

Main performances, data policy & licensing, mission management aspects

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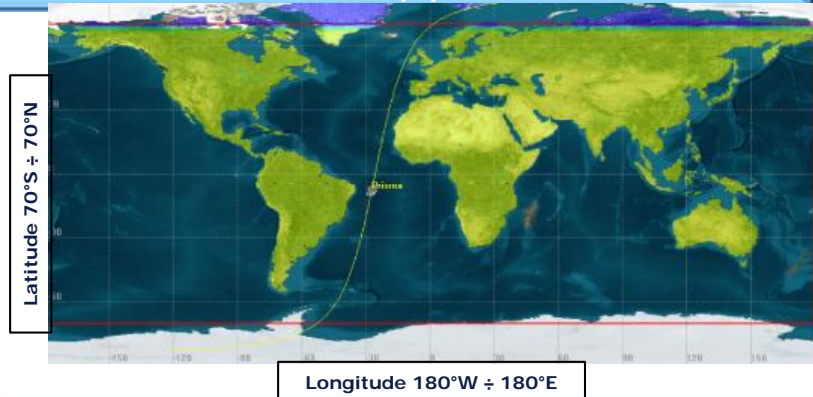


Mission Overview



PRISMA: PRecursoro IperSpettrale della Missione Applicativa

- ❖ National EO hyperspectral Mission fully funded by ASI and realized by Italian Industries Consortium led by OHB Italia, Leonardo and Telespazio
- ❖ Mission conceived as a Pre-operational and technology demonstrator, with focus on
 - Space qualification of PAN/HYP payload
 - Development of PAN/HYP products up to Level 2D
- ❖ Launch on March 2019, access to Users opened on May 2020 <https://prisma.asi.it/>



- ❖ PRISMA Records (pushbroom scanning mode) the radiation reflected from the Earth surface (spectral cubes) in 400nm – 2505nm spectral window
 - 240 total bands in VNIR (#66,) & SWIR (#174, 920–2505 nm), partial spectral overlap
 - High spectral Resolution (better of 14 nm)
 - Medium spatial resolution (30m) and swath (30km)
 - PAN camera (400–700 nm) offers added capability with 5m spatial resolution

- ❑ **Primary mode – Manage user requests**
 - CALVAL sites (high priority)
 - Nominal requests from all registered users, subject to quota and a priority level (depends by the user type)
 - Mission Manager can promote Nominal Requests already accepted to Very Urgent, for insertion in next day plan
- ❑ **Background mission** to fill-up resources still available after planning the users requests

Products and performances



- All Product are in **HD5-EOS** format and include HYP data cube + PAN image + masks + metadata
- ❖ **Level 1: Top-of-Atmosphere Radiance** radiometrically corrected and calibrated in physical units (incl. Cloud mask; Sun-glint Mask; Classification Mask; Calibration and characterization data)
 - ❖ **Level 2B: Geolocated at Bottom-of-Atmosphere Radiance**
 - ❖ **Level 2C: Geolocated at Bottom-of-Atmosphere Reflectance** (incl. Aerosol Characterization Product (VNIR); Water Vapour Map Product (HYP); Cloud Characterization)
 - ❖ **Level 2D: Geocoded version of the level 2C** products

Absolute HYP **radiometric accuracy** better than **5%** (TOA or BOA)

SNR 160:1 in VNIR and **100:1** in SWIR (240:1 in PAN)

MTF (@Nyquist) 0.3 for HYP and 0.2 for PAN

Geometric localization errors (CE90) better than **200m** (15m with GCPs)

Revisit time is **29 days** at same look angle (orbital cycle) but **<7days** with variable looking

Average response time (from user order to product ready) is **7.5 days** (measured)

Images can be acquired **worldwide** with illumination conditions **Solar Zenith Angle < 70 deg**

System can acquire 223 spot (30x30 Km) images/day (200.000 Km²) and **process 200 images/day up to L2D**

