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DETECTION OF GEOTHERMAL ANOMALIES USING PRE-DAWN THERMAL REMOTE SENSING DATA FROM ECOSTRESS SENSOR

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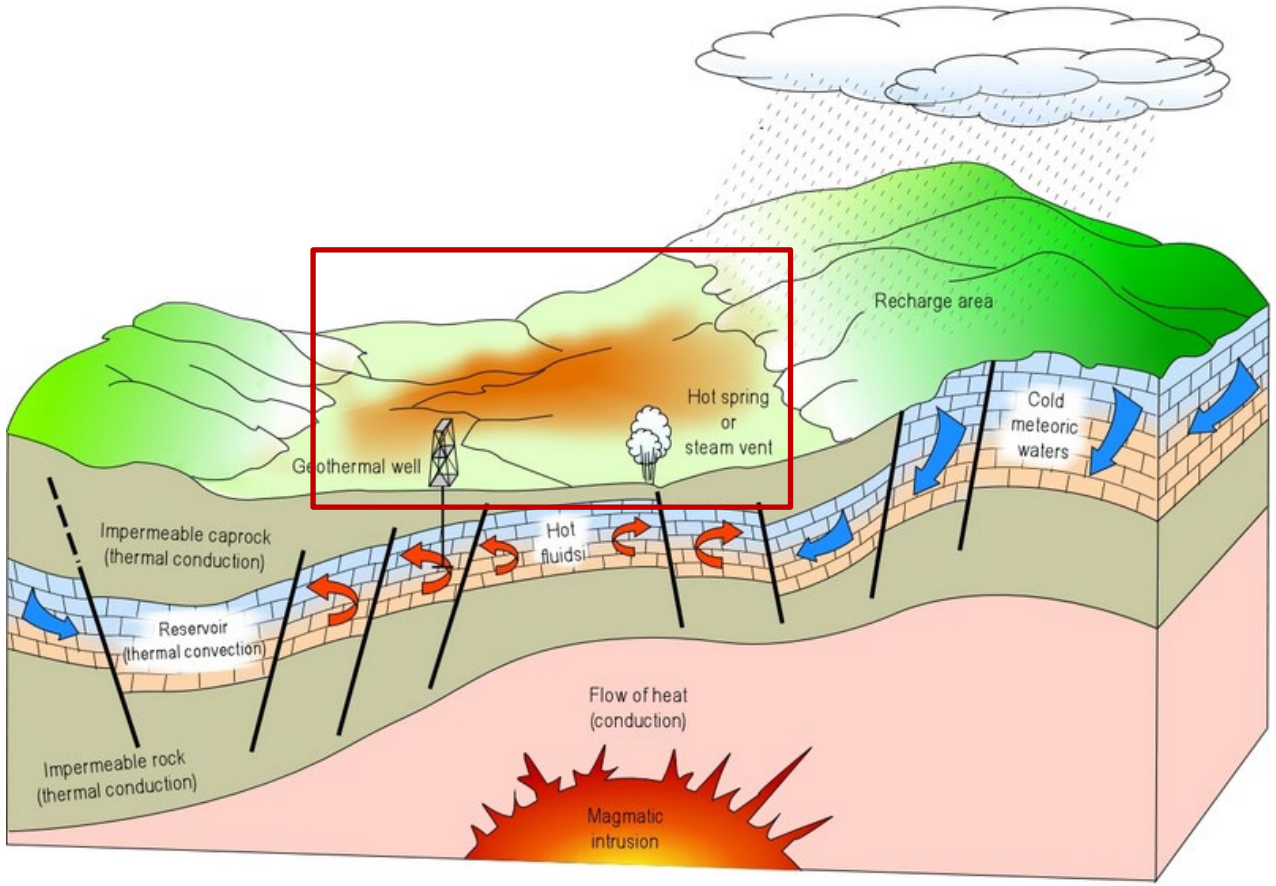
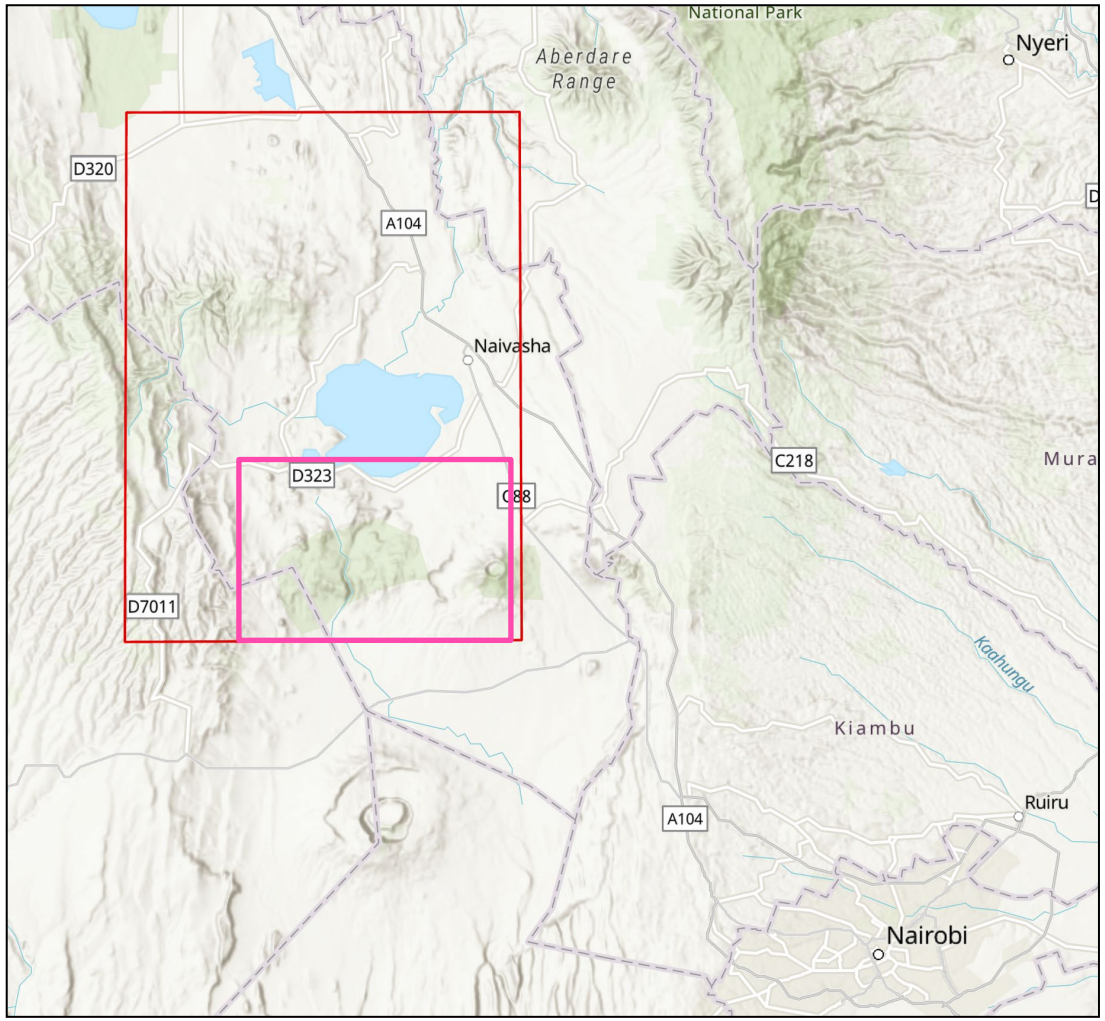
DETECTING GEOTHERMALLY ACTIVE AREAS



