

# COUNTRY HOT TOPICS

## GOFC-GOLD Network: SCERIN / MedRIN

Country: ITALY

Team : R. Lasaponara\*, L. Telesca, N. Abate, N. Afflitto, A. Aromando  
N. Masini, A. Minervini, M. Danese, M. Sileo, A. Loperte, M. Proto  
G. Dibello, G. Loperte,

Joint Workshop of the GOFC-GOLD SCERIN and MedRIN Networks

CIHEAM conference center, Chania, Greece, July 16 – July 19, 2024

Land Cover Change (LCC) and Extreme Events in the Context of Climate Change

Mediterranean Agronomic Institute of Chania  
Region of Crete

Eratosthenes Center of Excellence, Cyprus University of Technology

Aristotle University of Thessaloniki

NASA LCLUC Program

GOFC-GOLD and START, USA



## 2007 Basilicata FIRESAT

### Daily estimates of fire danger using multitemporal satellite MODIS data: the experience of FIRE-SAT in the Basilicata Region (Italy)

#### Remote Sensing priorities or 'hot topics'

- Topic 1 : Operational Fire Monitoring

Fire danger and risk: Modelling

Fire monitoring : open tools

Fire emission

Fire severity estimation and mapping of fire impact

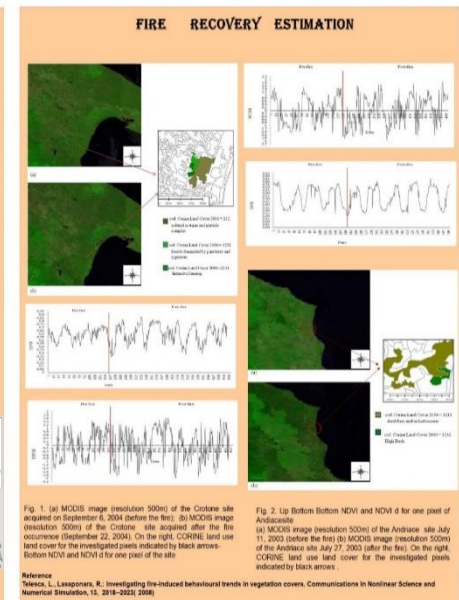
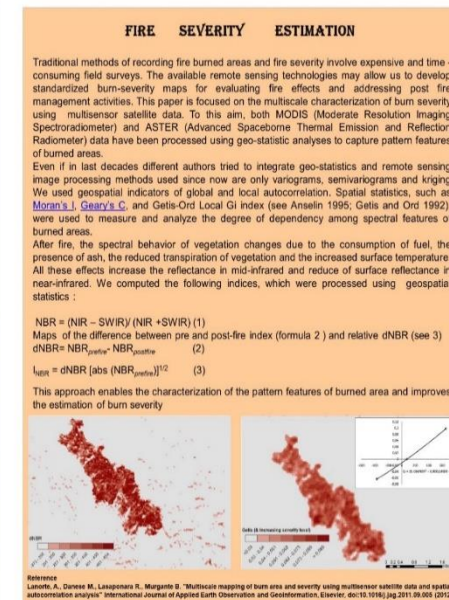
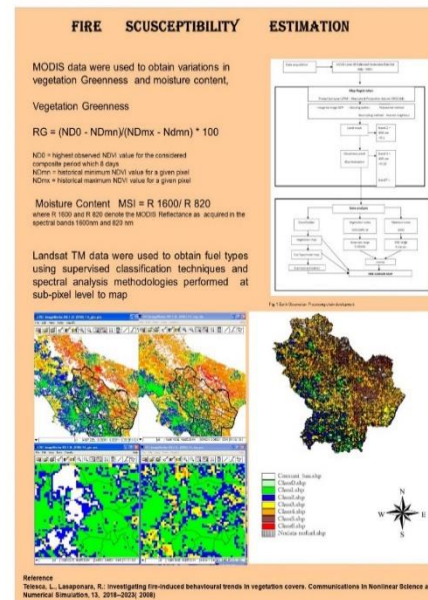
- Topic 2: Smart forest monitoring issues and challenges

