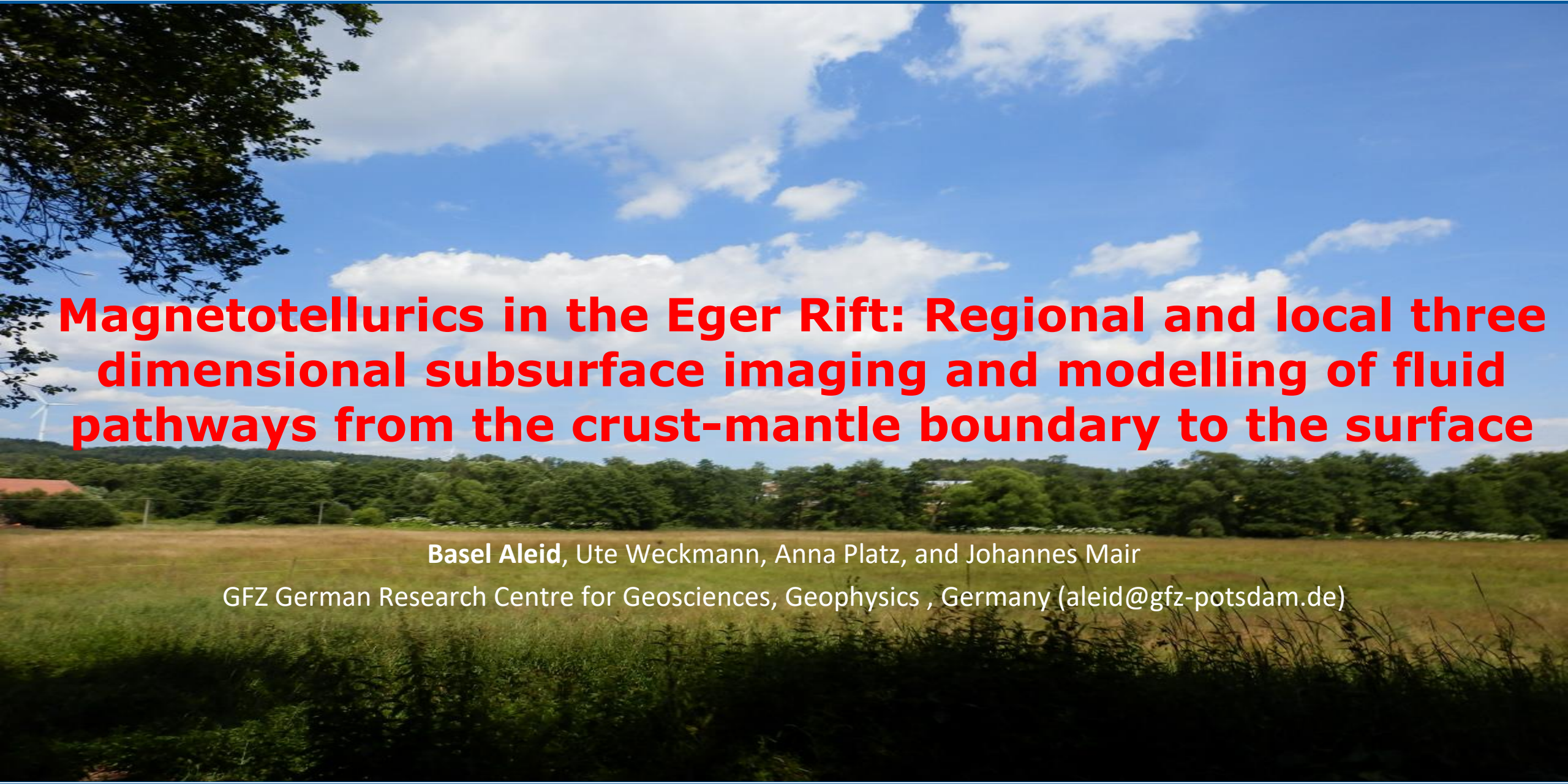

Magnetotellurics in the Eger Rift: Regional and local three dimensional subsurface imaging and modelling of fluid pathways from the crust-mantle boundary to the surface

