



# WELCOME

Boulogne forest

Rune Floberghagen  
Head of Science, Applications & Climate Department  
Earth Observation Directorate  
European Space Agency (ESA)

## International Workshop on High-Resolution Thermal EO

10-12 May 2023 | ESA-ESRIN | Frascati (Rome), Italy

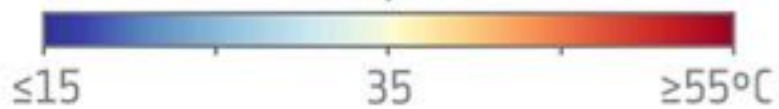






# Land surface temperature

17 July 2022



Southern Gironde wildfires

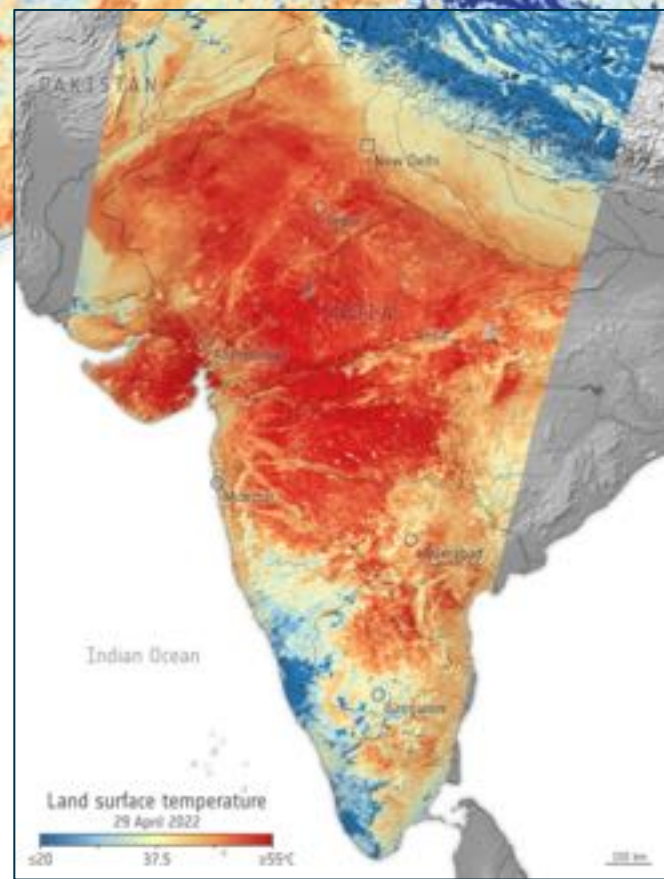
FRANCE