Satellite time series analyses : methods and Approaches

Geophysical parameters for land and soil Degradation

EO based SDGs for land

Focus In the recent years the Basilicata Region (Southern Italy) has been characterized by an increasing incidence of fire disturbance which also tends to affect protected (Regional and national parks) and natural vegetated areas. FIRE\_SAT project has been funded by the Civil Protection of the Basilicata Region in order to set up a low cost methodology for fire danger/risk monitoring and fire effect estimation based on satellite Earth Observation techniques. To this aim, NASA Moderate Resolution Imaging Spectroradiometer (MODIS), ASTER, Landsat TM data were used. The spectral capability and free of charge availability makes these data sets very suitable for daily monitoring of large areas.



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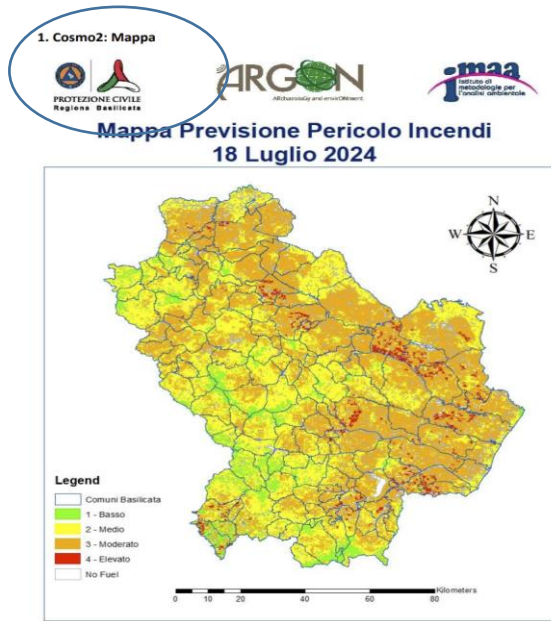
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**Achieved Results/Geographical dimension/ Development of new standards/protocols, etc.**



In this paper, we present outputs from research activities we conducted in the framework of the FIREMAP project (financed by the Office of Civil Protection of the Department of Infrastructure of the Basilicata Region) in the context of burn severity mapping addressed to the estimation of post-fire damage mainly for the (i) assessment of the impact of fire on soil and hydrological risk and (ii) to support the definition of mitigation strategies.

All local scale, managers need to be aware of the impacts that fire can have on soil systems, and how these impacts can lead to undesired changes in soil productivity, sustainability, hydrological alteration, and watershed biological responses. For this reason, the availability of reliable and timely information on fire affected areas and from sensory (and eventual) changes is crucial to optimize post-fire damage and optimize strategies related to post-fire management.

The methodological approach (described) for the Basilicata Region is based on (i) the estimation of the severity using MODIS, TIR and Sentinel 2 data, (ii) in situ analysis and (iii) the statistical investigations on the co-occurrence between fire and landslide events. As an example, the following maps (2012) and before the maps for 2011 and 2012.

In this investigation, and acquisition of samples for the laboratory analysis in the case of Plotting Plan 2012.

Change burnt areas where we investigated landslides occurred after the fire.

Co-occurrence of fires and landslides (orange dots in the figure) for 2011

Co-occurrence of fires and landslides (red dots in the figure) as assessed for the 2011 events

## Firesat 2024 / Success stories / Good practices

In this paper, we present and discuss the tools we devised for the **protezione civile** of the Basilicata region for the estimation of (i) fire susceptibility (ii) fire expansion, (iii) mapping of burnt areas and burn severity, landslides susceptibility after fire.

The central assumption underlying the testing of new approaches adopted is (i) the definition of an integrated methodology for the characterization of fire hazard capable of combining different techniques and (ii) the activation of profitable synergies between the various actors involved in the management and active firefighting processes. The integration of diverse fire hazard factors (among them the assessment of the presence, typology and status of fuels and their fire susceptibility) does provide very significant indications encompassing all the planning phase of forest fire monitoring, forecasting, prevention, active fight, damage assessment and post-fire damage and recovery.

