

The logo for CEOS (Committee on Earth Observing Satellites) features the letters 'C', 'E', and 'S' in a bold, lime green font. The letter 'O' is replaced by a realistic image of the Earth from space, showing blue oceans and white clouds, with a yellow orbital ring around it. The background is a dark blue space with faint grid lines and stars.

CEOS

A collage of various aerial satellite images, including urban areas, agricultural fields, and natural landscapes, arranged in a circular pattern. The images are in different colors and orientations, creating a dynamic and textured background.

VH-RODA 2023 Workshop
27 – 30 November 2023 | ESA – ESRIN | Frascati (RM),
Italy

***GCPIX: A PROPOSAL TO ORCHESTRATE GROUND CONTROL POINT
COLLECTION FOR GLOBAL SATELLITE EARTH OBSERVATION***

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- **CEOS Strategic Implementation Team (SIT)**
 - **New Space Task Team** 
 - **Cooperation and collaboration** opportunities to **facilitate interoperability** between private and public sector data
 - **Identify and support** potential **complementary capabilities** enabled by New Space actors
 - **P. Goryl et al. Presentation – VH-RODA DAY 1**
 - **CEOS Recommendation:**
Establishing a reference for geometry and image quality Cal/Val via a **Reference GCP Database**



- **CEOS Working Group on Calibration & Validation (WGCV) Mission Statement**
 - to ensure **long-term confidence** in the accuracy and quality of Earth Observation data
→ providing **references, methods, protocols, tools and expertise** for **Cal/Val** to “**New Space**”
 - to ensure **interoperability with a view to a Global Earth Observation System of Systems (GEOSS)**

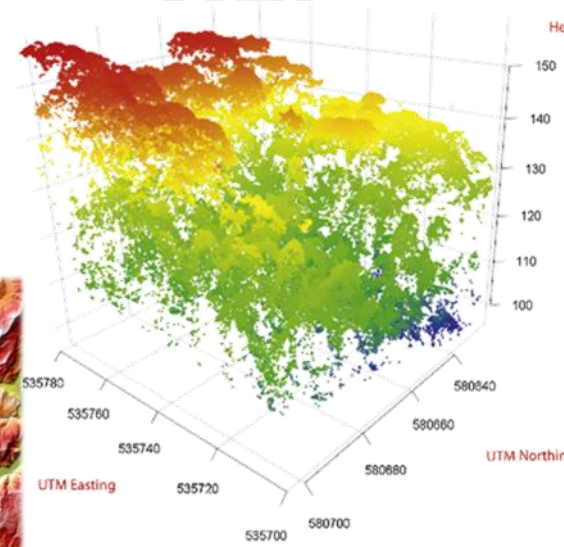
SRIX4Veg



fiducial reference
measurements
for vegetation



DEMIX



Credits: Laurin et al. 2016

BRIX

ACIX



Credits: Song et al., March 2020
Remote Sensing 12(5):833,
DOI:10.3390/rs12050833

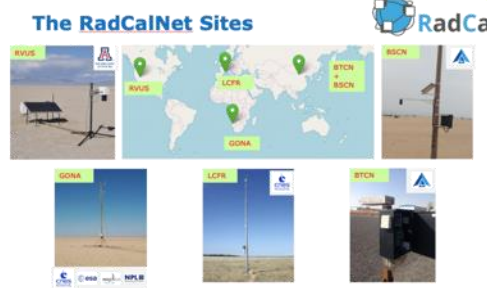
CMIX



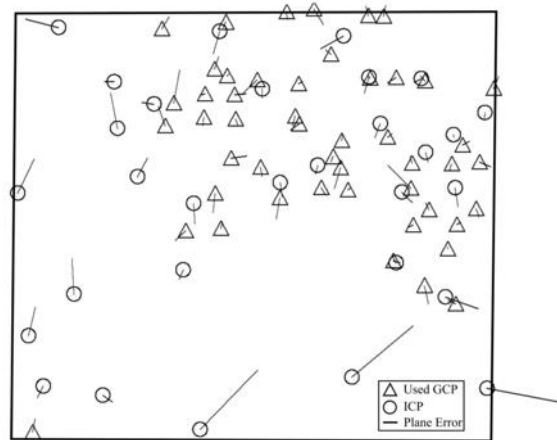
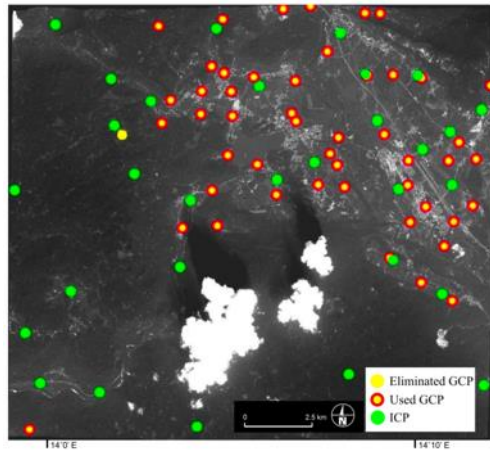
RadCalNet



