MEDCLIVAR 2016 CONF
Athens, Greece 26-30 September 2016 Learning from the past, perceiving the present, engaging for the future

# GEO-CRADLE:

## Fostering regional cooperation and roadmap for GEO and Copernicus implementation in N. Africa, Middle East, and the Balkans

*Funded under H2020 - Climate action, environment, resource efficiency and raw materials*
*ACTIVITY: Developing Comprehensive and Sustained Global Environmental Observation and Information Systems*
*CALL IDENTIFIER: H2020 SC5-18b-2015 Integrating North African, Middle East and Balkan Earth Observation capacities in GEOSS*
***Project GA number: 690133***
***Total Budget: 2,910,800.00 €***

**Haris KONTOES, Research Director, National Observatory of Athens,**

**Project Coordinator**

# GEO-CRADLE

… is a unique EU funded Coordination Action running at regional level,
… is looking at the N. Africa, Middle East, and the Balkan territories;

It seeks to identify common needs, create synergies, and integrate capacities,

Fosters the regional cooperation and integration of monitoring capabilities and networks, and scientific skills

Proposes/sets up large scale regional initiatives based on the Earth Observation (space based and in-situ) for addressing societal priorities in different thematic aspects including the Adaptation to Climate Change

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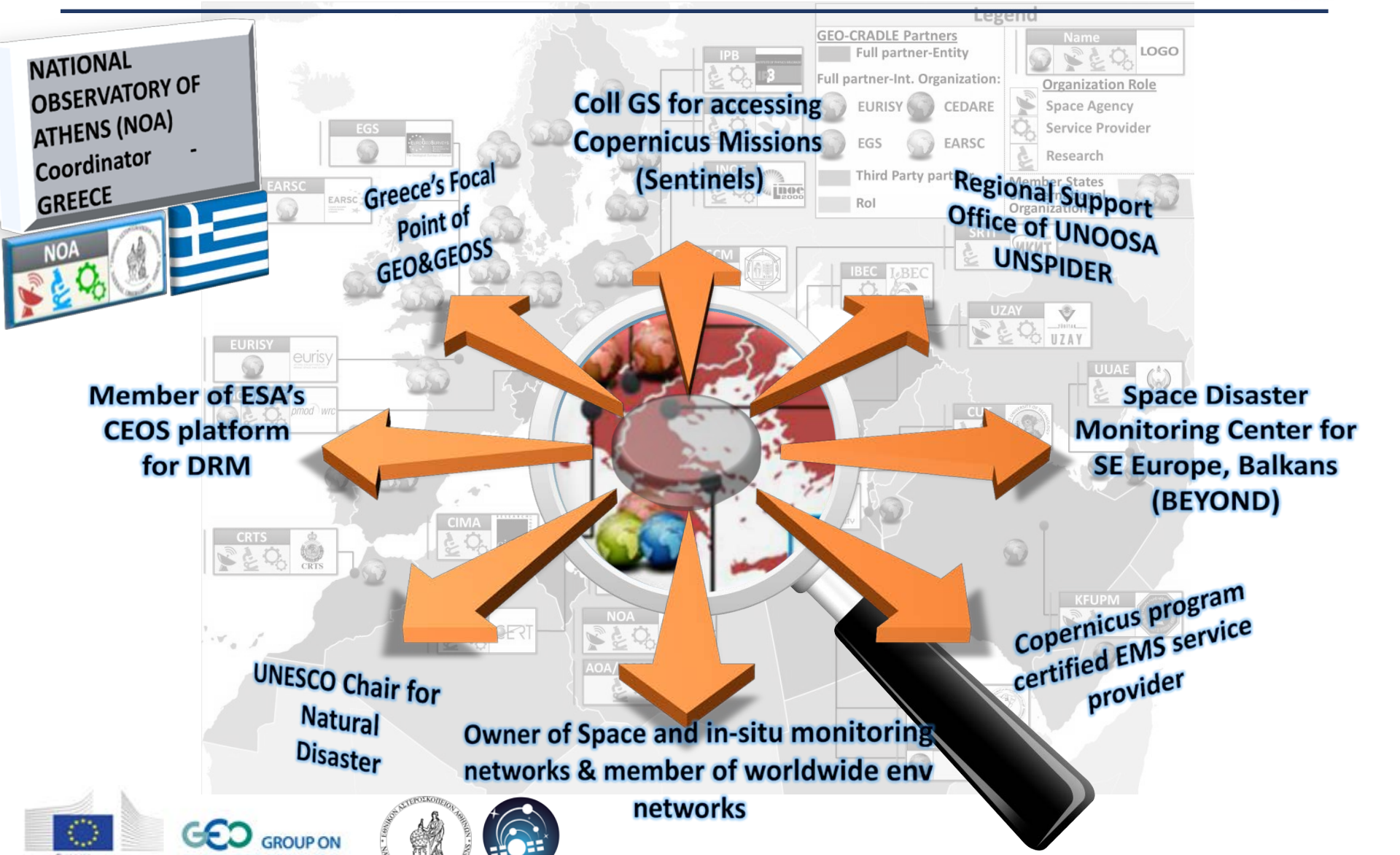
1. To create a multi-regional (Balkans, N. Africa and Middle East, namely RoI) coordination network
2. Support the effective integration of Earth Observation capacities in the RoI
3. Facilitate the engagement of the complete ecosystem of EO stakeholders in the RoI
4. Promote the uptake of EO services and data in response to regional needs
5. Enhance the participation in and contribution to the implementation of GEO, GEOSS, and Copernicus in the RoI