The fire risk methodology is based on the integration of satellite data with meteorological data and forecasts. The main novelty compared with the methodology already developed (and operationally used by the Protezione civile of the Basilicata Region) is the updated of the risk estimation based on the MODIS proxy indicators with the meteorological forecasting provided by the COSMO 5 and COSMO 2 model (respectively at 5 km and 2 km as obtained from ECMWF forecasting).

The automatic processing of meteorological data and forecasting has twofold applications (i) the assessment of fire risk and (ii) the estimation of the expansion of fire perimeter using FIRESITE software.

**SIMULAZIONE DELL'EVENTO POST-INCENDIO CON IL SOFTWARE FIRESITE (FIRE AREA SIMULATOR)**

2016-08-07 Marina di Maratea

2015-08-18 - Latronico (PZ)

Automatic mapping of Burnt areas and Fire severity Piancardillo fires

- Synergies and trade-offs across fields :**Multidisciplinary approach**
- stakeholder involvement: **Protezione Civile and carabinieri Forestal**
- Link to International policies : **EU**

**Numerous NETWORKING OPPORTUNITIES** within a GOFC-GOLD RIN and between MedRIN and SCERIN)

Burned areas, treated as geographic data, are characterized by inherent complexity. There are many indexes that could be derived from satellite data to find their delimitation and the areas with different fire severity inside of them. However this multidimensionality and heterogeneity is difficult to manage in classic Geographic Information Systems, so in the last years many works and methods were proposed in other application fields for visualization, dimensionality reduction and classification of this type of data. In the following figures burnt severity estimation is made using Sentinel 1 and sentinel 2 data by CNR-IMAA.

Referenza: Lasaponara, B. Tucci, L. Ghermandi On Use of Satellite Sentinel 2 Data for Automate Mapping of Burnt Areas and Burn Severity. 2018. Sustainability 10(11), 3889

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GOFC-GOLD  
Global Observations of Forest  
Cover and Land-Use Dynamics

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Region of Crete

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Cyprus University of Technology

