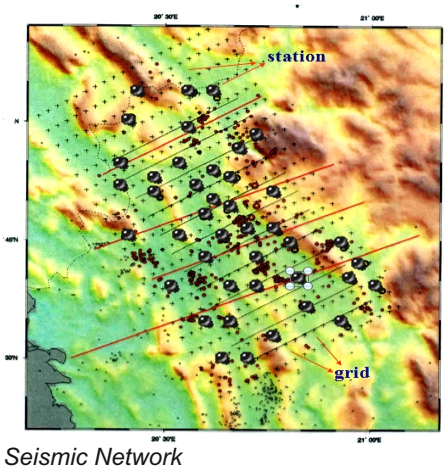
PST Survey in NW Greece

When the Earth whispers, we are there



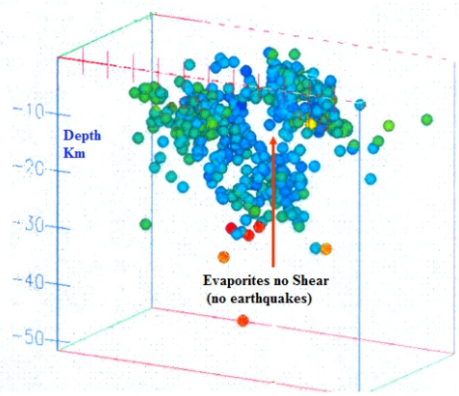
Seismic Network

Landtech Geophysics successfully completed a high resolution Passive Seismic Tomography (PST) investigation in NW Greece for Shell. This is a thrust belt region with difficult topography and seismic penetration problems due to surface weathered limestone plus the existence of evaporites.

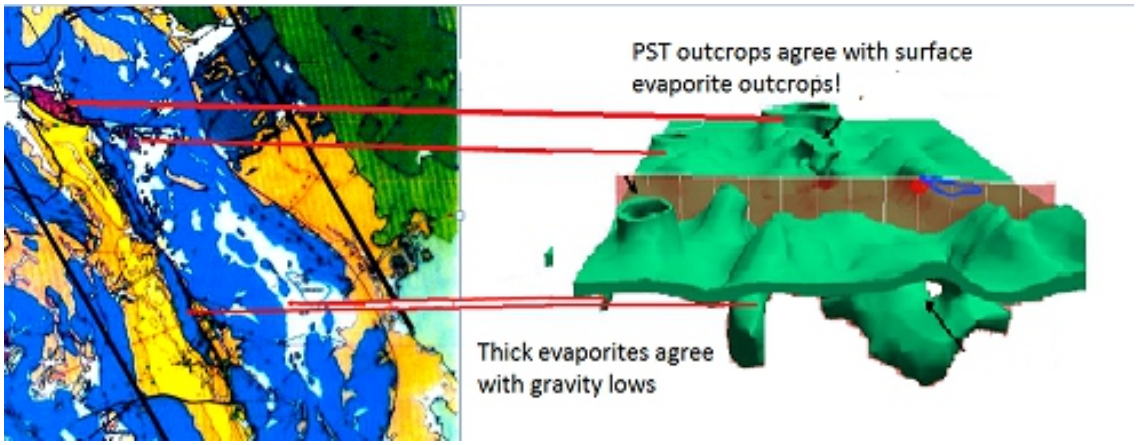
Conventional seismics failed to show any structure and as a result, the exploration program was terminated. By installing a network of 40 specially designed Landtech seismometers and using local microseismicity as seismic sources, a regional structure of a 2800 sq.KM area was obtained in 3D.

Despite the regional nature of this PST survey (large area and small number of installed passive stations limited by budget), the obtained structural information was impressive and revealed many potential hydrocarbon traps.

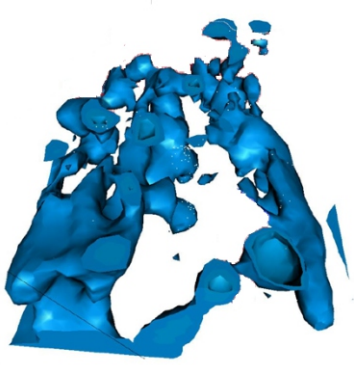
The 3D distribution of evaporites was accurately mapped and agrees with surface outcrops and the gravity data. Furthermore, 3D Vp and Vp/Vs volumes were obtained for all the investigated area.

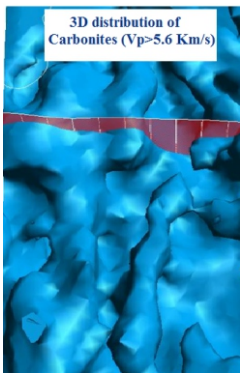


Above: seismic sources below the target



By selecting velocity values corresponding to known lithological formations in the region, we can reveal the 3D structure. In the figure (right) we depict formations with 1.85< Vp/Vs<1.95. In the figure (right) we depict the obtained 3D carbonate structure by selecting from the 3D velocity cube Vp velocities higher than 5.6Km/s which in situ measurements have shown that correspond to Carbonates.
It is worth mentioning that all structural “highs” correspond exactly to structural highs of these formations.

