GEO-CRADLE:
Fostering regional cooperation and roadmap for GEO and Copernicus implementation in North Africa, Middle East and 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 €

http://geocradle.eu/

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Project Coordinator
Research Director NOA
GEO-CRADLE

... is a unique EU funded Coordination Action running at regional level;
... is looking at the territories of North Africa, Middle East and Balkans;

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

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

Define and communicate goals that are clear and beneficial from societal and market wise point of view, and also realistic and in line with the domestic priorities and user needs;

Proposes/sets up large scale regional initiatives based on the Earth Observation (space based and in-situ) for capacity building and also addressing societal priorities in the thematic areas of the project such as Adaptation to Climate Change, Access to Raw Materials, better exploitation of the renewable Energy resources, and Food Security.

Objectives

✓ Promote the uptake of EO services and data in response to regional needs.
✓ Support the effective integration of existing Earth Observation Capacities in the region.
✓ Facilitate the engagement of the complete ecosystem of EO stakeholders in the region.
✓ Enhance the participation in and contribution to the implementation of GEOSS and Copernicus in North Africa, Middle East and the Balkans.
Thematic Areas

- Adaptation to Climate Change (ACC)
- Improved Food Security – Water Extremes Management (IFS)
- Access to Raw Materials (ARM)
- Access to Energy (SENSE)
GEO-CRADLE

... is a unique EU funded Coordination Action running at regional level; ... is looking at the territories of North Africa, Middle East and Balkans.

It seeks to identify common needs, create synergies, and foster the regional cooperation and integration of monitoring capabilities and networks, as well as scientific, technological and human capacities.

Defining and communicating goals that are clear and beneficial from societal and market wise point of view, and also realistic and in line with the domestic priorities and user needs.

Proposes/sets up large scale regional initiatives based on the Earth Observation (space based and in-situ) for capacity building and also addressing societal priorities in the thematic areas of the project such as Adaptation to Climate Change, Access to Raw Materials, better exploitation of the renewable Energy resources, and Food Security.

- **Promote** the uptake of EO services and data in response to regional needs.
- **Support** the effective integration of existing Earth Observation Capacities in the region.
- **Facilitate** the engagement of the complete ecosystem of EO stakeholders in the region.
- **Enhance** the participation in and contribution to the implementation of GEOSS and Copernicus in North Africa, Middle East and the Balkans.
GEO-CRADLE brings together a highly-complementary team combining a strong background in GEO-related coordination activities with proven excellence in the field of Earth Observation:

- Leading research institutes and universities
- Highly-esteemed international associations
- Service Providers with strong regional presence

NATIONAL OBSERVATORY OF ATHENS
Coordinator
Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related initiatives toward GEOSS

The Project Pillars

To join the network follow the link to create your profile:
http://cpdev.crowdpolicy.com/geo-cradle-stakeholders/

To join the network follow the link to create your profile

To join & search the network follow the link
http://cpdev.crowdpolicy.com/geo-cradle-stakeholders/
The Project Pillars

To join the network follow the link to create your profile:
http://cpdev.crowdpolicy.com/geo-cradle-stakeholders/

The GEO CRADLE Regional Data Hub (GC-RDH) is going to provide its users with a transparent discovery and access mechanism of the GEOSS portal’s resources, and other regional portals! This mechanism will heavily rely on the GEO Discovery and Access Broker (DAB) APIs which is a middleware component in charge of interconnecting the heterogeneous and distributed capacities contributing to GEOSS; part of the GEOSS Common Infrastructure (GCI) since November 2011.
Utilizing the GEO DAB APIs for easy access and discovery of regional EO data
Utilizing the GEO DAB APIs for easy access and discovery of regional EO data

Mediterranean acidification under the influence of climate change as well as associated economic impacts.

Projections will be based on new observations of chemical conditions as well as new observational and experimental data on the responses of key organisms and ecosystems to acidification, which will be fed into existing ocean models that have been improved to account for the Mediterranean's fine-scale features. These scientific advances will allow us to provide the best advice to policymakers who must develop regional strategies for adaptation and mitigation.