Toulouse

Barcelona

SPAIN

Madrid



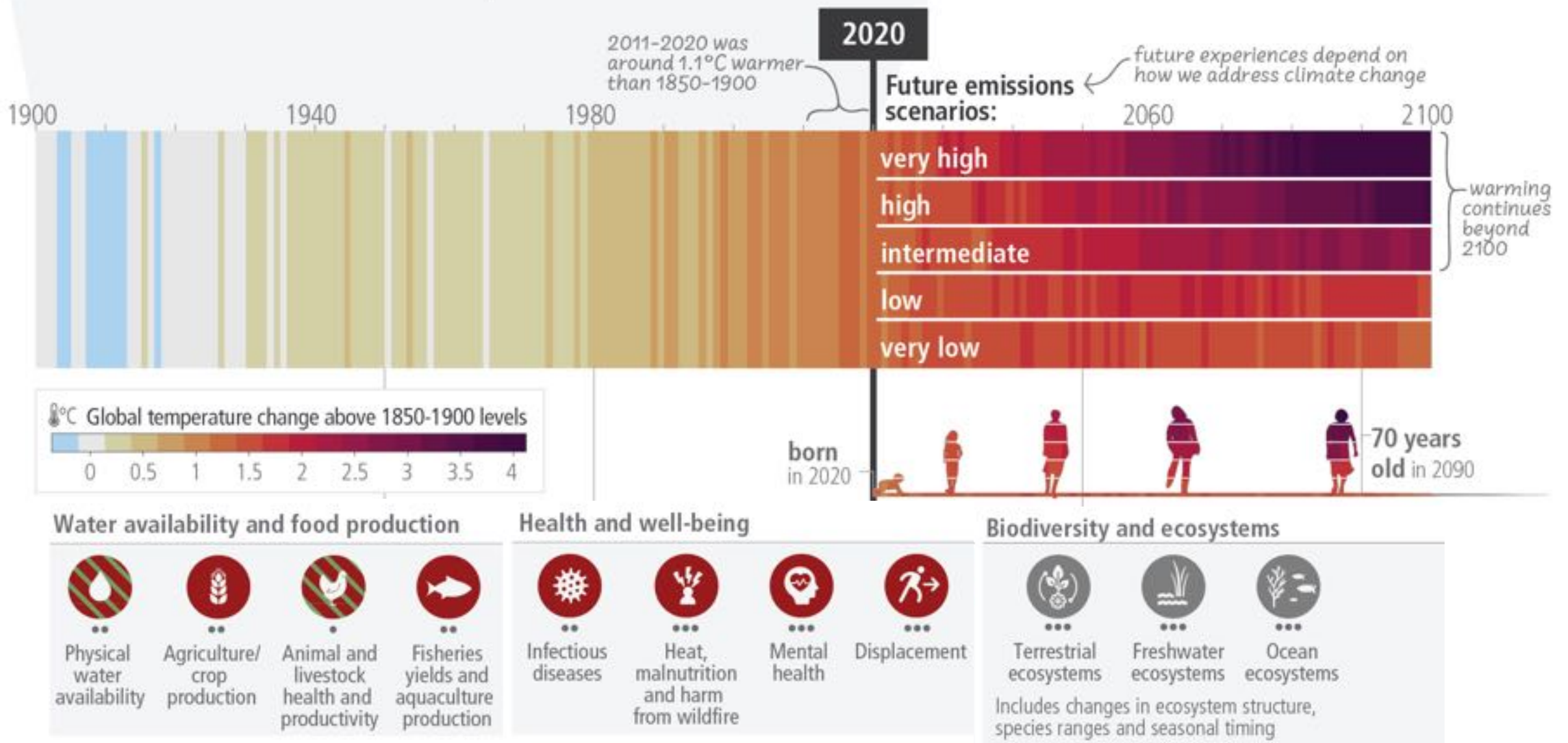
## Land surface temperature

29 April 2022



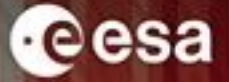


# A Hotter and Different World – AR6 IPCC 2023









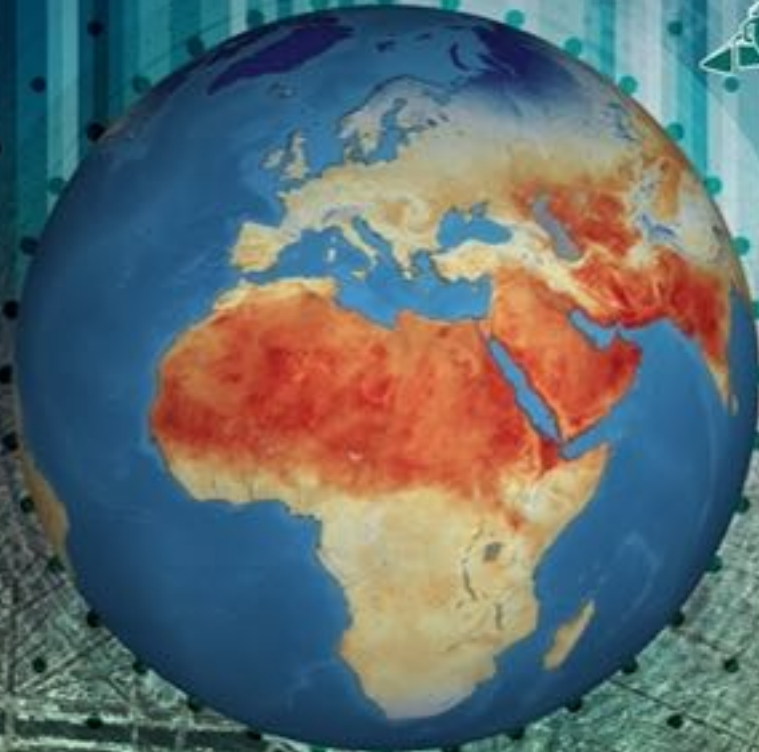
164 abstracts



305 participants  
+ online

39 countries

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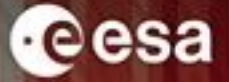
11 missions  
(7 New Space)