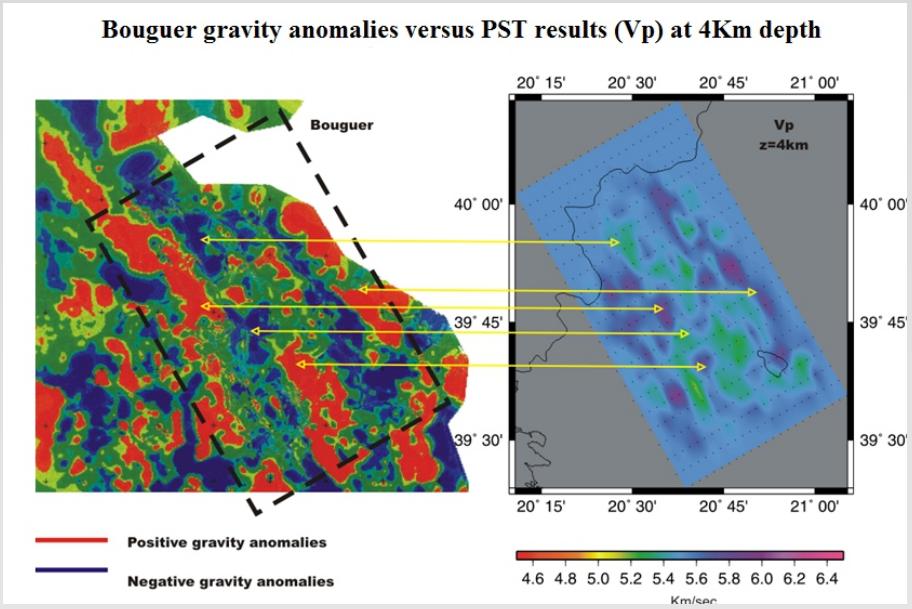


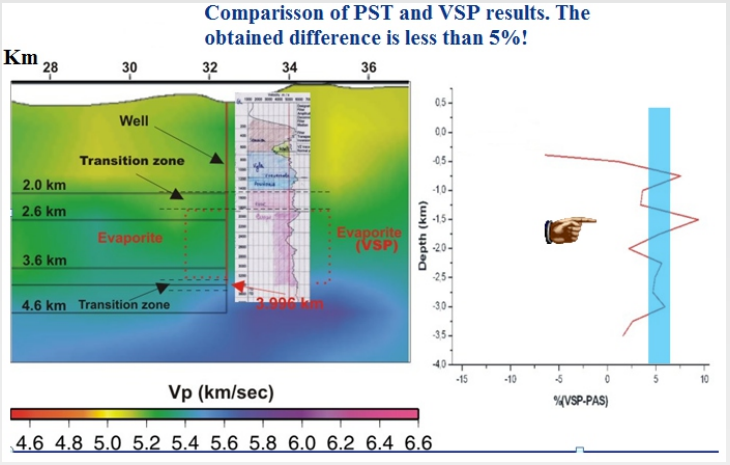


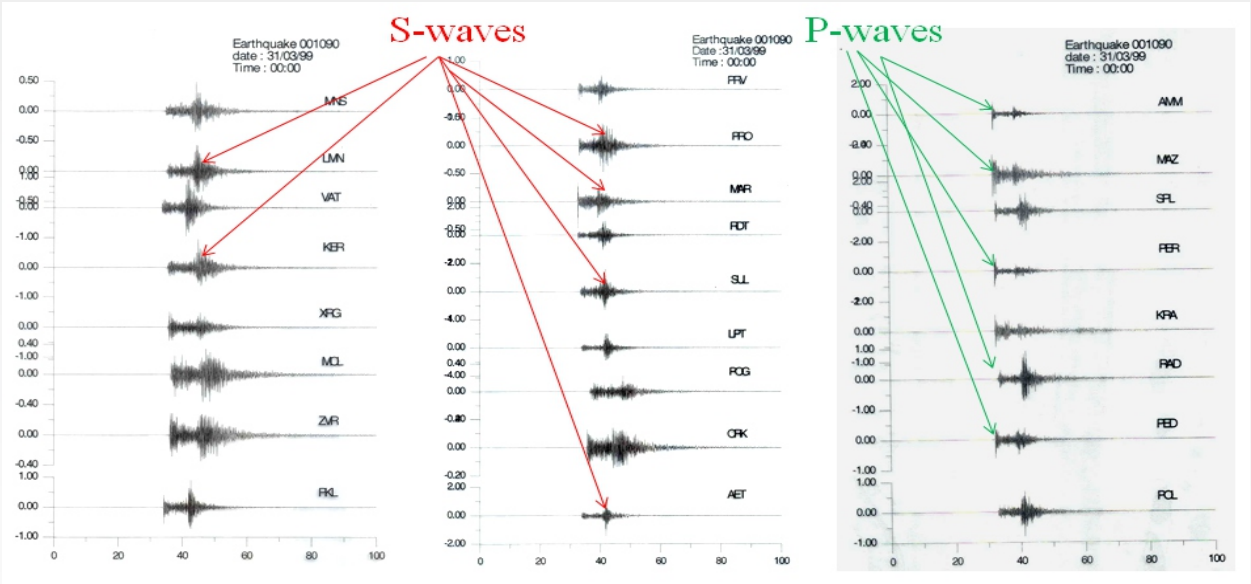
The data obtained from the PST survey were also in agreement with the gravity data. In the figure to the right, we compare Bouguer gravity values with Vp values taken from a passive tomography section at a depth of 4Km. It is evident that positive gravity anomalies correspond to high seismic velocities while lows in the gravity anomalies correspond to seismic velocity lows.

We are so confident of the accuracy of our PST results that we can even compare them with VSP data! In the example depicted in the figure to the right, all lithological features obtained from a VSP survey are exactly presented in the corresponding PST section. The difference of the obtained velocities from PST and VSP surveys were **less than 5%**

In the figure below we show the recorded seismograms at 24 stations of the network and the corresponding P– and S– wave arrivals.







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