PRISMA Data Policy & Exploitation



- ❖ A simple policy has been approved by ASI: Free of charge & quasi-Open data to all for the 2020 year duration (renewable)
- ❖ This will allow
 - ❑ to lower the PRISMA data access barriers (to new acquisitions and archived data too)
 - ❑ to expand the PRISMA user community
 - ❑ to simplify the data exploitation
 - ❑ to build customer loyalty to PRISMA data
 - ❑ to gather a feedback from users, unbiased by external factors like user nationality, data price, etc

- ❖ A «quasi-Open» policy
 - ❑ Full support to National security needs
 - ❑ User Registration and Licence explicit acceptance **is required**
 - ❑ Each User will be allowed to use only a portion of the system resources, through **Priority and Quota** mechanisms
 - ❑ Products use is allowed for scientific research, R&D of new applications, prototype services **but NOT for commercial purposes (will change by 2021)**
 - ❑ Products are **costless** for the users but **cannot be redistributed**

- ❖ Exploitation with Science and User Community deep involvement
 - ❑ PRISMA Advisory Group for data Exploitation supporting the definition/updating of the mission exploitation scenario
 - ❑ International Collaborations: CNES, DLR, ESA, NASA-JPL mainly on CALVAL domain
 - ❑ Training & Outreach (Workshops, Education events,...)
- ❖ System improvement project foreseen in 2022

International Collaborations

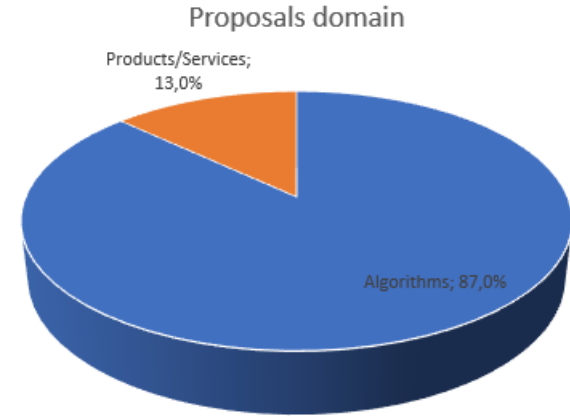
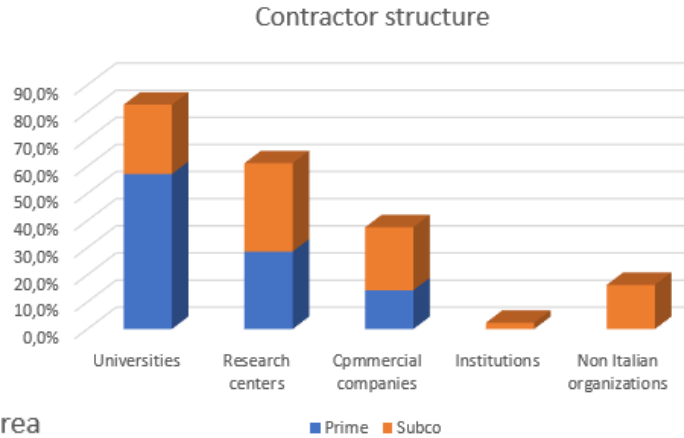
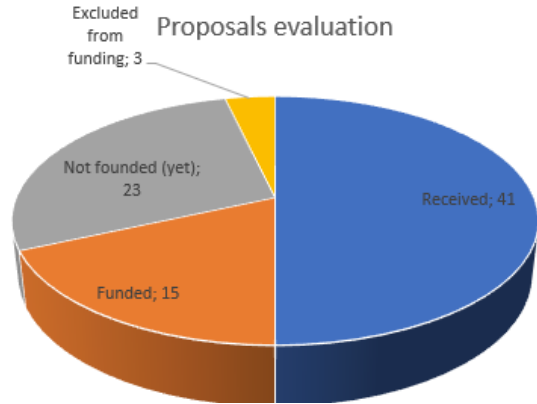


ASI is fully open to define agreements with international bodies, in order to develop joint research projects, use the PRISMA system capacity, collaborate on CALVAL of the PRISMA sensor + products and in general exploit potential synergies between respective EO assets