RadCalNet



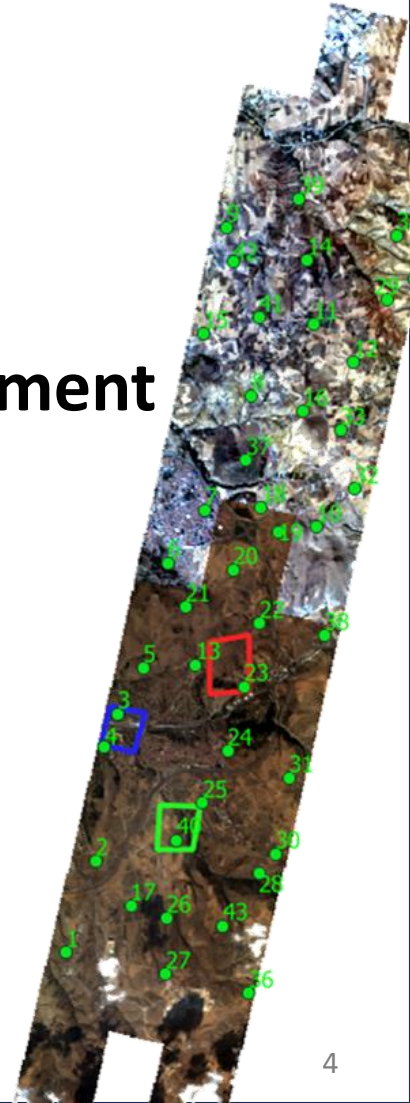
- Spatial data **interoperability**, seamless **integration/analysis** of **multi-source** and **multi-temporal** data
 - **Geolocation accuracy** is crucial
 - **Geometric distortions** corrections are vital
- **GCPs** are essential for **georeferencing** and **Geometric quality assessment**



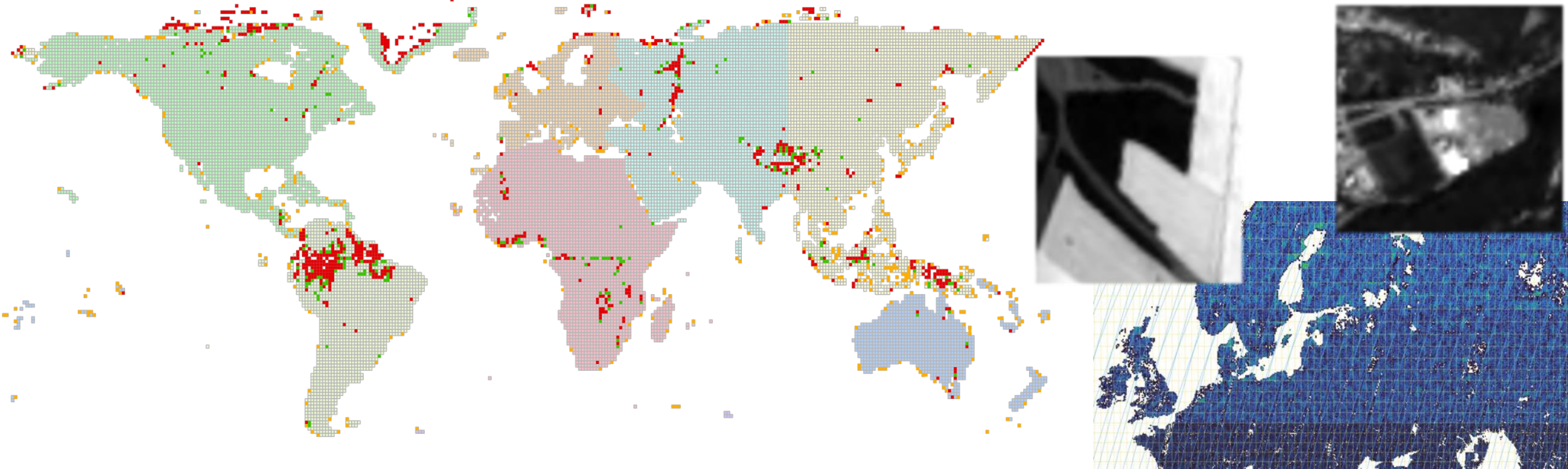
Credits: Pehani et al. Remote Sens. 2016, 8(4), 343; <https://doi.org/10.3390/rs8040343>



