UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO
POSGRADO EN CIENCIAS DE LA TIERRA

"INTEGRAL CHARACTERIZATION OF A GEOTHERMAL SYSTEM CON PASSIVE SEISMIC AND ELECTROMAGNETIC METHODS"

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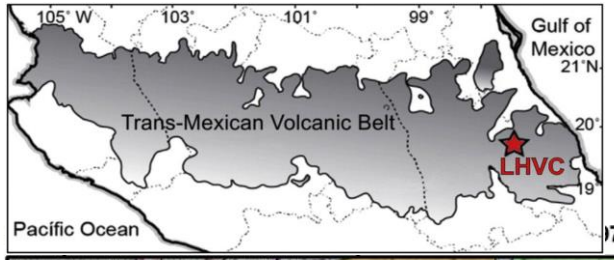
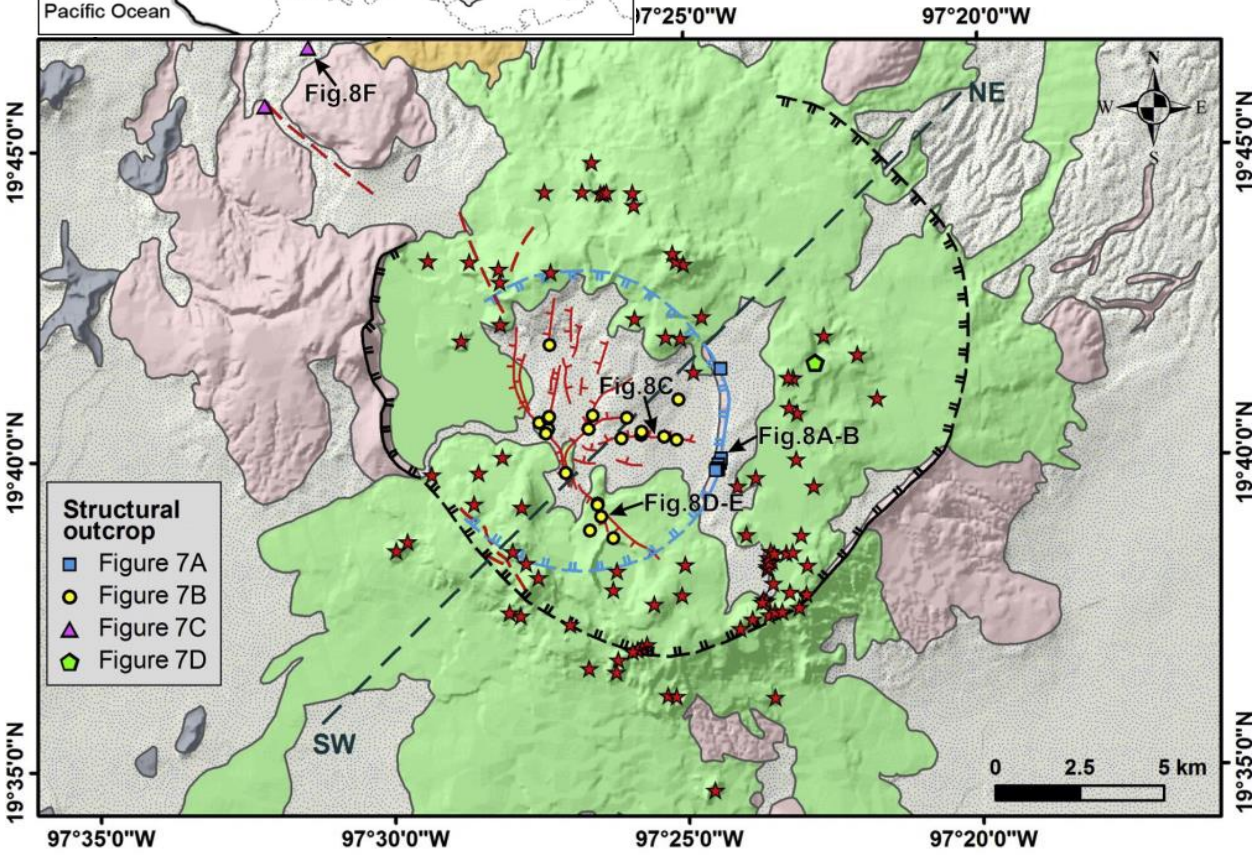
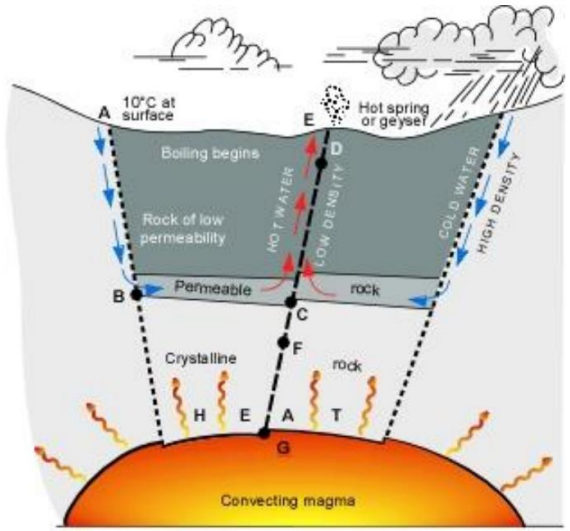
SETUP

