TECHNISCHE UNIVERSITÄT WIEN

NATIONALPARK NEUSIEDLER SEE SEEWINKEL

Application of electrical and electromagnetic methods to delineate changes in salt content of soda lakes

EGU22-5554

Hettegger, A., Aigner, L., Armas, M. A., Moser, C., Cimadom, A., and Flores-Orozco, A.

EMI measurements

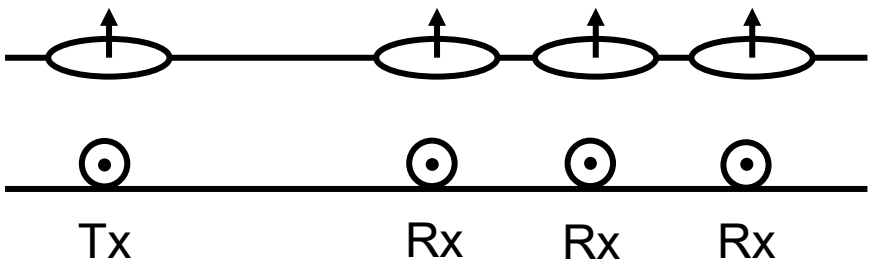
Low induction number electromagnetics (EMI)

CMD-Mini Explorer

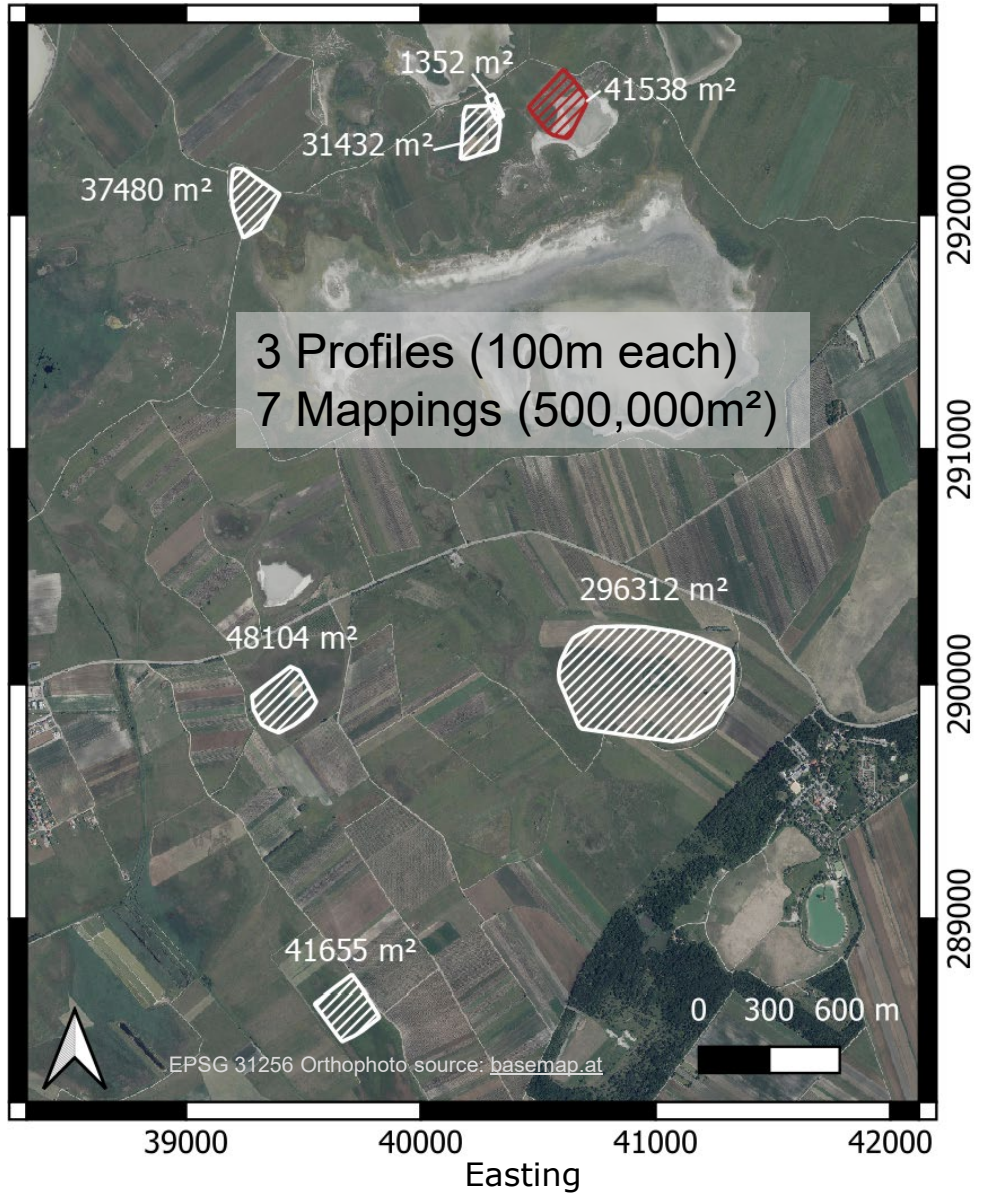
CMD Explorer, GF Instruments

Horizontal coplanar (HCP)

Vertical coplanar (VCP)