Conceptual geothermal system with steam extraction for electricity production and surface manifestations
source: Geothermal-energy.org

- Geothermal activity can be used for sustainable energy production
- Thermal imagery can be used to detect geothermal anomalies

STUDY AREA – OLKARIA, KENYA



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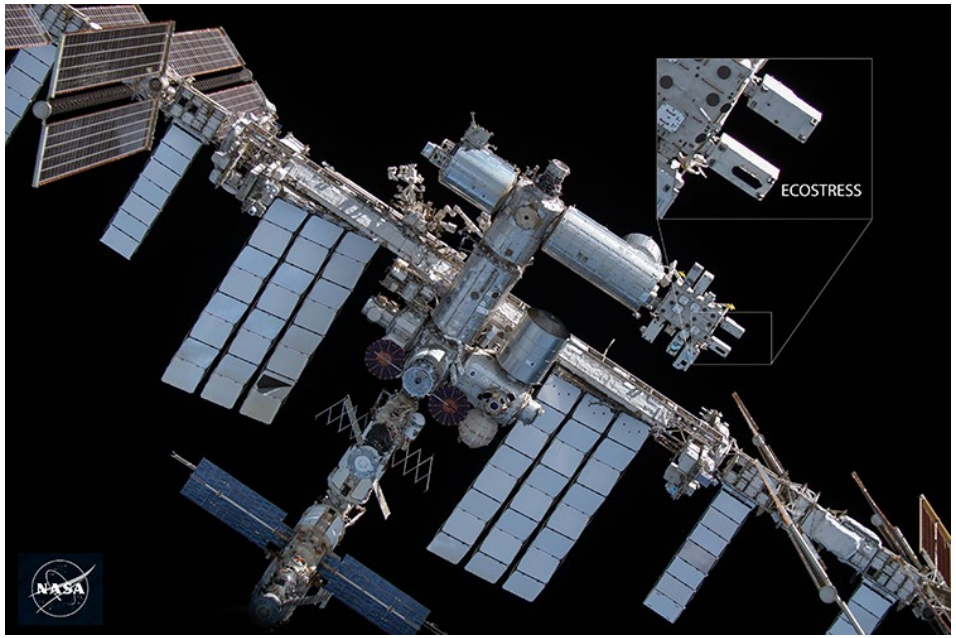
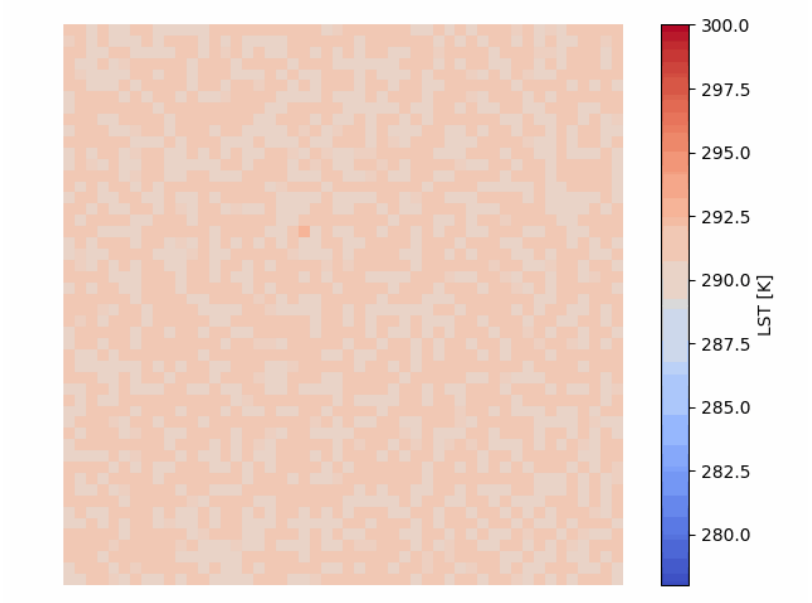
ECOSTRESS SENSOR