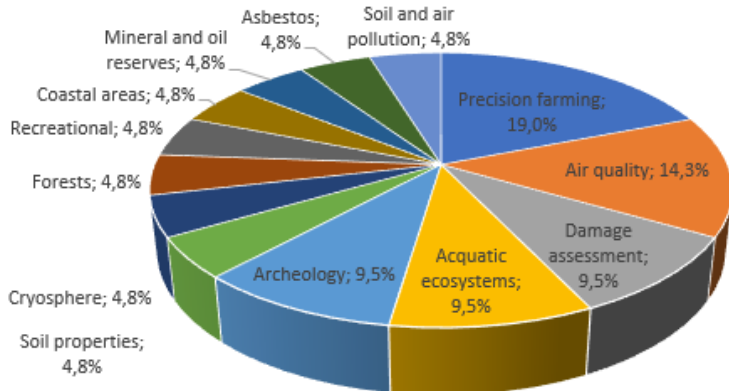
We have agreements with:

- CNES (signed)
 - ✓ Exchange of technical and scientific data over calibration sites managed by CNES and over CEOS-PICS (Pseudo Invariant Calibration Sites)
 - ✓ Support to CALVAL activities
- DLR (close to signature)
 - ✓ Support to CAL/VAL by sharing test sites data, strategies, methodologies, results
 - ✓ Visibility about activities and results (thematic EO applications, L3/L4 product developments, etc)
 - ✓ Mission exploitation platforms/Toolboxes
 - ✓ Coordination of data acquisitions in support of joint scientific objectives
- ESA: Support to CHIME (2020 and 2021 PRISMA4CHIME project), study of a HYP+HR/VHR CALVAL site, participation to joint scientific events
- Contacts for cooperation agreements with NASA/JPL, NOAA, ASA, NZSA,

PRISMA SCIENZA



Products/Services study area



PRISMA scientific program, co-funded by ASI

- Budget ~3 M€ with max co-fund 200k€/proposal
- 41 proposal received, 15 will be (co-) funded, 23 are eligible
- Largest participation came from universities with algorithmic studies
- 5 themes accounts for 60% of study areas

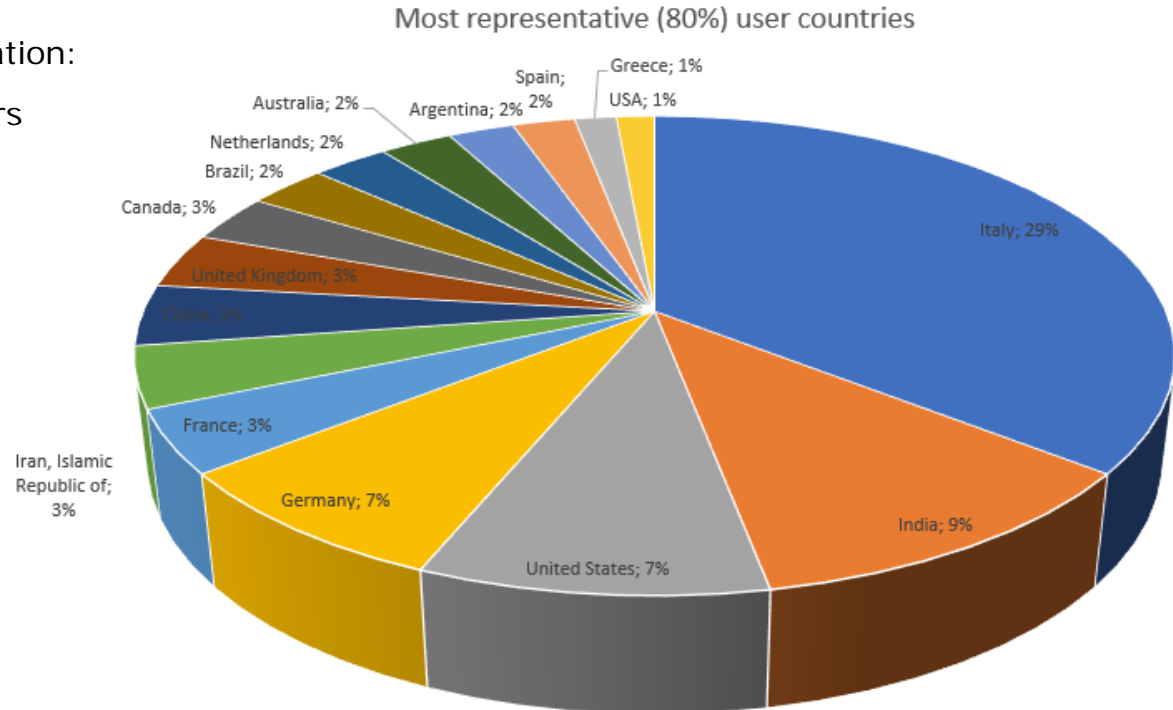
Mission Statistics – User amount & nationality