5 space agencies  
as co-organizers

## International Workshop on High-Resolution Thermal EO

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# Objectives

Benjamin Koetz, LSTM Mission Scientist & Head of Sustainable Initiatives Office  
Giuseppe Ottavianelli, Head of Applications Section

Earth Observation Programmes Directorate, European Space Agency (ESA)

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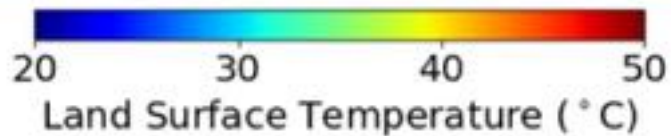
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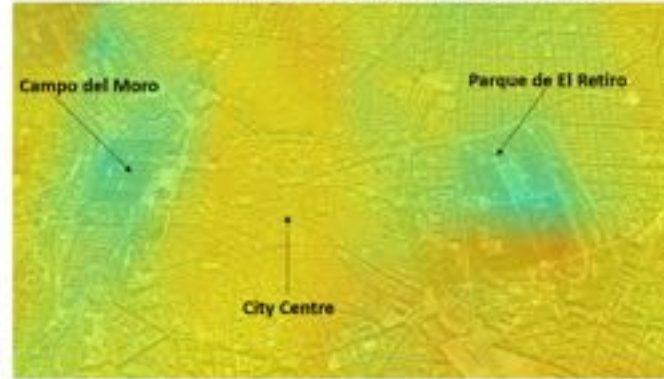


# Need for High Resolution Thermal EO

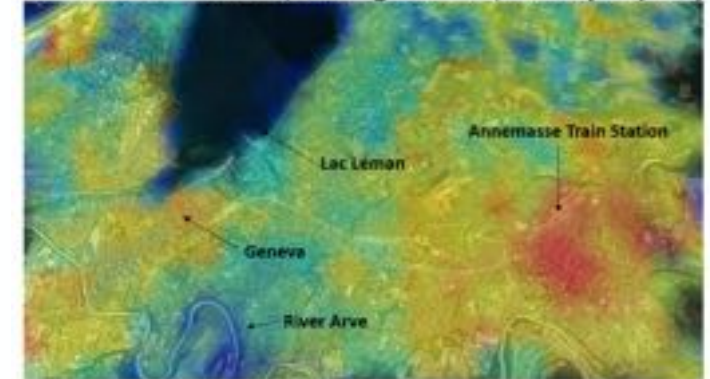
Rome, north area, 13 August 2021, 2:17 pm (UTC)



Madrid, 16 August 2021, 8:36 am (UTC)



Switzerland & France, 17 August 2021, 12:43 pm (UTC)



South outskirts of Modena, 13 August 2021, 2:17pm (UTC)



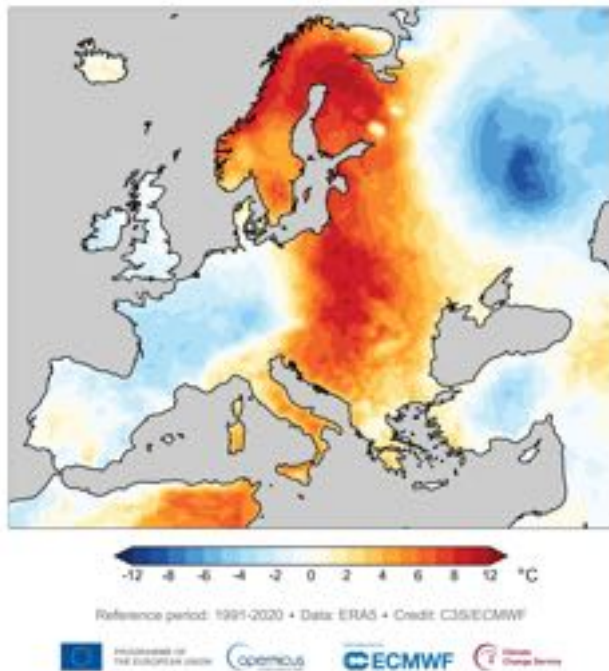
European ECOSTRESS Hub (EEH)  
[https://www.nasa.gov/mission\\_pages/ecostress](https://www.nasa.gov/mission_pages/ecostress)  
<https://foodsecurity-tep.net/ecostress-hub>