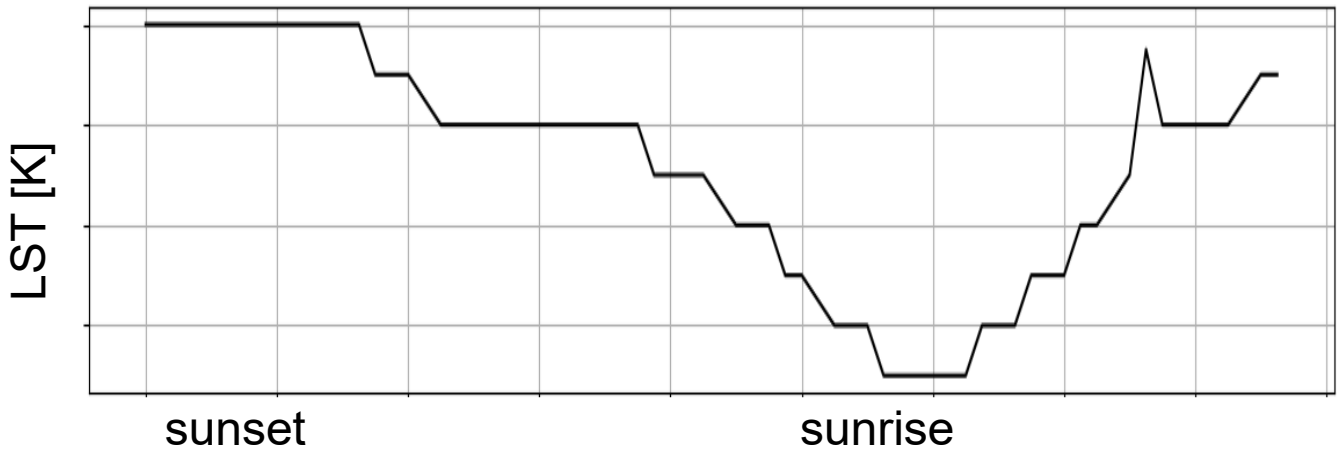
Credits: NASA



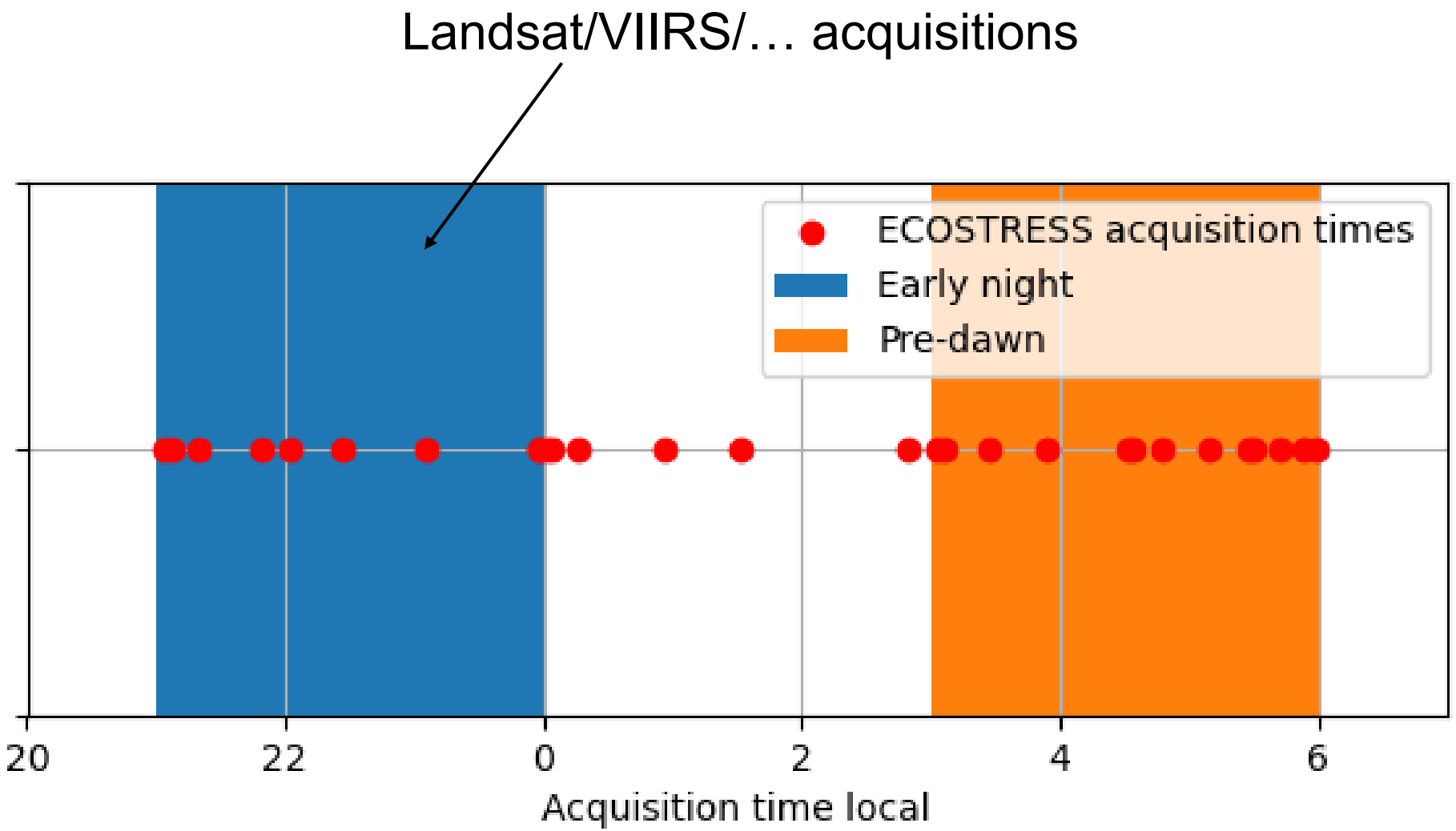
- Mounted on the International Space Station
- Precessing orbit