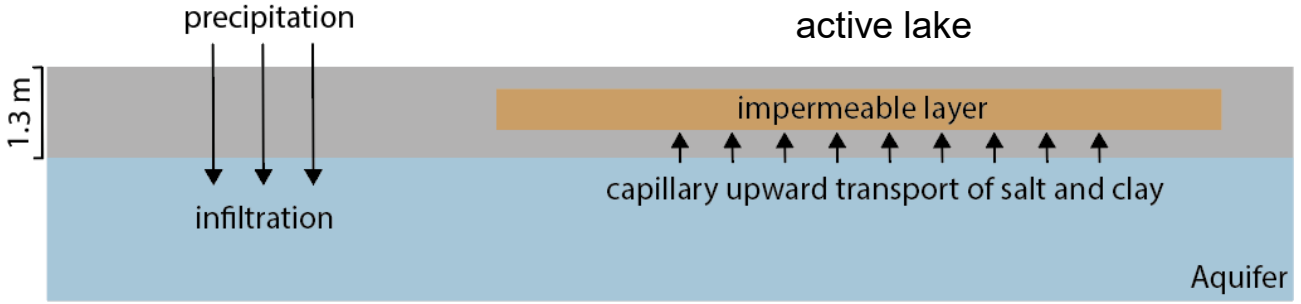


0.25 – 6.7 m effective depth



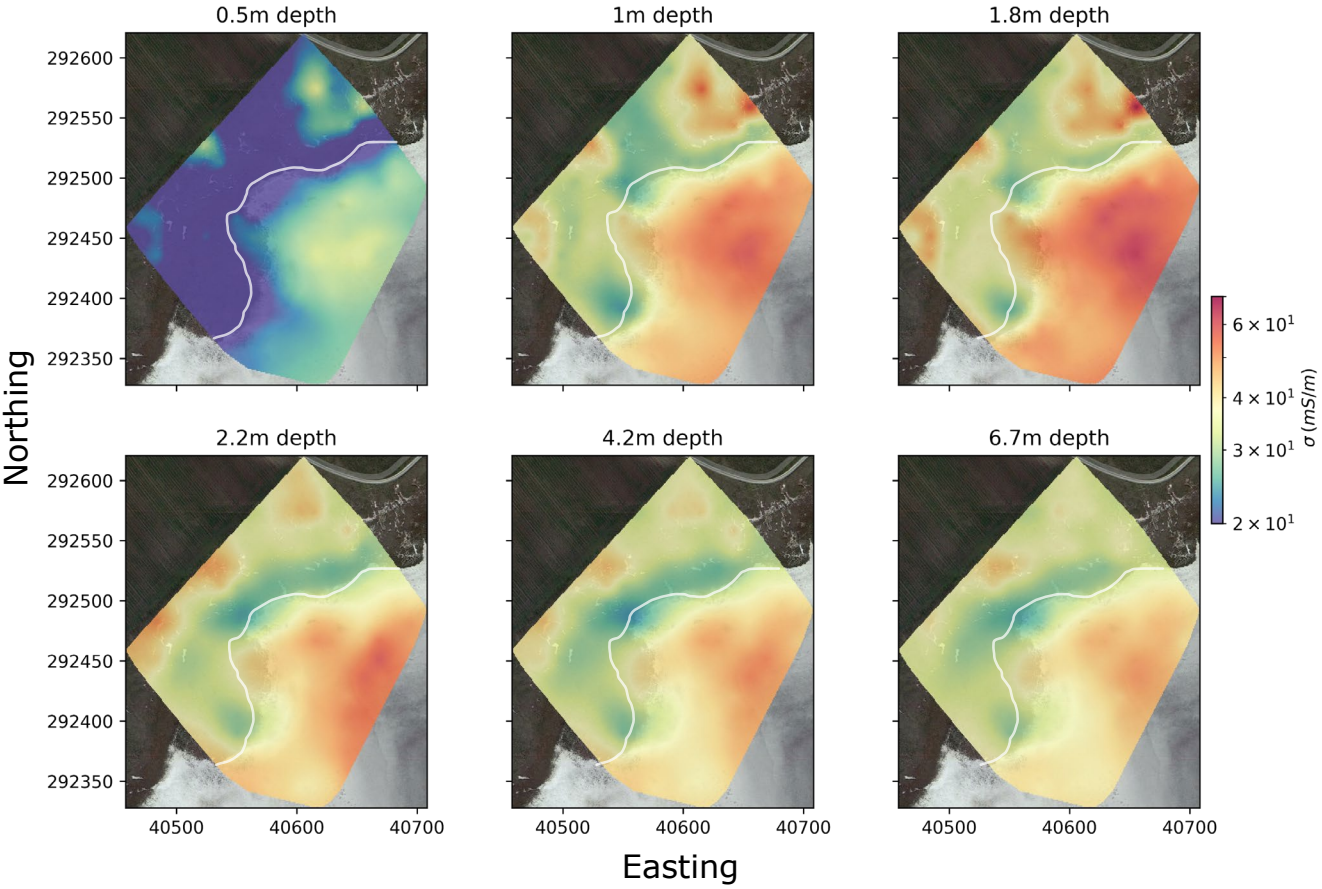
Seewinkel – soda lakes

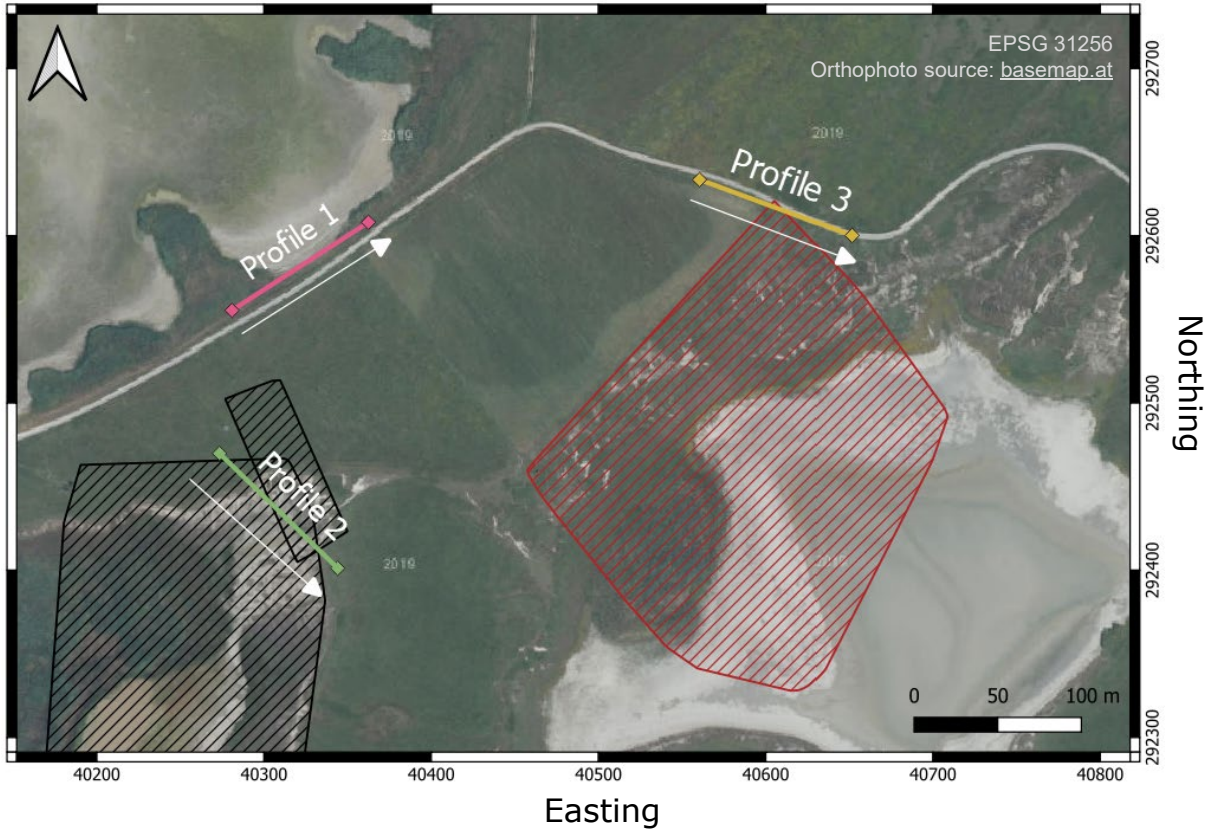
- Can we use EMI to map lateral