

Cal/Val Park for Optical Sensors: a New Concept

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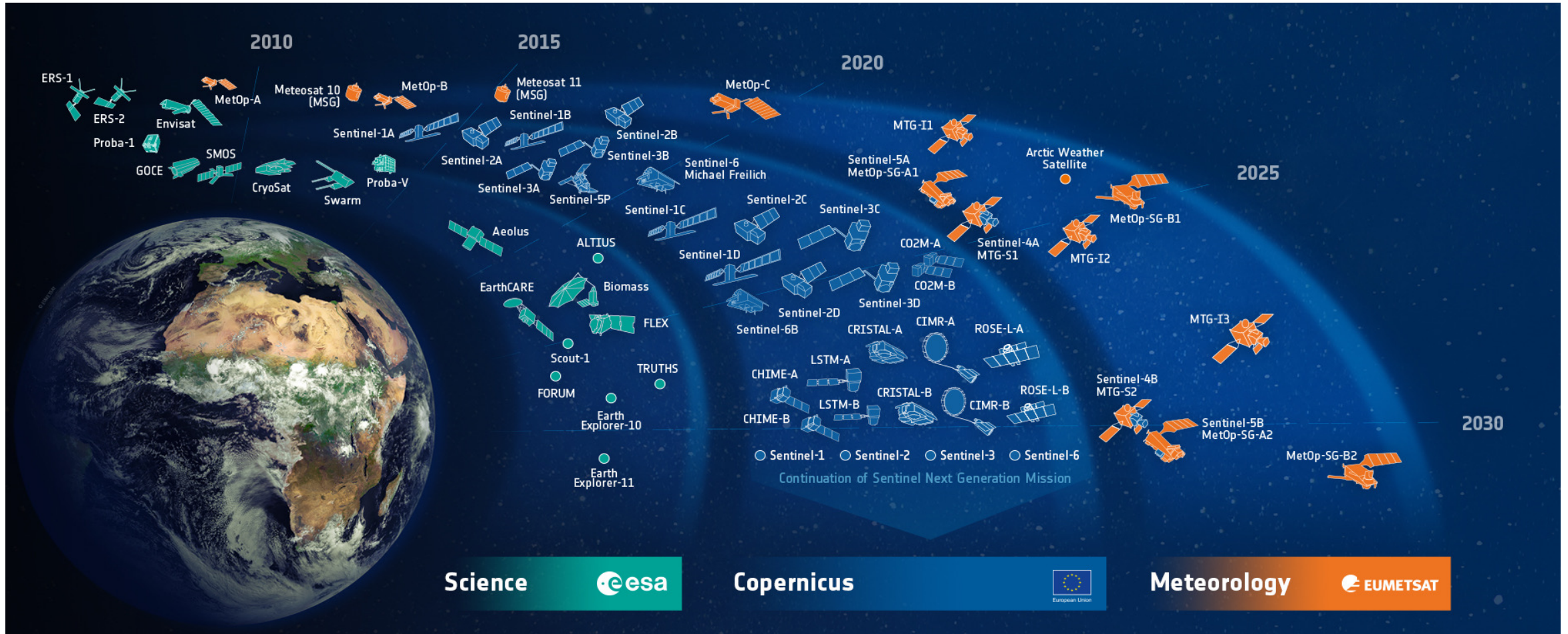
¹ESA – European Space Agency