- 5 bands in thermal-IR
- Product pixel size 70x70 m
- Swath width 384 km

HEAT DECAY OF GEOTHERMAL ANOMALIES

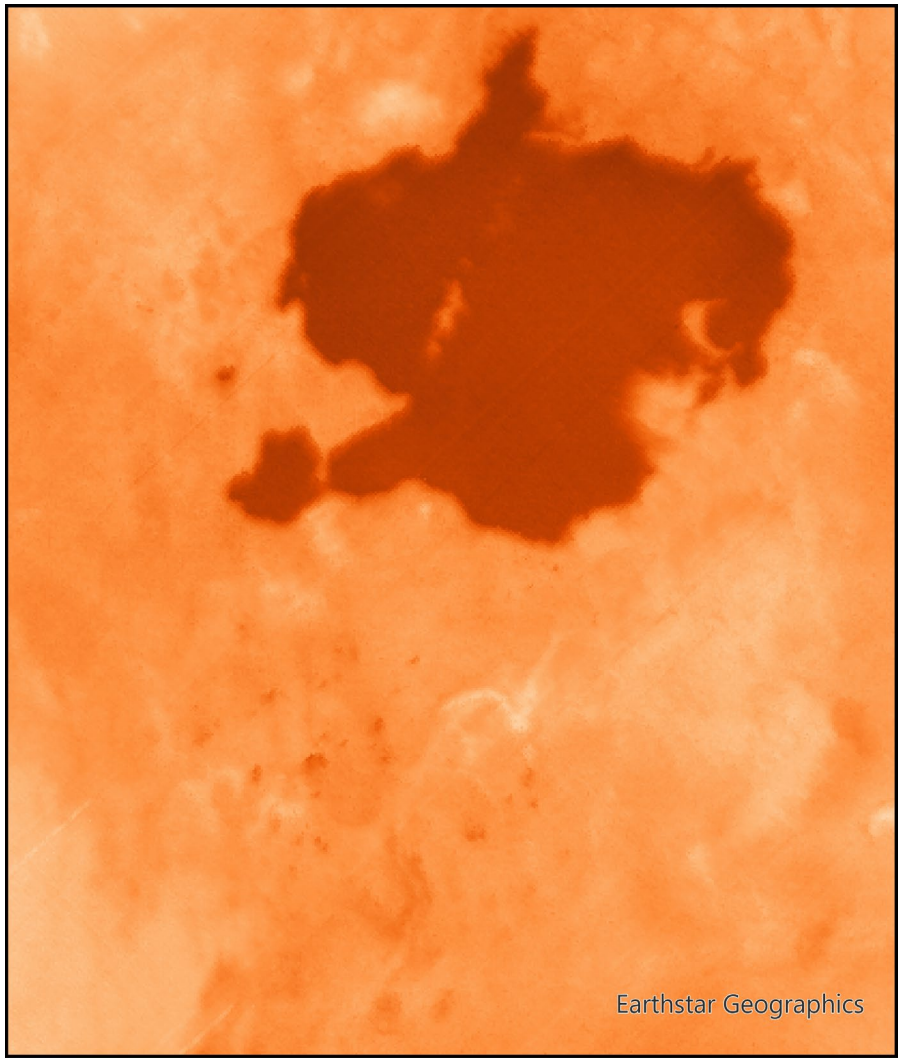




WHY USE ECOSTRESS DATA?



