EGU General Assembly 2020

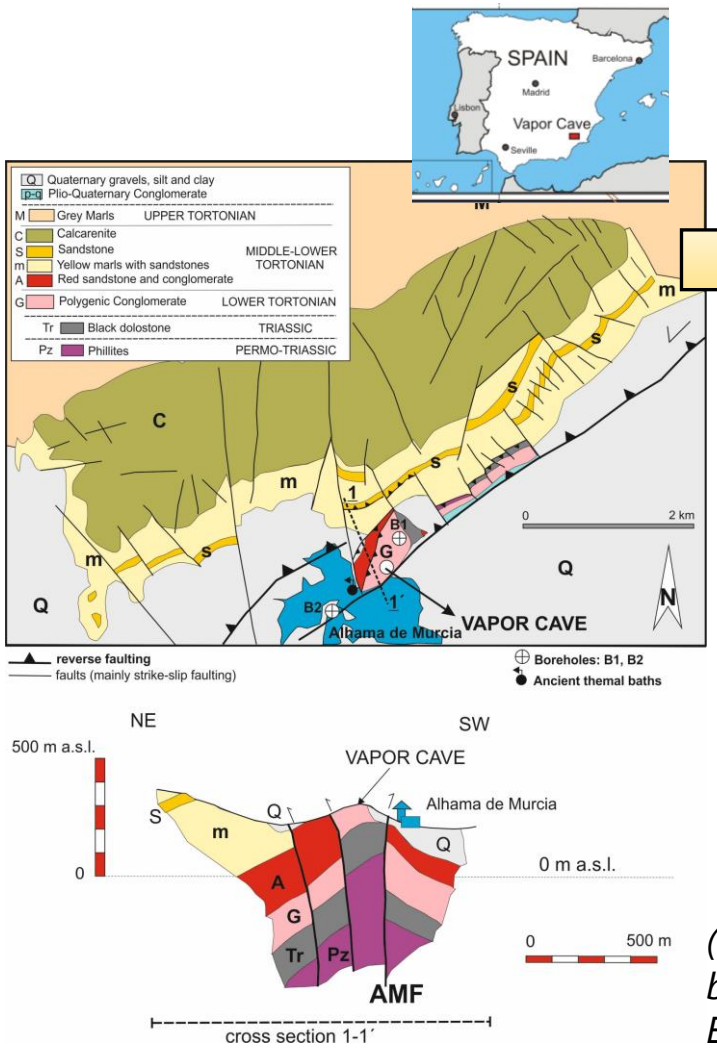
GMPV1.6: Geochemical monitoring in volcanic and seismically active regions: new advances

#shareEGU20, 8 May 2020

Abstract: EGU2020-17591

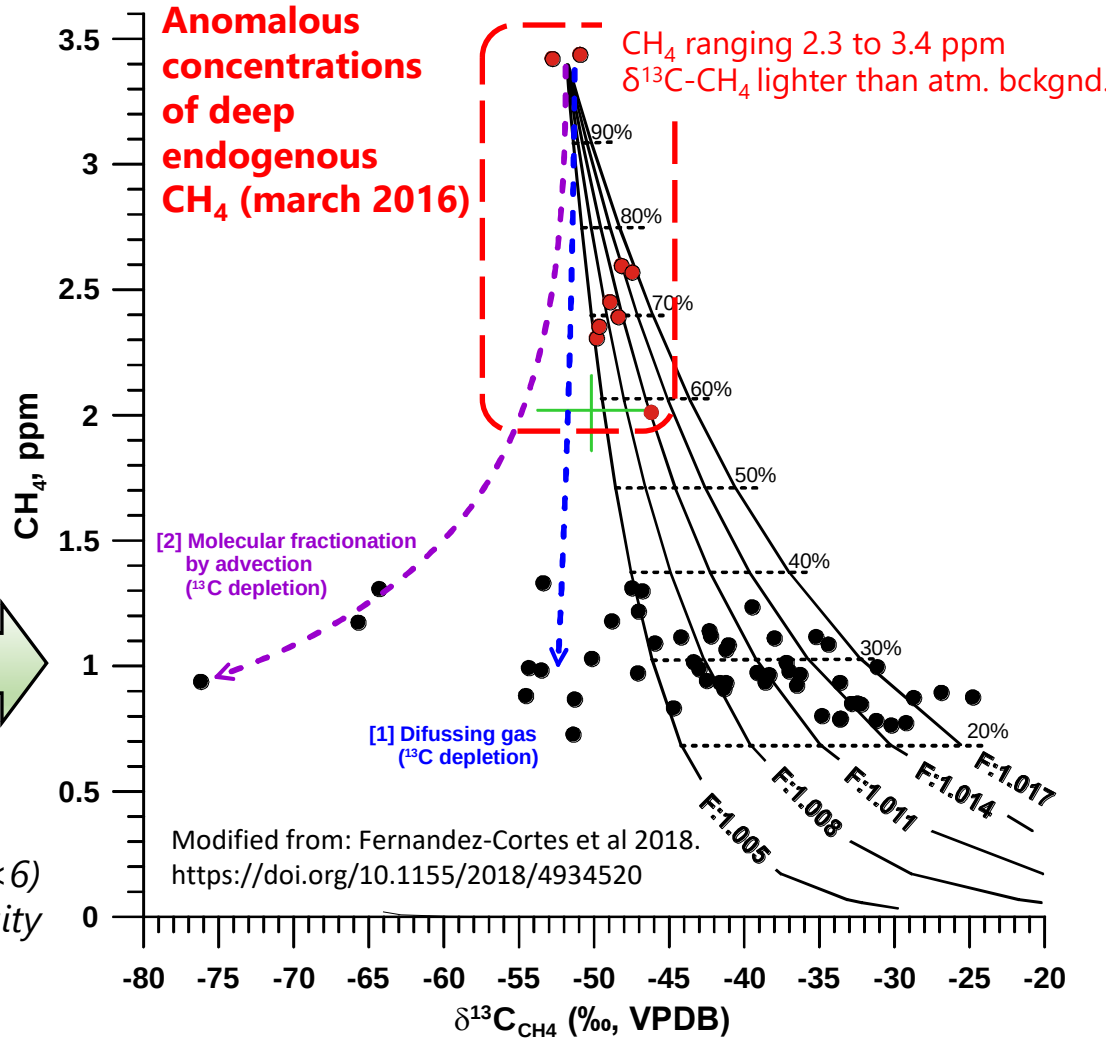
Ángel FERNÁNDEZ-CORTÉS
José María CALAFORRA
Universidad de Almería
Raúl PÉREZ-LÓPEZ
Instituto Geológico y Minero de España
Sergio SÁNCHEZ-MORAL
Tamara MARTÍN-POZAS
mncn CSIC
Soledad CUEZVA
Universiteit Antwerpen