965 Licenses to Use activated @ 31.08.2021

Limiting to the (statistically) most representative part of the user population:

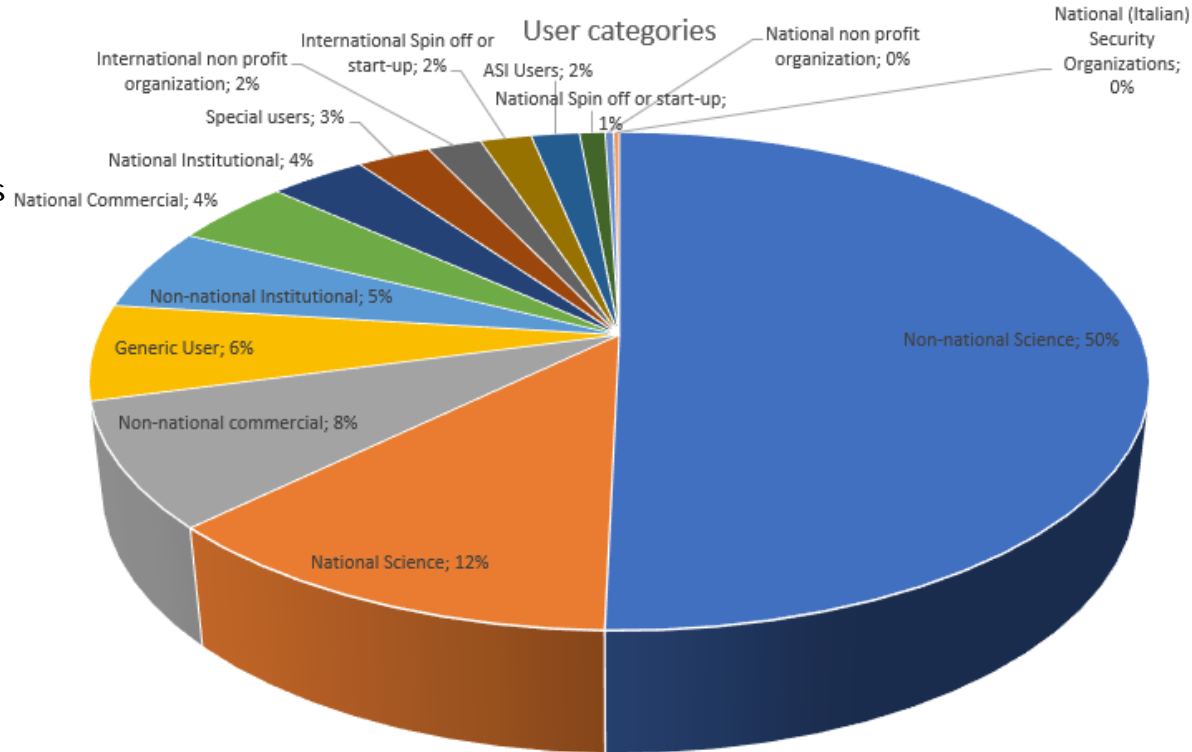
- 16 nations covers **80%** of the users
- the Italian users are only **1/3**
- India, USA and Germany together account the **1/4** of the users



Mission Statistics – User category



- **62%** of the total users are scientists (**50%** of the users belongs to non-Italian Science and are the largest category)
- Institutional (**9%**) and commercial (**12%**) represents **21%** of total users
- Foreign commercial (**8%**) are two times the Italian commercial (**4%**)
- **6%** of user are still freelance!