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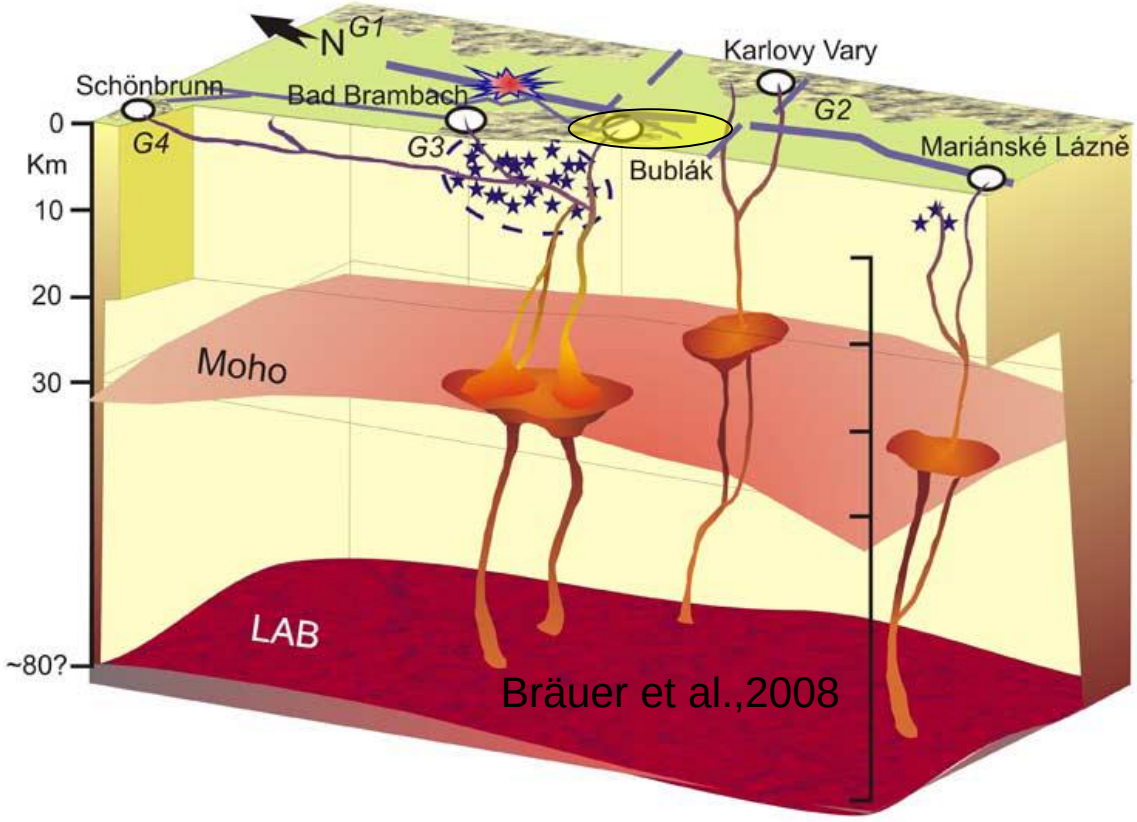
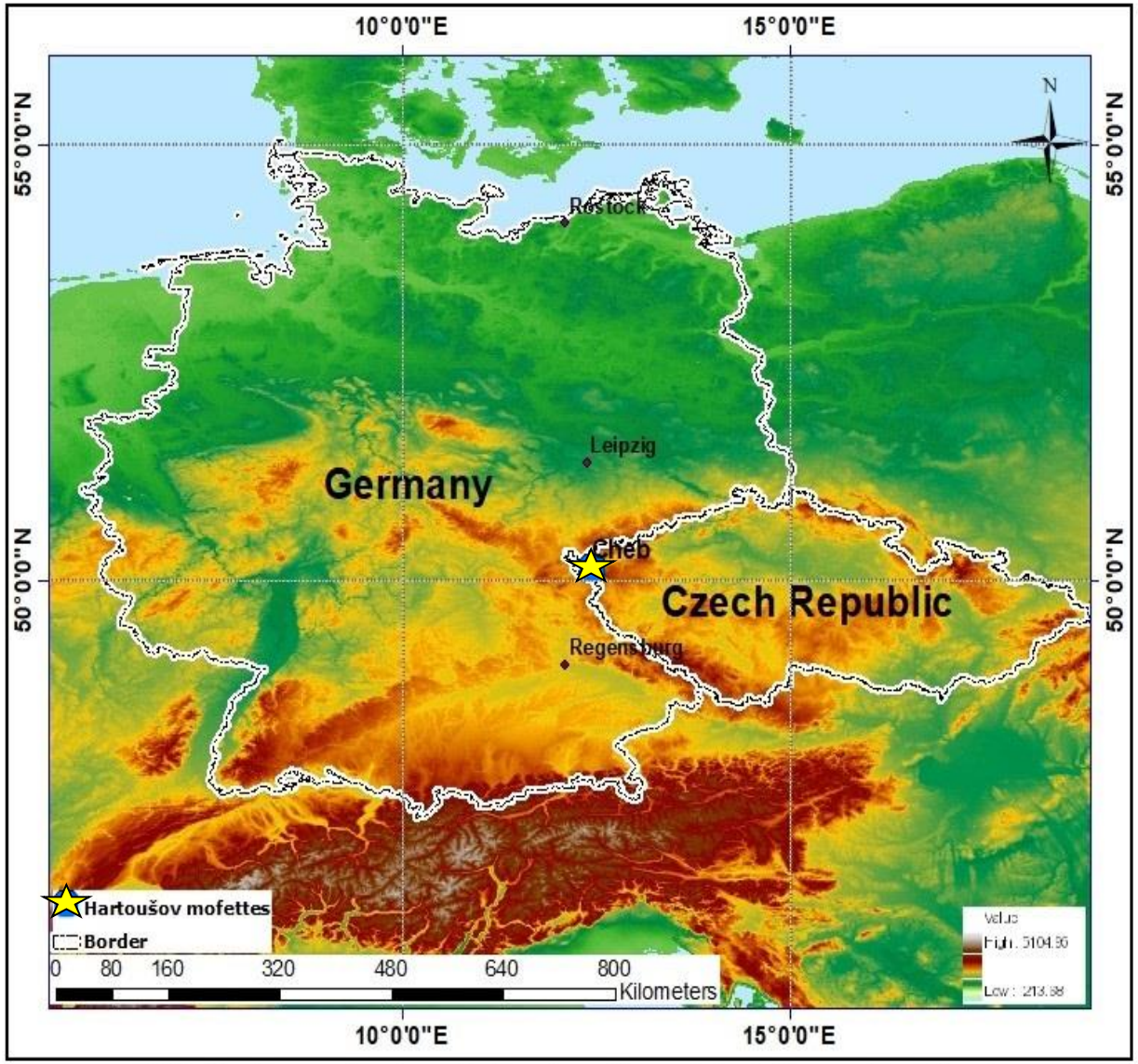
GFZ Helmholtz Centre Potsdam

Conceptual model of the Eger Rift:

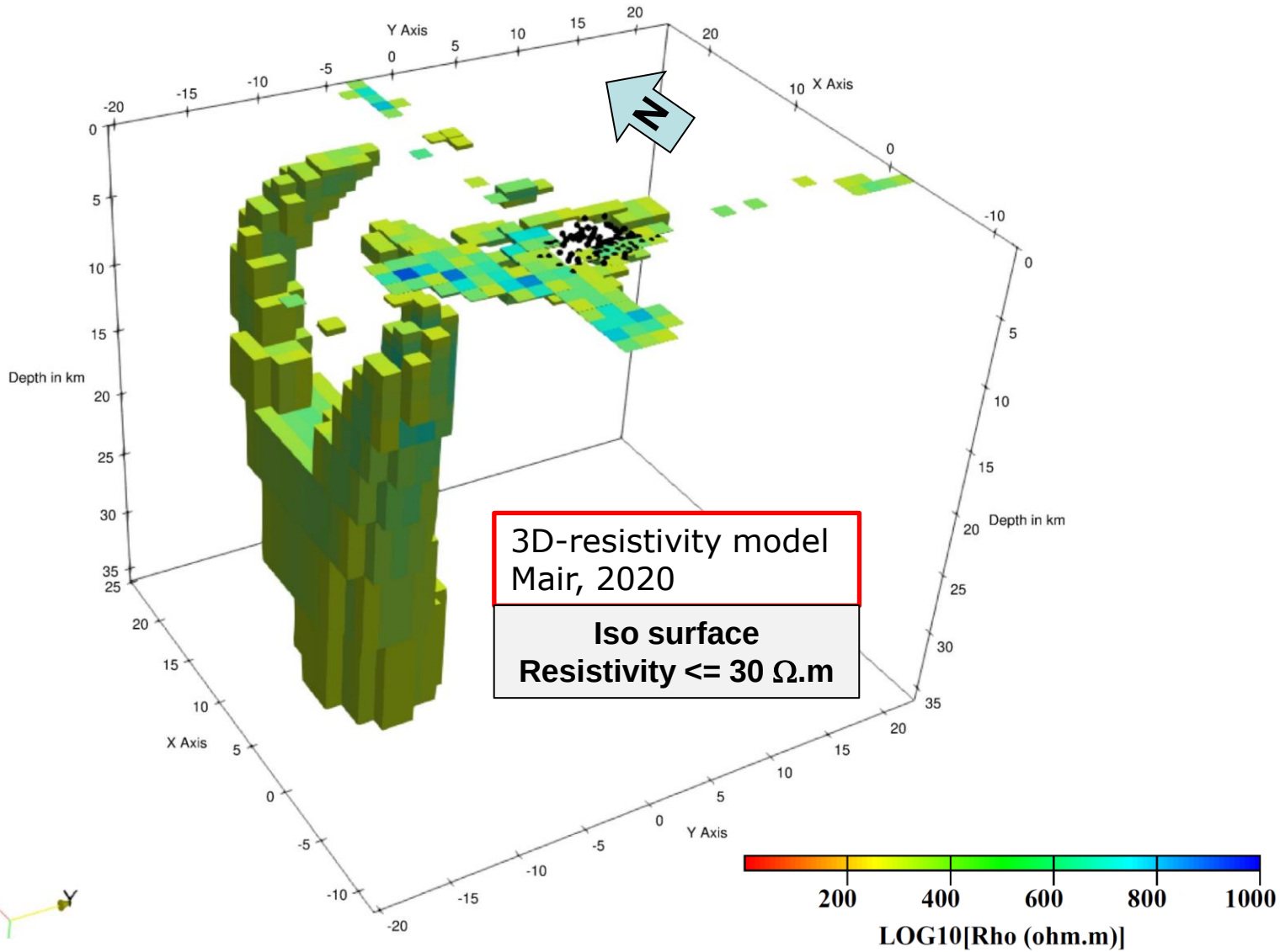


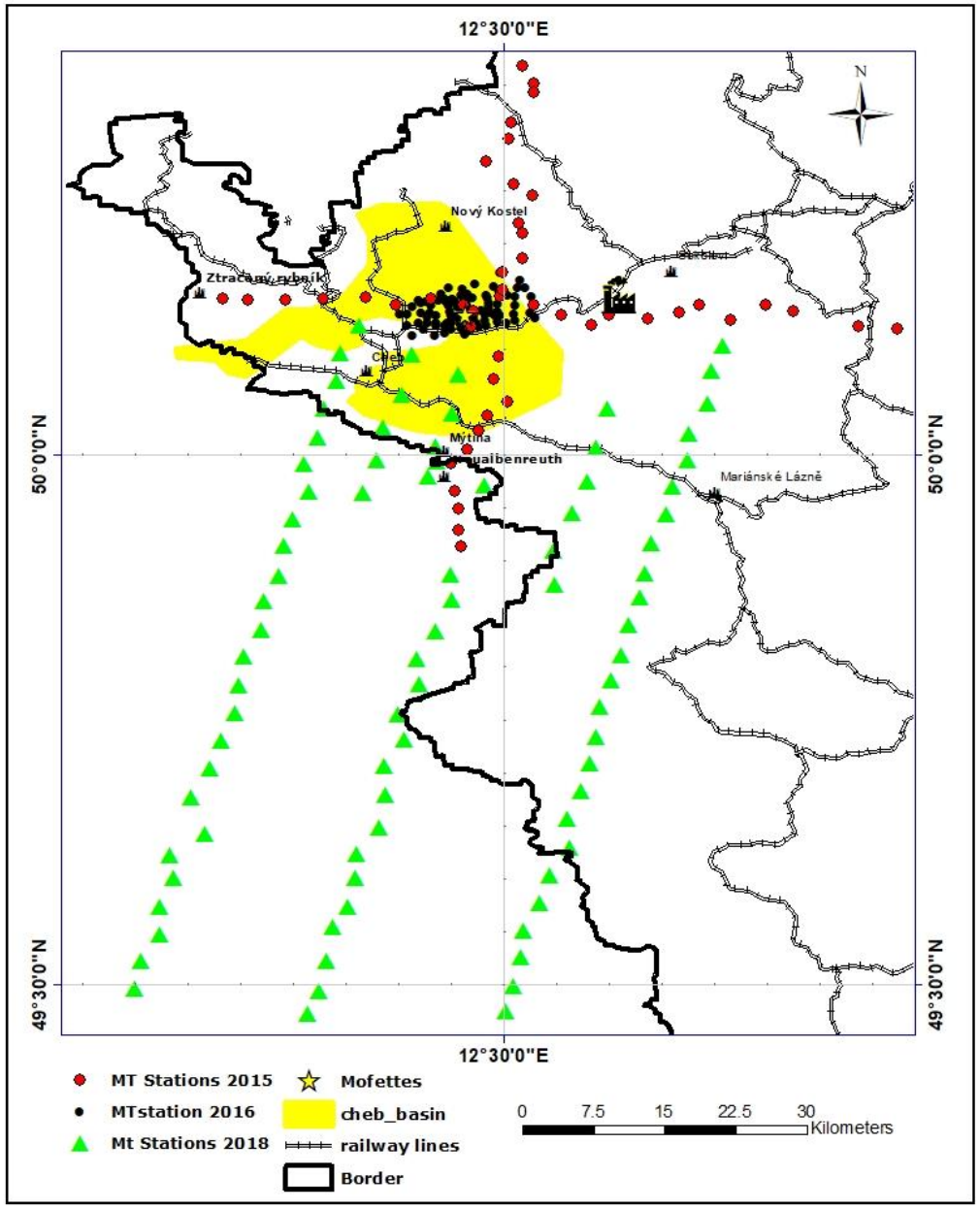


The research aims to:

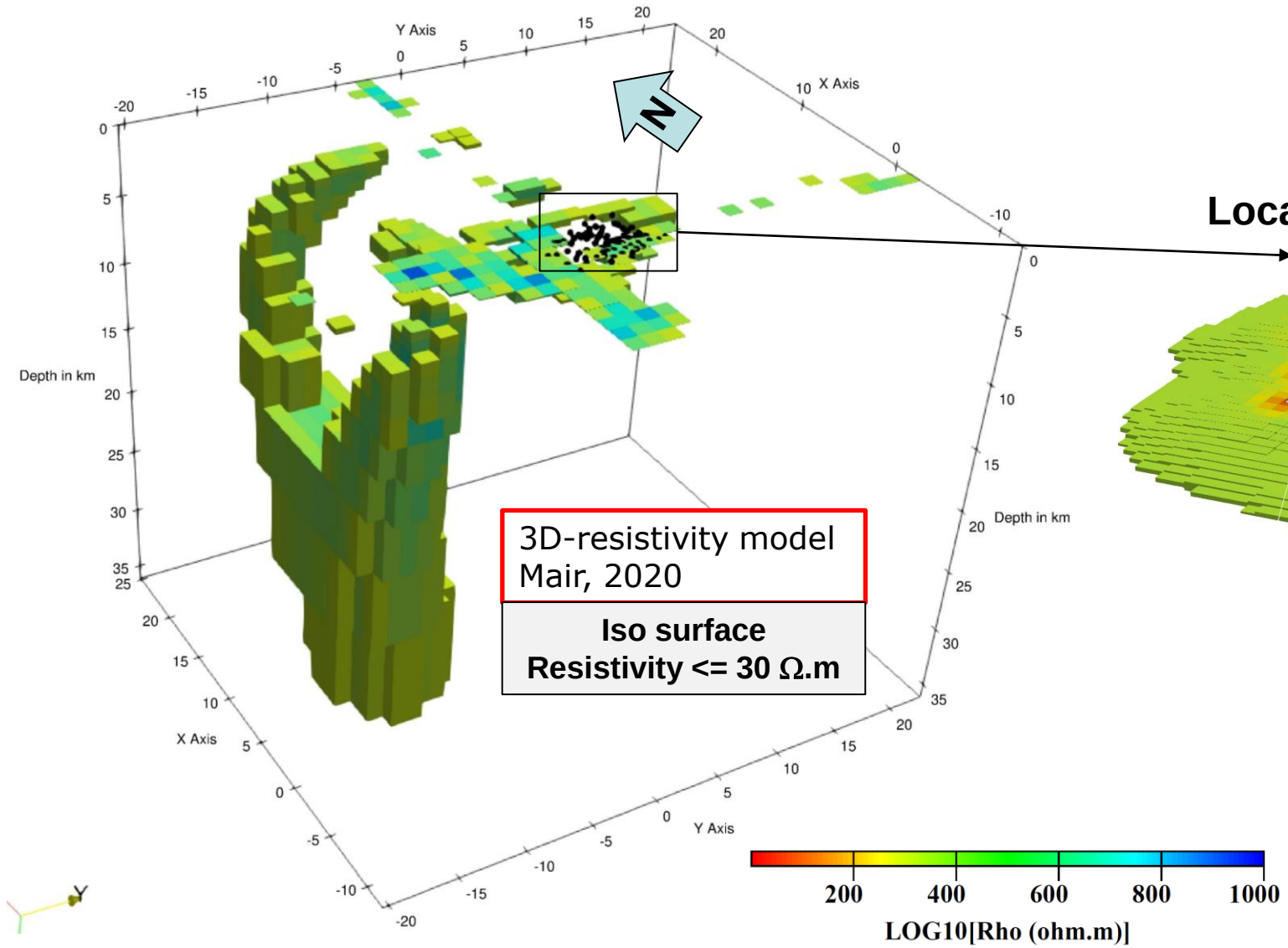
- contribute to a comprehensive and holistic interpretation of the tectonic regime
- image the ascent paths of fluids.

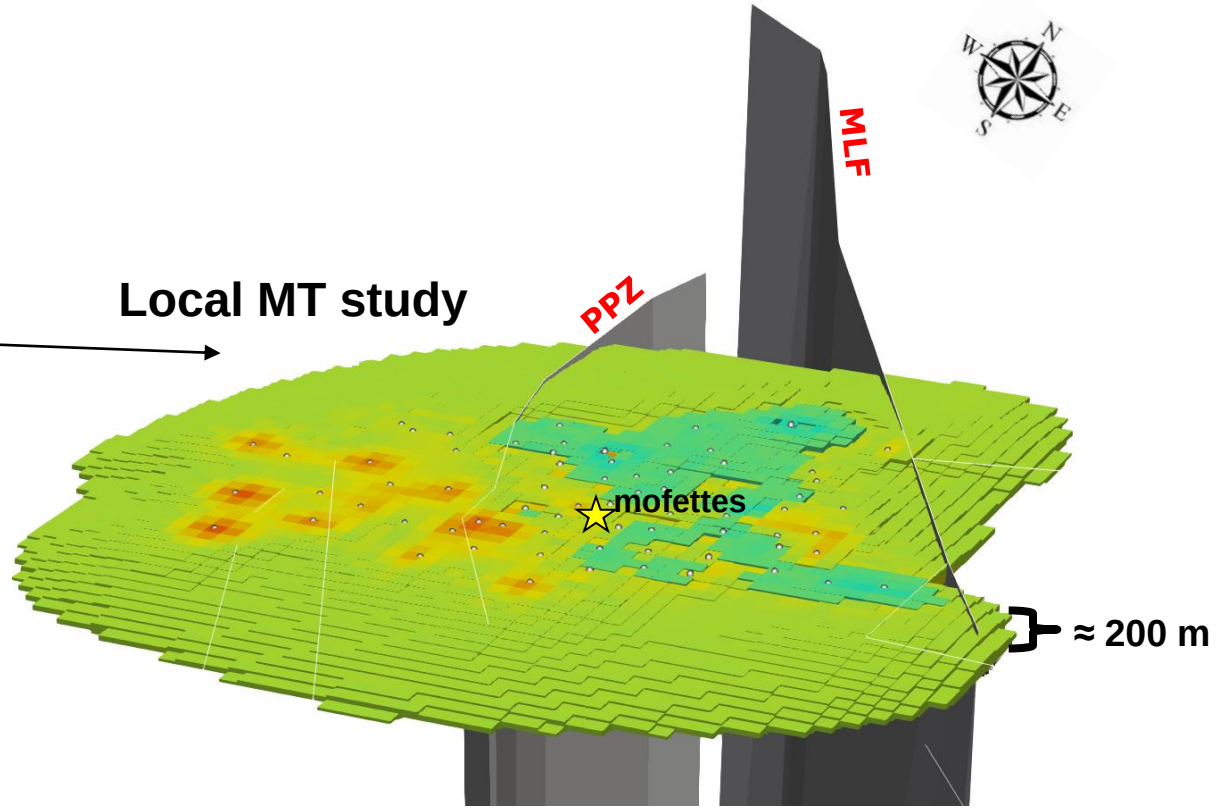
Vertical Channels in regional MT studies:





Vertical Channels in regional MT studies:



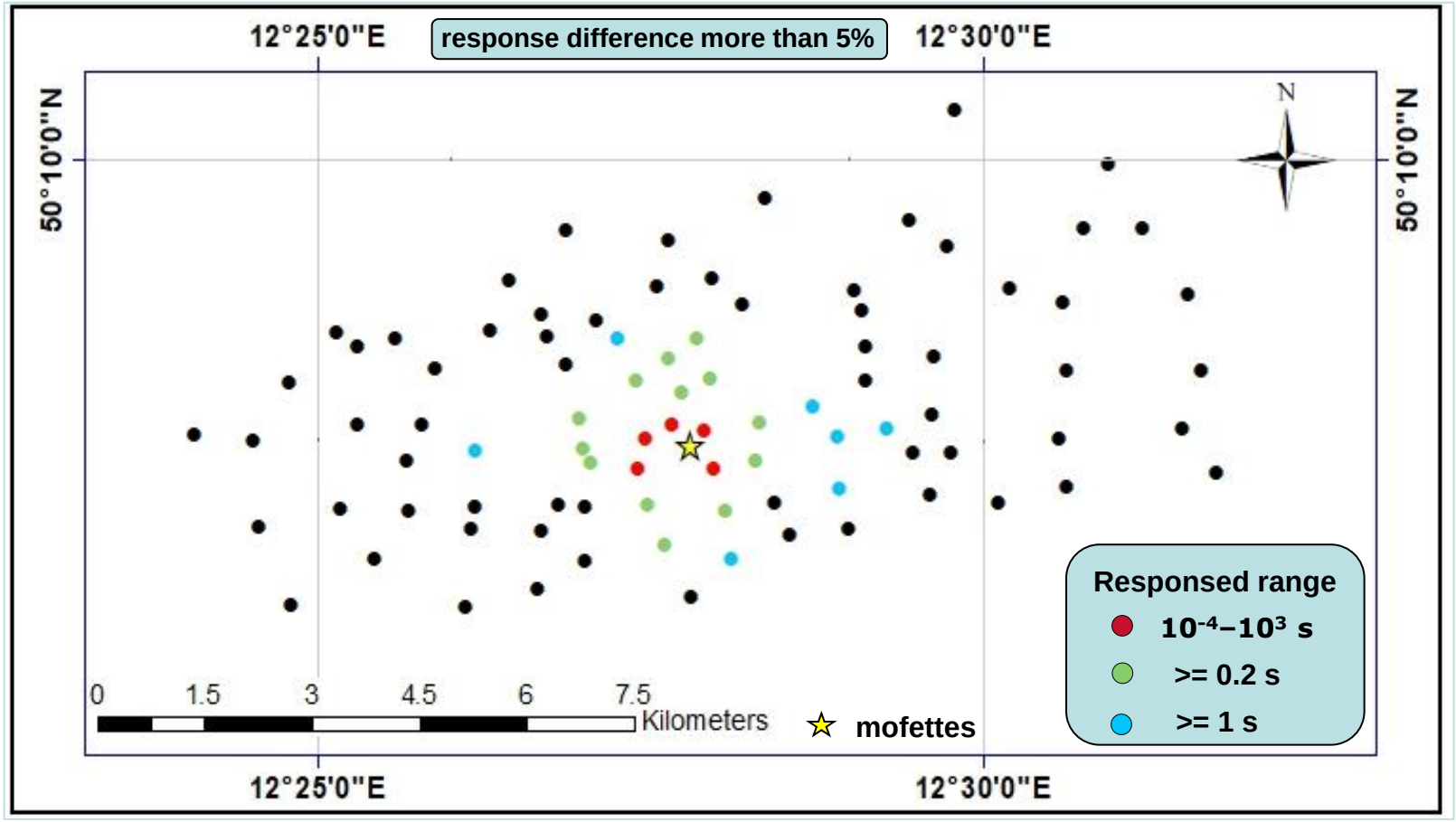


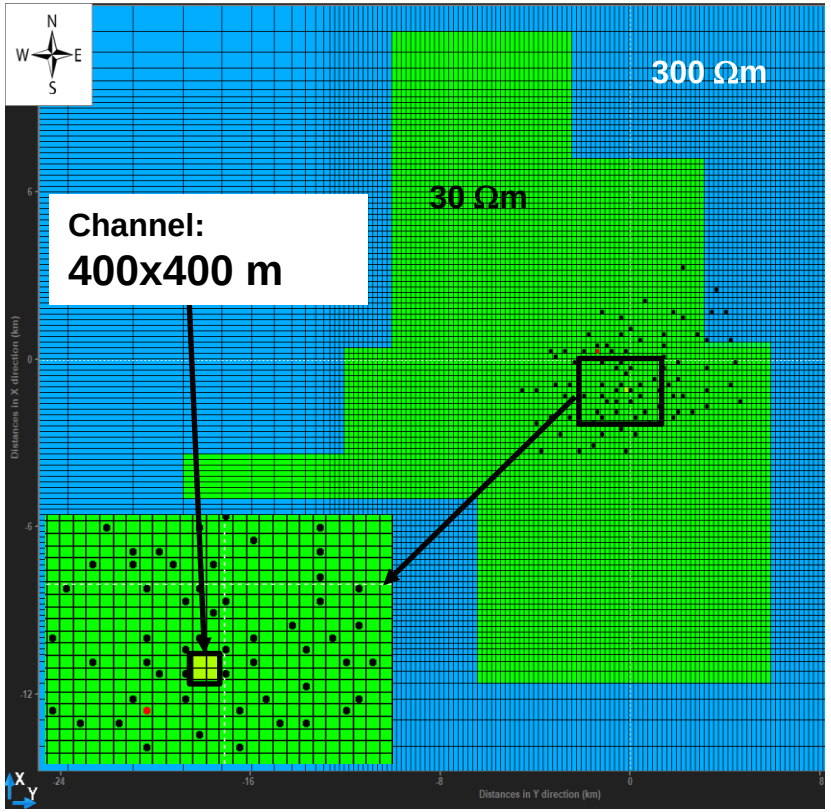
PPZ: Počatky-Plesná zone
MLF: Mariánské Lázně Fault

ModEM (Meqbel, 2009; Egbert&Kelbert, 2012; Kelbert et. al., 2014)