# The Coordinator

# The Coordinator



# The Partners

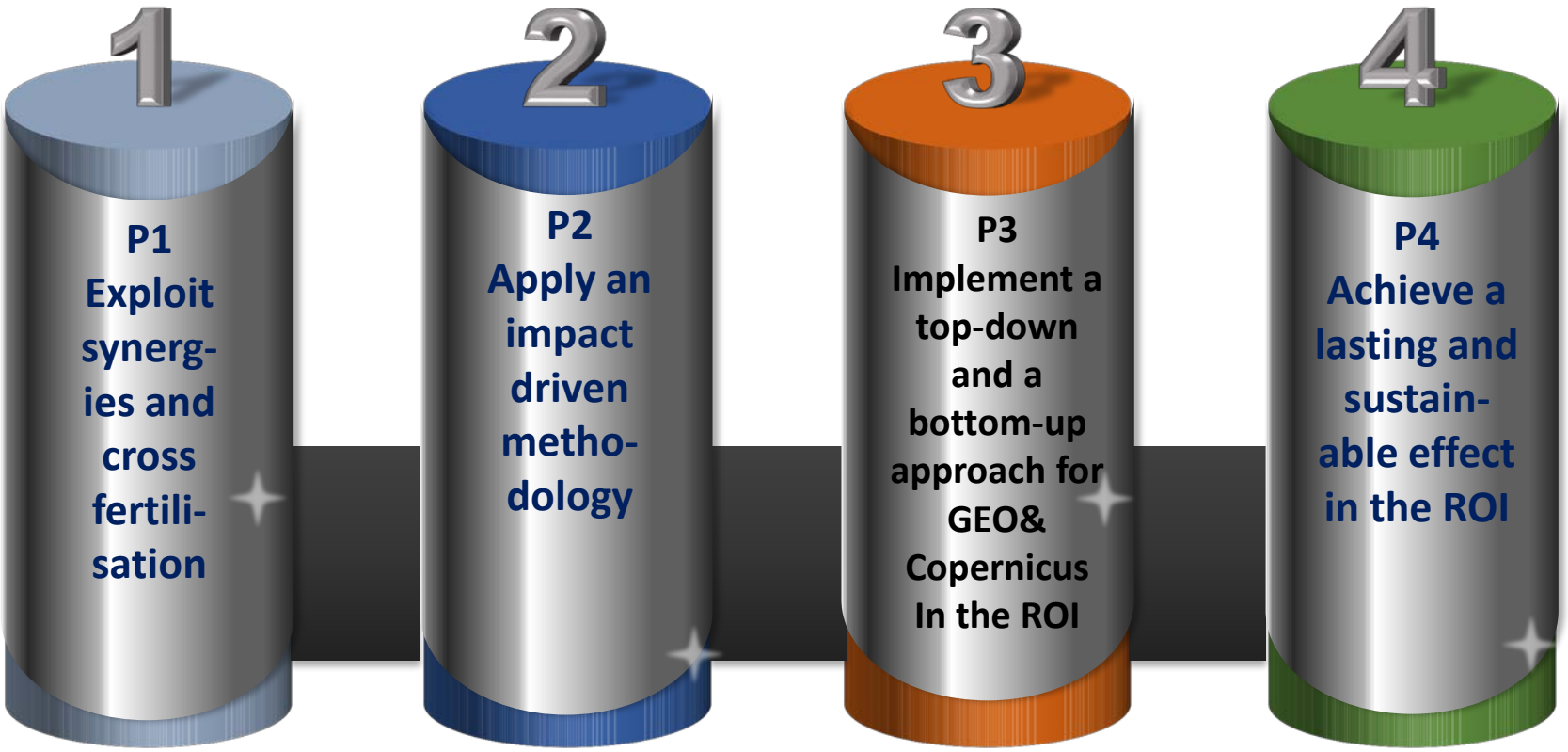

At the consortium level 48 women (39% of personnel) are involved

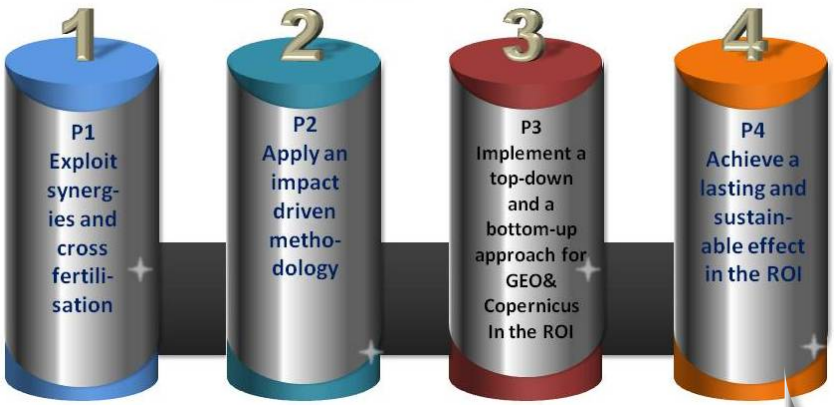
Gender Analysis

31% of the WorkPackages are led by women

Gender Analysis

# 4 main pillars underpin the GEO-CRADLE concept

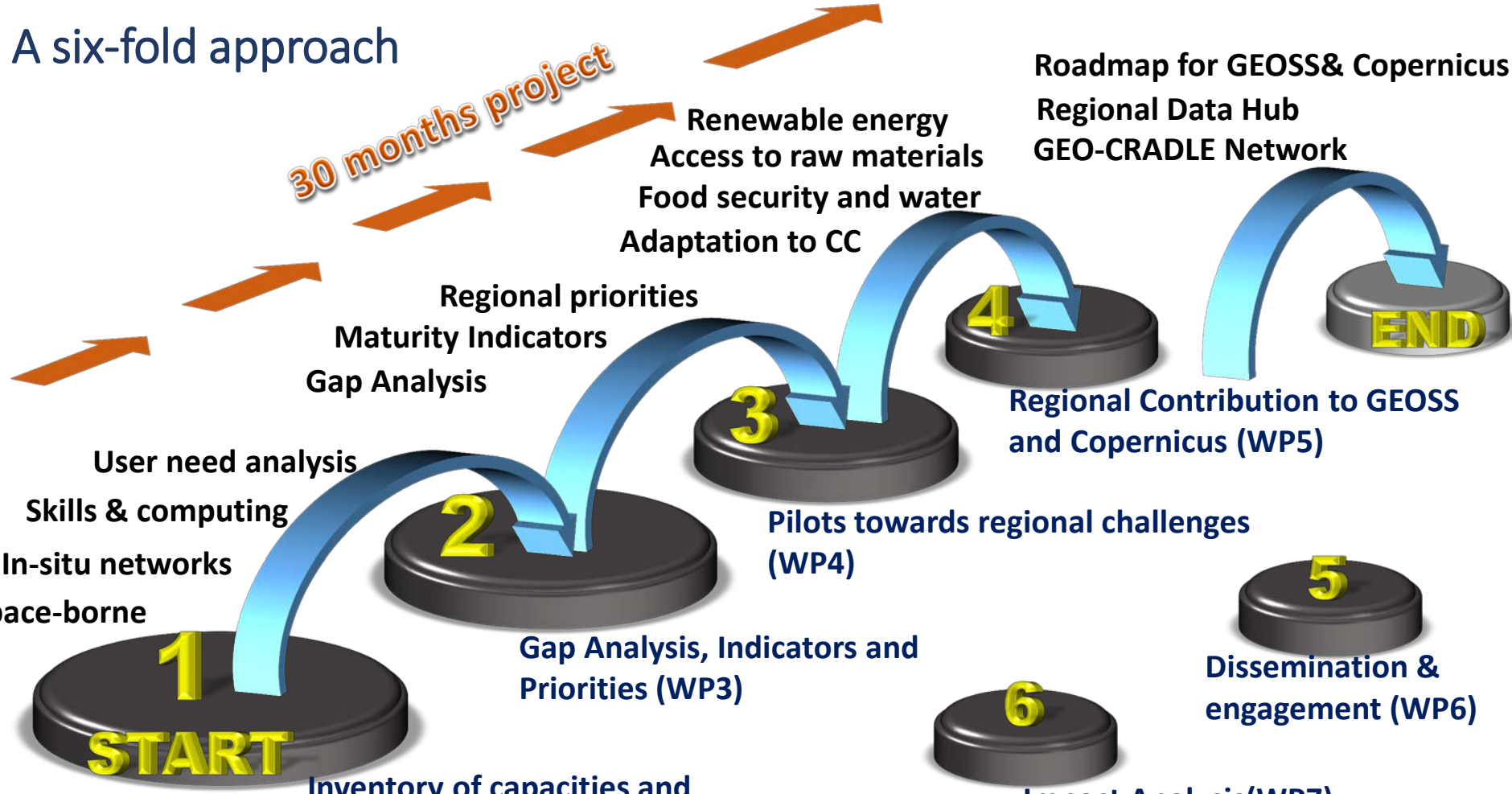


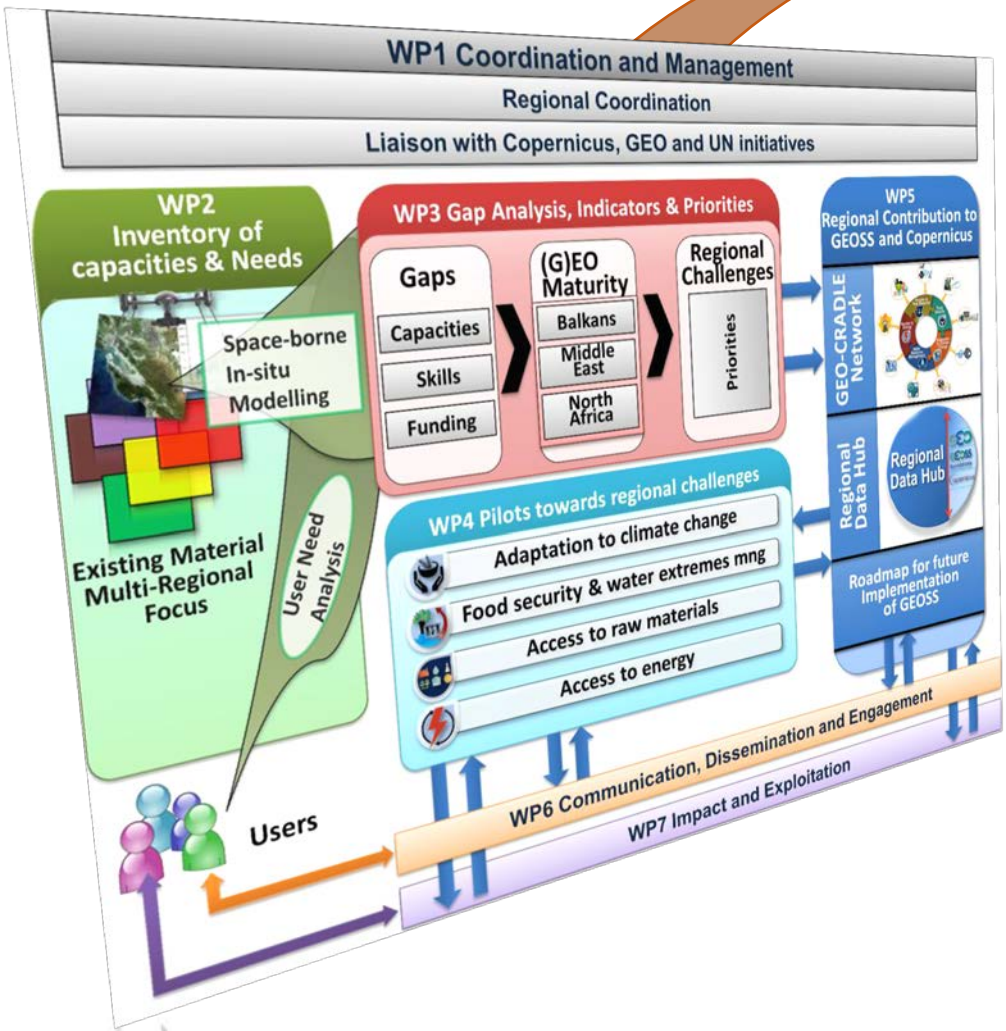


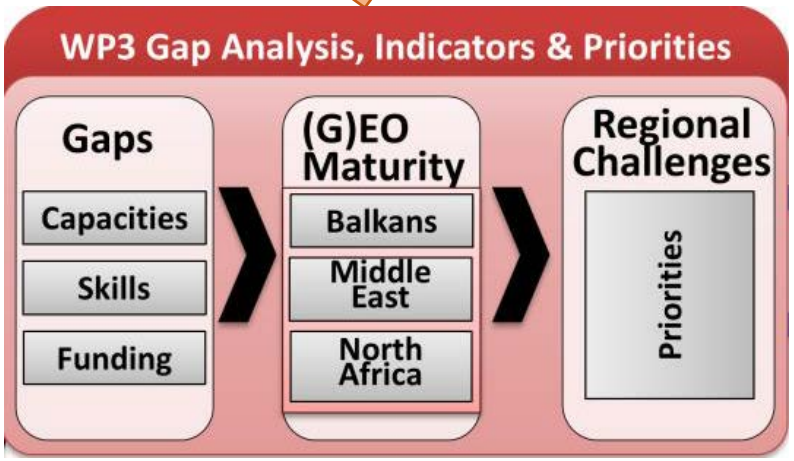

1 Lessons learned and best practices from past projects and initiatives

