1. RESEARCH QUESTION

How to link the macro- and microstructure of lacustrine carbonates with elastic wave velocities?

2. GEOLOGICAL FRAMEWORK

Development of two lacustrine sedimentary basins on Samos during the Upper Miocene.

3. MULTI-SCALE METHODOLOGY: FROM ULTRASONIC TO SEISMIC

Sketch of the refracted wave propagation

4. PLUG ULTRASONIC LABORATORY DATABASE

Crossplots of P-wave velocity measurements acquired from the same location, laboratory and outcrop, with different frequencies. The Probability Distribution Law (PDL), for each crossplot is indicated in colors.

5. OUTCROP DATASET

Crossplots of P-wave velocity measurements acquired from the same location, laboratory and outcrop, with different frequencies. The Probability Distribution Law (PDL), for each crossplot is indicated in colors.

6. SEISMIC DATASET

Impact of the large scale fabric (stratification, fractures,) on the elastic properties:

Low P-wave velocities (Maximum of 2400 m/s)

7. UPSCALING DATASET

• Descriptive statistics of Vp of each dataset are compared to the wavelength sizes (Vp/frequency). It shows a general decrease, from ultrasonic laboratory data to seismic.

8. UPSCALING MODEL

• We propose to compute a crack density between scales (Walsh, 1965).
• Using the asymptotic approximations given by David & Zimmerman (2011), we reverse the Vp changes in terms of crack density (DEM scheme).
• He indicated by David & Zimmerman (2011), this DEM scheme is only valid for cracks with aspect ratio lower than 0.01.

9. TAKE HOME MESSAGE