VOLCANIC COMPLEX "LOS HUMEROS" (VCLH)

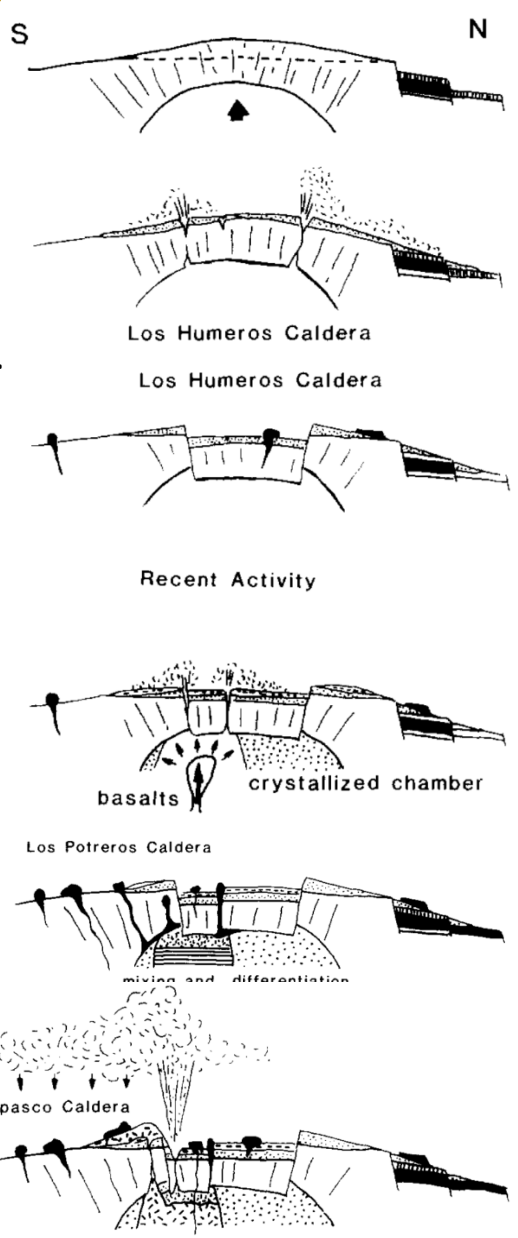
- Evento de compresión NE-SW: fallas inversas y lineamientos NW-SE.
- Evento de tensión y trans-tensión: fallas normales N-S, buzamiento al NE.







Norini et al., 2015



Campos-Enriquez y Garduño-Monroy, 1987

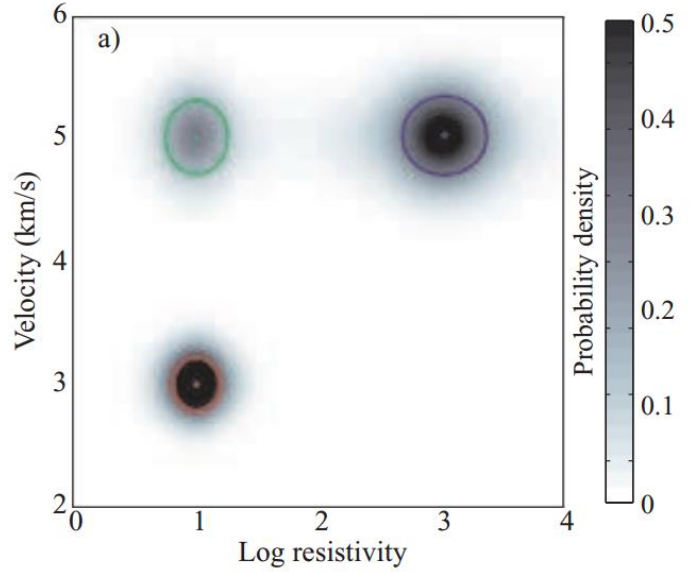
1	2	3	4	5	6	7

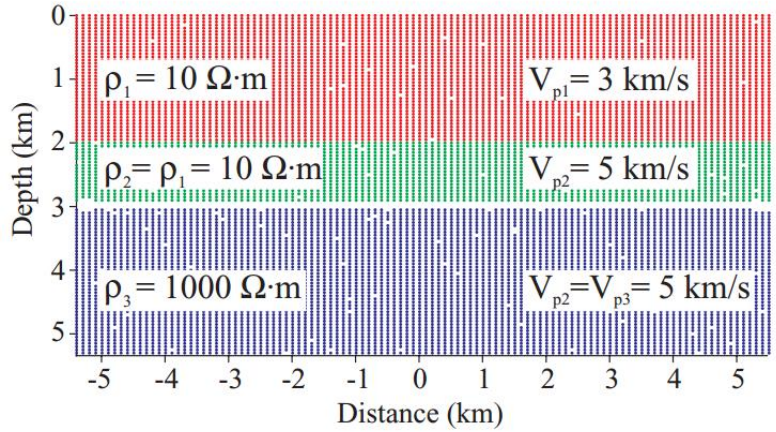
PROPERTIES

Target \ Physical property	Density	Magnetic susceptibiity	Electrical resistivity	Dielectric permittivity	Seismic velocity
Porosity	Strong	None	Strong ★	Moderate	Moderate
Permeability	None	None	Weak	Weak	Weak
Water content	Moderate	None	Strong ★	Strong	Moderate ★
Water quality	None	None	Strong	None	None
Clay content	Weak	None	Strong	Weak	Moderate
Magnetic mineral content	Moderate	Strong	Weak	None	None
Metallic mineral content	Strong	None	Strong	None	Moderate
Mechanical properties	Moderate	None	Moderate	Weak	Strong
Subsurface structure	Moderate	Moderate	Moderate ★	Strong	Strong ★

