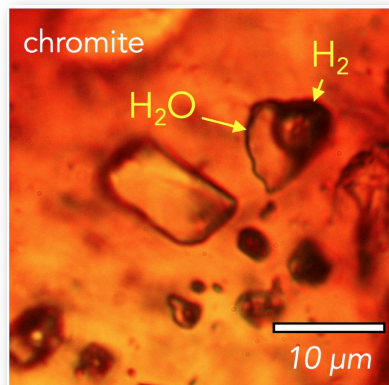
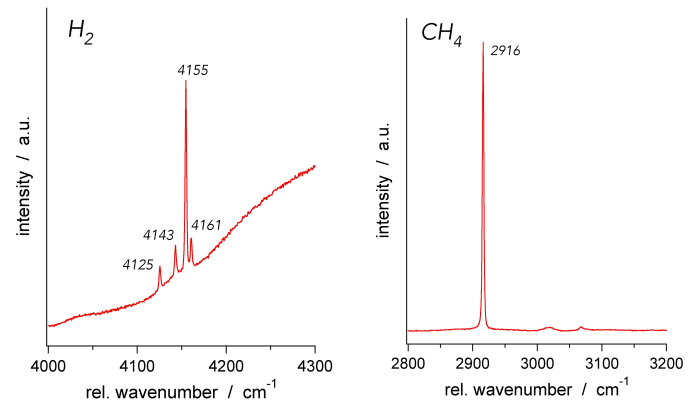
Fluids produced by serpentinization (and pyritization) are preserved in **fluid inclusions** that formed during coeval rodingitization and diopsidites formation

This natural geologic hydrogen can be regarded as an emerging fuel and a potential low-carbon energy source, although economic viability, exploration strategies and safe extraction remain active research topics.



after Morag et al. (2015)

### Raman Spectroscopy



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