CzechGlobe

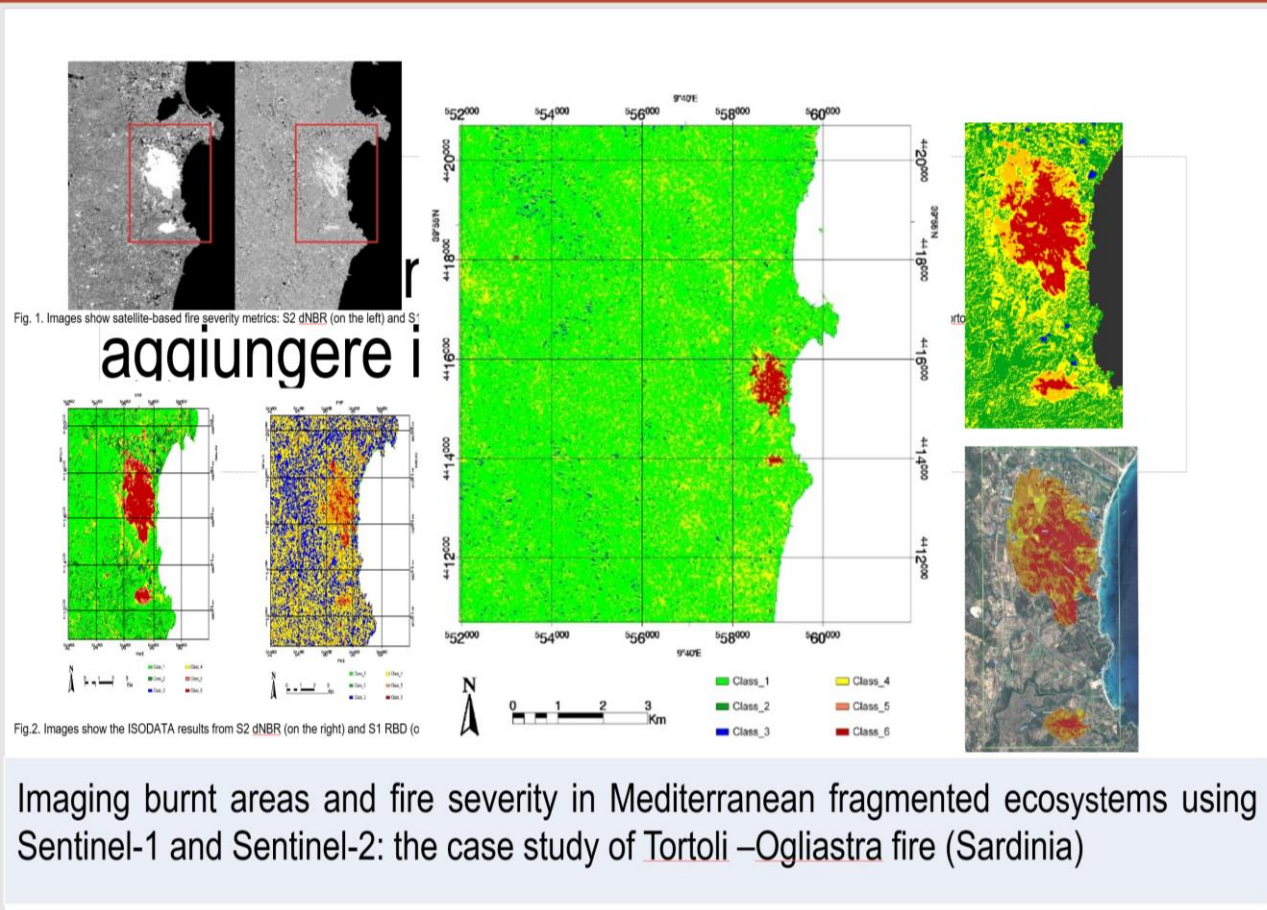
GIS  
Crete

FACULTY OF SCIENCE  
Aristotle University of Thessaloniki

## Projects/ Success stories / Good practices

**Achieved: Integration of S1 and S2 for fire severity estimation (use cases in Sicily, Sardinia..)**

## Future plans



- *Re-inforce Contribution to IRIDE*
  - *Contribution to space economy*
  - *Development of new standards/protocols,*
  - *Improve the estimation of fire impact*
- *Further consolidation of*
  - *Synergies and trade-offs across fields*
  - *stakeholder involvement;*
  - *Link to International policies*
- *NETWORKING OPPORTUNITIES (within a GOFC-GOLD RIN or between MedRIN and SCERIN)*