Strong | Moderate | Weak | None

Degree of relationship





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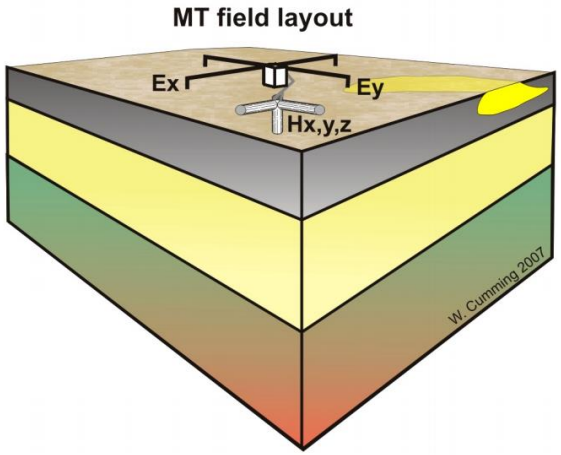
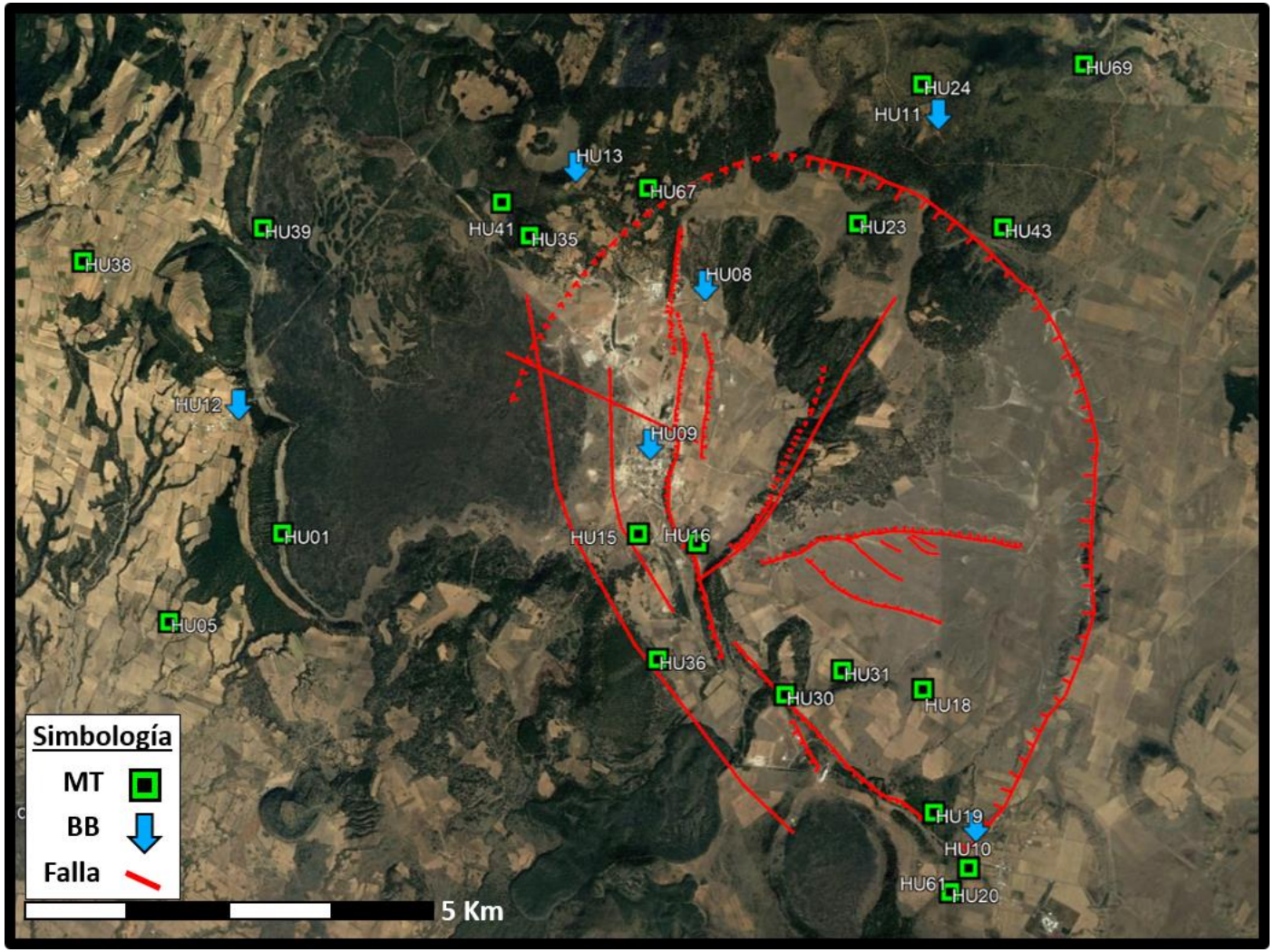
SURVEYS