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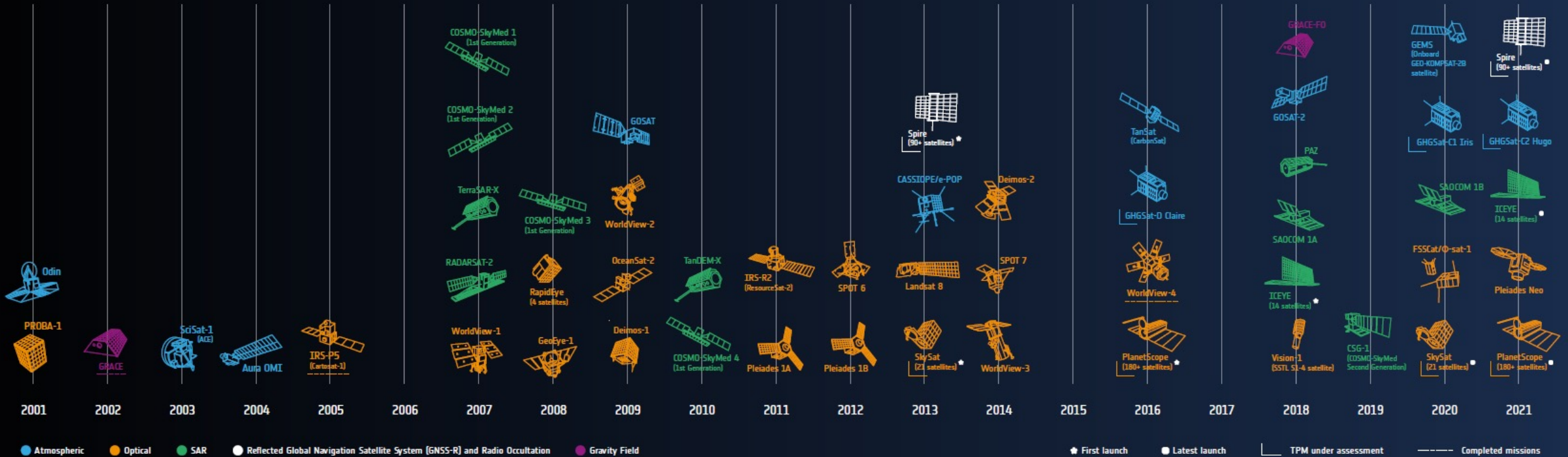
- **ESA-developed EO Satellites:** 12 in heritage, 15 in operation, 41 in development, 22 in preparation (**90 in total**)