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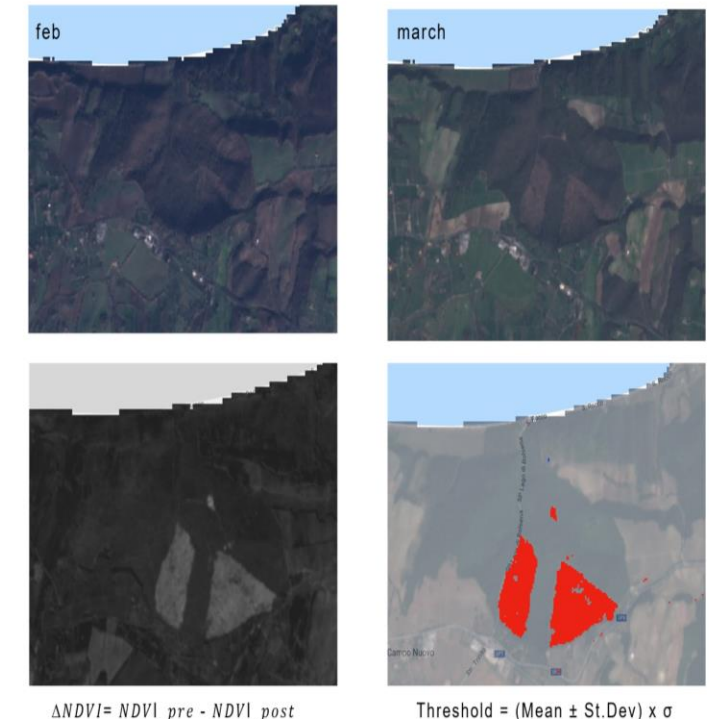
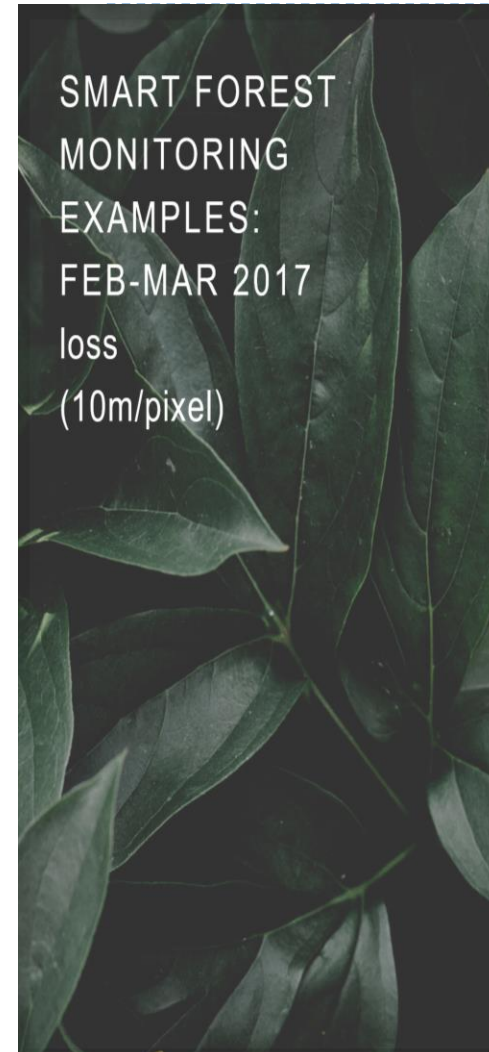
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- Topic 2: **Smart forest monitoring issues and challenges**
  - Satellite time series analyses : methods and Approaches to assess both drastic and subtle changes
  - Geophysical parameters for land and soil Degradation
  - EO based SDGs
  - **Effective Early warning EO based indicators at high spatial and temporal resolution to contribute to IRIDE**



feb - march 2017: operations to enhance the visibility of the change and automatic threshold

SMART FOREST MONITORING



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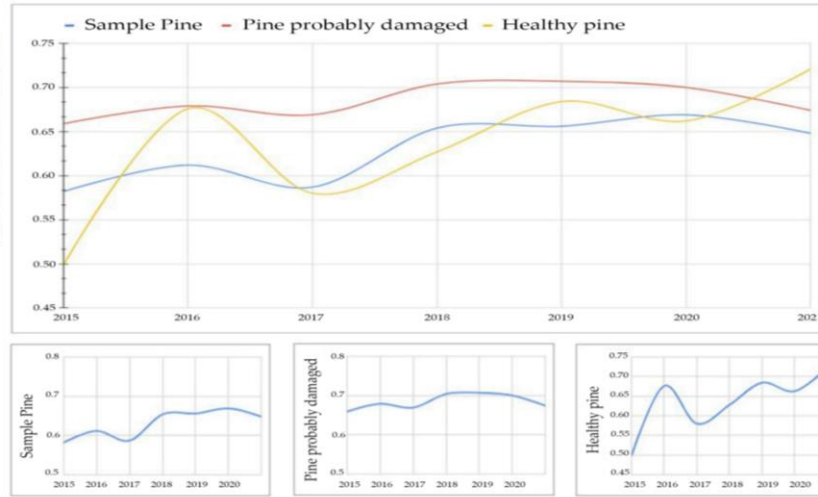
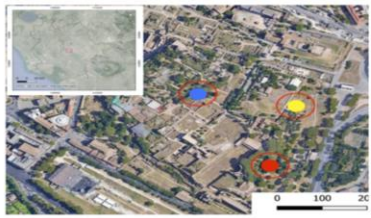
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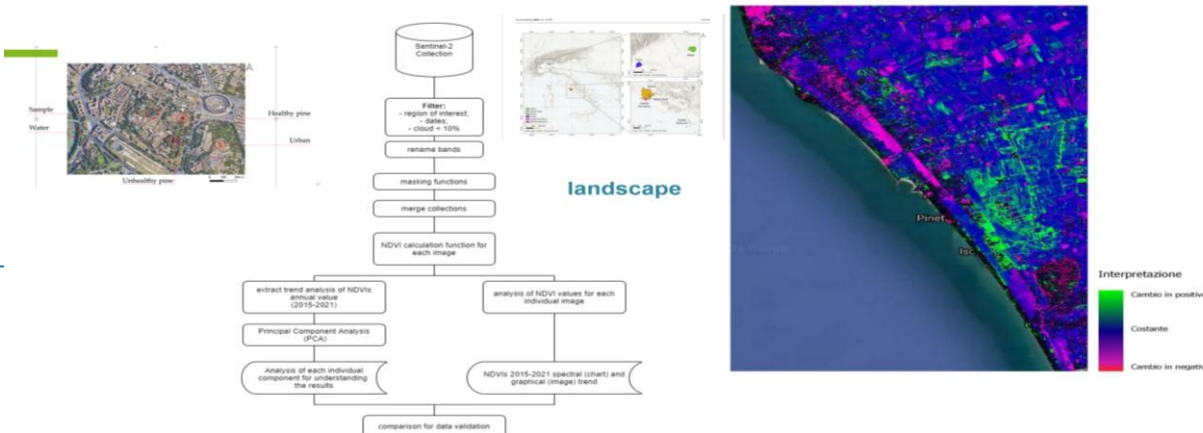
## Projects/ Success stories / Good practices



