

Future for Heritage

Gunter Schreier,
Daniele Cerra, Simon Plank, et alii

Earth Observation Center (EOC)
German Aerospace Center (DLR)

Future for Heritage

Agora during ESA Living Planet Symposium
25. May 2022
Bonn, Germany



Wissen für Morgen



Earth Observation Center (EOC)

Deutsches Fernerkundungsdatenzentrum (DFD)
German Remote Sensing Data Center

Director: Prof. Dr. Stefan Dech

Institut für Methodik der Fernerkundung (IMF)

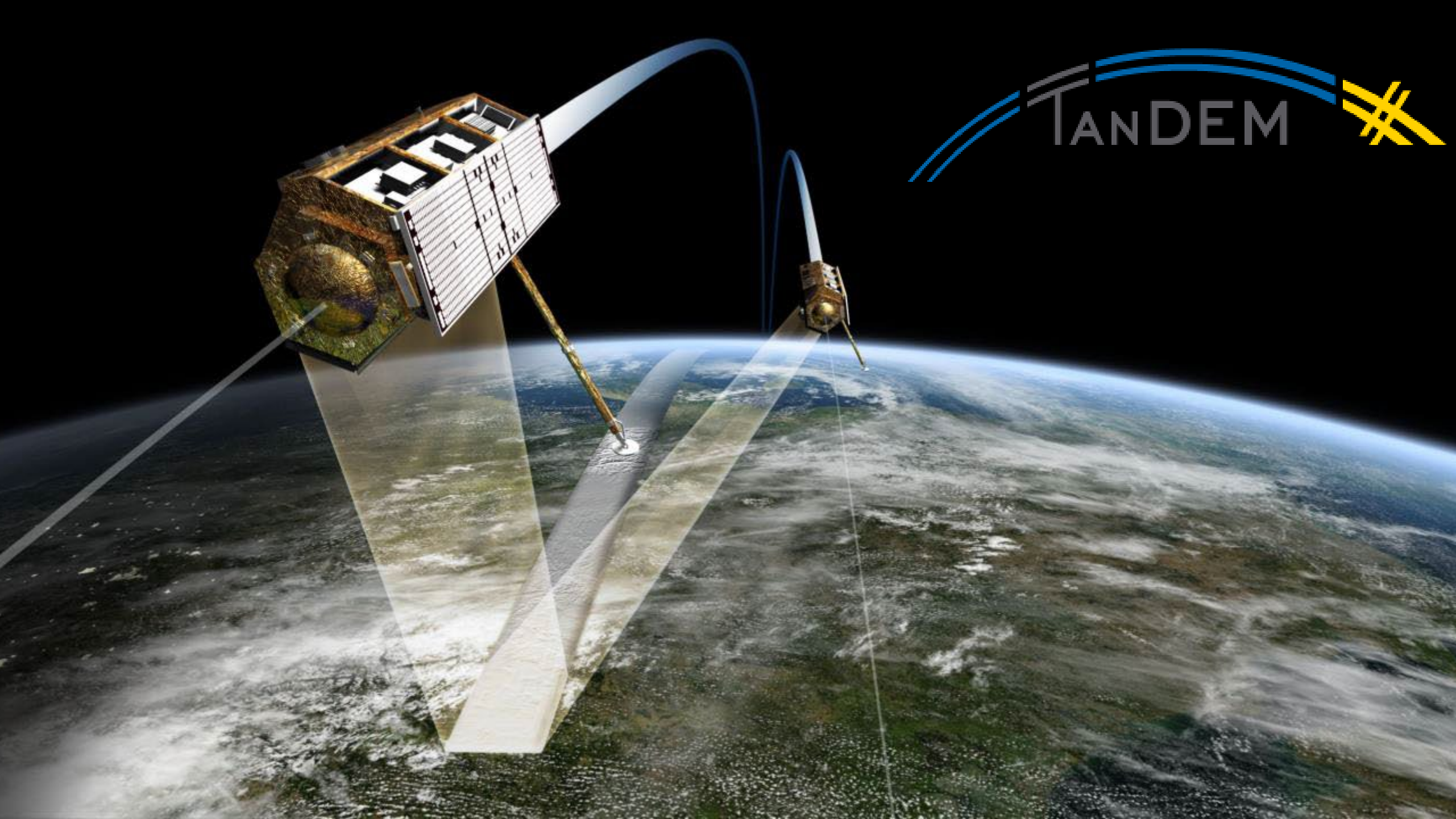
Remote Sensing Technology Institute

Director: Prof. Dr. Peter Reinartz &
Dr. Peter Haschberger (acting)