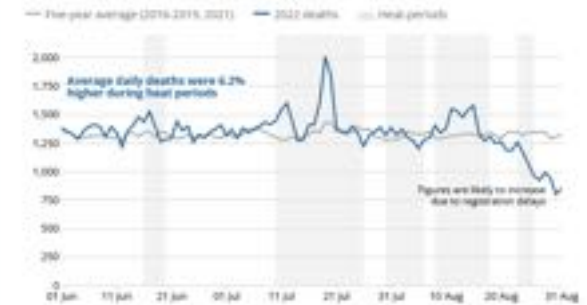


High resolution and frequent thermal EO capabilities will be critical for adaptation and preparedness to heat waves & droughts

Surface temperature anomaly for 01 July 2022



Number of daily death occurrences, five-year average and heat-period days, 1 June to 31 August 2022, England and Wales



Source: Office for National Statistics

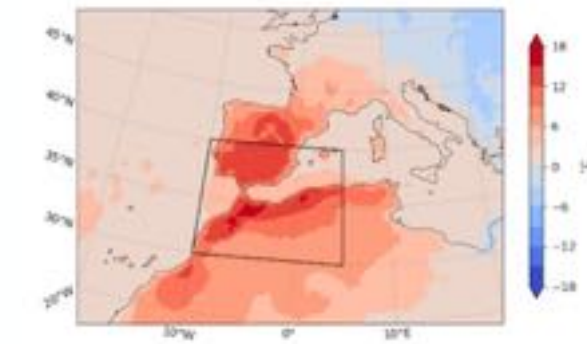


Figure 1. ERAS-extended maximum daily temperature anomaly with respect to 1991-2020 averaged over 26-28 April 2023. The black box outlines the study area.



# One of the various factors impacting biodiversity loss

Global warming and biodiversity loss 1970 – 2018

Global Warming Stripes. #showyourstripes. Data Source UK Met Office CC BY 4.0  
From biodiversitystripes.info Data: LPI 2022. Living Planet Index <http://stats.livingplanetindex.org/>





- Strengthen **international cooperation and coordination** in the space and ground segments, for calibration and validation activities, for products definition & harmonization.
- Share **updates on the state-of-the-art activities and projects** in relevant science and application areas, **stimulating exchanges** across research groups for the use of the upcoming missions.
- Formulate **recommendations** and identify high-priorities **topics for future R&D activities** supporting the preparation of HR thermal EO data exploitation. (e.g., ESA EOP FutureEO Block-4 roadmap: Science, Applications, Industry, Digital Innovation, Disruptive Technologies, Sentinel User Preparation).



# Sentinel User Preparation (SUP) ESA EOP Initiative



Activity in collaborative synergy with the EC



CRISTAL

## WHAT

SUP is a preparatory program for the use of Copernicus Expansion/NG data. Strong support by MS and EARSC.

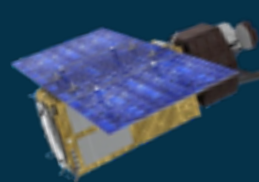
With a multi-mission approach.

## WHY

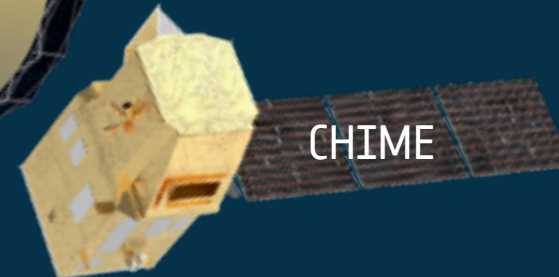
Supporting the integration of new Copernicus Expansion/NG datasets towards future operational working practices and promote European leadership for space systems where competitors are already active and boost digital commercialisation (ref. EARSC workshop 2021 with D-EOP).



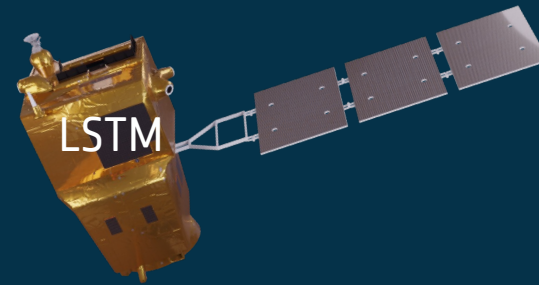
CO2M



CIMR



CHIME



LSTM



ROSE-L

## HOW

- Build the necessary expertise in the various science and application domains and sectors (academia, value adding companies) to prepare future downstream services.
- Ensure awareness for rapid uptake by users and stakeholders of derived information products.