2 Alignment with EC & GEO priorities/vision

# A six-fold approach




WP1 Coordination and Management
Regional Coordination
Liaison with Copernicus, GEO and UN initiatives
WP2 Inventory of capacities & Needs
Space-borne
In-situ
Modelling
Existing Material
Multi-Regional
Focus
User Need Analysis
WP3 Gap Analysis, Indicators & Priorities
Gaps
Capacities
Skills
Funding
(G)EO Maturity
Balkans
Middle East
North Africa
Regional Challenges
Priorities
WP5 Regional Contribution to GEOSS and Copernicus
GEO-CRADLE Network
Regional Data Hub
Regional Data Hub
WP4 Pilots towards regional challenges
Adaptation to climate change
Food security & water extremes mng
Access to raw materials
Access to energy
Roadmap for future Implementation of GEOSS
Users
WP6 Communication, Dissemination and Engagement
WP7 Impact and Exploitation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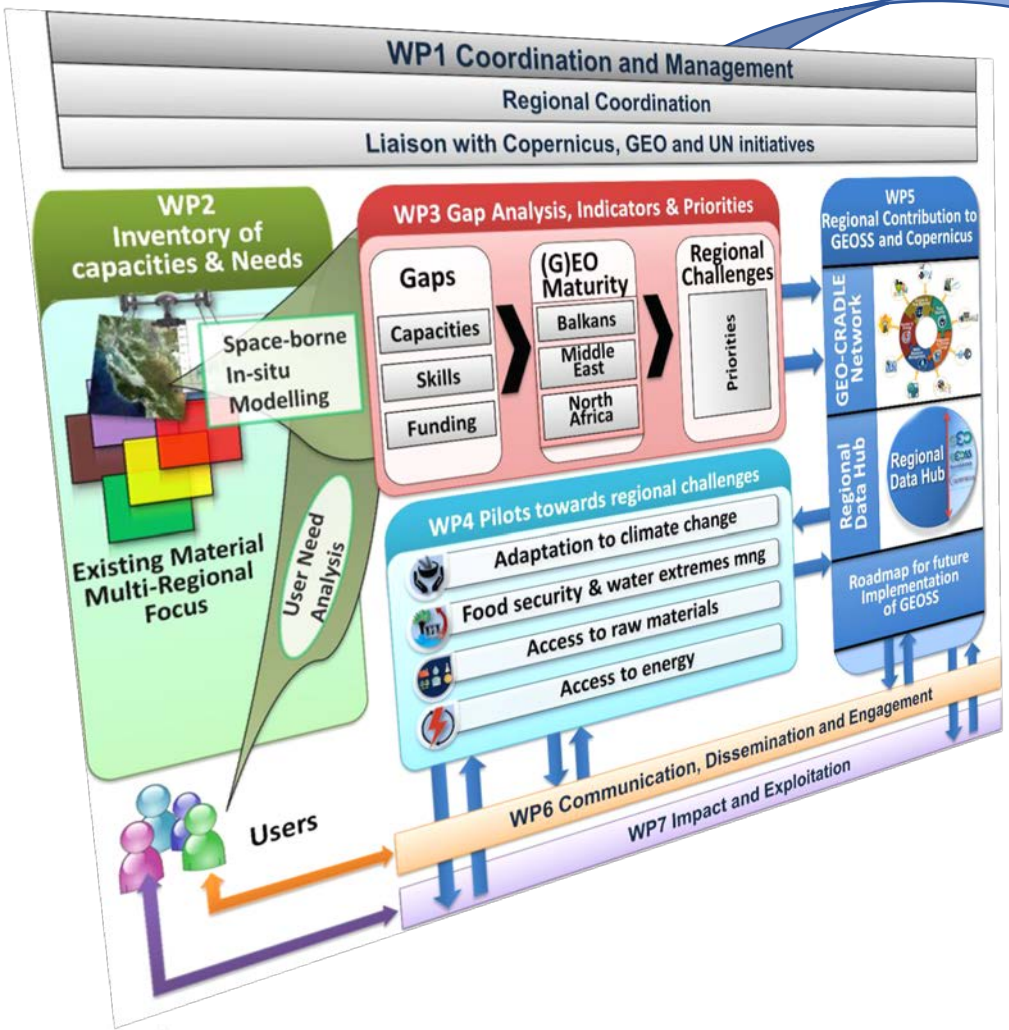
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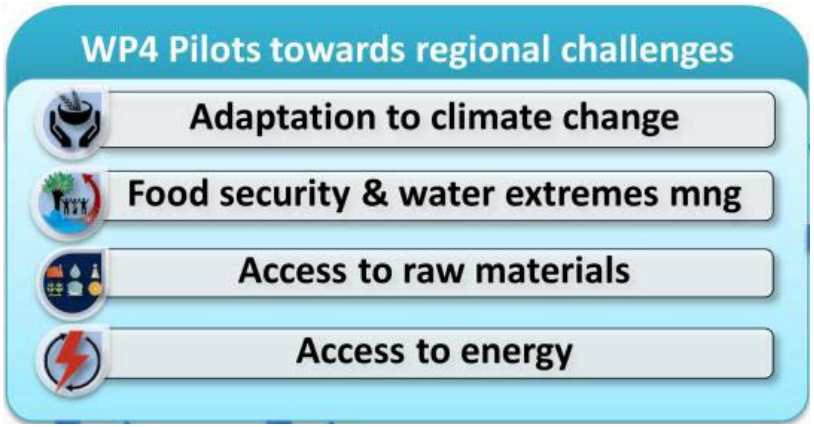
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GEO GROUP ON EARTH OBSERVATIONS