- EO Data Acquisition, polar stations
- EO Data Archiving & Processing
- Data distribution, big data platforms
- Processor and algorithm development
- Development of geoscientific EO applications, near real time services
- Global Services for disaster & crisis management

- ca. 350 employees
- ca. 40 at Universities (TU Munich, Univ. Würzburg, Augsburg)
 - ca. 250 Scientists and Engineers from over 30 countries
 - PhD Students
 - guest Scientists
- ca. 53 % Third party income



TANDEM



Egypt, Pyramids of Giza



Venice – Vertical Movement



DLR-Center for Satellite Based Crisis Information (ZKI)

- Pooling DLR Earth Observation Expertise in georisks and sensor technologies
- Development of Copernicus Core Service „Emergency Mapping“
- 24/7 staff availability
- Part of the global „Charter on Space and Major Disasters“
 - TerraSAR-X, RapidEye data
 - Coordination and mapping functions

TerraSAR-X Spotlight Dual-Pol Image: Uruk - Irak November 16, 2008



Demonstrate feasibility of merging existing information with space based observation to document status of archaeological/ world cultural heritage sites
Practical demonstration:
Uruk, Iraq; endangered for looting in post war crisis

Partner:
German Archaeological Institute (DAI)
Bavarian Cultural Site Service
Definiens Imaging GmbH
European Space Imaging
DLR

Classified Looting Areas
2001



Classified Looting Areas
2005



Palmyra – Temple of Bel: destroyed by IS (30.08.2015)



Processing and analysis: DLR-DFD/ZKI
In cooperation with Prof. Andreas Schmidt-Colinet, TU Vienna