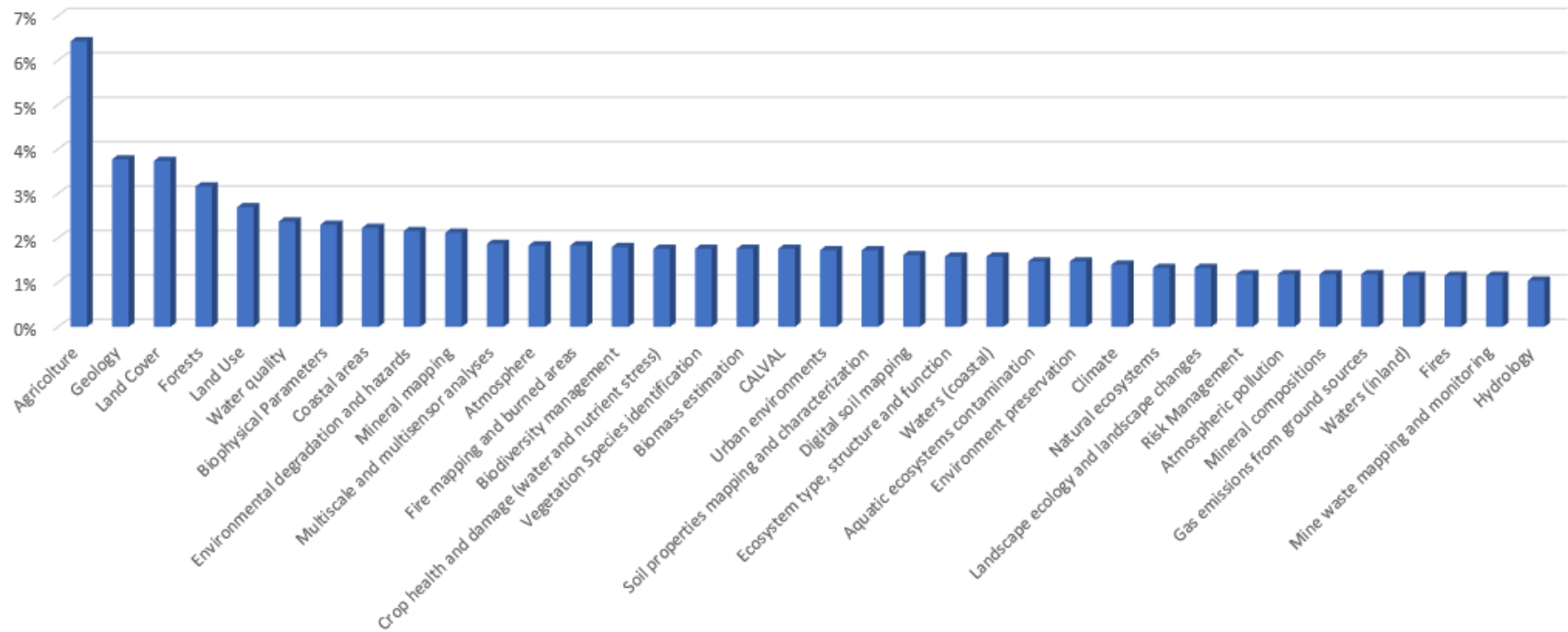


Mission Statistics – Use of data



26 thematic areas cover **70%** of all applicative usages

Most frequent (70%) Usages of Data



Mission Statistics



Data from NASA / US / NOAA / JICA / SEBCO
Image Landsat / Copernicus
Image IBCAO

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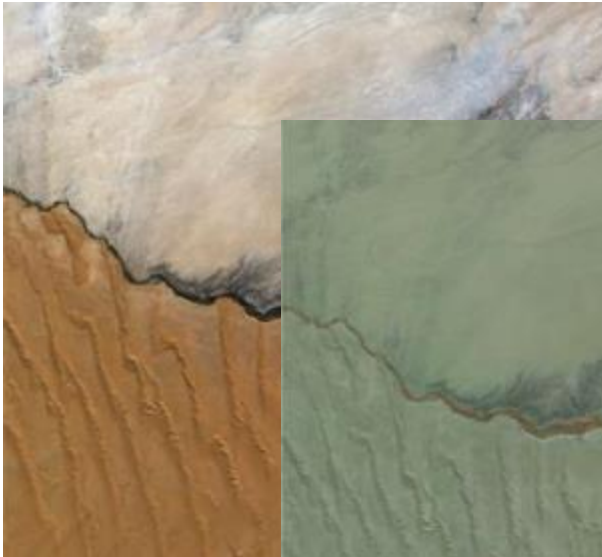
Data from NASA / US / NOAA / JICA / SEBCO
Image Landsat / Copernicus
Image IBCAO