- Readiness of science/applications/downstream analytics to address societal/environmental challenges.
  - Act as 'de-risking' factor and incentive for growth to maximise return-on-investment.

## EFFECTS





→ **Enabling actions** on:

- 1) [SUP-1] Applications preparedness with stakeholder and end-users
- 2) [SUP-3] Fundamental research and algorithm/products developments/validation
- 3) [SUP-4/5] New processing methods for Sentinel Expansion class datasets

→ **Cross-cutting** components :

- 1) [SUP-2] SUP Sharing and Collaboration Environment
- 2) [SUP-6] Training, toolboxes and education

→ **Multi-mission** approach.

→ **Representative dataset consolidation** (e.g., in terms of revisit time, resolution, and spectrally/technique) over specific areas of interest, with stakeholder engagement as necessary, through: proxy-data from non-ESA missions (national, international partners, commercial), simulated/synthetic data from models, and in-situ/validation/campaign data. Leveraging and complementing existing infrastructure/datasets and planned campaign data.



- **Multi-missions** Applications topics :
  - **Agriculture** (crop and vegetation indices, operations monitoring, yield estimation, water productivity with soil moisture/irrigation/evapotranspiration)
  - **Ecosystem and biodiversity monitoring** (ecosystem structural and functional traits, habitat mapping)
  - **Soil management** capacities (e.g., composition, organic carbon, degradation)
  - Enhanced **Methane Point Sources** capacities
  - **Forest management** (classification, biomass/carbon, disturbances, fire risks)
  - **Resilient Cities**
  - **Critical Infrastructures**
  - **Mining and extractives**



# Overview of Program & Logistics

Date: Wednesday, 10/May/2023		Date: Thursday, 11/May/2023		Date: Friday, 12/May/2023	
8:45am	Registration	9:30am	2.1 Agriculture, irrigation, evapotranspiration	9:00am	3.1 Calibration & Algorithms
9:30am					
9:30am	Opening				
11:00am	Location: ... Chair: An ... Chair: Mi ...				
11:00am	Discuss				
11:15am					
11:15am	Coffee B				
11:45am					
11:45am	1.2 Har				
1:00pm	Location: ... Chair: Bl ... Chair: Si ...				
1:00pm	Discussion and Recommendations	1:20pm		12:50pm	Closing Session
1:15pm		1:20pm	Lunch		Location: Big Hall, Building 14
1:15pm	Lunch	2:30pm		1:15pm	Chairs: Giuseppe Ottavianelli ESA, Benjamin Koetz ESA, Simon Hook NASA/JPL, Philippe Gamet CNES, Sara Venafra ASI, Bimal Bhattacharya ISRO
2:30pm		2:30pm	2.3 Ecosystem & Coastal		
2:30pm	1.3 New Space for Thermal EO	4:00pm	Location: Big Hall, Building 14 Chair: Emmanuelle AUTRET, IFREMER Chair: Gilles Boulet, IRD		
3:50pm	Location: Big Hall, Building 14 Chair: Ferran Gascon, ESA Chair: Zhuoting Wu, USGS	4:00pm	Discussion and Recommendations		
3:50pm	Discussion and Recommendations	4:10pm			
4:00pm		4:10pm	Coffee Break		
4:00pm	Coffee Break	4:40pm			
4:20pm		4:40pm	2.4 Urban Heat & Cryosphere		
4:20pm	1.4 Algorithm development	6:10pm	Location: Big Hall, Building 14 Chair: Glynn Hulley, NASA Jet Propulsion Laboratory Chair: Jose A. Sobrino, University of Valencia		
5:50pm	Location: Big Hall, Building 14 Chair: Itziar Barat, ESA Chair: Jean-Louis Roujean, CESBIO	6:10pm	Discussion and Recommendations		
5:50pm	Discussion and Recommendations	6:20pm			
6:00pm		6:20pm	POSTER SESSION		
6:00pm	POSTER SESSION AND WELCOME DRINK	7:20pm	Location: Big Hall, Building 14		
7:30pm	Location: Big Hall, Building 14				

Discussions & Recommendations sessions fundamental for the definition of the future roadmap

A very rich 2.5-day programme!

ESA Conference support team (e.g., taxi, shuttle to Frascati on Friday).

Lunch in the Canteen at 1h30.

Group Photo.





**Thanks to the full team  
...the organizing committee,  
...the scientific committee,  
...the session chairs,  
...the onsite team!**

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