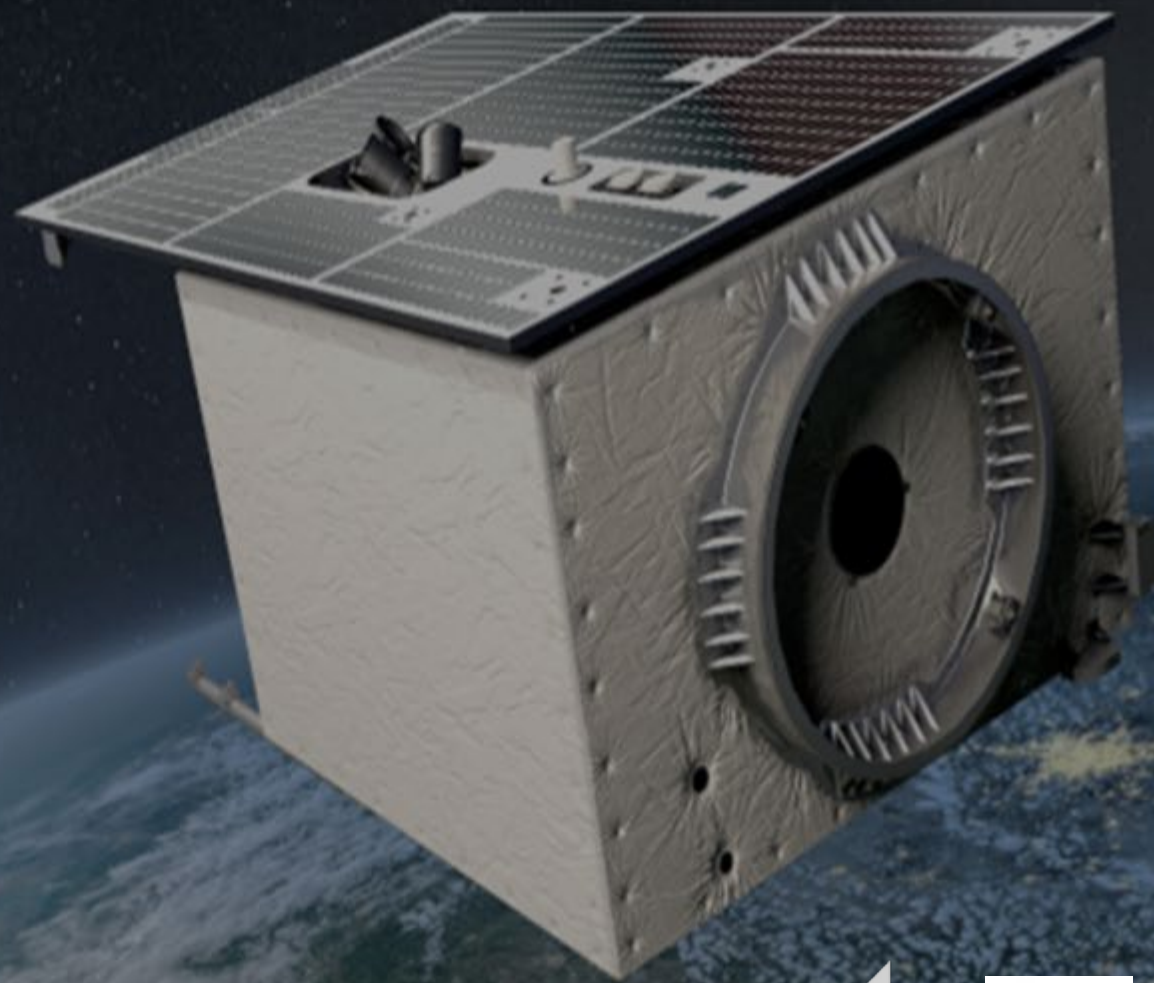
©European Space Imaging / DigitalGlobe



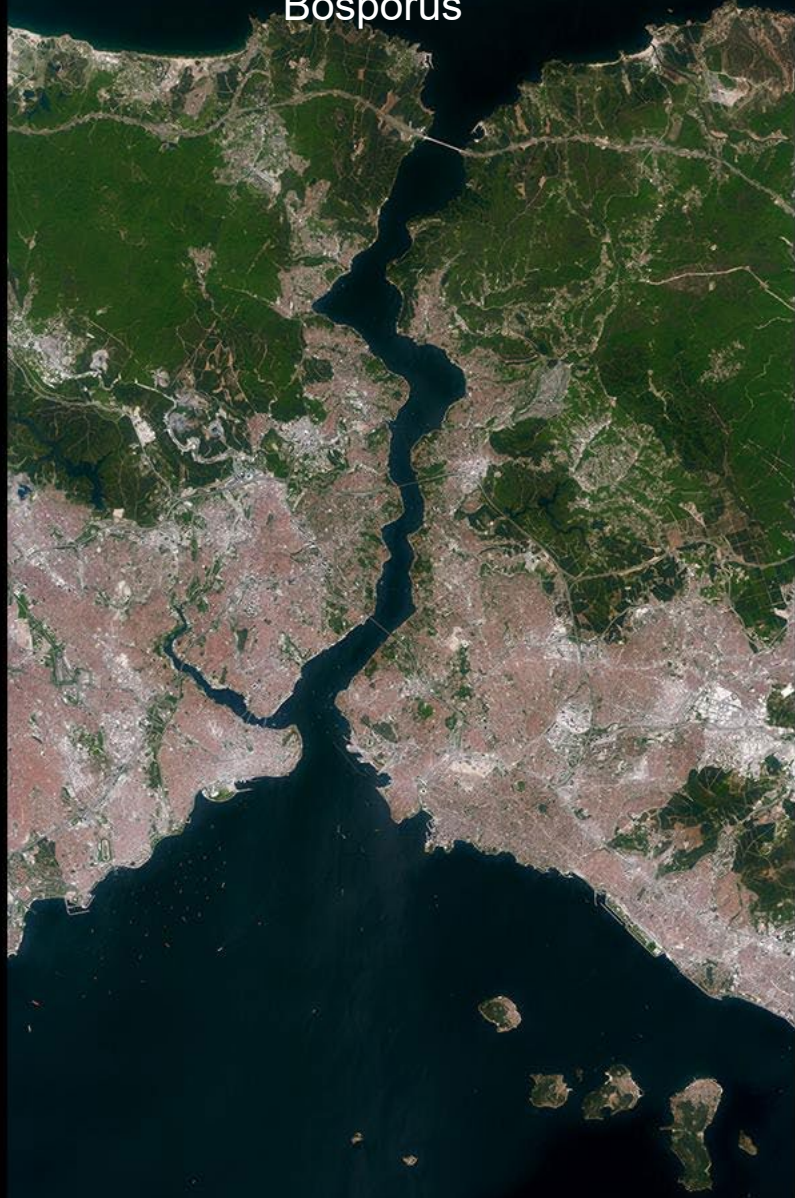
Palmyra, Syria
TerraSAR-X data with superimposed archaeological linements
Andreas Schmidt-Colinet, Roland Link et al.