Geochemical monitoring of mantle-derived gases migration along active faults: case of Vapor cave (southern Spain)



Vapor cave, situated along a tectonically active master fault (*) with an outstanding upwelling of hydrothermal (>33°C) and CO_2-rich air from the zone of fluid-geodynamic influence

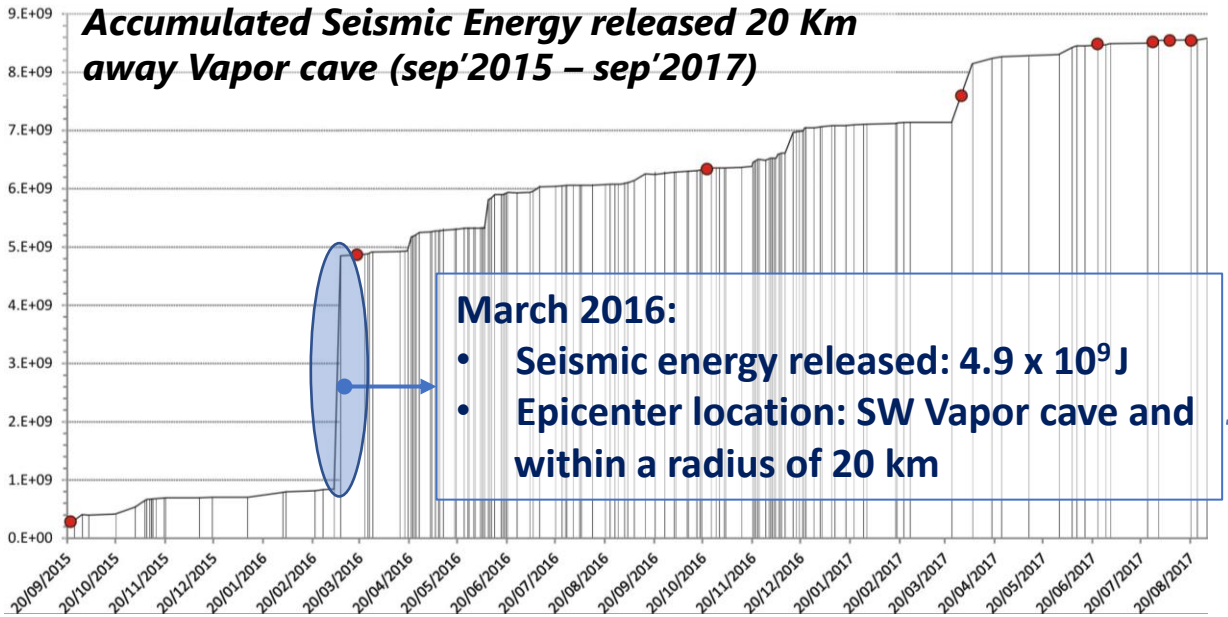
This cave constitutes an effective sink of CH_4. This gas is continuously depleted and ^{13}C-enriched along the vertical migration pathway into the cave (CH_4<1 ppm and $\delta^{13}C$ close to −30‰).