Data and Resources

Dataset info

These fields are compatible with DCAT, an RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>Publisher</td>
<td>Global Earth Observation System of Systems (GEOSS)</td>
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<tr>
<td>Modified Date</td>
<td>2012-03-02</td>
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<td>Release Date</td>
<td>2012-03-02</td>
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Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related initiatives toward GEOSS

The Project Pillars

http://cpdev.crowdpolicy.com/geo-crable-stakeholders/

The Regional Priorities

Priority Definition Workflow

1. Identify recommendations
   - Identify national EO recommendations as perceived from GEO-CRADLE partners.

2. Define the priority framework
   - Propose a priority framework
   - What are the criteria to consider in the definition of priority goals?

3. Develop the regional action plan
   - Builds upon the national priorities the regional priorities by looking at the commonalities of national actions with the RoI as well as the specificity of the region.

4. Validate the action plan
   - Validate the action plan with decision makers.
   - How to ensure that the action plan is in adequacy with real needs in the RoI?
The Regional Priorities
Adaptation to Climate Change (ACC)

The ACC pilot will pave the ground for the holistic monitoring and forecasting of region-specific atmospheric components, ECVs and hazards, in line with the standards and vision of GEOSS and Copernicus for information extraction and service delivery regarding the Climate SDG.

Specifically, the GEO-CRADLE ACC will provide 3 services on respective thematic pillars:
1. Desert dust services
2. Regional climate change projection services
3. Air quality services

Gap Analysis of the Regional Climate related Capacities

End-users expressing interest in the ACC pilot
(from the results of end user survey and gap analysis)

- Tourism sector for dust forecasting
- Meteorological agencies for dust forecasting
- Civil aviation for dust forecasting
- Insurance companies for Climate Change services
- Agriculture sector for Climate Change services
- Water river basin agencies for Climate Change services
The Regional Priorities
Adaptation to Climate Change (ACC)

The interactive web application “Climate-Protection” will provide accurate past-present-future climate information using Essential Climate Variables (ECVs) and Climate Indices (CI). These open-access information are especially important for the following sectors:

**Energy**
Potential solar and power production, as well as estimated energy requirements of households.

**Agriculture**
Droughts, intense rainfall, frost, evaporation or even growing season periods for plants.

**Natural Hazards**
Extreme rainfall, intense wind velocity and fires.

**Tourism**
Favorable summer and winter conditions for tourists by combining various Essential Climate Variables.
### Indicative list of Climate variables and indices

<table>
<thead>
<tr>
<th>Climate Indices</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1.1 Mean near surface temperature</td>
<td>Fundamental</td>
</tr>
<tr>
<td>C1.2 Precipitation rate</td>
<td>Fundamental</td>
</tr>
<tr>
<td>C1.3 Maximum near surface temperature</td>
<td>Fundamental, extremes</td>
</tr>
<tr>
<td>C1.4 Minimum near surface temperature</td>
<td>Fundamental, extremes</td>
</tr>
<tr>
<td>C1.5 Wind speed at 10m, 50m, 100m and 200m</td>
<td>Fundamental, Energy, natural disasters</td>
</tr>
<tr>
<td>C1.6 Surface absorbed solar radiation</td>
<td>Fundamental, Energy, Tourism, Agriculture</td>
</tr>
<tr>
<td>C1.7 95th percentile of rain day amounts</td>
<td>Extremes, natural disasters</td>
</tr>
<tr>
<td>C1.8 95th percentile of wind speed at 10 m</td>
<td>Extremes, natural disasters</td>
</tr>
<tr>
<td>C1.9 Annual greatest 5-day total rainfall</td>
<td>Extremes, natural disasters</td>
</tr>
<tr>
<td>C1.10 Fraction % of total rainfall from events &gt; long-term P90</td>
<td>Extremes, natural disasters</td>
</tr>
<tr>
<td>C1.11 Number of events &gt; long-term 90th percentile of rain days</td>
<td>Extremes, natural disasters</td>
</tr>
<tr>
<td>C1.12 Number of frost days Tmin &lt; 0 degC</td>
<td>Extremes</td>
</tr>
<tr>
<td>C1.13 Heat Wave Duration Index</td>
<td>Agriculture, Tourism</td>
</tr>
<tr>
<td>C1.14 Standardized Precipitation Index (SPI)</td>
<td>Agriculture, Water resources</td>
</tr>
<tr>
<td>C1.15 Potential evaporation</td>
<td>Agriculture</td>
</tr>
<tr>
<td>C1.16 Growing season duration (GSD)</td>
<td>Agriculture</td>
</tr>
<tr>
<td>C1.17 Tourism Climate Index (TCI)</td>
<td>Tourism</td>
</tr>
<tr>
<td>C1.18 Snow depth (SnowD)</td>
<td>Tourism</td>
</tr>
<tr>
<td>C1.19 Heating Degree Day (HDD)</td>
<td>Energy</td>
</tr>
<tr>
<td>C1.20 Cooling Degree Day (CDD)</td>
<td>Energy</td>
</tr>
</tbody>
</table>
The September 2015 Middle East dust-storm results in dramatic reduction of visibility in Limassol (Mamouri et al., 2016, ACP). Landuse changes (desertification) and local meteorology increased the severity of this episode (Solomos et al., 2016, ACPD).
Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related initiatives toward GEOSS