110k images (including those from the background mission) all over the world @31.08.2021; a new approach to background planning is going to be used to improve global land coverage

Some Images



SWIR



VNIR



PAN



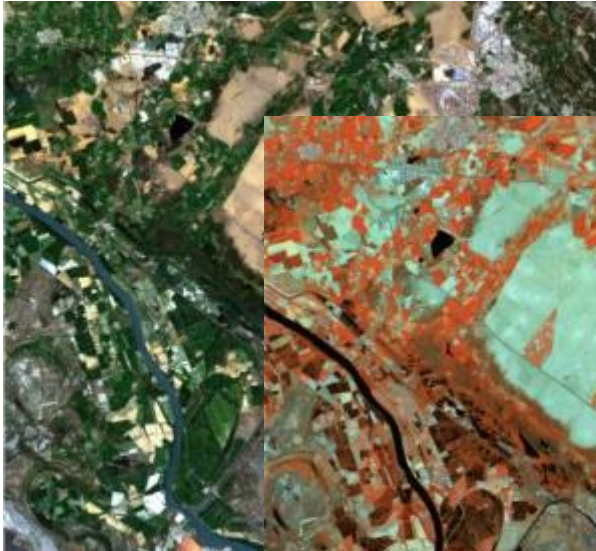
PRISMA main CalVal – Gobabeb (Namibia)

Data/Information generated by Leonardo S.p.A. under an ASI License to Use; Original PRISMA Product - © ASI - (2020-2021)

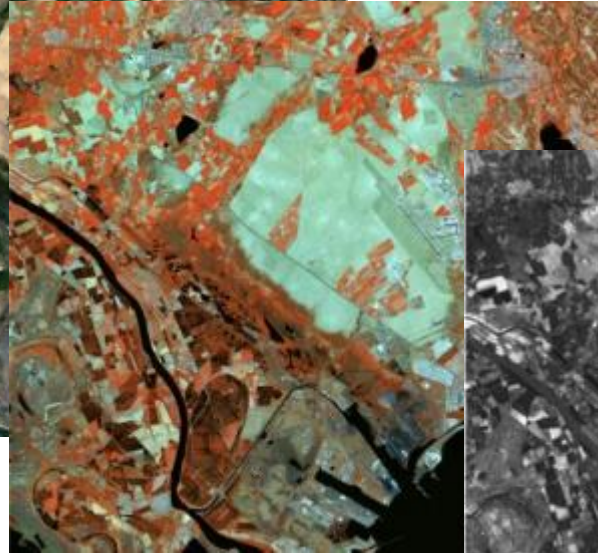
Some Images



SWIR



VNIR



PAN



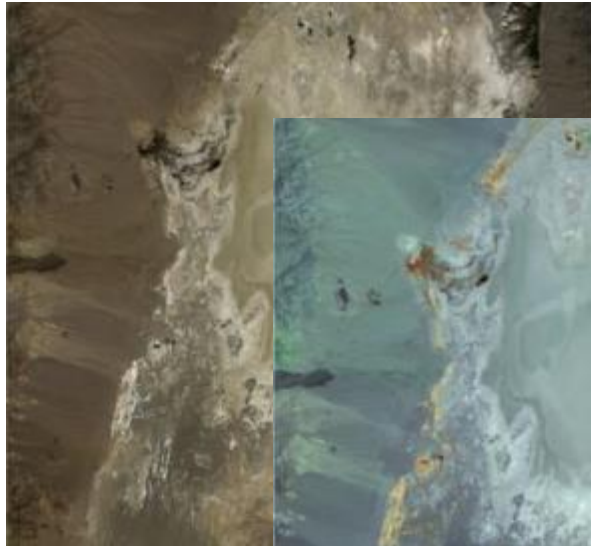
PRISMA CalVal – LaCrau (France)