Forward modelling to test vertical channel (10km, 10Ωm) under Cheb basin:

real station layout





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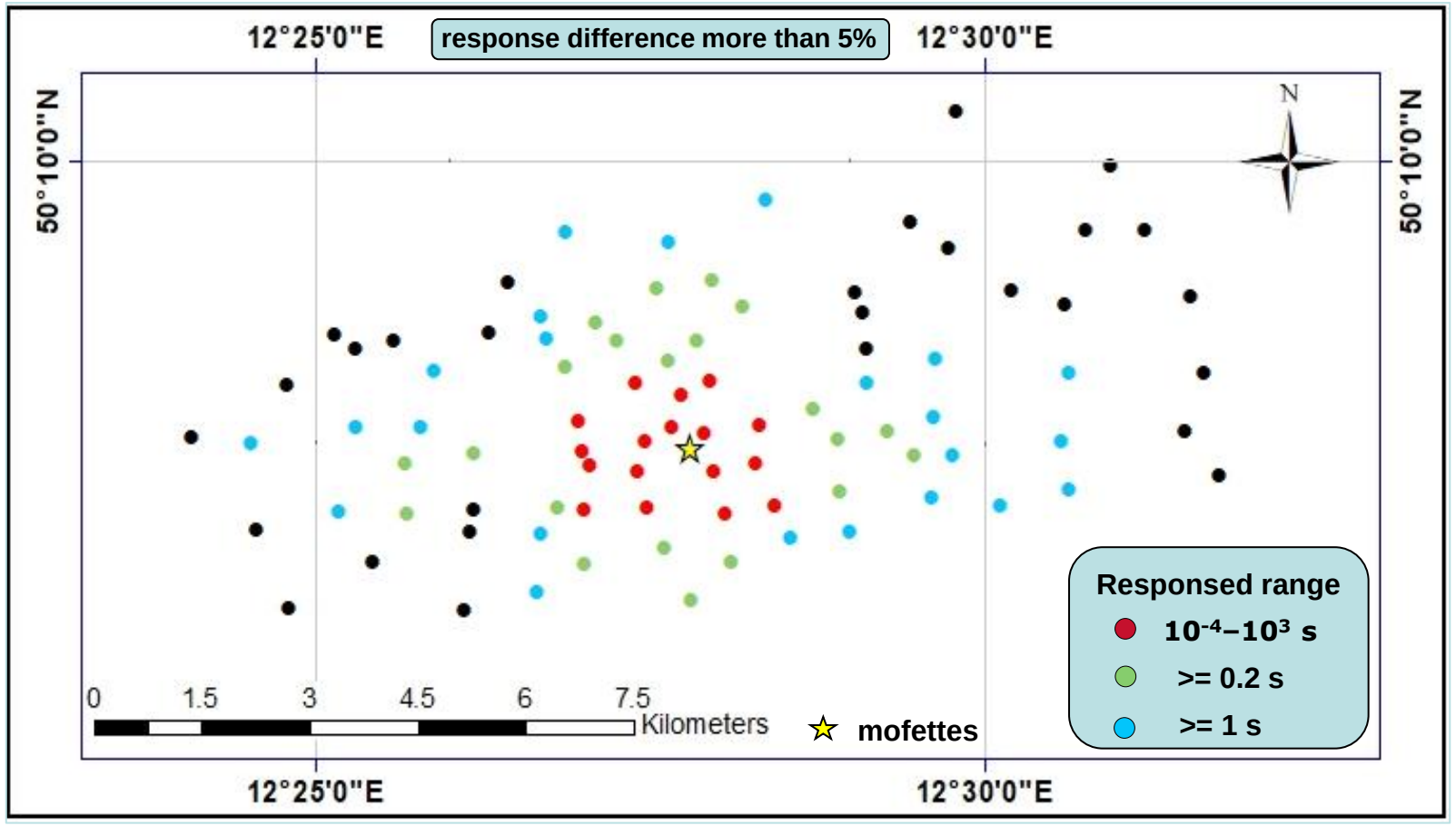
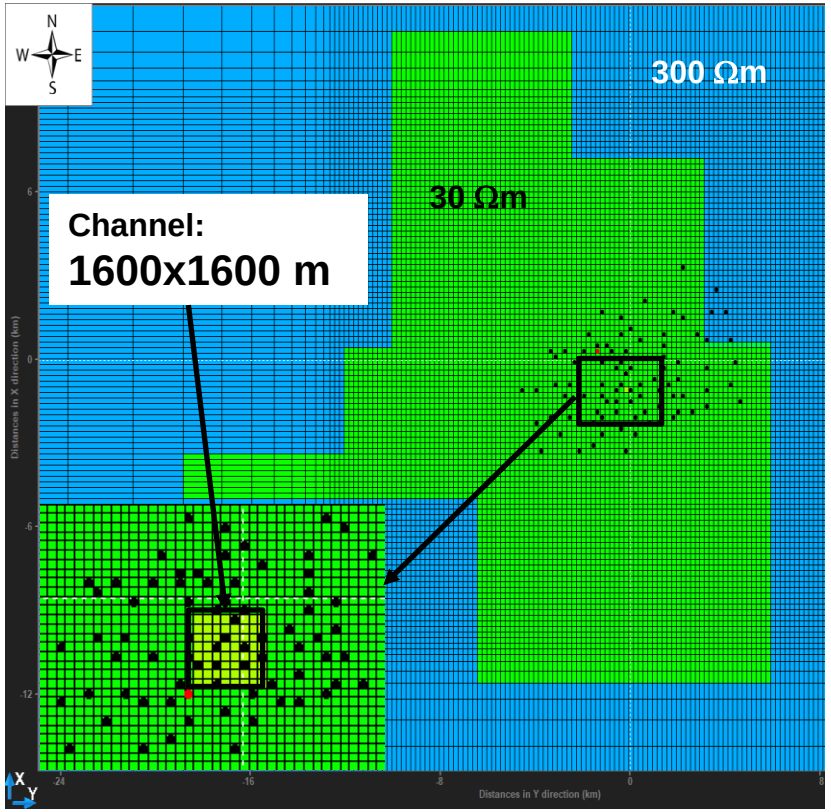