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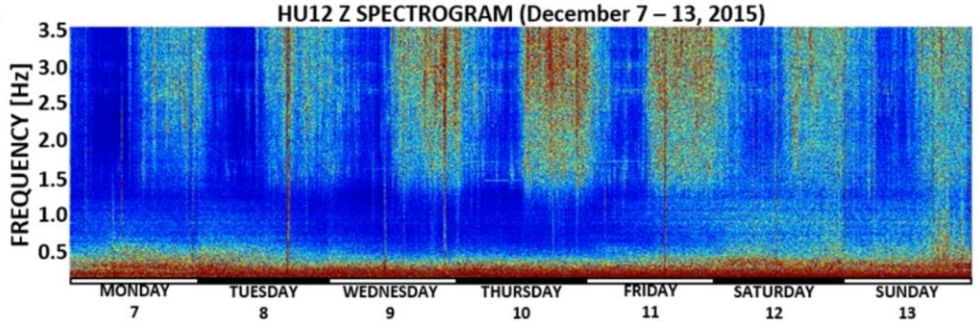
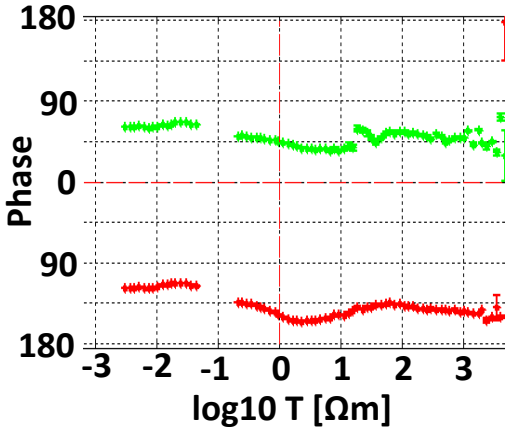
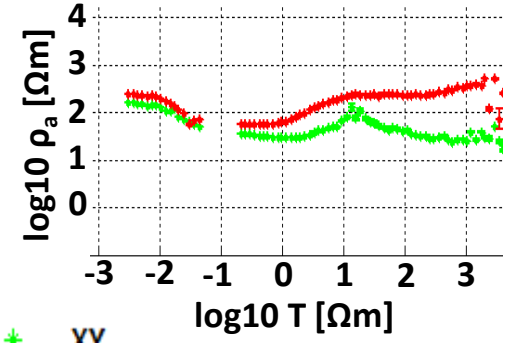
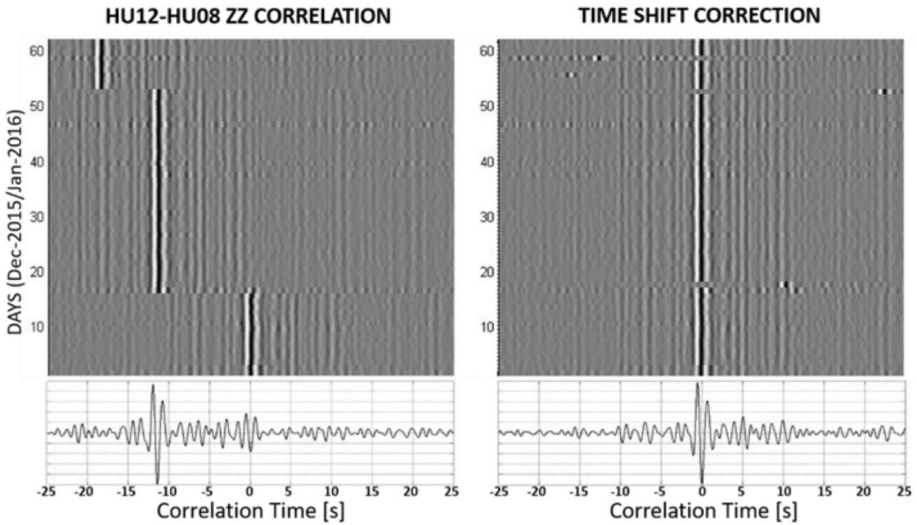
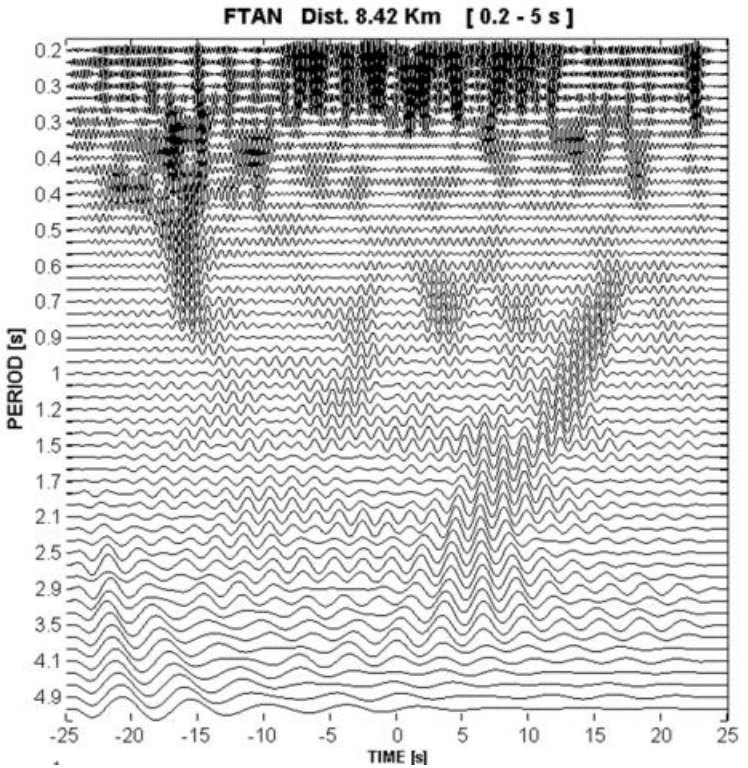
DATA