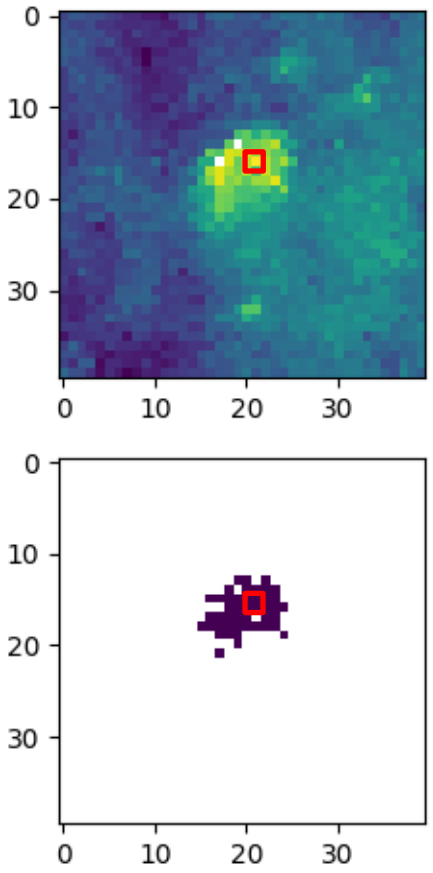
ECOSTRESS LAND SURFACE TEMPERATURE IMAGE



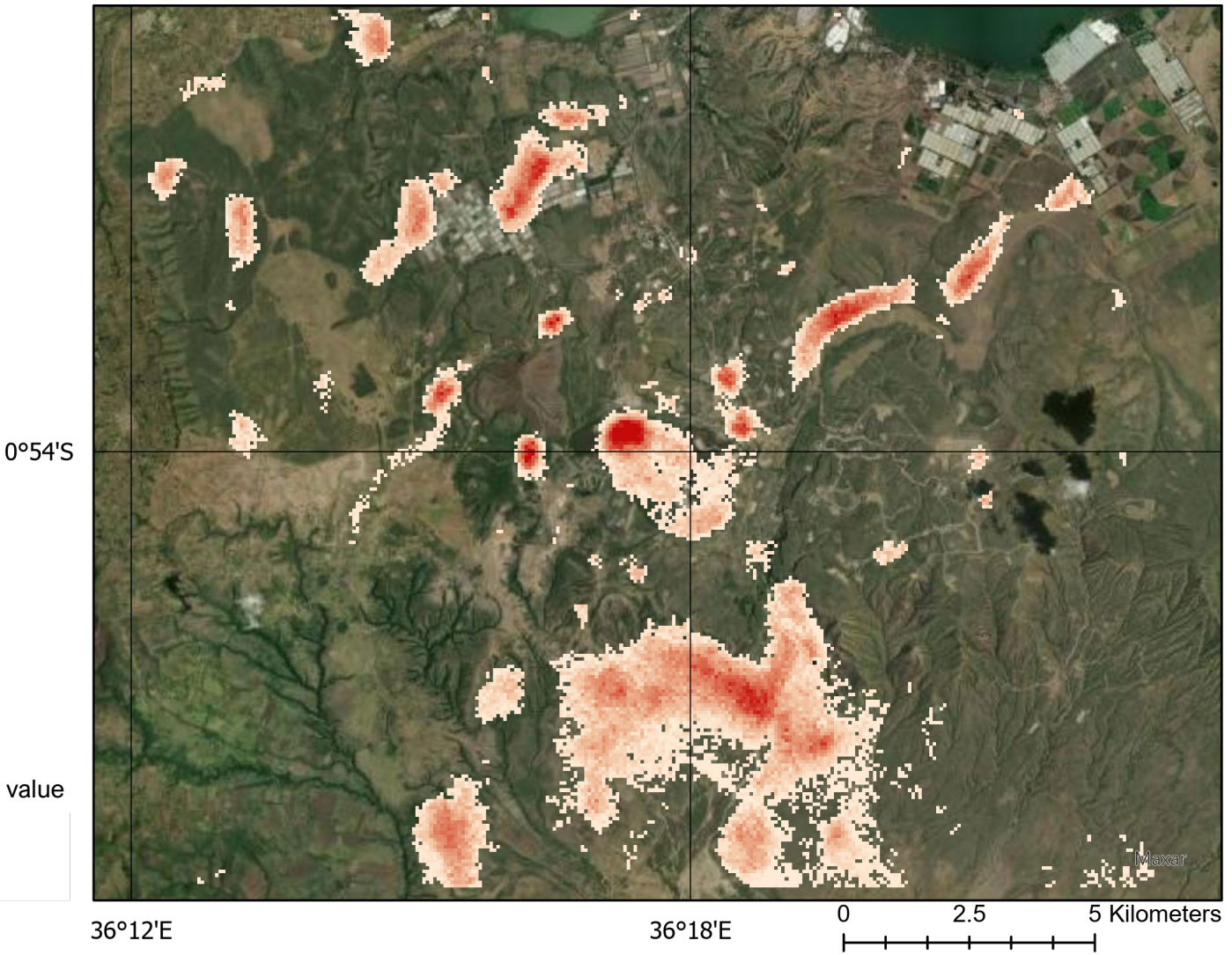
warmer

cooler

DETECTION OF GEOTHERMAL ANOMALIES