variability of the impermeable layer?
- Can we use EMI to map active/degraded lakes?
- What is the thickness of the impermeable layer?



Data collected and hosted from: Niko Hofinger
LGPL <http://www.gnu.org/licenses/lgpl.html>, via Wikimedia Commons

EMI Mapping results





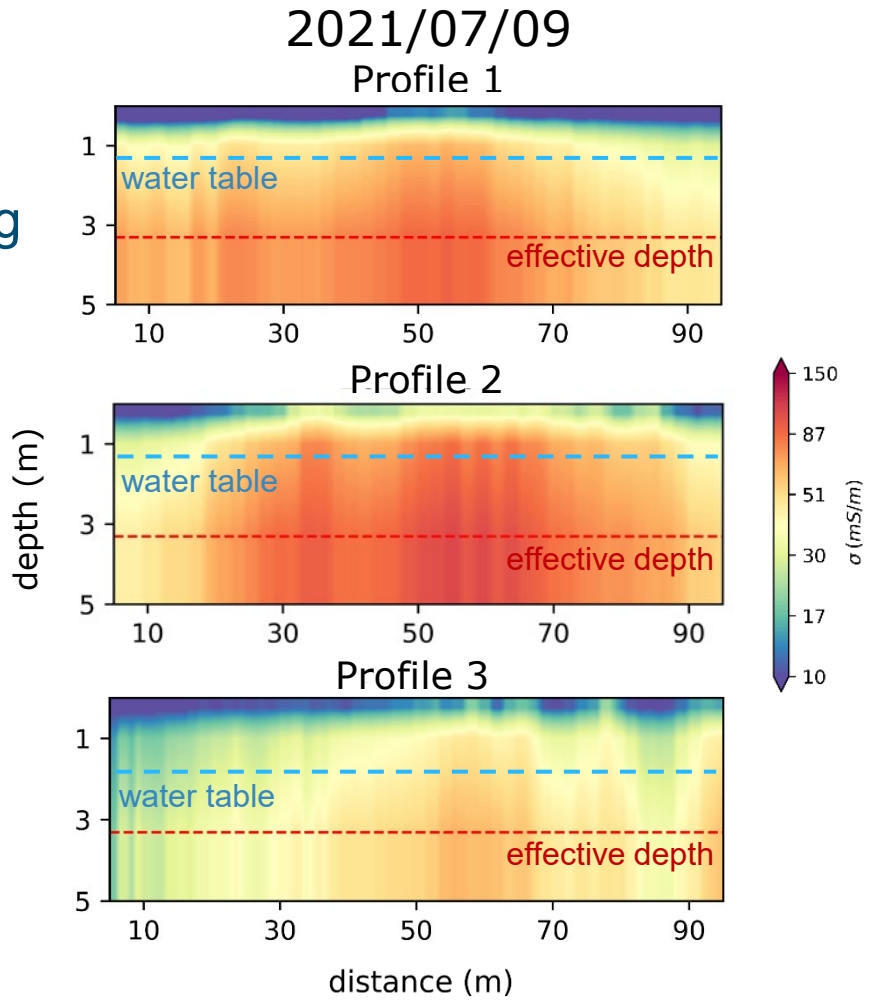
- EMI is favorable to map lateral variability of electrical conductivity which we link to salt and clay content