EUFAR

Athens - ACTRIS

Finokalia - ACTRIS

AMOS - ACTRIS

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Soil Spectral Library (Task 4.2 – IFS pilot)

Prediction (spectral based) models of field moisture and clay content

<table>
<thead>
<tr>
<th>Property</th>
<th>ΣFC, SPF, SEL</th>
<th>ΣA</th>
<th>Prediction equation</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Field Moisture (SFM)</td>
<td>0.045, 0.14, 0.016</td>
<td>0.945</td>
<td>( w_1 \times 0.353 + w_1 \times 1.60 + 0.39 \times 0.08 )</td>
<td>1.65 μm reflectance slope</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>0.003, 0.016, 0.002</td>
<td>0.627</td>
<td>( w_1 \times 0.37 + w_1 \times 0.64 \times 1.84 + 0.062 \times 0.062 )</td>
<td>0.646 μm reflectance slope</td>
</tr>
</tbody>
</table>

Flood Forecast Model (Task 4.2 – WEM)

Pixel by pixel map on Sentinel -2 data using prediction models

Sentinel-2 Satellite
The Regional Priorities
Access to Raw Materials (ARM)

Establishing a roadmap for long-term monitoring, mapping, and management of Quarries, Mineral Deposits in the ROI.

- Use of existing regional capacities and skills
  - Development of protocol for evaluating the level of impact
  - Mapping of quarries and waste materials in abandoned mines
  - Monitoring of ground deformation during/after mining

- Identification, collection, assessment and use of EO based and in-situ data
- Enrichment of the information content of the Regional Data Hub
SOLar Energy Applications
The Solar Energy Nowcasting SystEm (SENSE) pilot

**SENSE**

- Solar power production now-casting and forecasts, from t+0 min to t+2 hours ahead, with a time resolution from 15 minutes
- Nowcasts and forecasts on different spatial horizons: from the local plant production to the country scale
- Integration in any already existing Information System. Possibility to add meteorological sensors on-site to optimize forecasts
- Use of solar irradiance spectra for: Agricultural, health, biological and scientific application and studies

**Users:** Municipalities, private and government based Energy transmission operators, solar farms, renewable energy planning, smart phone apps, health and agricultural sectors, scientific community
Areas with optimum solar energy potential

Operational energy planning

Areas with optimum solar energy potential

Optimum locations for CSP & PV installations using solar Atlas energy maps
Solar radiation related products

UV Index, Aegean and Adriatic sea
1. **Submit to the EC a roadmap** with funding priorities in relation to capacity building, filling in gaps (networks, infrastructures, data sharing, skills), training, education, service provision, and business uptake at regional level.

2. **Engage the countries and regional stakeholders** in the data sharing process, the use of open standards, and facilitate the access of the local actors to existing portals, web servers, data repositories, and satellite image archives through big infrastructures such as GEOSS, the European Data Portal, Copernicus data/service portals, and any existing regional Data Hubs (e.g. GEO-CRADLE RDH).
The GEO-CRADLE Contribution

3. **Generate and sustain a network stakeholders** to ensure visibility, and sharing of knowhow, excellence, and skills between the local actors and their counterparts worldwide

4. **Deliver a prototype methodology and a detailed assessment** on the nations’ (market and science) maturity in relation to EO. Compare the regional capacity/state-of-the-art with the ones of developed countries in space, and find the complementary roles where they exist