CRADLE

WP1 Coordination and Management

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WP2 Inventory of capacities & Needs

Space-borne
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Existing Material
Multi-Regional
Focus

User Need Analysis

WP3 Gap Analysis, Indicators & Priorities

Gaps: Capacities, Skills, Funding

(G)EO Maturity: Balkans, Middle East, North Africa

Regional Challenges: Priorities

WP4 Pilots towards regional challenges

- Adaptation to climate change
- Food security & water extremes mng
- Access to raw materials
- Access to energy

WP5 Regional Contribution to GEOSS and Copernicus

GEO-CRADLE Network

Regional Data Hub

Roadmap for future Implementation of GEOSS

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WP6 Communication, Dissemination and Engagement

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European Commission

GEO GROUP ON EARTH OBSERVATIONS

NATIONAL OBSERVATORY OF ATHENS

IAASARS

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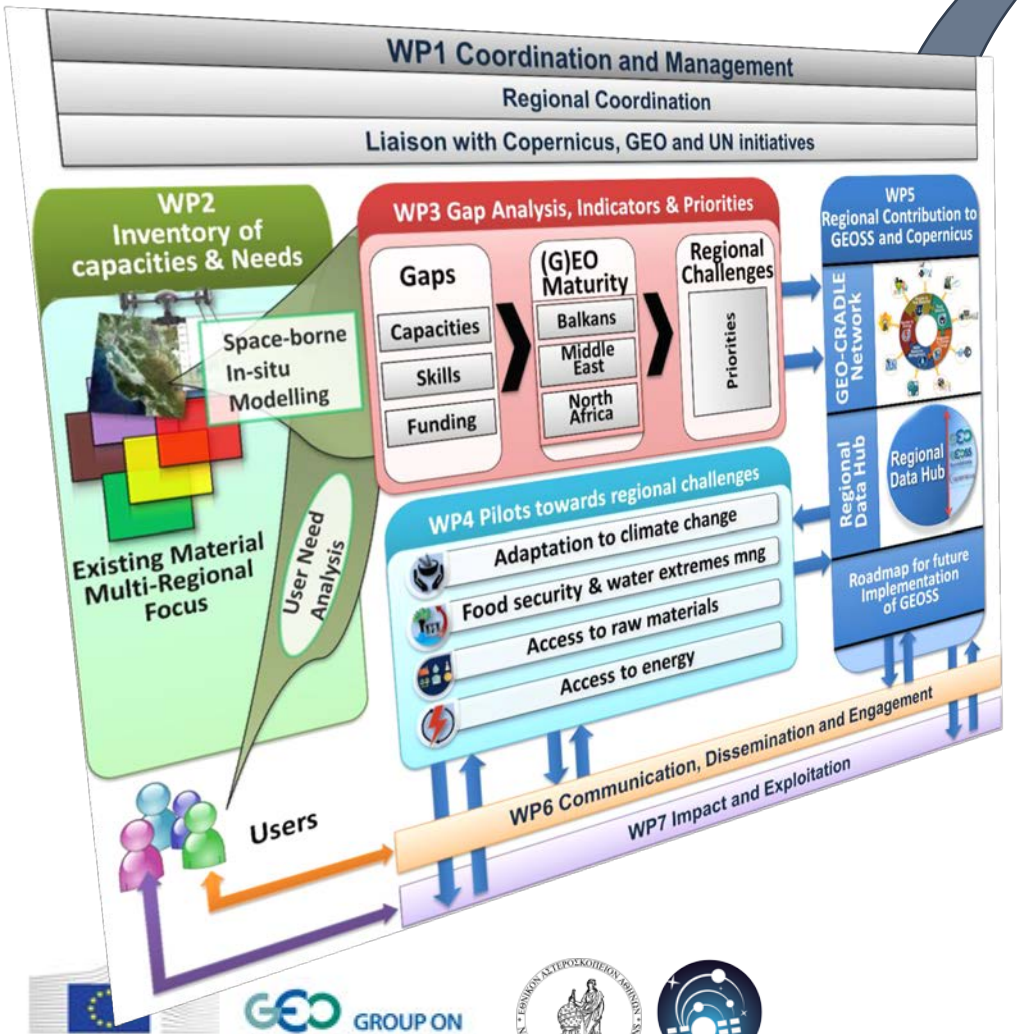



European Commission

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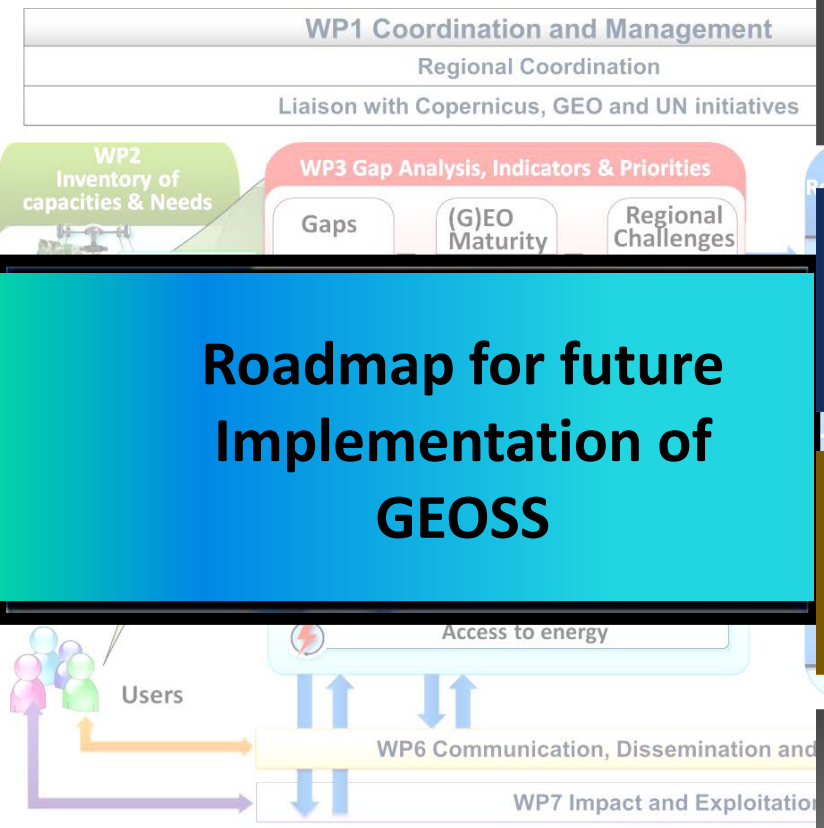