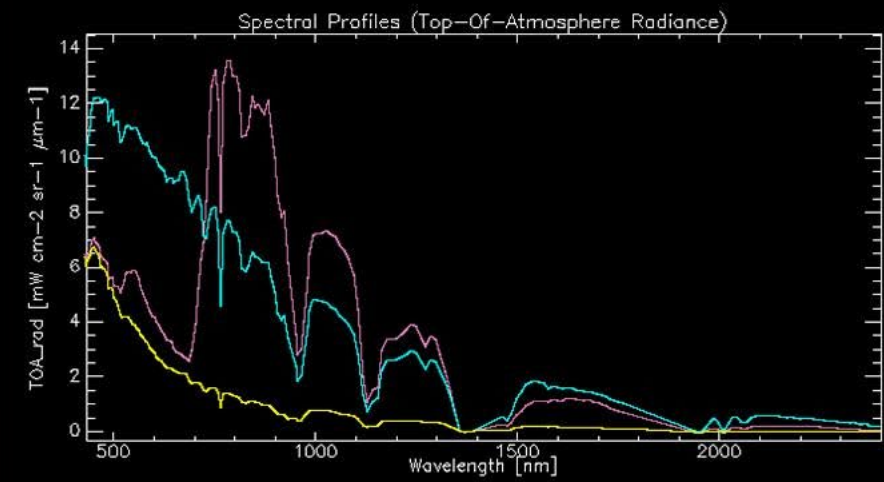
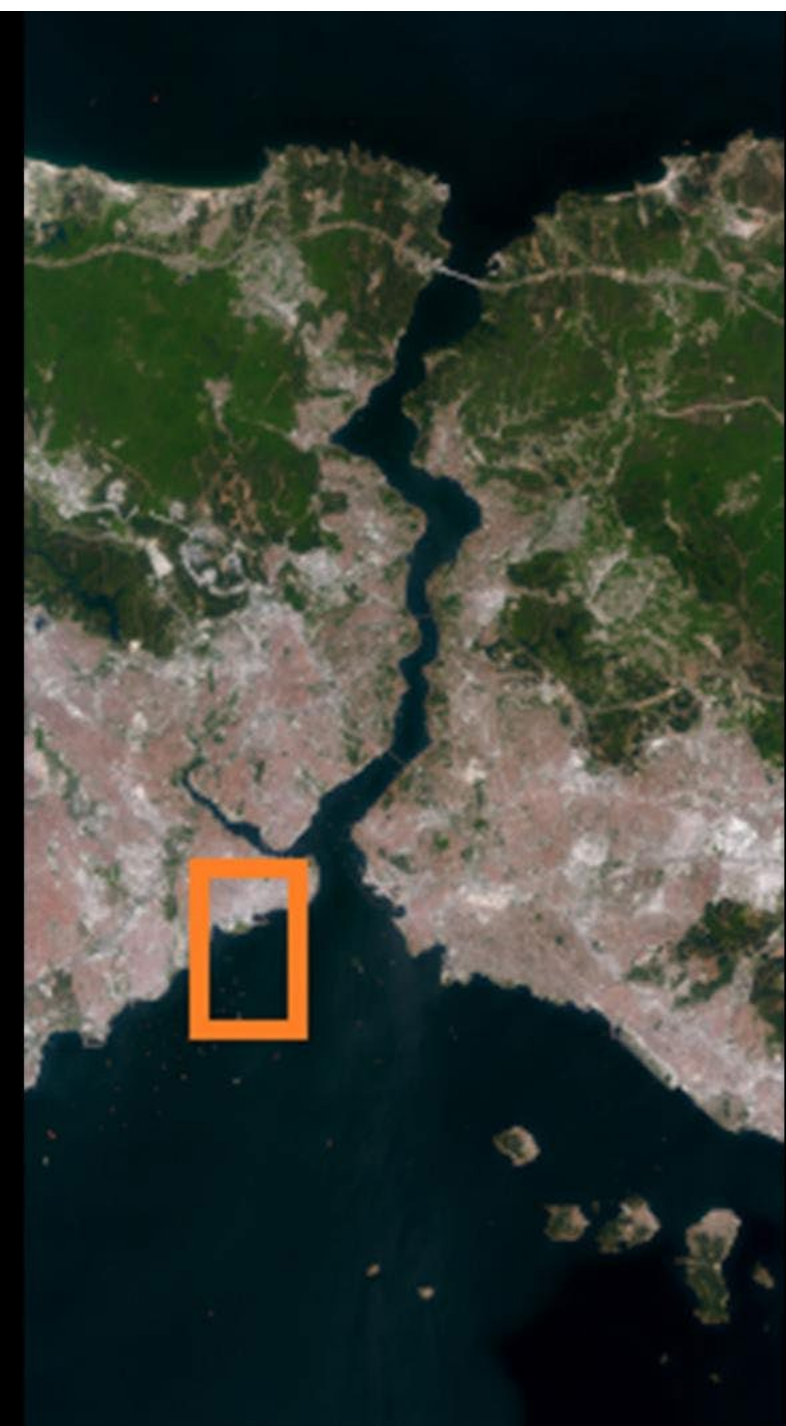