5. **Support the EO market** uptake and internationalisation by,
   - Understanding the local market, and capacities
   - Mapping existing policies in sectors that may need support from EO
   - Facilitating access to open data
   - Mapping the local competitive landscape
   - Engaging the end-user community
   - Facilitating partnering with international interlocutors (companies, researchers, industries)
   - Building trust / Overcoming cultural and linguistic issues

6. **Advance the role of the countries in GEO, and Copernicus** by,
   - Setting up local GEO offices, Copernicus Relay Offices, and/or nominating official GEO representations at various levels
   - Strengthening the EO industrial/research dimension by using Copernicus & GEO as key drivers
   - Helping the stakeholders understand how they can benefit from and contribute to GEOSS & Copernicus
EU Funding Opportunities
European Structural and Investment Funds (ESIF) 2014-2020

1) European Regional Development Fund (ERDF)*
2) European Social Fund (ESF)
3) Cohesion Fund (CF)
4) European Maritime and Fisheries Fund (EMFF)
5) European Agricultural Fund for Rural Development (EAFRD)
   * including European Territorial Cooperation (ETC) / INTERREG


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EU Funding Opportunities
European Structural and Investment Funds (ESIF) 2014-2020

Available budget for 2014-2020
(in Billions €)

- The European Regional Development Fund (ERDF)
- The European Social Fund (ESF)
- The Cohesion Fund (CF)
- The European Maritime and Fisheries Fund (EMFF)
- The European Agricultural Fund for Rural Development (EAFRD)

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EU Funding Opportunities
European Structural and Investment Funds (ESIF) 2014-2020

MAP 1: CATEGORIES OF REGIONS FOR THE ERDF, ESF AND EAFRD 2014-2020

MAP 2: MEMBER STATES ELIGIBLE FOR COHESION FUND SUPPORT 2014-2020

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EU Funding Opportunities
European Structural and Investment Funds (ESIF) 2014-2020

The Common Strategic Framework also sets out practical ways to build synergies between the ESI Funds and other EU policies and instruments:

- Common agricultural policy
- Common fisheries policy
- Horizon 2020
- Life
- Erasmus+
- Connecting Europe Facility
- Instrument for Pre-accession Assistance
- European Neighbourhood Instrument
- European Development Fund

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EU Funding Opportunities

EU Framework Programme for Research and Innovation (Horizon 2020)

https://ec.europa.eu/programmes/horizon2020/

H2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020), enhancing EU international research and Third Country participation.

Excellent Science
- European Research Council
- Future and Emerging Technologies
- Marie Skłodowska-Curie actions
- Research Infrastructures, including e-Infrastructures

Industrial Leadership
- Leadership in Enabling and Industrial Technologies
  - Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology
  - Information and Communication Technologies
- Space
- Access to risk finance
- Innovation in SMEs

Societal Challenges
- Health, Demographic Change and Wellbeing
- Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy
- Secure, Clean and Efficient Energy
- Smart, Green and Integrated Transport
- Climate Action, Environment, Resource Efficiency and Raw Materials
- Europe in a changing world - Inclusive, innovative and reflective societies
- Secure societies – Protecting freedom and security of Europe and its citizens

Spreading Excellence and Widening Participation
- Cross-cutting activities (focus areas)
- Fast Track to Innovation Pilot
- European Institute of Innovation and Technology (EIT)
- Euratom
- Smart Cyber-Physical Systems

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Highly relevant to GEO-CRADLE!
EU Funding Opportunities
EU Framework Programme for Research and Innovation (Horizon 2020)

HORIZON 2020 BUDGET (EUR 78.6 billion, current prices)

- **Industrial Leadership**
  - EUR 17.0 billion

- **Societal Challenges**
  - EUR 29.7 billion

- **Excellent Science**
  - EUR 24.4 billion

- **European Institute of Innovation and Technology**
  - EUR 2.7 billion

- **Euratom**
  - EUR 1.6 billion

- **Other**
  - EUR 3.2 billion

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The PRIMA initiative

The Commission has agreed on a proposal for a Partnership for Research and Innovation in the Mediterranean Area, PRIMA, which is set to develop much-needed novel solutions for sustainable water management and food production.

Funding for the €400 million partnership will come from the participating countries (currently around €200 million), matched by a €200 million contribution from the EU through its current research framework programme Horizon 2020.