# Roadmap for future Implementation of GEOSS

**Guides** the implementation of GEOSS and the uptake of Copernicus in the RoI

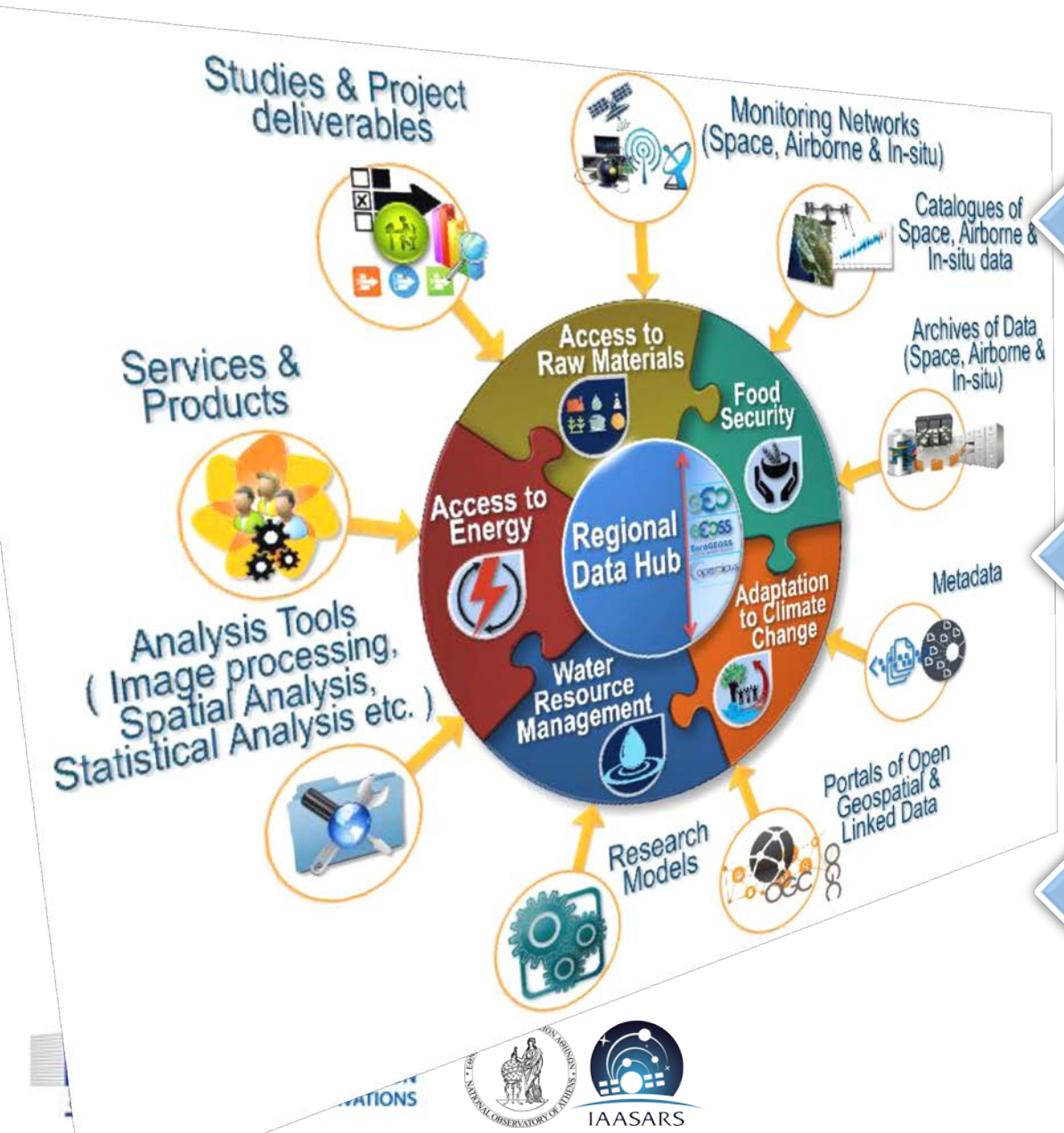
**Assesses** the readiness and maturity of each country in the RoI

**Lays out** the actions for the long-term response to major regional challenges in the RoI

**Paves** the ground for a potential regional large initiative



**Acts as "one-stop-shop" that offers free access and several discovery options to catalogs of data and metadata specific to the RoI**




Abides by the GEOSS Data Sharing Principles — RDH

Complies with the navigation logic of the GEOSS portal — RDH

Strengthen the GEOSS portal & Alleviate its shortcomings — RDH

- User Needs
- System Specs
- Data Collection

Collaboration

GCI APIs

- GCI, DAB APIs
- Architecture
- Source Code

Implementation Extension

- Regional Implementation
- API extensions
- RDH Improvements


Enhanced RDH

Regional Network

Community Portal

# WP410 – Adaptation to Climate Change (ACC)

Leader: NOA
Participants: CEDARE, CUT, INOE, IPB, AOA
Duration: M9-M24

The ROI is one of the most sensitive and vulnerable to climate change regions on Earth. Task 410 envisages to consolidate EO platforms with atmospheric and climate models to mitigate the climate change and its side effects.

**The Ultimate Goal is:**
Provide the necessary support and coordination to **existing infrastructures**, to deliver consolidated information and knowledge for long term strategic planning on adaptation and mitigation to climate change and air quality for the RoI.