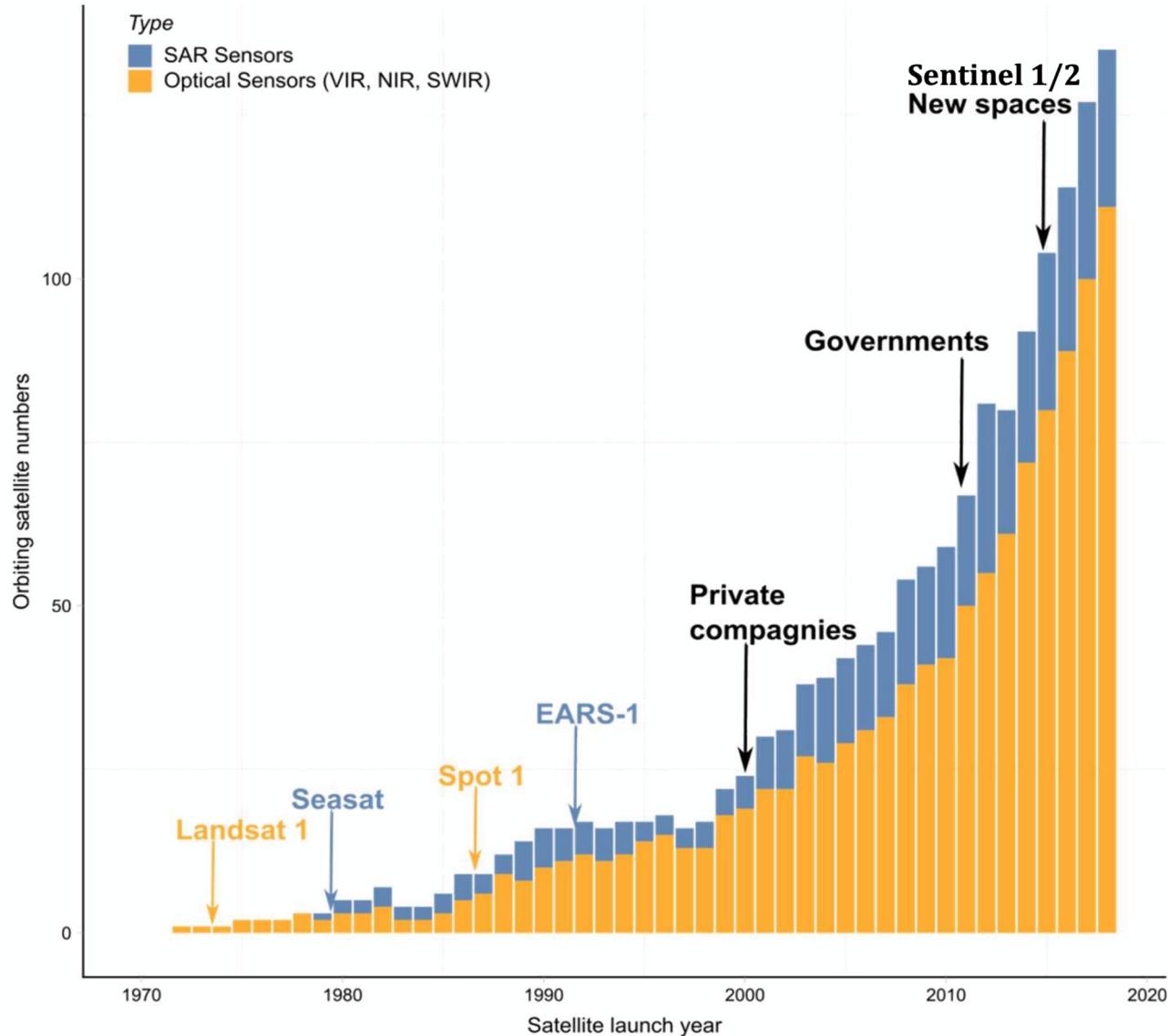


CONTEXT

EO capacity from space, particularly the VHR missions domain, has **dramatically increased** → highly dynamic and competitive **New Space** environment (>50 ESA TPM)

THIRD PARTY MISSIONS TIMELINE



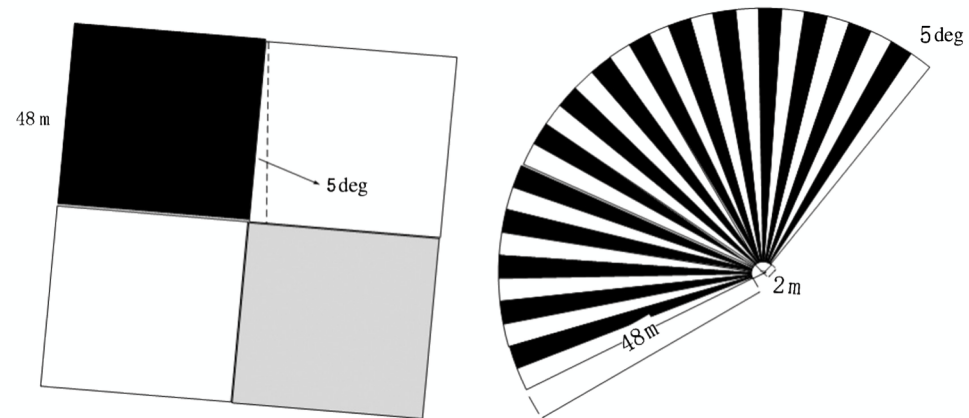
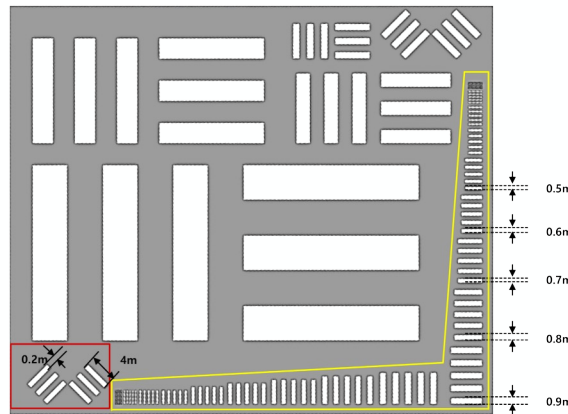


GEOSPATIAL INFORMATION FOR AFRICAN AGRICULTURE: A KEY INVESTMENT FOR AGRICULTURAL LAND POLICIES, Tonneau et al.

“ 2020 WORLD BANK CONFERENCE ON LAND AND POVERTY” The World Bank - Washington DC, March 16-20, 2020