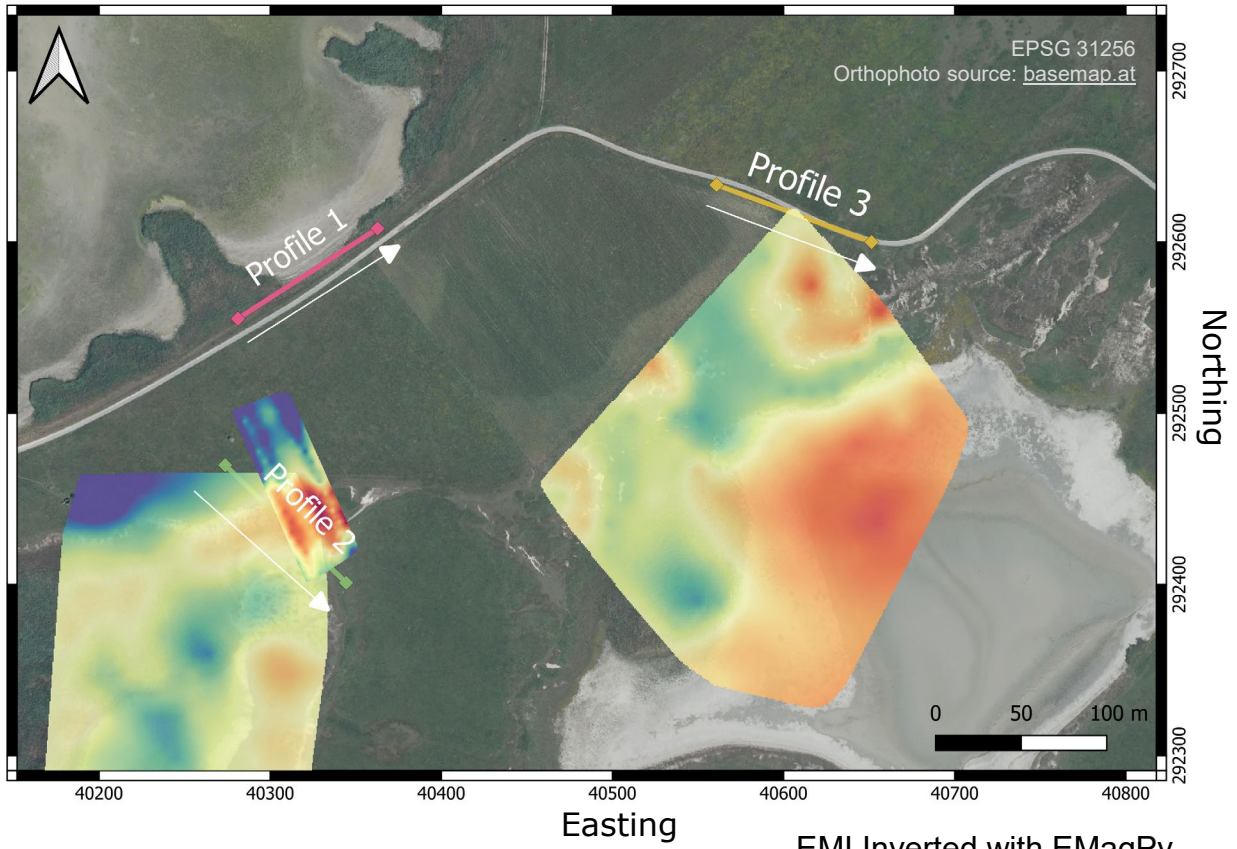
EMI Inversion results

degrading

active

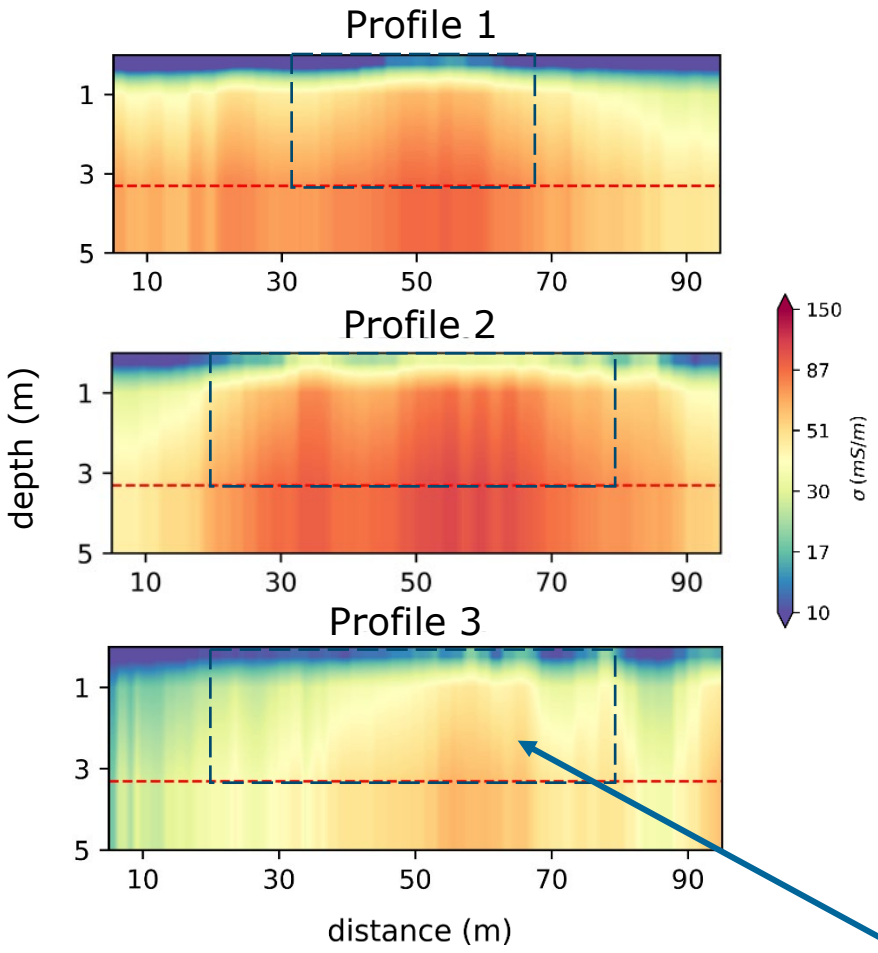
degraded

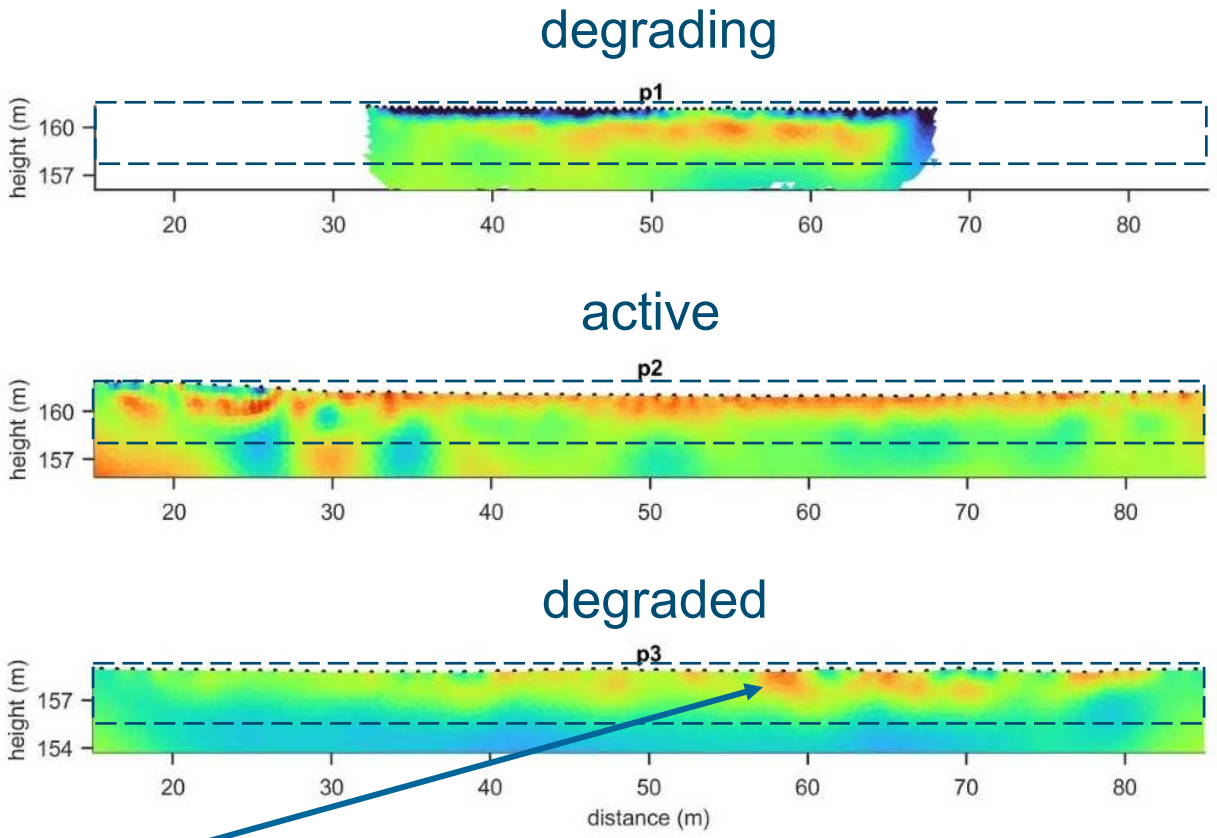




EMI Inverted with EMagPy
McLachlan, et al. Computers & Geosciences, 2020

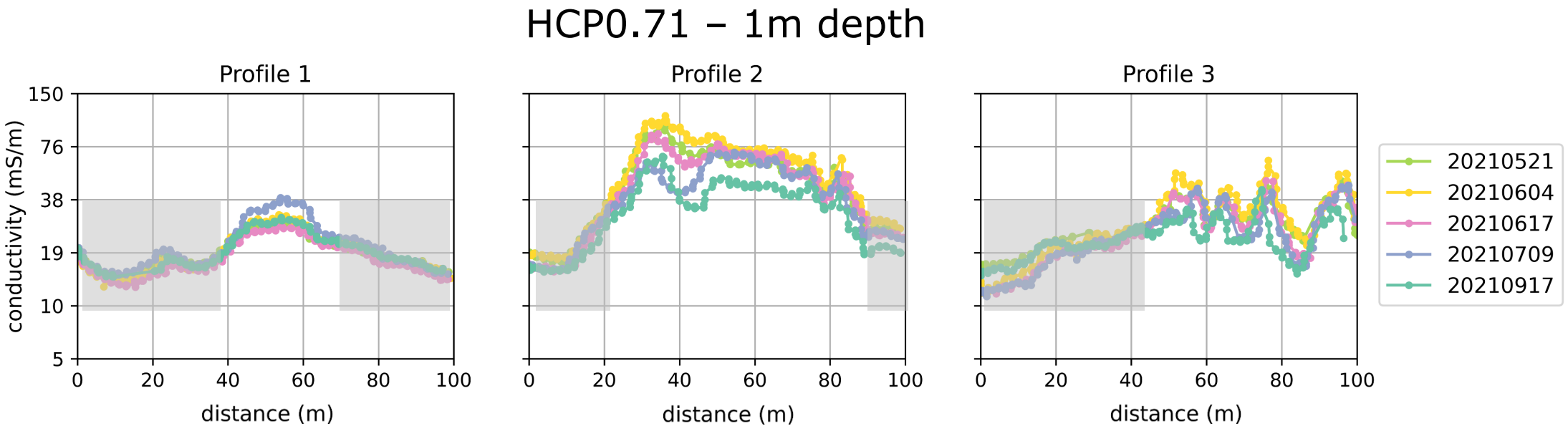