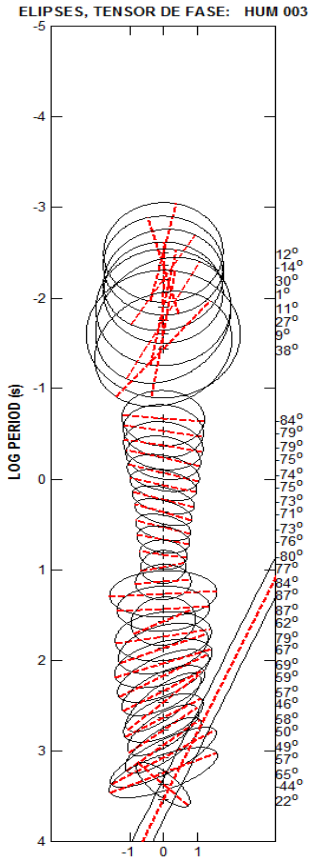












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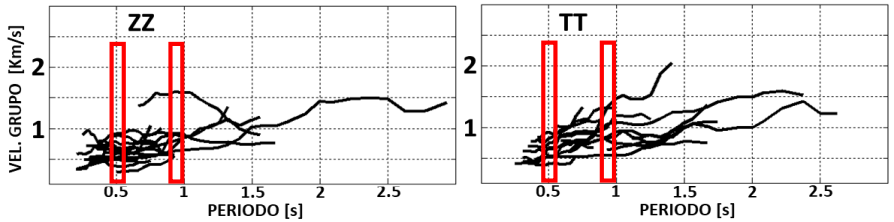
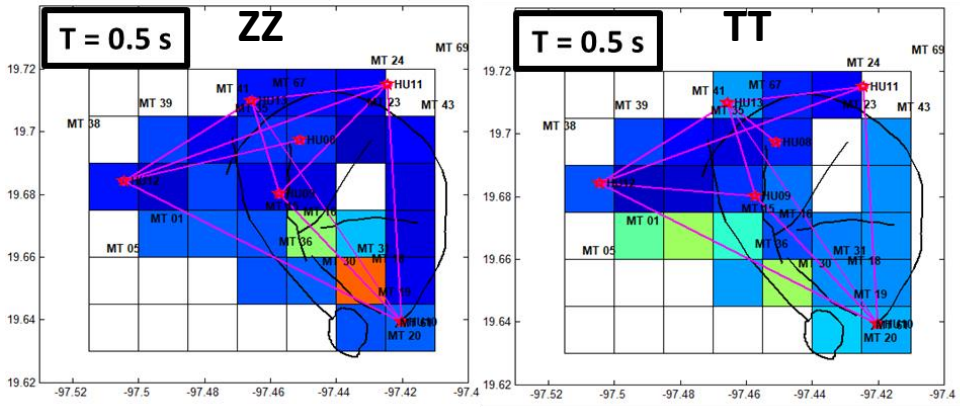
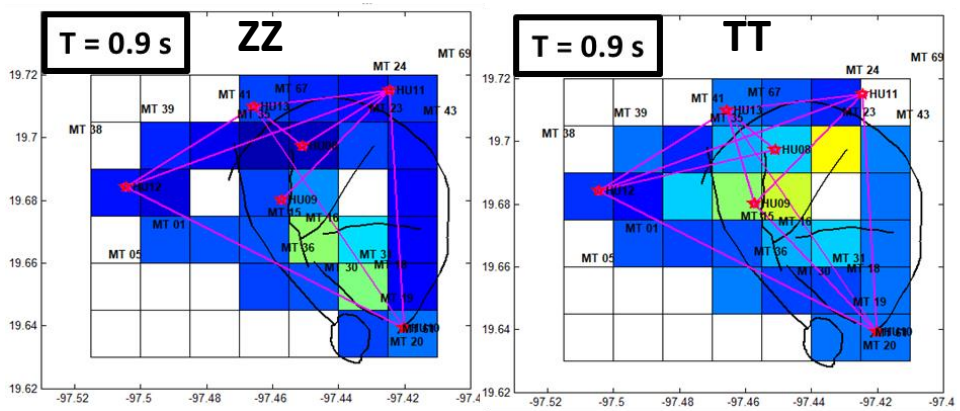
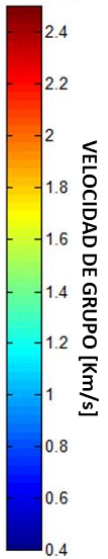
PROCESSING