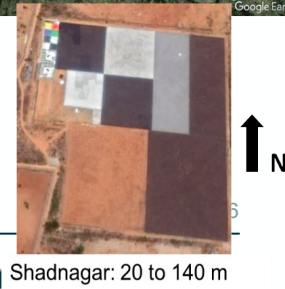
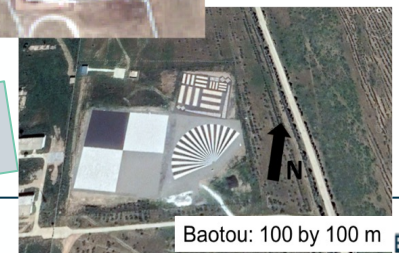
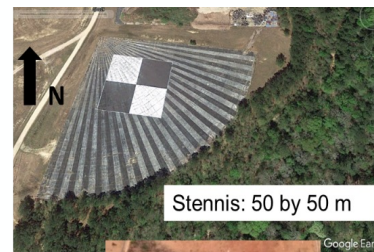
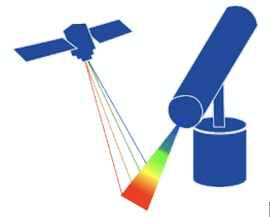
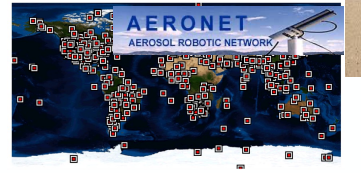
Original Caption: **The cumulative number of near-polar orbiting, high resolution, Earth observing civilian satellites in the optical and microwave domains** (Data source: <https://www.wmo-sat.info/oscar/satellites>). The important steps in the history of space have been highlighted.

- As EO system architect in Europe, ESA needs to **assess the quality and the suitability** of ESA and New Space missions (with a view to potential inclusion as **TPM/CCM**)
- Need for an **innovative and pioneering Cal/Val site**, with a strong focus on VHR missions



CURRENT SITUATION

- **RadCalNet:** free and open access service providing SI-traceable Top-of-Atmosphere (TOA) spectrally-resolved reflectances over a network of sites, with associated uncertainties
- **AeroNet:** provides long-term, continuous and readily accessible public domain database of aerosol optical, microphysical and radiative properties
- **Hypernet(s):** (work-in-progress): a new lower cost hyperspectral radiometer and associated pointing system and embedded calibration device for automated measurement of water and land bidirectional reflectance
- **Several cal/val sites** set-up by national space agencies or institutions to fulfil their specific needs



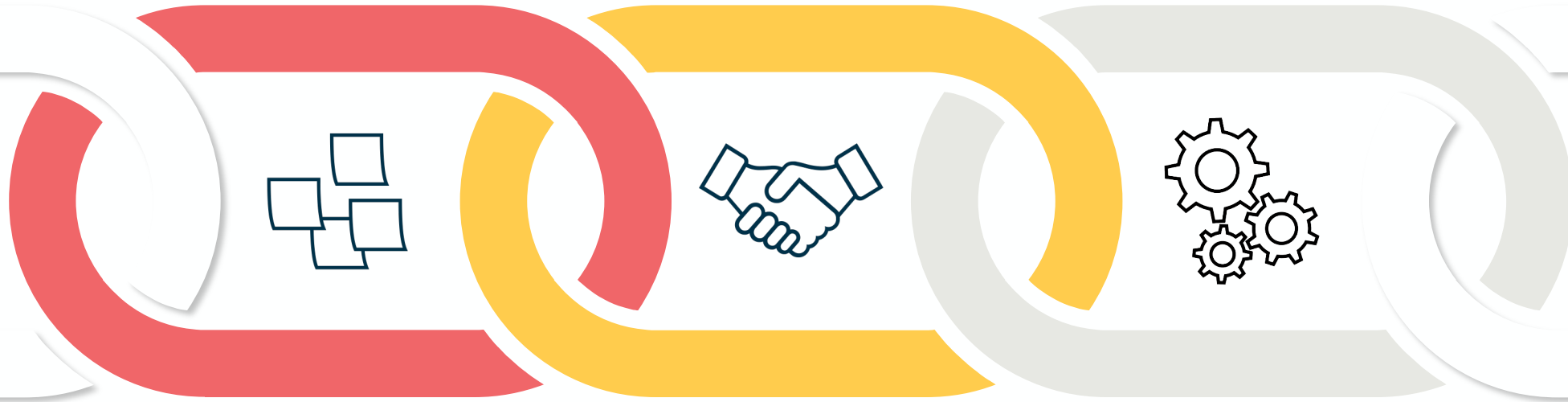
Each site and network is dedicated to a specific task with little flexibility