EnMAP Hyperspectral Imager



EnMAP – first sight– 4.5.2022
Bosporus

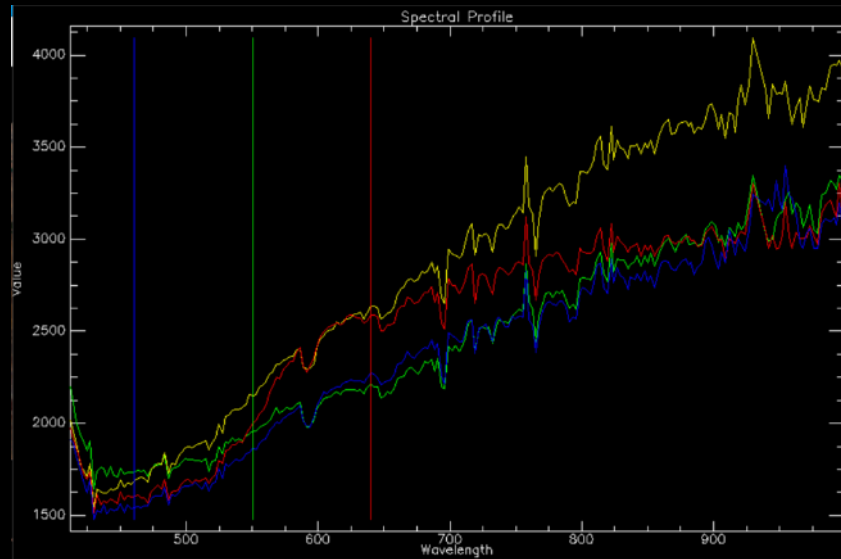
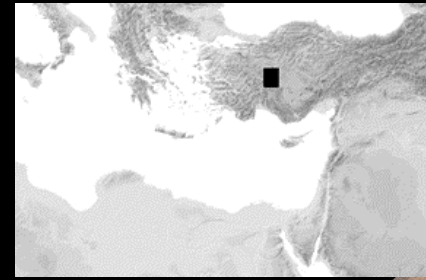




Anthrosol detection near Konya, Turkey



Anthropogenic soils characterised by a high level of organic content in particular phosphates; result of mixture of mudbrick clay with animal and human faeces, discarded rubbish, degraded wood and straw over long periods of time