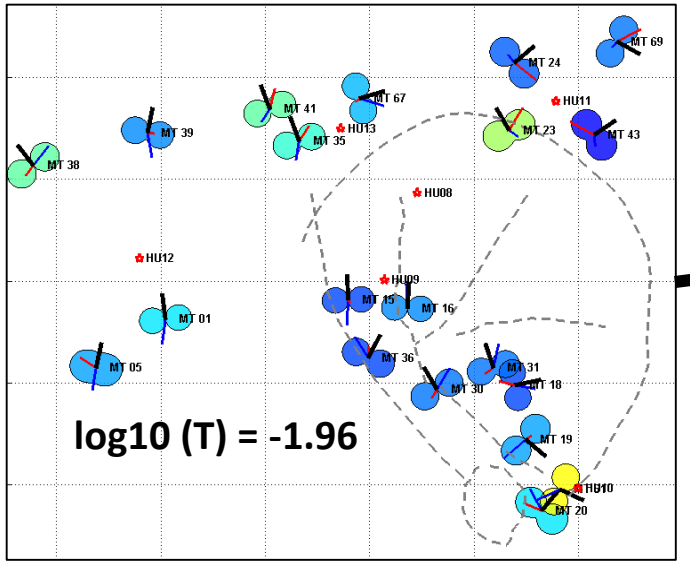
$$\mathbf{H}_Z(\omega) = \mathbf{T}(\omega)\mathbf{H}(\omega)$$