$LST_{(x,y)}$



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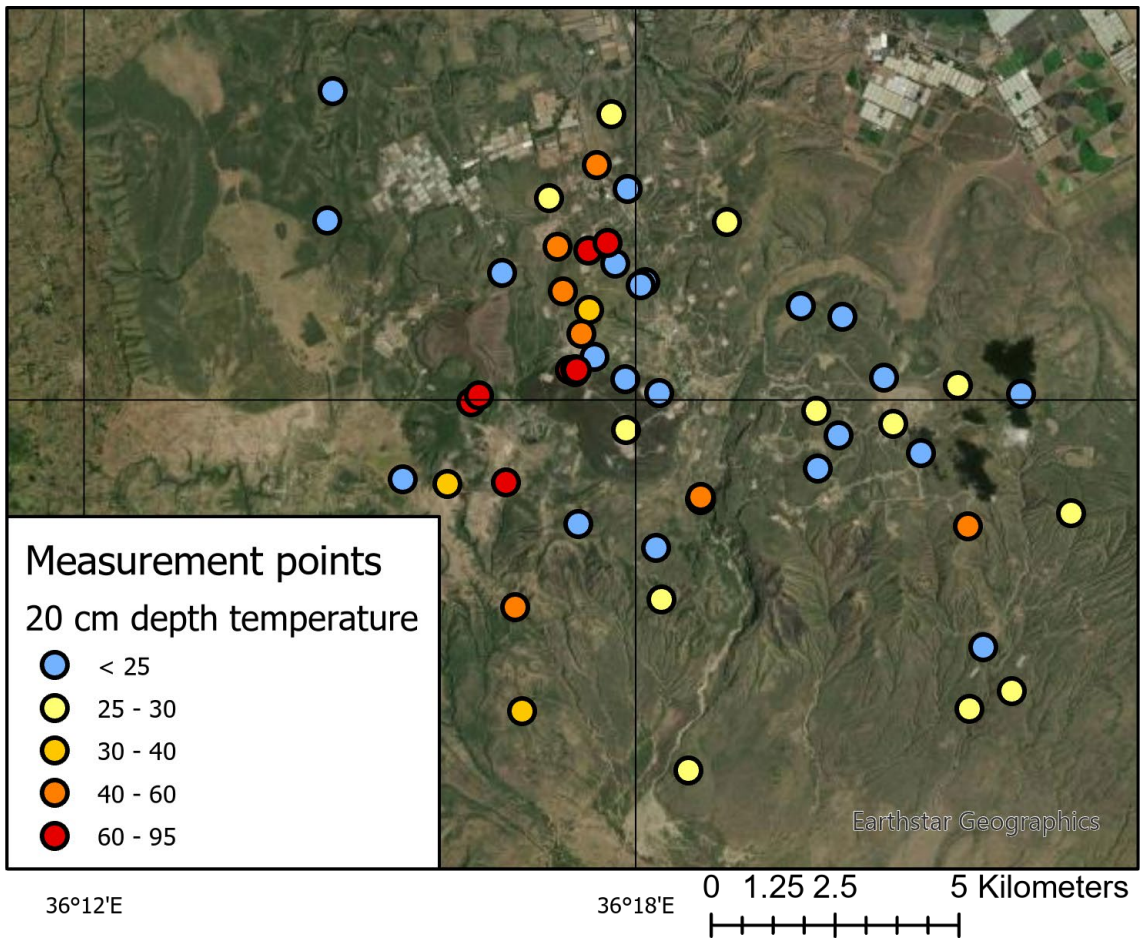
FIELD WORK, CREATION OF REFERENCE DATA