The partnership is scheduled to run for 10 years, starting in 2018.

http://ec.europa.eu/research/environment/index.cfm?pg=prima

http://geocradle.eu
The IPA provides assistance to countries directly in line to become members of the European Union (candidate countries: Albania, Montenegro, Serbia, the former Yugoslav Republic of Macedonia, and Turkey), as well as the rest Balkan countries (potential candidates: Bosnia-Herzegovina and Kosovo*).

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

https://ec.europa.eu/neighbourhood-enlargement/instruments/overview_en

http://geocradle.eu
The IPA is the means by which the EU supports reforms in the 'enlargement countries' with financial and technical help. The IPA funds build up the capacities of the countries throughout the accession process, resulting in progressive, positive developments in the region.

Budget of IPA II for 2014-2020: € 11.7 billion.

<table>
<thead>
<tr>
<th>Country</th>
<th>2016</th>
<th>Pre-accession assistance is an investment in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>89.7</td>
<td>✓ Public administration reform</td>
</tr>
<tr>
<td>Bosnia &amp; Herzegovina</td>
<td>42.7</td>
<td>✓ Rule of law</td>
</tr>
<tr>
<td>The former Yugoslav Republic of Macedonia</td>
<td>91.6</td>
<td>✓ Sustainable economy</td>
</tr>
<tr>
<td>Kosovo*</td>
<td>88.7</td>
<td>✓ People</td>
</tr>
<tr>
<td>Montenegro</td>
<td>37.4</td>
<td>✓ Agriculture and rural development</td>
</tr>
<tr>
<td>Serbia</td>
<td>207.9</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>630.7</td>
<td></td>
</tr>
<tr>
<td>Multi-country</td>
<td>390.0</td>
<td></td>
</tr>
</tbody>
</table>

Highly relevant to GEO CRADLE!
The ENI funds the European Neighbourhood Policy (ENP) which covers cooperation with EU’s 16 Neighbours.

Russia takes part in Cross-Border Cooperation activities under the ENP and is not a part of the ENP as such.

* SYRIA: EU Cooperation with Syria is currently suspended due to the political situation

** PALESTINE: This designation does not entail any recognition of Palestine as a state and is without prejudice to positions on the recognition of Palestine as a state.


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EU Funding Opportunities
European Neighbourhood Instrument (ENI)

Budget of ENI for 2014-2020: € 15.4 billion.


http://geocradle.eu

Highly relevant to GEO-CRADLE!
The DCI covers all the developing countries except the countries eligible for the Pre-Accession Instrument. There are 3 specific components covered:

- **Geographic programmes** support cooperation with around 47 developing countries in Latin America, South Asia and North and South East Asia, Central Asia, Middle East and South Africa. They support actions based on the European Consensus for Development and the following areas:
  - Human rights, democracy and good governance
  - Inclusive and sustainable growth for human development (e.g. health, education, social protection, sustainable agriculture, food and nutrition security...)
  - Migration and asylum
  - The link between humanitarian relief and development cooperation
  - Resilience and disaster risk reduction
  - Development and security, including conflict prevention.

- **Thematic programmes**
- **Pan-African Programme**

Highly relevant to GEO-CRADLE!

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The DCI covers all the developing countries except the countries eligible for the Pre-Accession Instrument. There are 3 specific components covered:

- **Geographic programmes**
- **Thematic programmes**
- **Pan-African Programme**

**Thematic programmes** benefit all developing countries (including those covered by the ENPI and the EDF). These programmes add value, complementarity and coherence to the geographical programmes. There are 2 categories:

- **'Global public good and challenges':** this programme addresses climate change, environment, energy, human development, food security and migration while ensuring coherence with the poverty reduction objective. No less than 27% of this programme is spent on climate change and environment objectives. At least 25% of the programme is used to support social inclusion and human development.

- **'Civil society organisations and local authorities':** this programme provides greater support to civil society and local authorities to encourage them to play a bigger role in development strategies.

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EU Funding Opportunities
Development Cooperation Instrument (DCI)

The newly established Pan-African Programme supports the strategic partnership between the EU and Africa. This programme complements other financing instruments which are used in Africa (in particular ENI and EDF) and supports activities of trans-regional, continental or global nature in and with Africa.

Highly relevant to GEO-CRADLE!

Geographic programmes
Thematic programmes
Pan-African Programme

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Thank You

Thank you!