A NEW CONCEPT: CAL/VAL PARK

- ✓ Open to both **multi-spectral and hyperspectral VHR and HR** missions (SAR not precluded...)
- ✓ For both TOA radiance, reflectance and BOA reflectance. **FRM-compliant** instrumentation/measurements
- ✓ Open to be used by both the “institutional space” and the “commercial/new space” at **international level**
- ✓ Common “playground” to **test and run new cal/val** methodologies, instruments, and initiatives
- ✓ Open to include **both temporary and long-term instrumentation** and initiatives
- ✓ **Scalable** (as far as possible) to accommodate **new needs** and new types of EO missions that may come in the **next years**
- ✓ Building on already **existing cal/val technologies AND new technologies** and methods
- ✓ **Multi-Agency ESA-ASI** joint effort with a **Synergetic approach** not to duplicate efforts (and budgets)

THREE-STAGE PROCESS



Phase 1

**Cal/Val Park
Definition
Study**

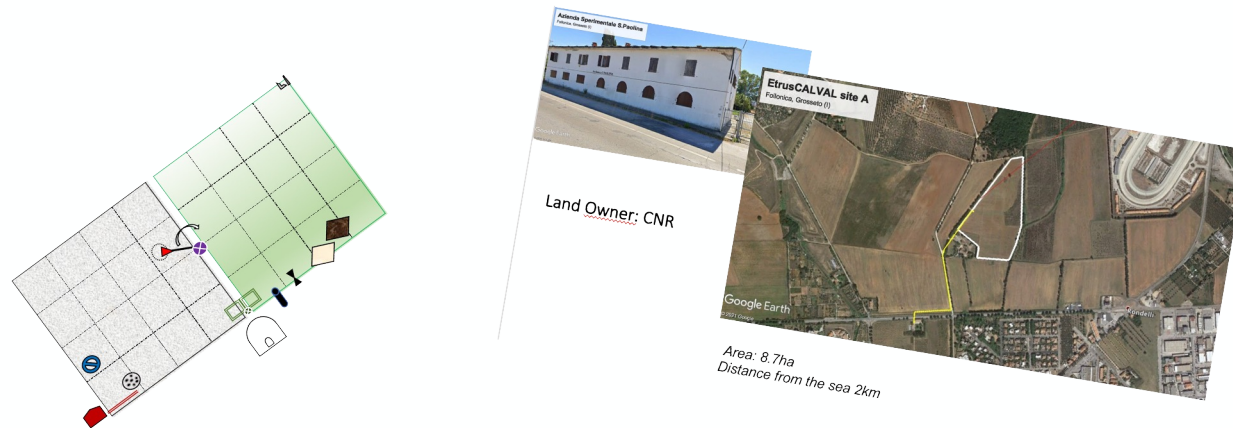
Phase 2

**Set-up
activities**

Phase 3

**Operational
activities**

- Definition of requirements, parameters and design will also be based on the **interests and needs** of VHR satellites providers
- **We are gathering recommendations!**
 - What are your **needs**?
 - What should we **include to make the Cal/Val Park really useful** for HR and VHR missions? (e.g., in terms of Cal/Val Targets, Materials, Instruments and Tools)

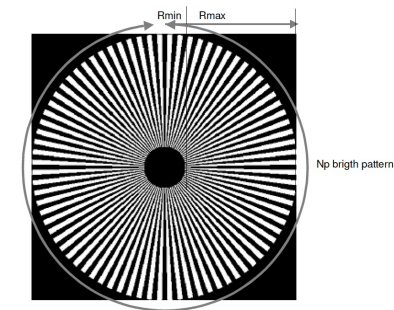
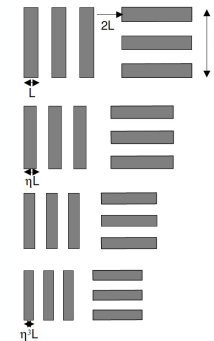


- **MTF computation**

- Edge targets?
- Adjustable orientation?
- Size?
- Others?



Shadnagar: 20 to 140 m



- Absolute and multi-temporal geolocation assessment with **common well-geolocated Ground Control Points (GCPs)**

- **Equipment for radiometric performance assessment**

- Aeronet site?
- RadCalNet site?
- Hypernetts site?



- Mainly for both **multi-spectral and hyperspectral VHR and HR** missions

- Spectrometer
- What else?

- Collaboration with ASI
- Set-up and operational activities
- Maintenance and Campaign Measurements
- Staff and property rental/sale management



- **Interest from other Space Agencies and Institutions at international level?**



Please let us know if
you have
comments/questions.
Feel free to drop us an
email or provide
comments (QR CODE)

Thank you!



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