## Future plans

- *Re-inforce Contribution to IRIDE*
  - *Contribution to space economy*
  - *Development of new standards/protocols,*
  - *Improve Early Warning for vegetation degradation*

## Sentinel 2 based analysis : From a single tree level up to landscape level



- *Further consolidation of*
  - *Synergies and trade-offs across fields*
  - *stakeholder involvement;*
  - *Link to International policies*
- *NETWORKING OPPORTUNITIES (within a GOFC-GOLD RIN or between MedRIN and SCERIN)*

# IRIDE: the Italian Satellite Constellation for Earth Observation



<https://www.wired.it/article/iride-costellazione-satellitare-asi-esa-sistema-dettagli/>

## Iride: un *all star team* italiano per il programma più ambizioso del nostro spazio

L'Agenzia spaziale europea e quella italiana hanno descritto in dettaglio la costellazione satellitare che promette di essere l'avanguardia dell'osservazione della Terra. La realizzerà un gruppo di eccellenze nazionali



È il programma spaziale italiano più ambizioso degli anni recenti, uno dei più importanti a livello europeo di **osservazione della Terra**: è la costellazione satellitare **Iride**, il cui sviluppo, iniziato nel 2022, adesso entra nella nuova fase realizzativa.

In una conferenza ospitata stamattina, 12 aprile - non a caso nell'anniversario del primo storico volo di Jurij Gagarin - all'**Esrin di Frascati**, il centro dell'**Agenzia spaziale europea** cui fanno capo tutte le attività di monitoraggio del nostro Pianeta, hanno dettagliato i prossimi passi del programma Adolfo Urso, Ministro delle Imprese e del Made in Italy, Simonetta Cheli, direttrice dei Programmi di osservazione della Terra dell'Esa e capo dell'Esrin, Roberto Formaro, direttore dei Programmi dell'Agenzia spaziale italiana e Guido Levrini *programme manager* di Iride per l'Esa.

La costellazione, che sarà composta da **69 apparati** di cui il primo raggiungerà l'**orbita nel 2025**, sfrutterà **più tecniche osservative** e disporrà di satelliti allo stato dell'arte e al servizio sia delle istituzioni che delle *startup* e realtà industriali nazionali. Al **completamento, previsto entro la metà del 2026**, Iride permetterà una **rivisitazione giornaliera di ogni località italiana**, con una distanza di campionamento al suolo dell'ordine di **due metri**. **Insieme** con altri sistemi spaziali nazionali ed europei, servirà le Amministrazioni Pubbliche, a partire dalla Protezione Civile, per contrastare il **dissesto idrogeologico e gli incendi**, tutelare le coste, monitorare le infrastrutture critiche, la qualità dell'aria e le condizioni meteorologiche.