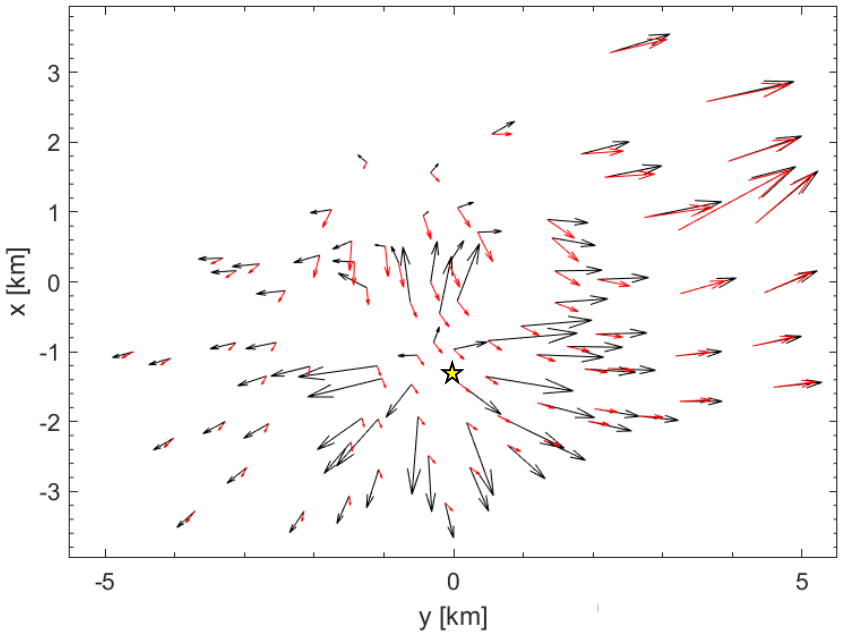


ModEM (Meqbel, 2009; Egbert&Kelbert, 2012; Kelbert et. al., 2014)

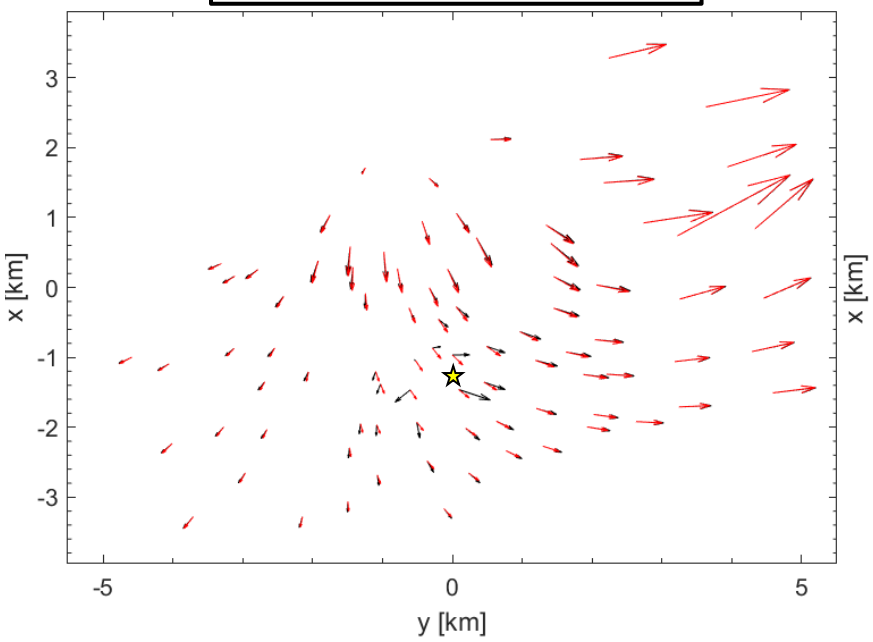
Forward modelling to test vertical channel (10km, 10Ωm) under Cheb basin:

vertical transfer functions

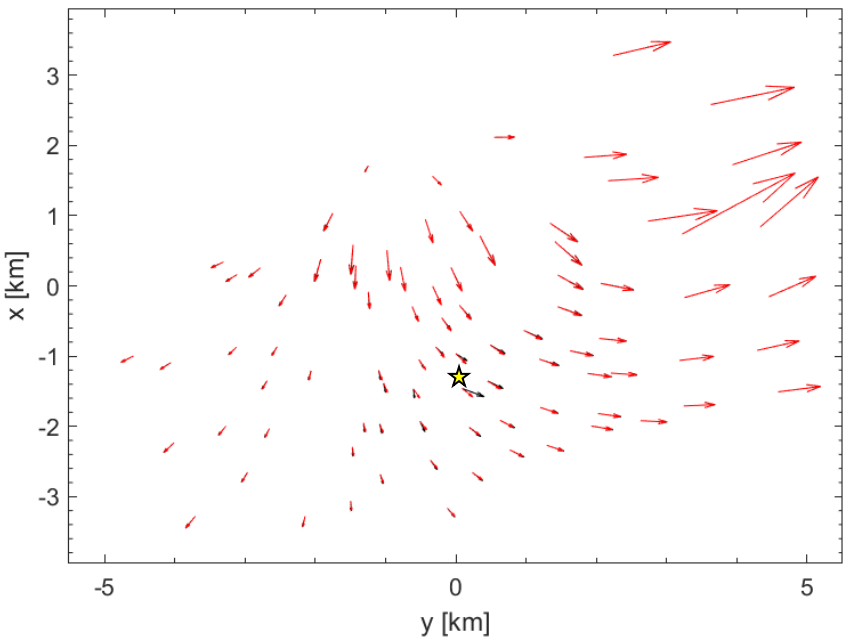
Channel : 1600x1600 m



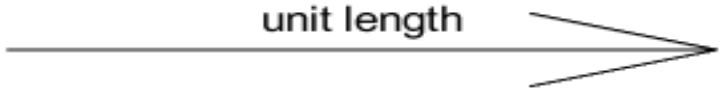
Channel : 400x400 m



Channel : 200x200 m



Real Induction Vector: T = 0.707 s



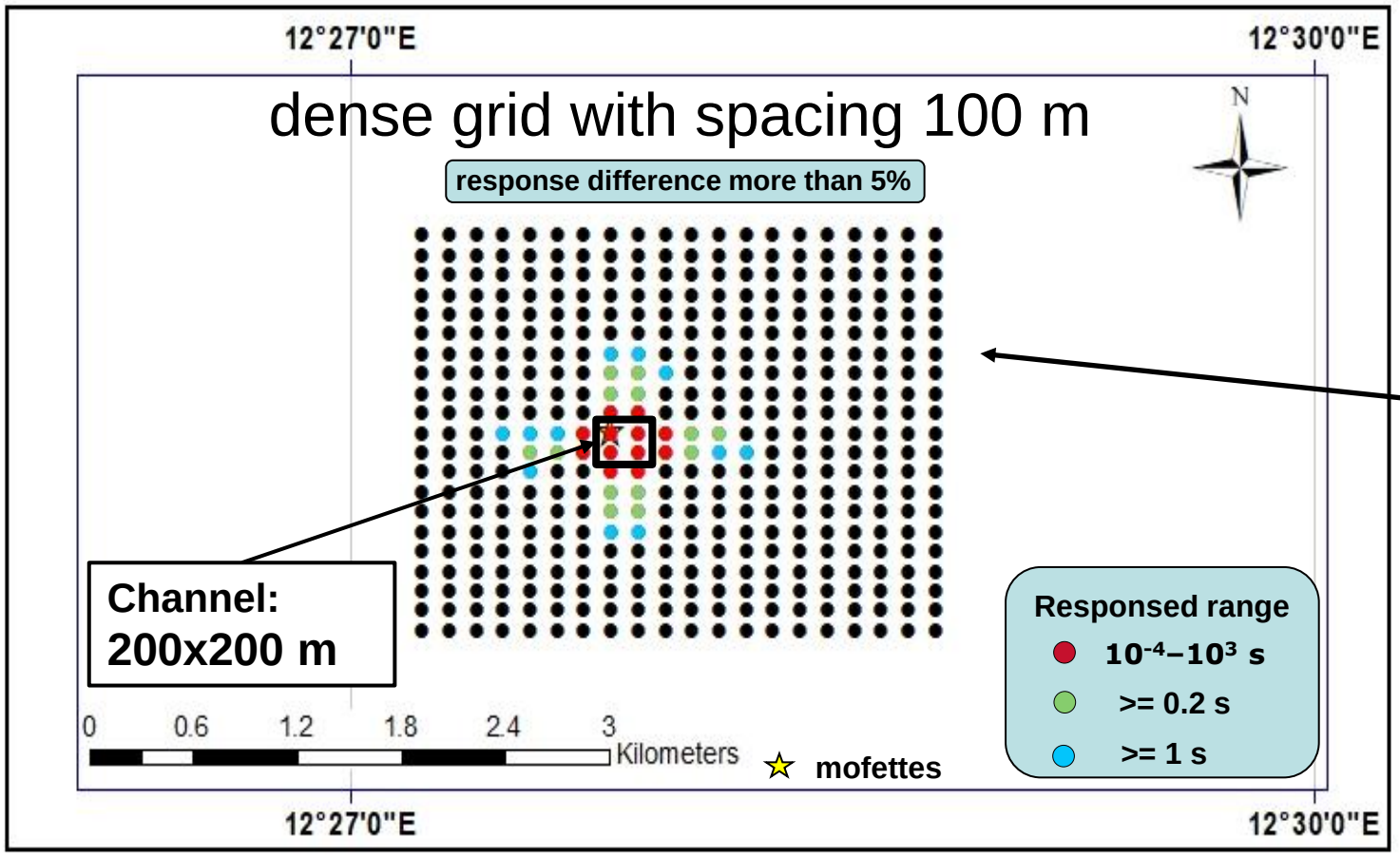
Response from model with channel

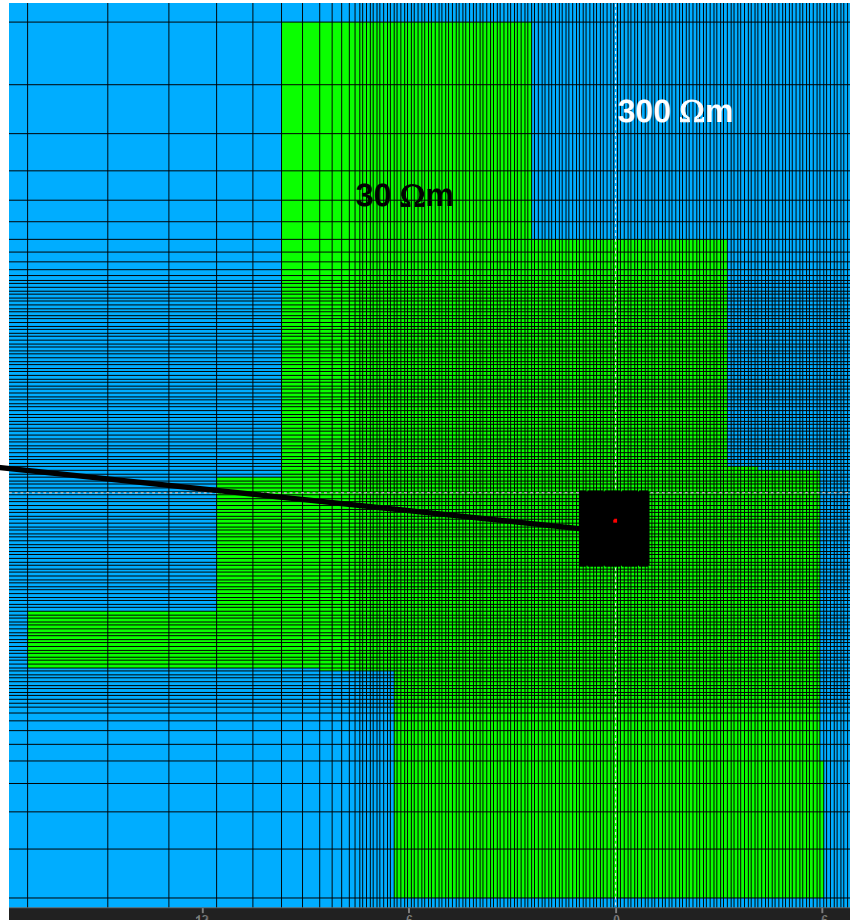
Response from model without channel

mofettes

Forward modelling to test vertical channel (10km, 10Ωm) under Cheb basin:

synthetic idealized grid





ModEM (Meqbel, 2009; Egbert&Kelbert, 2012; Kelbert et. al., 2014)

Conclusion:

- Conceptual models of the Eger Rift include vertical pathways for lithospheric fluids that feed the mofette fields in the Cheb Basin with CO_2 .
- Regional Magnetotelluric (MT) models reveal such channels outside the Cheb Basin.
- The dense MT grid (~500m station spacing) centred on the mofettes does not reveal a vertical channel below. Possible reasons: insufficient station coverage, poor data quality, lack of vertical channel below.
- Forward modelling studies suggest that:
  - Only channels with a diameter of 400 m can be resolved
  - Only stations in the vicinity of 1 Km next to the vertical channel show significant changes in transfer functions
  - Even station spacing improves detectability
  - Long period data (> 1 s) required
- Summary for the Eger Rift:
  - Uneven station spacing → reduced lateral coverage ☹
  - Strong EM noise contribution → reduced frequency layout ☹
  - Channel might be unresolved or the lithospheric fluids migrate horizontally in the Cheb basin towards the mofettes

Thank you for your attention