Flagship 2.6.3: AI algorithm for (satellite) imaging reconstruction

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Milestones and KPI of flagship 2.6.3

MS10 (to be completed by August 2025)

- TAR6.10 [MS report for UC2.6.3: Implementation of the selected technology(ies); test and validation on selected dataset(s). Proof-of-Concept deployment]. **KPI**: [Final report provided; release of the developed code on public repository];

KPIs

KPI ID	Description	Acceptance threshold	Status
KPI2.6.1.1	Publications	2	3+2+1*
KPI2.6.1.2	Presentations at conferences	2	3
KPI2.6.1.3	Publicly available Code repositories	1	0**
KPI2.6.1.4	Use case Test Datasets	1	6

3 published, 2 accepted, one under review.

+1 abstracts submitted +1 abstract accepted

1 private now and to made public before the end of the project

+1

KPI 2.6.1.1: Publications

➢ **Already published: 2**

- D. Marletta, A. Midolo, E. Tramontana, Detecting Photovoltaic Panels in Aerial Images by Means of Characterising Colours, Technologies 2023, 11(6), 174 (**PAPER**)
- N. Lopane et. al., Geoelectric Joint Inversion for 3D Imaging of Vineyard Ground, Agronomy, 14 (11) (**PAPER**)

- D. Marletta, A. Midolo, E. Tramontana, Automatic Land Use and Land Cover Classification by Means of Characterising Colours, Proceedings of IEEE WETICE, June 26-28, 2024, Reggio Emilia, Italy (**PROCEEDINGS**)

➢ **Accepted: 2**

- G. A. Anastasi et. al., The Spoke 2 of the ICSC National Centre, with a focus on deep learning applications in astroparticle physics and satellite imagery, Proceedings of 13th CRIS-MAC 2024, June 17-21, 2024, Trapani, Italy (**PROCEEDINGS**)
- G. Piparo et. al., AI algorithms for satellite and airborne imaging reconstruction, Nuovo Cimento C (**PROCEEDINGS**)

➢ **Under review: 1**

- Virginia group's paper on last year acquisition campaign and analysis (**PAPER**)

KPI 2.6.1.2: Presentations at conferences

➢ **Already performed: 3**

- G. A. Anastasi et. al., The Spoke 2 of the ICSC National Centre, with a focus on deep learning applications in astroparticle physics and satellite imagery, 13th CRIS-MAC 2024, June 17-21, 2024, Trapani, Italy (**TALK**)
- D. Marletta, A. Midolo, E. Tramontana, Automatic Land Use and Land Cover Classification by Means of Characterising Colours, IEEE WETICE, June 26-28, 2024, Reggio Emilia, Italy (**TALK**)
- G. Piparo et. al., AI algorithms for satellite and airborne imaging reconstruction,110th SIF congress, September 9-13, 2024, Bologna, Italy (**INVITED TALK**)

➢ **Accepted: 1**

- European Geosciences Union (EGU) General Assembly 2025, 27 April to 2 May 2025, Vienna, Austria. Abstract submitted by G. A. Anastasi.

➢ **Submitted: 1**

- ESA Living Planet symposium 2025, 23-27 June 2025, Vienna, Austria. Abstract submitted by G. Piparo.

KPI 2.6.1.4: Use case Test Datasets

➢ **Deterministic Learning Algorithm for Object Identification: 2**
- High-resolution satellite/aerial imagery for photovoltaic panel identification (**PUBLIC**)
- High-resolution satellite/aerial imagery for land use segmentation (**should be PUBLIC?**)

➢ **High-Resolution Image Processing Based on Spectral Indexes for Disease Detection in Vineyards: 2**
- First acquisition campaign: 17 ha vineyard of Sangiovese grapes in Emilia-Romagna (Italy), August 8, 2023 (**PRIVATE**)
- Second acquisition campaign: 2000 ha of vineyards in the provinces of Ravenna, Forlì-Cesena, Rimini and Bologna (Italy), July 8-19, 2024 (**PRIVATE**)

➢ **Deep Learning for Satellite Imagery Analysis: 2+1**
- Sentinel multi-modal data based on Copernicus Emergency Management Service (CEMS) post-wildfire segmentation labels (**PUBLIC**)
- Sentinel multi-modal data based on Ferrara group segmentation/identification of Flavescence doree labels (**PRIVATE**)
- Sentinel multi-modal data based on SEMAFORO activities (For the moment, based on GS estimated evapotranspiration value labels) (**PRIVATE**)

Extra activities

Within Flagship 2.6.3, several outreach activities were carried out:

➤ Presentation of the Flagship activities during the **public session of the annual Spoke 2 meeting** in December 2024, both in person and live on YouTube.

➤ **Partecipation in the webinar dedicated to Space Economy**, organized by the ICSC Supercomputing Trends Observatory and publications on the dedicated report

➤ **Filling out the questionnaire** "COMMUNICATION – Enhancing the impact of NRPP-funded project results"

Thanks for the attention

Giuseppe Piparo[1], Gioacchino Alex Anastasi[2], Gabriele Galli[3,4], Nicola Lopane[3,4,5], Daniele Marletta[6], Alessandro Midolo[6], Giuseppe Pappalardo[6], Virginia Strati[3,4], Emiliano Tramontana[6], Alessia Tricomi[1,2,7], Salvatore Calcagno[6]

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