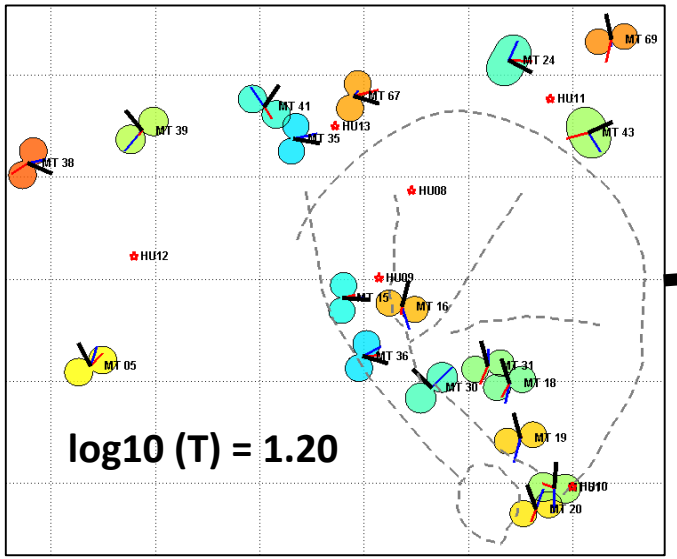


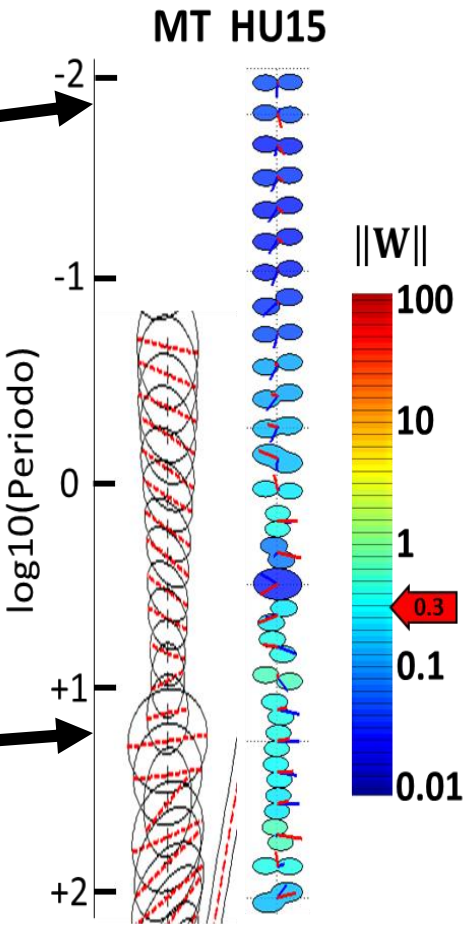




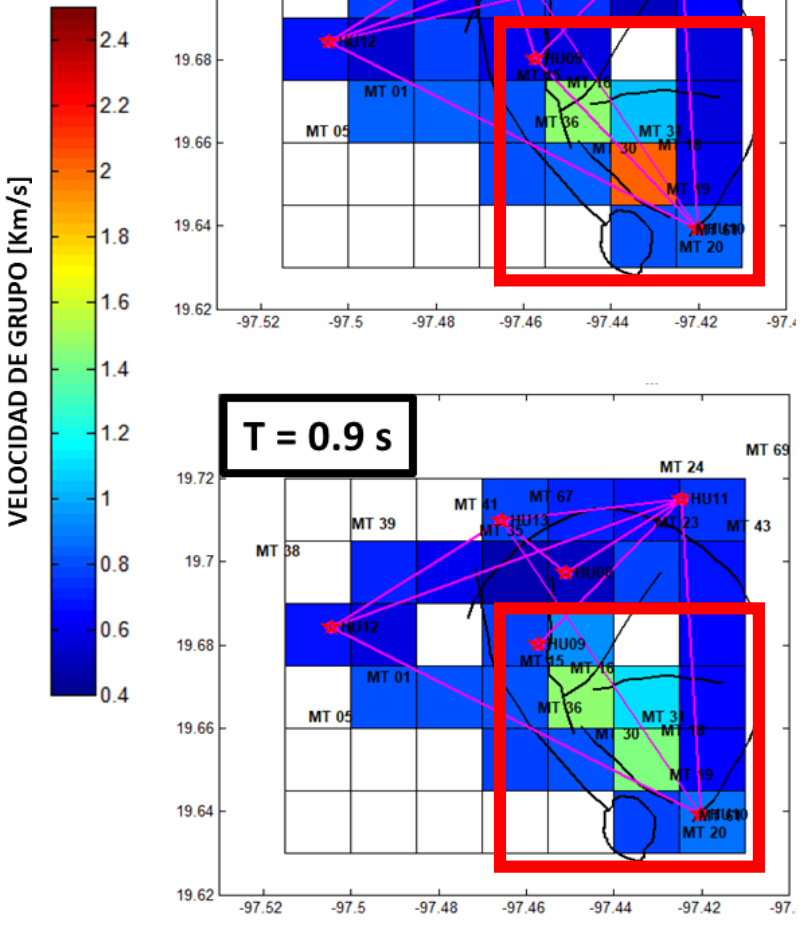


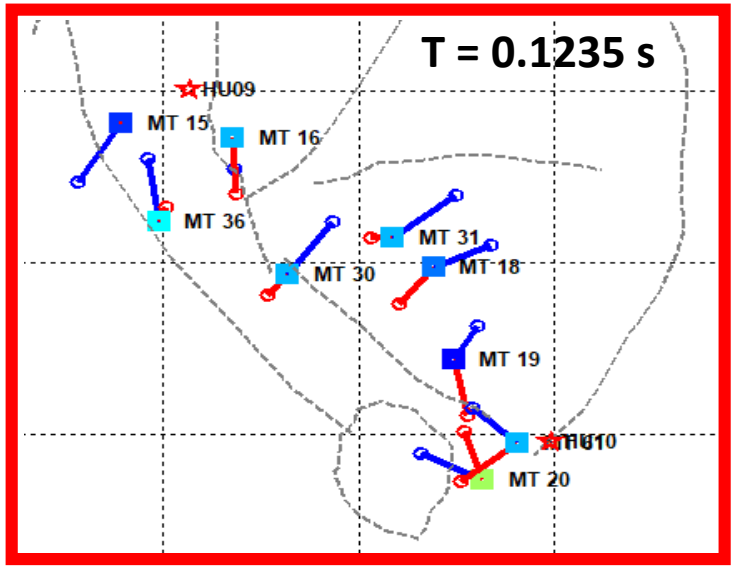


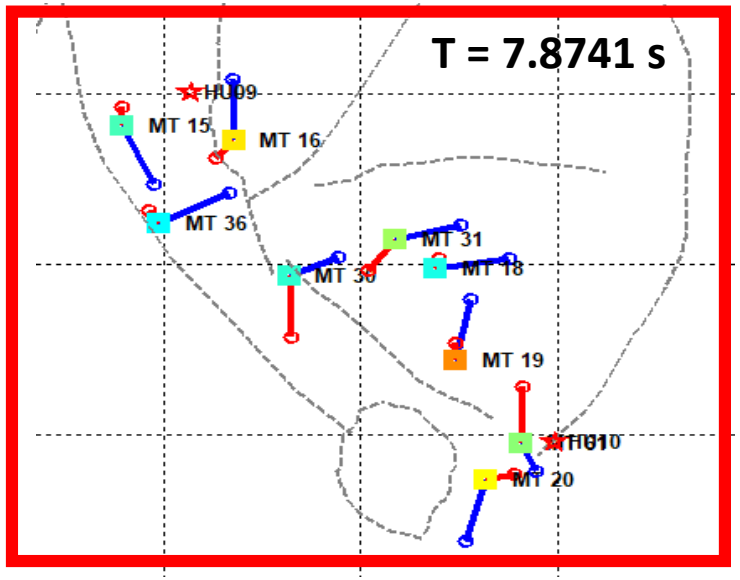




INTERPRETATION





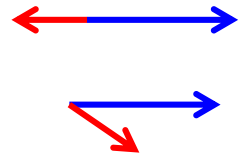


Berdichevski & Dmitriev, 2010

$\|W\| \approx 0$ — Homogeneous

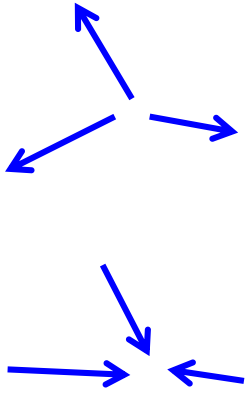
$\|W\| > 0.3$ — Strong geoelectrical heterogeneity

$\|W\| \gg 0$ $\quad$ $\mathrm{Im}[W] \gg 0$



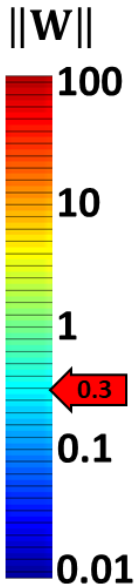
2D

3D



Conductive Structure

Resistive Structure



1	2	3	4	5	6	7

SYNTHESIS

SEISMIC

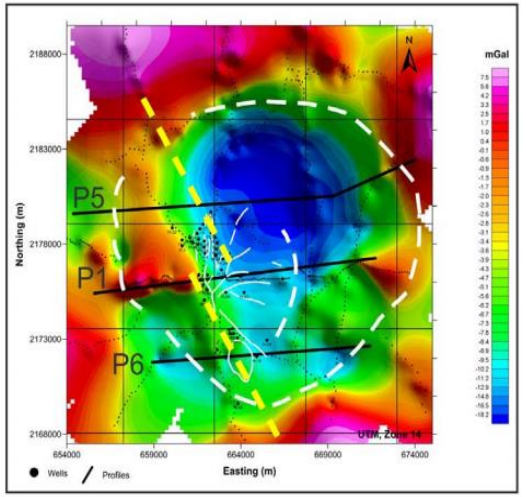
- Vp, Vs maps
- Vp/Vs, sensitive to phase .