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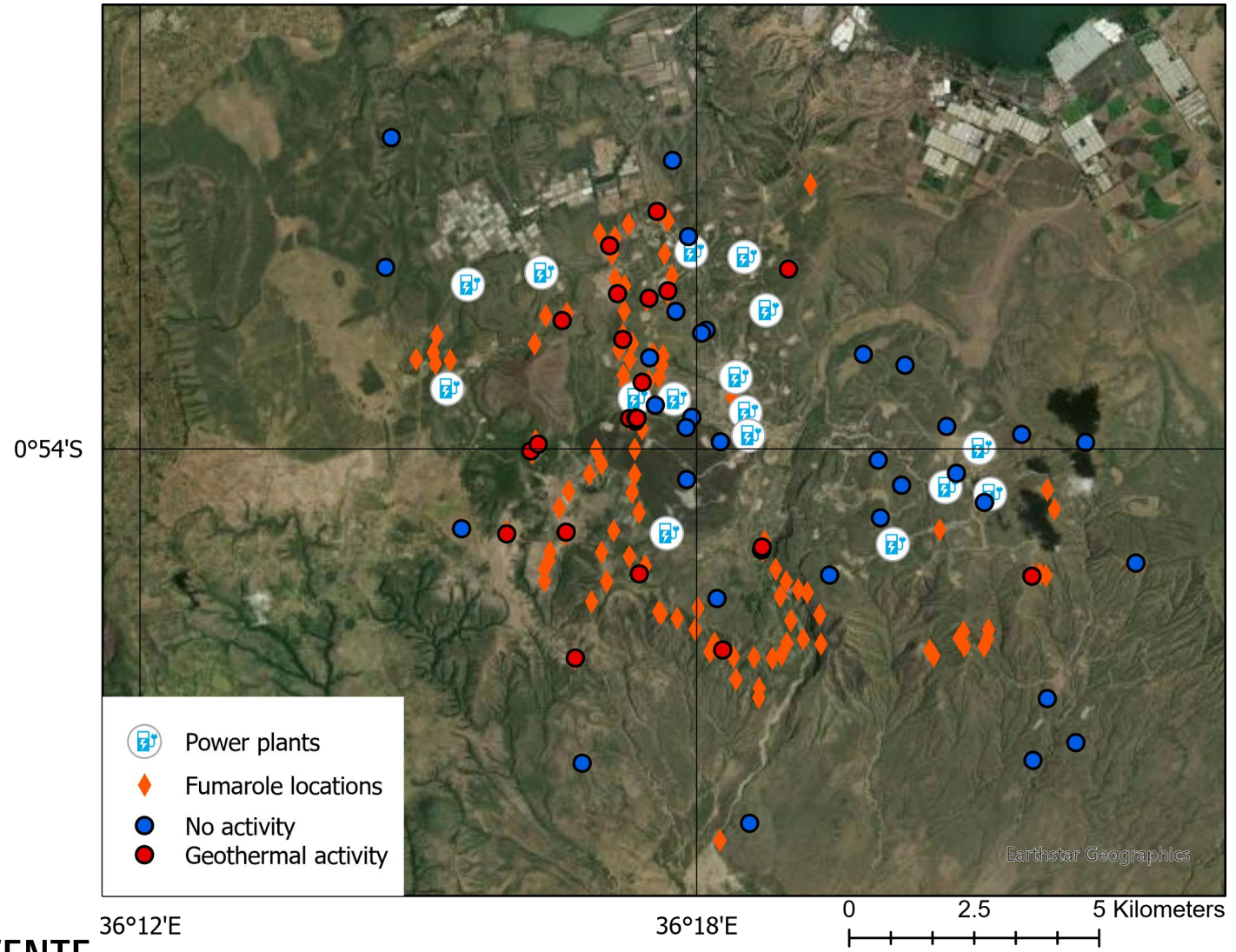
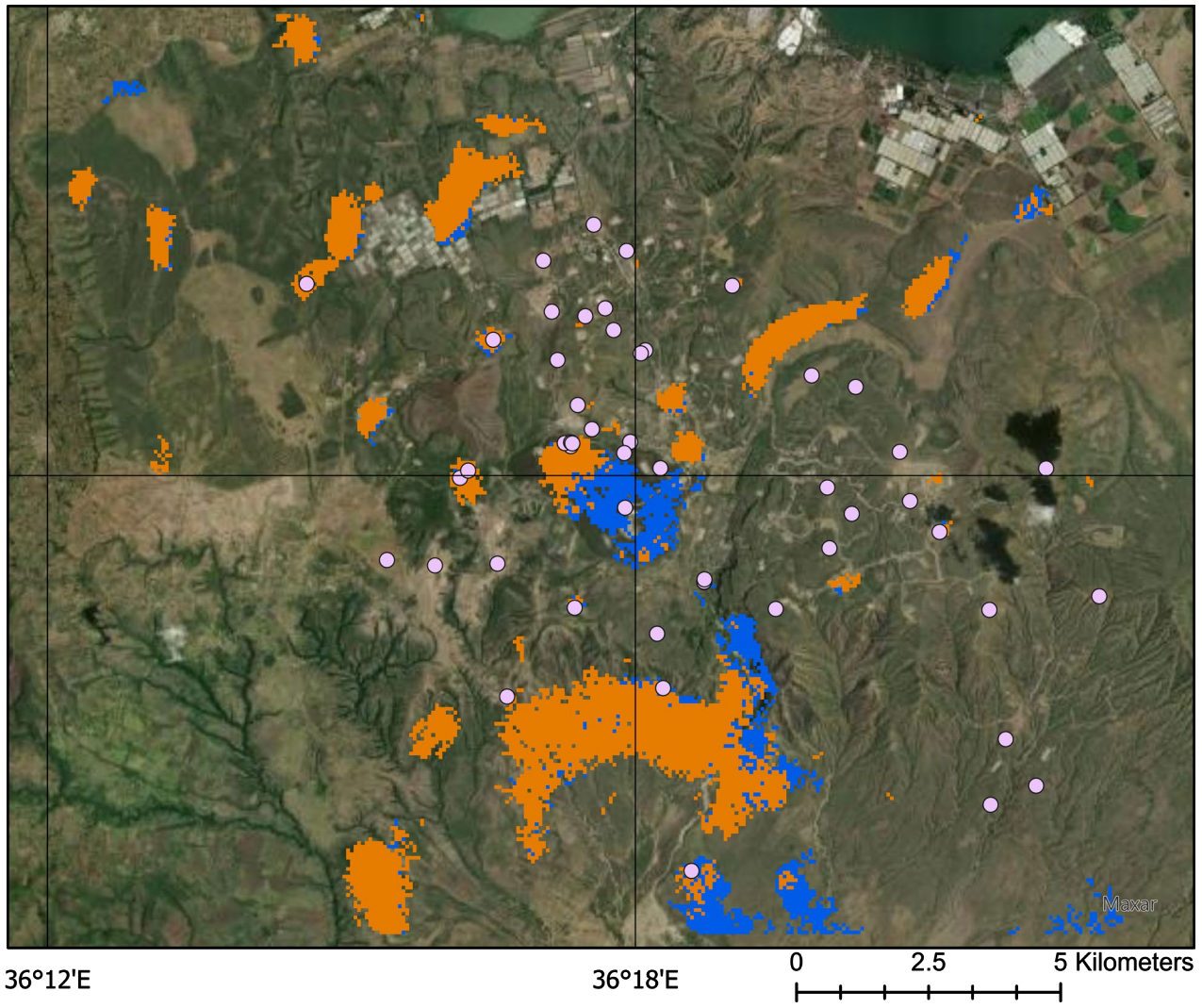
FIELD WORK, CREATION OF REFERENCE DATA