(*) AMF fault is related with small sized (m<6) but high destructive (macroseismic intensity EMS VII-VIII) instrumental earthquakes

Earthquake activity(*) nearby the Vapor Cave and fluid mobilization

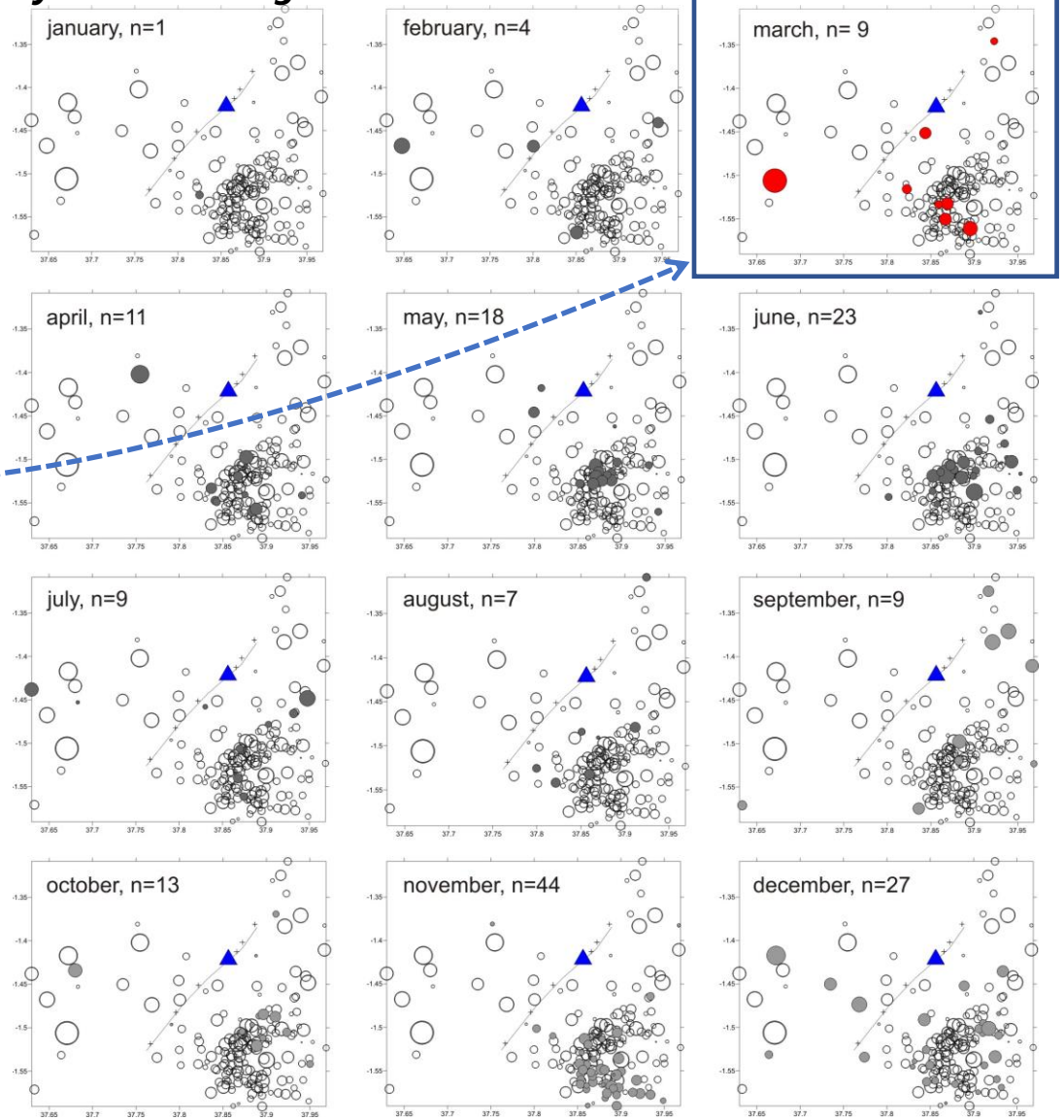
Accumulated Seismic Energy released 20 Km away Vapor cave (sep'2015 – sep'2017)



March 2016:

- **Seismic energy released: 4.9 x 10^9 J**
- **Epicenter location: SW Vapor cave and within a radius of 20 km**

Epicentral earthquake distribution (20 km away of Vapor Cave) by month during 2016



○ earthquakes recorded during 2016

● earthquakes each month

● earthquakes during march'16

▲ Vapor cave

— NE-trending of AMF

(*) Source: www.ign.es last access march 2018

Some preliminary conclusions

Seismic energy released during March 2016 triggered an intense migration of endogenous fluids through the upper vadose, changing the gaseous composition of cave air, particularly CH4.

The orientation of the AMF with NE-trending, plus the geometry of the fault have an influence on the mobilization trajectory of deep-endogenous gases

Any anomalous concentration and isotopic deviation of CH4 in the cave atmosphere constitutes itself a very valuable property in terms of using as potential earthquake precursor in combination with other geochemical indicators.