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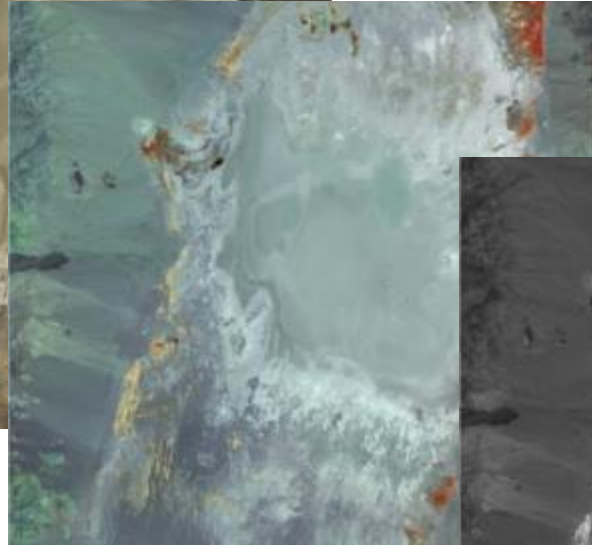
Some Images



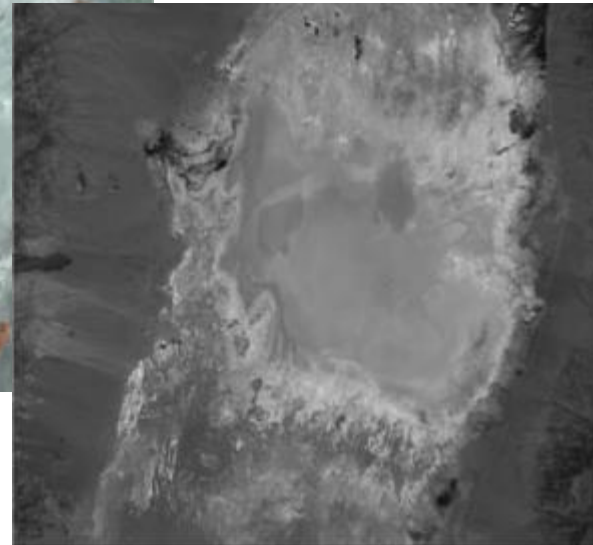
SWIR



VNIR



PAN



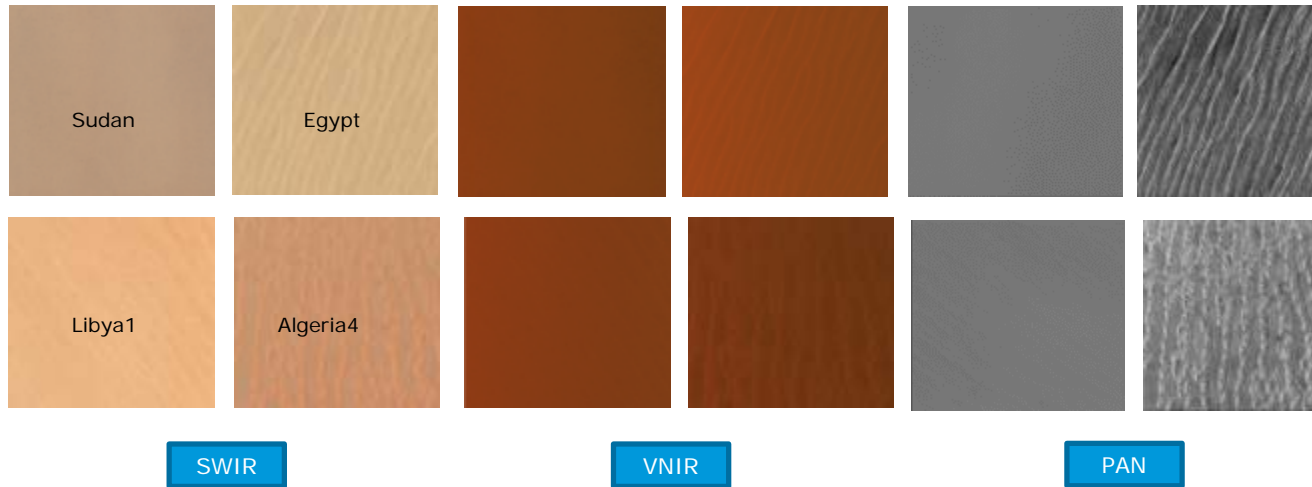
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PRISMA CalVal – Railroad Valley (Arizona)