Credits: Kocaman, Saunier, Albinet, Cal/Val Activities over Ankara Test Site within ESA EDAP Framework, VH-RODA 2023



- Community **recommendation** from the key forums “VH-RODA” and “JACIE”
 - Build up a **GCP DB for the VHR domain**
- **CEOS WGCV** welcomed and closely followed the **Sentinel-2 Global Reference Image (GRI)** and **harmonization with Landsat GCP Library**
 - which can serve as a **reference for high resolution (HR)** sensors (around 10 m – 50m GSD)

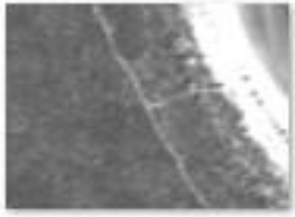




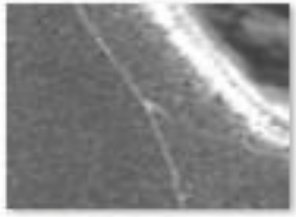
- ***CEOS is now proposing the development of a harmonised global CEOS Ground Control Points (GCP) Database and its extension to cover also VHR Optical Data [2.5-10m GSD, and potentially <2.5m GSD]***
- ***CEOS agencies are pooling activities and resources towards a unified and harmonized CEOS GCP Database for HR&VHR Optical Data***
 - ***GCPIX!***
 - ***A. Lewis, L.-W. Wang, R. Coghlan, **AGRI: The Australian Geographic Reference Image**, https://cmi.ga.gov.au/sites/default/files/2020-08/agri_report.pdf***
 - ***S. Saunier, S. Kocaman, C. Albinet, P. Goryl, “Development of a GCP Database Approach for Geometric Cal/Val of VHR Optical Imagery”***
 - ***Check out S. Saunier’s poster!***

• A. L. *Image* *Reference*

- L
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- A
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- C
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91412002_image_chip.bmp



91412004_image_chip.bmp



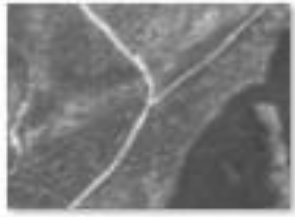
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91412004_E_phot_o.jpg



91412070_W_phot_o.jpg



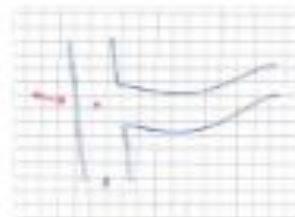
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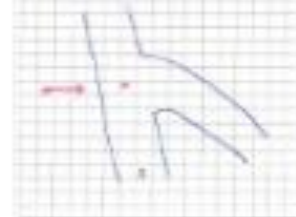
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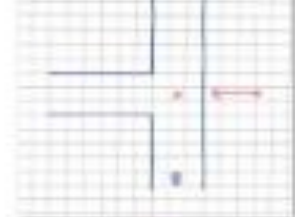
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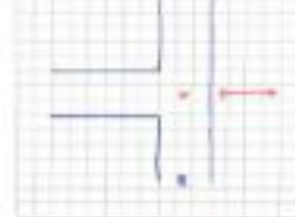
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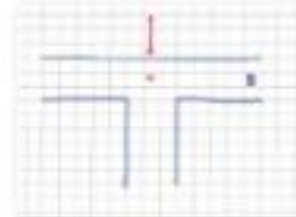
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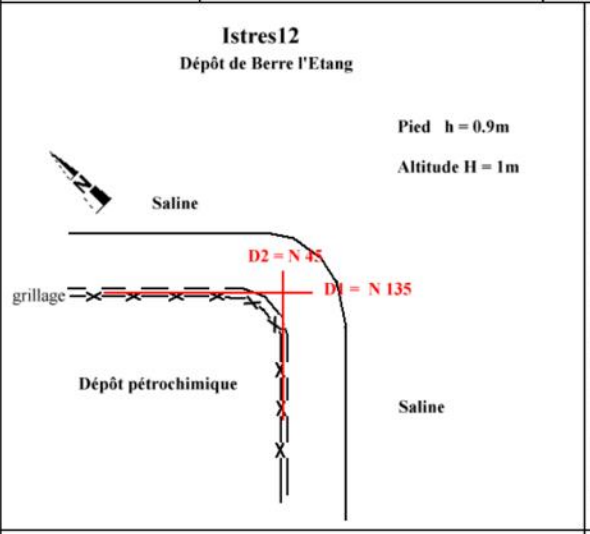
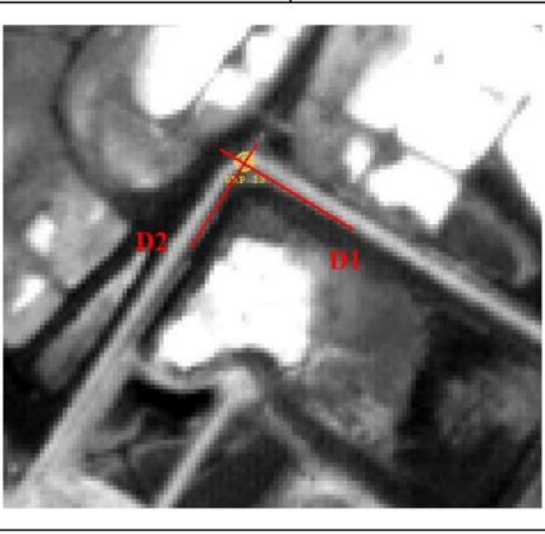