DETECTIONS IN DIFFERENT ACQUISITION TIMES

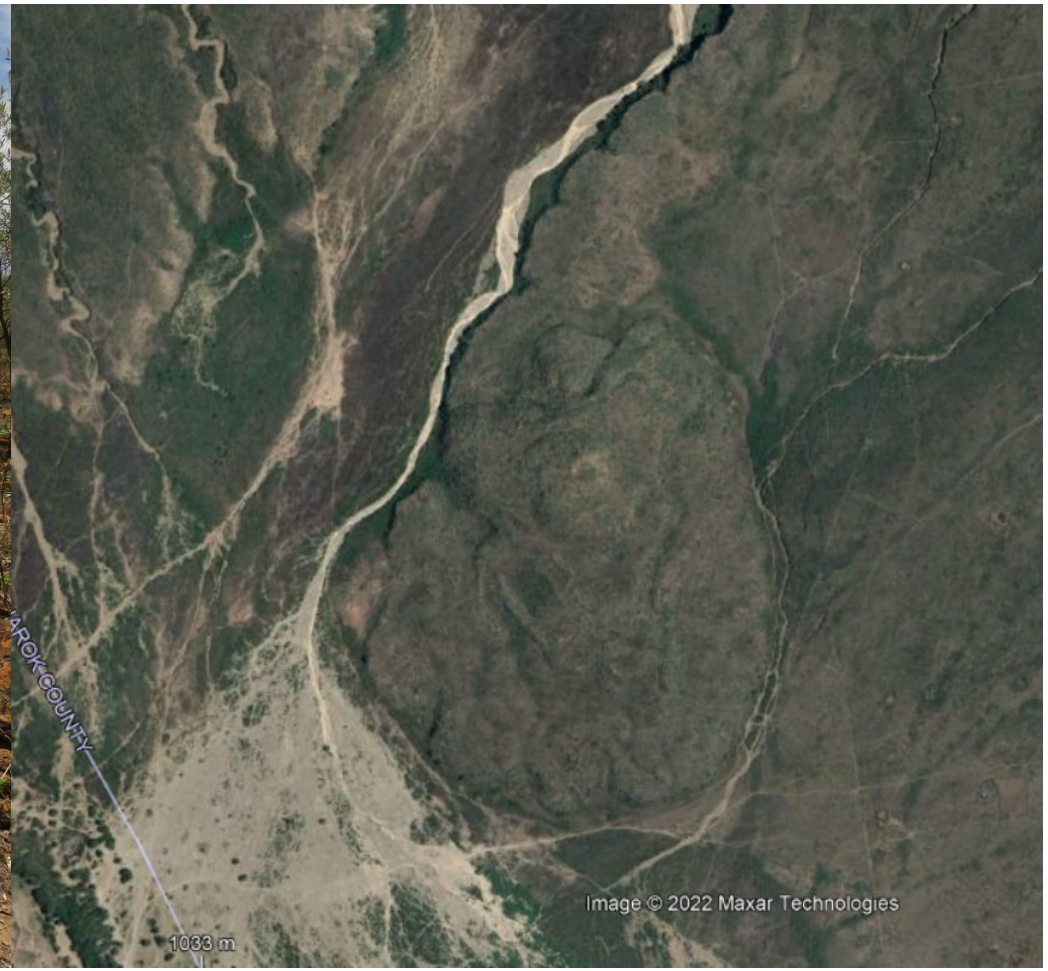
	Early night	Pre-dawn
Overall accuracy	61%	71%
Omission error	33%	24%

- The accuracy is higher in pre-dawn images
- The anomalies are larger in the pre-dawn images
- Some new anomalies are detected



ERROR SOURCES: OMISSION

ERROR SOURCES: COMMISSION



SUMMARY AND NEXT STEPS

- Pre-dawn imagery proves potential for mapping of geothermal anomalies, and therefore contributing to transition to sustainable energy production
- Some errors in detection are visible due to various effects, among others heat capacity of surfaces

- Analyse which variables influence detections: weather, land cover, vegetation health, heat capacity of surfaces