Comparison with ERT





EMI Monitoring results

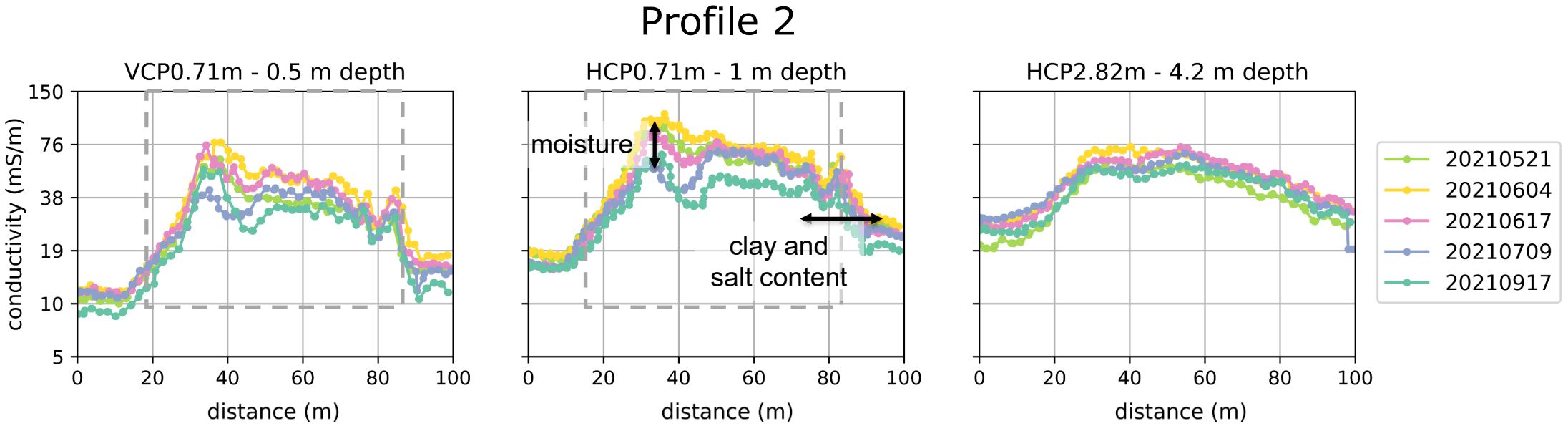
- σ is highest in active lakes due to high salt and clay content



degrading | active | degraded

EMI Monitoring results

- temporal changes ↔ soil moisture
- spatial changes ↔ clay and salt content



Conclusion

- EMI is well suited to map changes in salt content and delineate the extensions of the active soda lakes associated to high conductivity values
- The high conductivity is related to the accumulation of salt and clay content in a shallow top layer
- Monitoring EMI measurements reveal changes in the active lakes which we interpret to variations in soil moisture

➢ Outlook
- Quantification of clay and salt content
- Continuous monitoring to fully understand the salt dynamic

anna.hettegger@tuwien.ac.at and adrian.flores-orozco@tuwien.ac.at