ELECTROMAGNETIC

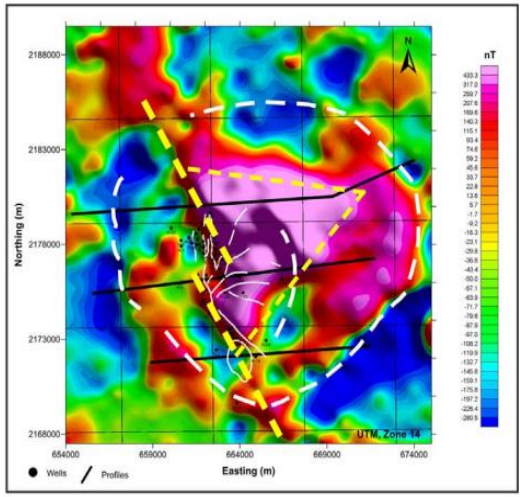
- MT Dimensionality of medium.
- Conductive/Resistive zones.

Need MORE DATA (Geophysics, Geology, Geochemistry, etc) to a full-integrated model.

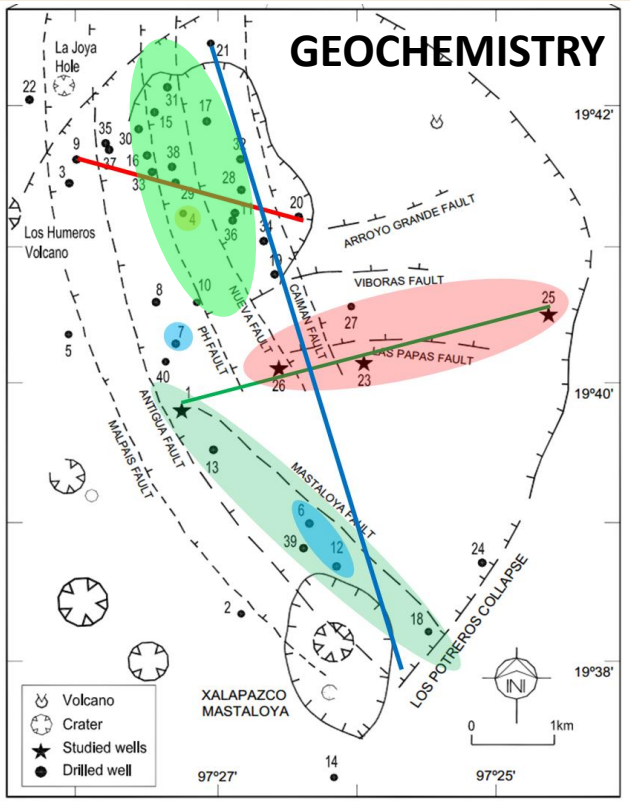
GRAVITY



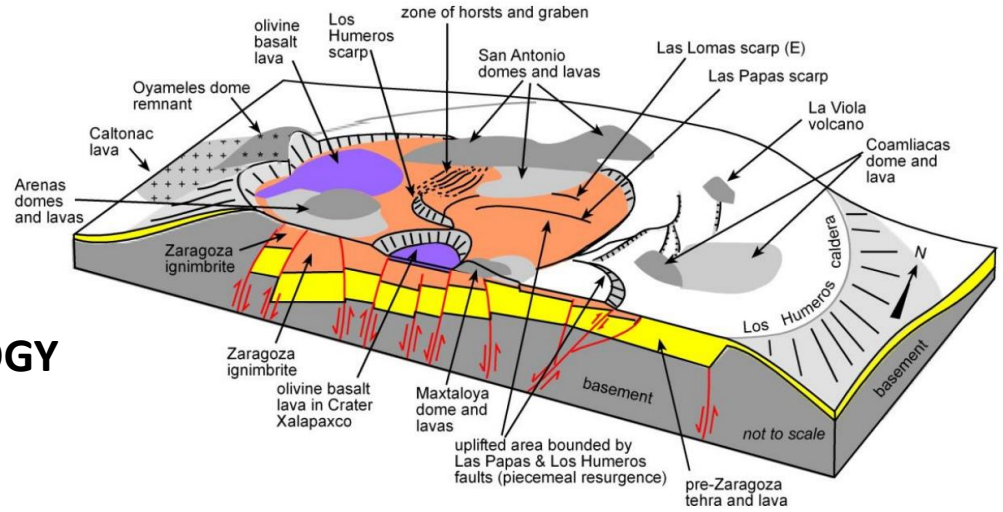
MAGNETIC



GEOCHEMISTRY



GEOLOGY



Acid Fluid

Inferior Reservoir production

Productive Zone

Non- productive Zone

High-Temperature fluids upward