# Steps to achieve the goals of WP410

## General key objectives

Collection, homogenization, archiving and integration of EO atmospheric data

**Establishment of a GEO-CRADLE Regional Data Hub**

**CLIMATE**
Regional climate models and climate data for past and future climate

**WEATHER**
Weather forecast models and near real time observations

**AIR QUALITY**
Air quality forecast models and near real time observations

Support decision makers on climate change mitigation and adaptation policies

Support local authorities and citizens awareness in weather extremes (heat waves, floods, storms, etc)

Support local authorities and citizens awareness in air quality exceedances (PM, ozone, Desert dust, fire smoke, volcanic ash, etc)

**Establishment of relevant regional pilot studies**

# Steps to achieve the goals of WP410

## Establishment of a GEO-CRADLE Regional Data Hub

### Existing ACC information (Examples)

| *Space-borne* | *Airborne* (e.g. campaigns) | *In-situ* | *Climate Model Databases* | *Models* |
|---|---|---|---|---|
| • NOA's Sentinel Data Hub<br>• NOA and TUBITAK X/L band antennas<br>• NOA EUMETSAT DVB2 acquisition antenna | • FENIX-SPECIM<br>• CHARADMexp<br>• ACEMED<br>• Aegean Game) | • AERONET<br>• ACTRIS<br>• EARLINET<br>• ICOS<br>• GAW/WMO<br>• E-OBS<br>• PANACEA | • CORDEX<br>• Climate4impact<br>• CMIP5<br>• CERA(DKRZ)<br>• CAMS(MACC)<br>• ENSEMBLES<br>• PRUDENCE | • RegCM4<br>• WRF<br>• NMM-DREAM<br>• FLEXPART |

# Climate regional data-hub

**PILLAR1: Set up a user friendly interactive web application tool for end users to retrieve climate variables and climate change information from high resolution regional climate projections**

**STEP 1:** Set up a regional high resolution database (0.12 °×0.12°) including climate projections for a number of climate variables from various Regional Climate Models (RCM) and emission scenarios (data source: CORDEX).

**STEP 2:** Set up a database with secondary climate indices relevant to specific sectors of interest and tailored to end-user needs.

**STEP 3:** Set up an interactive web application for retrieving time series of the relevant climate variables and indices following a selection tree:

- ***Selection of PARAMETER/VARIABLE*** *(e.g. climate variables or climate indices)*
- ***Selection of FREQUENCY*** *(e.g. month, year)*
- ***Selection of TIME FRAME*** *(e.g. present / future time slice)*
- ***Selection of EXPERIMENT/SCENARIO*** *(e.g. hindcast, RCP26, RCP45, RCP85)*
- ***Selection of MODELS*** *(e.g. RegCM, WRF, ensemble)*
- ***Selection of the LOCATION*** *(lat, lon)*

# Climate regional data-hub

## Indicative list of Climate variables and indices

| Climate Indices | | Relevance |
|---|---|---|
| CI1 | Mean near surface temperature | Fundamental |
| CI2 | Precipitation rate | Fundamental |
| CI3 | Maximum near surface temperature | Fundamental, extremes |
| CI4 | Minimum near surface temperature | Fundamental, extremes |
| CI5 | Wind speed at 10m, 50m, 100m and 200m | Fundamental, Energy, natural disasters |
| CI6 | Surface absorbed solar radiation | Fundamental, Energy, Tourism, Agriculture |
| CI7 | 95th percentile of rain day amounts | Extremes, natural disasters |
| CI8 | 95th percentile of wind speed at 10 m | Extremes, natural disasters |
| CI9 | Annual greatest 5-day total rainfall | Extremes, natural disasters |
| C10 | Fraction % of total rainfall from events> long-term P90 | Extremes, natural disasters |
| C11 | Number of events > long-term 90th percentile of rain days | Extremes, natural disasters |
| CI12 | Number of frost days Tmin < 0 degC | Extremes |
| CI13 | Heat Wave Duration Index | Agriculture,Tourism |
| CI14 | Standardized Precipitation Index (SPI) | Agriculture,Water resources |
| CI15 | Potential evaporation | Agriculture |
| CI16 | Growing season duration (GSD) | Agriculture |
| CI17 | Tourism Climate Index (TCI) | Tourism |
| CI18 | Snow depth (SnowD) | Tourism |
| CI19 | Heating Degree Day (HDD) | Energy |
| CI20 | Cooling Degree Day (CDD) | Energy |

**PILLAR 2: Strengthening the interplay between the Earth Observing System and modeling activities for weather, air quality and climate**

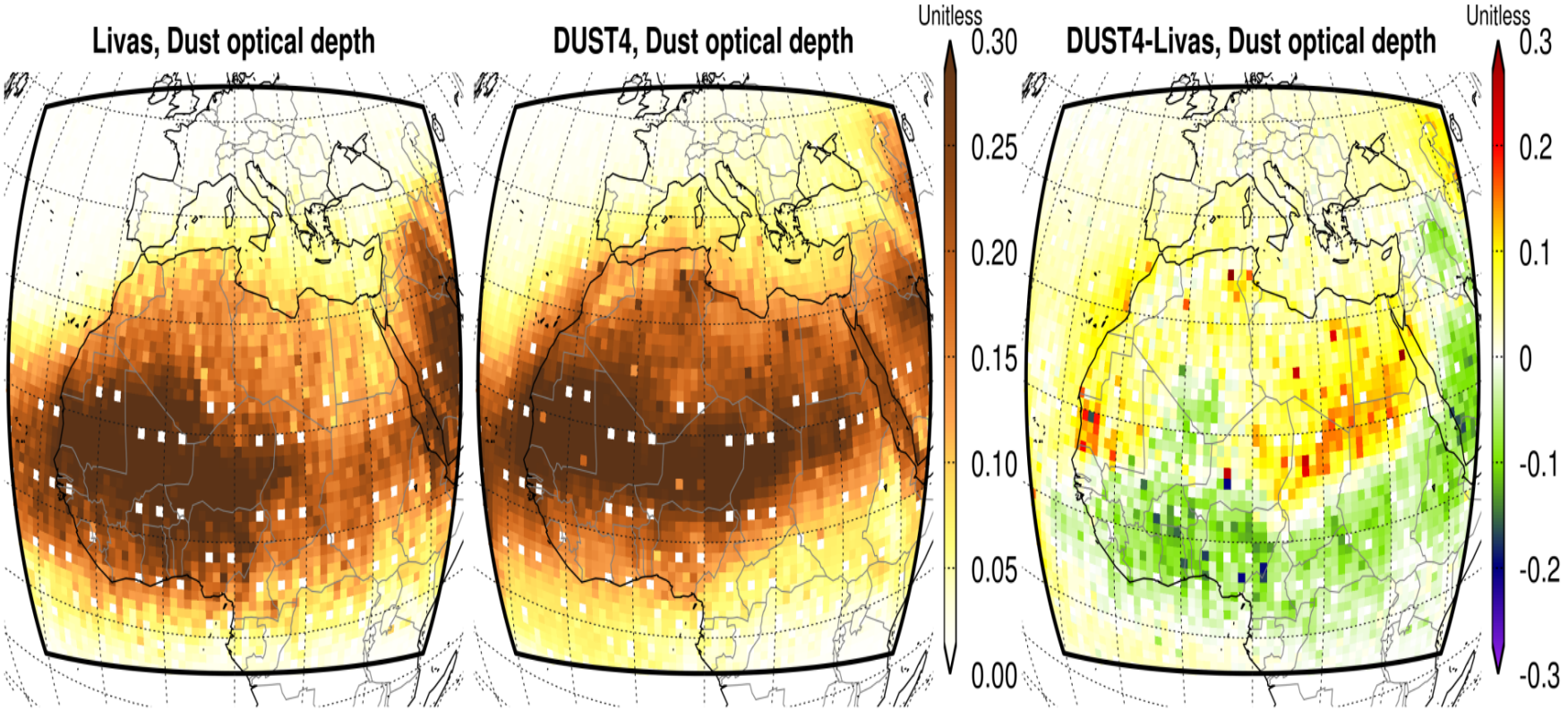
**Use of satellite data for optimizing regional climate projections.**