VIDEO

Grande Circo: 15 anni di rivoluzione dall'alto - con Sergio Cusani

### ARTICOLI PIÙ LETTI



ECONOMIA

**Google è vicina alla più grande acquisizione della sua storia**

DI ALESSANDRO PATELLA, WIRED ITALIA



SCIENZA

**Dobbiamo capire come fare la caccia sulla Luna**

DI BECKY FERREIRA, WIRED ITALIA

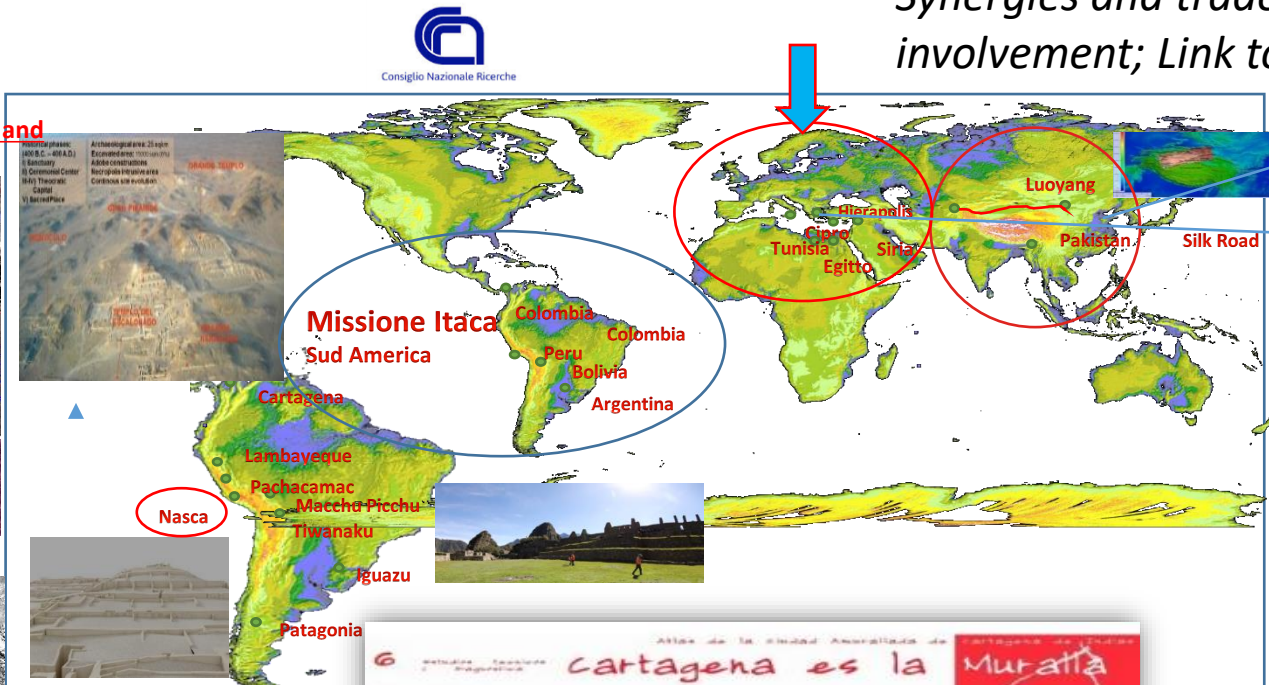


SECURITY

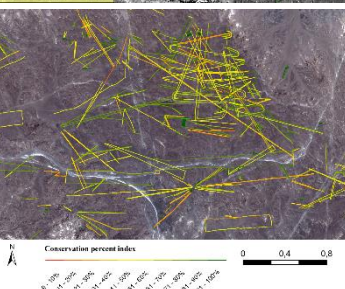
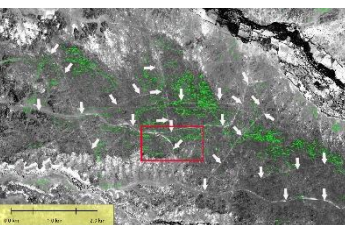
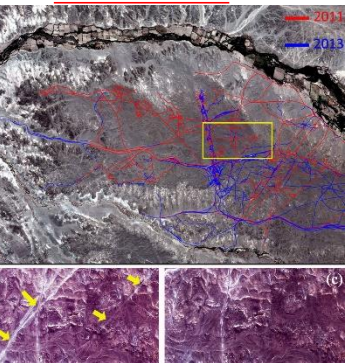
**Da oggi alcune persone possono**



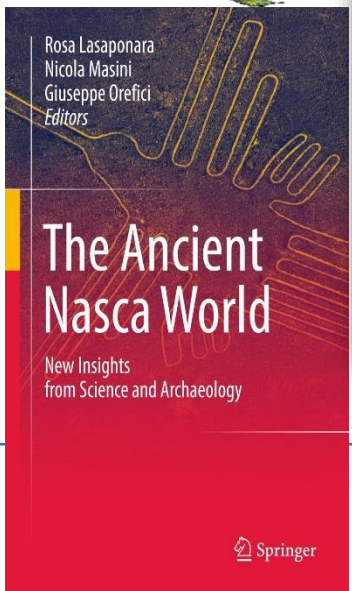
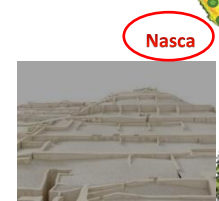
- Synergies and trade-offs across fields / stakeholder involvement; Link to International policies



**Nasca -PERU- Headquarters CNR-IMAA and ISPC since 2015**



**Missione Itaca Sud America**



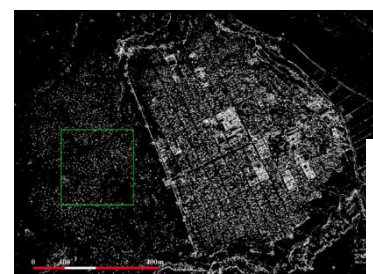