Some Images



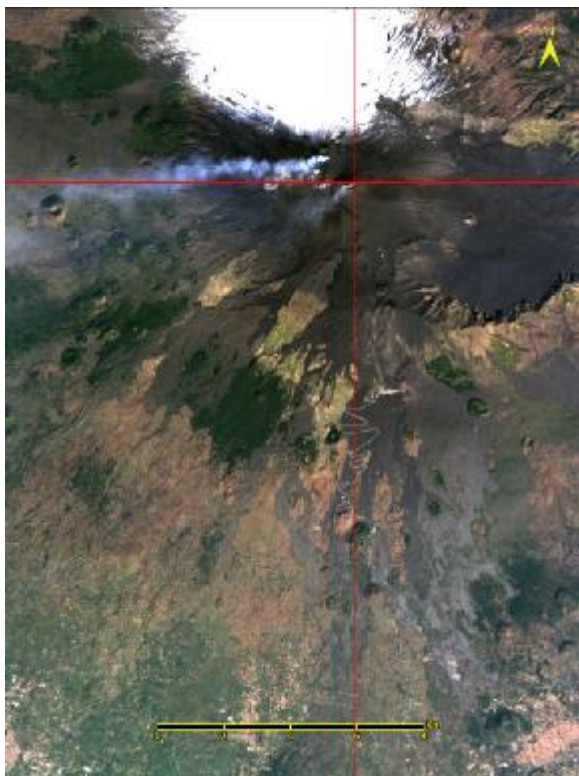
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PRISMA CaVal – 4 PICs taken from the more stable 8: Algeria3, Algeria4, Egypt, Libya1, Libya2, Libya3, Libya4, Sudan

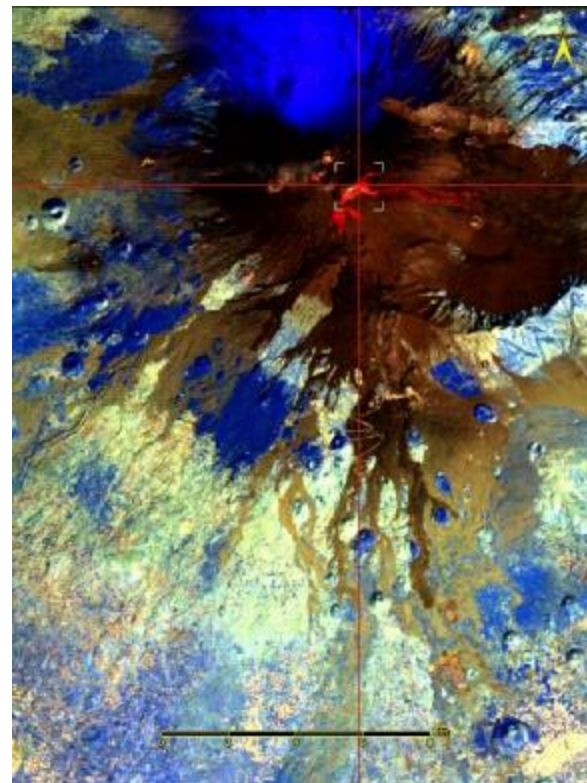
Some Images

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ETNA volcano, Sicily (Italy)

VNIR



SWIR



Agenzia Spaziale Italiana

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