DEGIS Acquisition (mosaic, 2 scenes)
2018-10-19



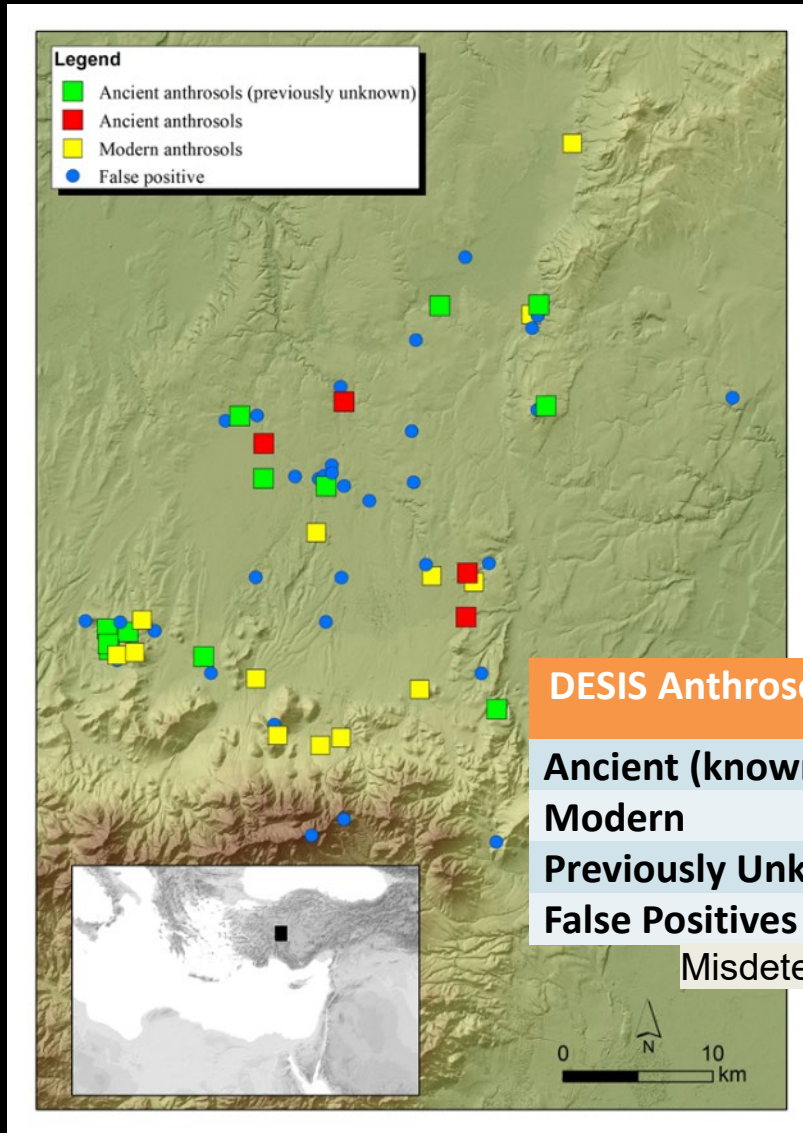
Bands 16, 59, 90
440 nm, 550 nm, 630 nm

Daniele Cerra¹, Michele Massa², Stefan Auer¹

¹, German Aerospace Center (DLR), Photogrammetry and Image Analysis

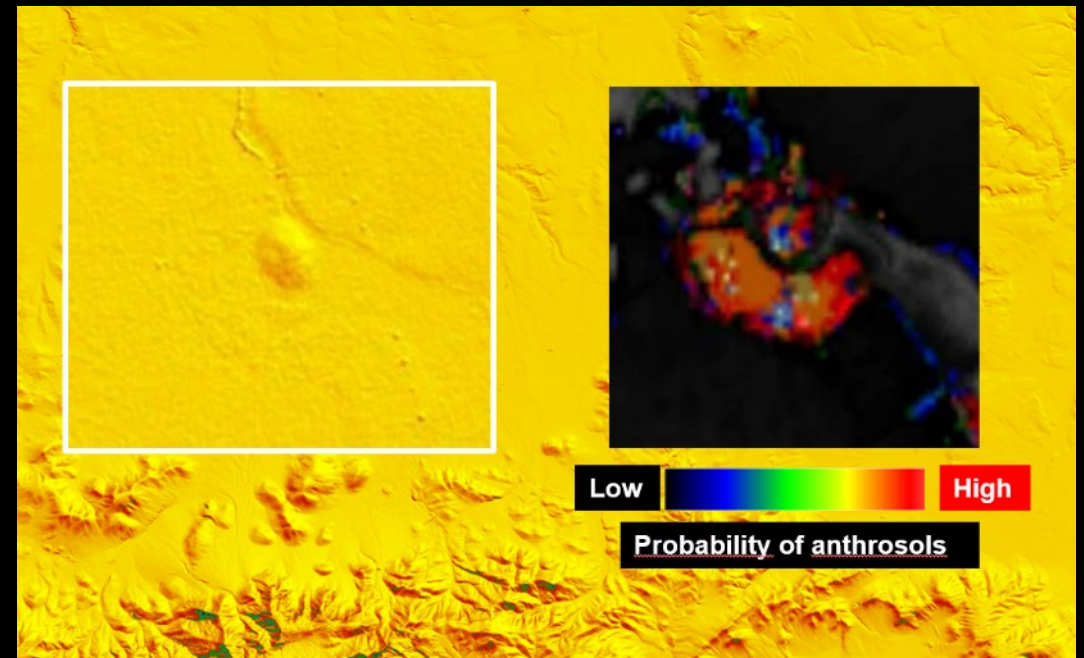
², University of Chicago, Oriental Institute

Anthrosol detection near Konya, Turkey



DEGIS Anthrosols Detections	N. of areas
Ancient (known)	4
Modern	13
Previously Unknown	14
False Positives	31

Misdetections: around 50%



Hipponion Submerged Harbour

Renovated in 300 BC

Hosted half of Caesar's fleet during the Roman Civil War against Pompey

In use until 500 years ago

50 years ago (aerial photograph)

This bulwark disappeared

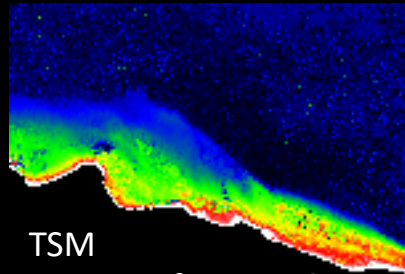
Google Earth



Harbour in DESIS

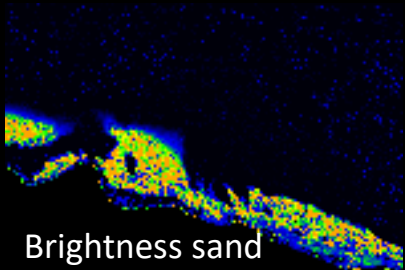
Estimated depth: 7m

Measured depth: 8m



TSM
0 – 5 g m⁻³

Total Suspended Matter
in Water



Brightness sand
0 – 15



300 m

Further EO initiatives

- ATHENA –REMOTE SENSING SCIENCE CENTER FOR CULTURAL HERITAGE MONUMENTS AND SITES – H2020 Project 2016 – 2018
 - Cyprus University of Technology, National Research Council of Italy (CNR) & DLR
- EXCELSIOR – generate in Cyprus an ERATOSTHENES Centre of Excellence (ECoE) bringing Earth Observation capacity into the Eastern Mediterranean, Middle East and North African (EMMENA) (2019 – 2026)
 - One line of excellence includes Cultural Heritage
 - Cyprus University of Technology, NOA, GR; TROPPOS, D; DEC, CY / DLR
- FPCUP Copernicus for Cultural Heritage Summer School Workshops (2022 – 2024)
 - Cyprus University of Technology, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), IT & DLR
- FPCUP Cultural Heritage Copernicus Technical Group (2023 – 2024)
 - Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), IT; Cyprus University of Technology (CUT); PRAXI Network/Foundation for Research and Technology Hellas (PRAXI Network/FORTH) & DLR



FPCUP =
Caroline Herschel Framework
Partnership Agreement
on Copernicus User Uptake

Gunter Schreier

German Aerospace Center • DLR

Earth Observation Center • EOC

German Remote Sensing Data Center • DFD