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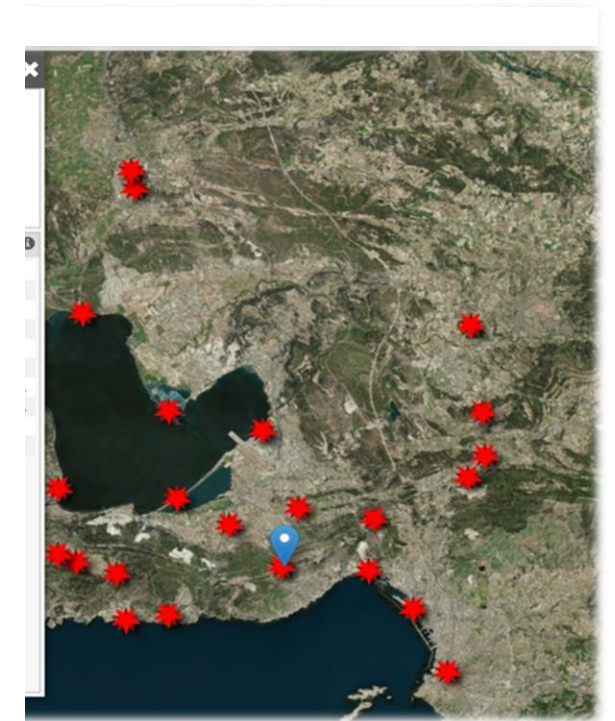
- *S. Saunier, S. K...*
 Approach for GCP

- **3 Sites: Ankara**
- **Check out S. S...**

... of a GCP Database

ISTRES 12			
Id : 12	Latitude: 43.46363° / 0.75858345 radians	Longitude: 5.14762° / 0.08984293 radians	Altitude (ellipsoid) : 65.47262013 m
<p>Istres12 Dépôt de Berre l'Etang</p> 			
A		B	
			
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GIS CLOUD FREE



29/11/2023

Table 1 - GCP 12 Description.



- *Key elements to be further developed during GCPIX*
 - define **criteria** for the **suitability** of GCPs (by resolution, season, wavelength, ...) and respective uncertainties, spatial density and distribution requirements
 - establish **protocols and formats for documenting and sharing** GCPs and respective libraries
 - **harmonization** of existing **sources** from the different CEOS agencies **towards a unified DB**
 - identification of **gaps/weaknesses** in coverage, consistency, quality, availability, ...
 - design and set-up of a **(cloud-based) platform** for sharing and managing the database
 - **improvement, densification**, and allocation of **additional source data (VHR)**
 - potential inclusion of **DEM data/reference chips** from suitable and agreed reference data

- ***The current VH-RODA 2023 forum is paramount***
 - ***to open the discussion on the proposed CEOS GCP Database concept***
 - ***To secure the buy-in of New Space partners, gathering feedback through dedicated panels and open discussion***



THANK YOU!

REFERENCES

- *CEOS New Space Task Team, https://ceos.org/document_management/Publications/Governing_Docs/CEOS_NewSpaceTaskTeam_ToR_29Nov2022.pdf*
- *CEOS New Space White Paper, v1.0, November 2023, in publication.*
- *Rengarajan, R.; Storey, J.C.; Choate, M.J. Harmonizing the Landsat Ground Reference with the Sentinel-2 Global Reference Image Using Space-Based Bundle Adjustment. *Remote Sens.* 2020, 12, 3132. <https://doi.org/10.3390/rs12193132>*
- *S. Saunier, S. Kocaman, C. Albinet, P. Goryl, “Development of a GCP Database Approach for Geometric Cal/Val of VHR Optical Imagery”, VH-RODA 2023, in publication.*
- *A. Lewis, L.-W. Wang, R. Coghlan, AGRI: The Australian Geographic Reference Image, https://cmi.ga.gov.au/sites/default/files/2020-08/agri_report.pdf*