- Pilot study for the effect of dust aerosols on climate
- Evaluation and optimization of Regional Climate Models (e.g. RegCM4) coupled with dust aerosols

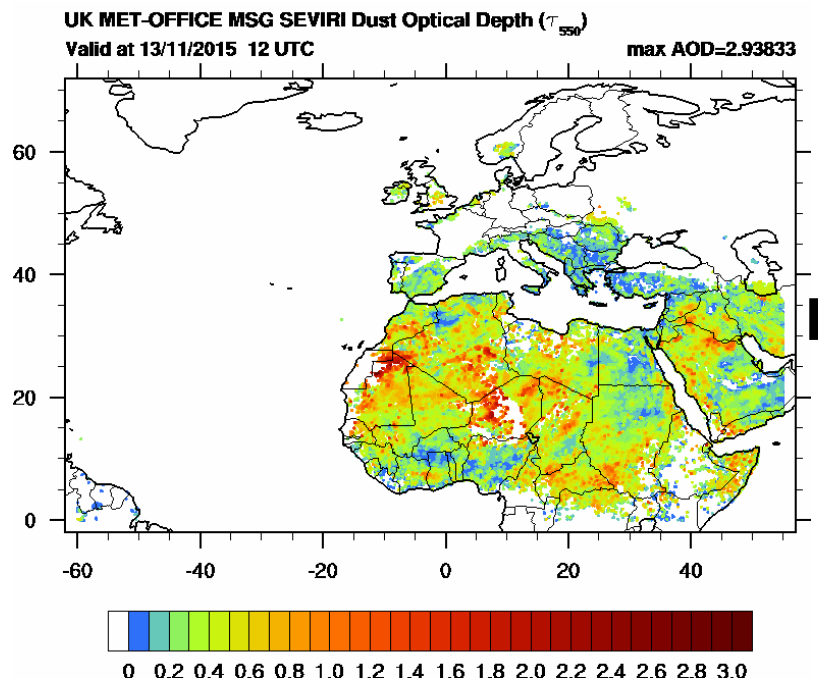
**Use of satellite data for assimilation in weather and natural hazards forecasts**

- Pilot study for the effects of dust aerosols on weather forecast
- Assimilation of satellite dust and biomass smoke in regional atmospheric models

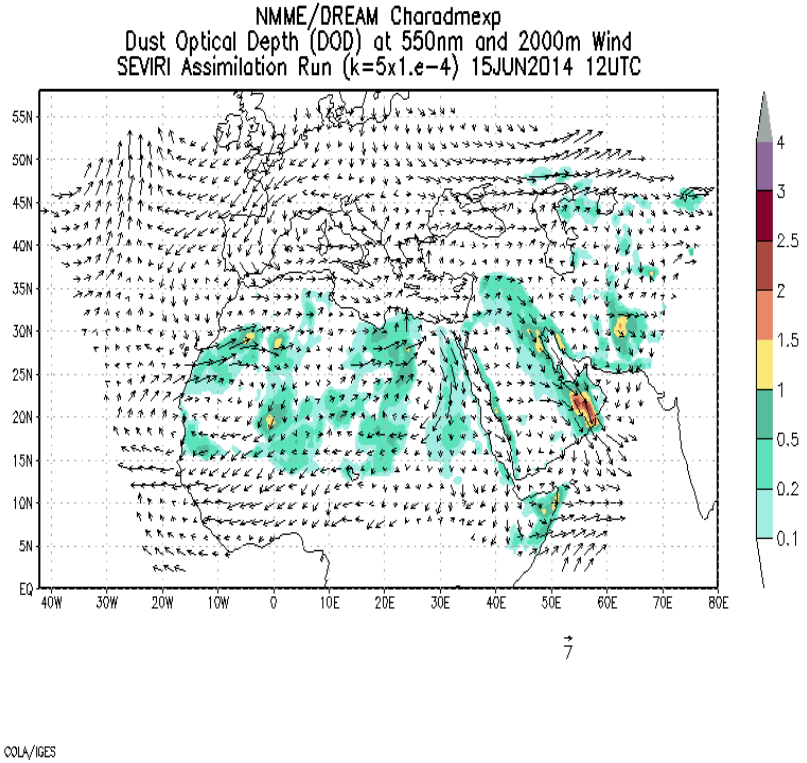
# Comparison of RegCM4 fields with the CALIPSO satellite database (LIVAS)



# Assimilation of MSG/SEVIRI dust in NMME-DREAM




**Dust initial field assimilation**




U.K. Met Office MSG dust optical thickness

NMME-DREAM model with dust assimilation



Solomos et al., 2016, COMECAP

thank you!

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