**Potenza -Pechino Internatio al Centro di Eccellenza CNR-IMAA /CAS-UNESCO cat 2 GEOPARCHI**

**Cipro Centro di eccellenza funded by EU and CUT University (Cyprus) More than 100 people hired in less than 2 years**

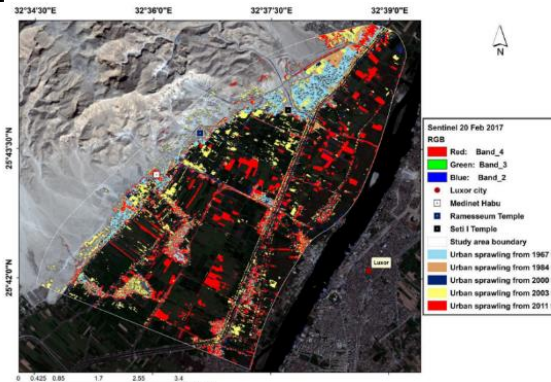
**Some Projctcs:** SERV\_FORFIRE (ERA4CS); FIREURISK (H2020); FIRESAT (Prot, civ), SPECTRA (Carabinieri), SPACeToTREE (ESA), Basilicata Heritage SMART\_Lab (reg Bas), Smart Forest CNR\_MIT-Carabinieri, COELUM, Space to tree -ESA

**Publicazioni** <https://scholar.google.it/citations?user=h-s87zUAAAAJ&hl=it>

**Space-based identification of illegal archaeological excavation in Syria**



**Urban sprawl 1984-2017 automatic detection around the Luxor (Egypt) archaeological area**



**Referenza :** A Elfadaly, W Attia, MM Qelichi, B Murgante, R Lasaponara **Management of Cultural Heritage Sites Using Remote Sensing Indices and Spatial Analysis Techniques 2018 Surveys in Geophysics, 1-31**

**Monitoraggio delle linee di Nasca**