



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

WATER EXTREMES MANAGEMENT

Water extremes mapping with EO: the FloodHub
service of the BEYOND Center of Excellence

Alexia Tsouni, NOA, Greece



Limassol, Cyprus – 16/11/2016





Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

Relevant needs registered in D2.5 User Need Analysis Report I

FLOODS

- Serbia, Romania, Bulgaria:
 - ✓ Information needs
 - ✓ Funding schemes that have allowed users to obtain geoinformation
- FYROM, Albania:
 - ✓ Information needs
 - ✓ Current data sources and data access
 - ✓ Regulations driving geo-information use
- Greece, Cyprus, Turkey:
 - ✓ Information needs
 - ✓ Current data sources and data access
 - ✓ Regulations driving geo-information use
- Morocco, Tunisia, Egypt, Israel:
 - ✓ Information needs
- Saudi Arabia, United Arab Emirates:
 - X



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Relevant needs registered in D2.5 User Need Analysis Report I

CONCLUSIONS

- **General observations and constraints:**
 - ✓ In the Balkans, Middle East and North Africa a common predominant topic is climate change - and in its water management aspects (the use of water for irrigation, or in risk management and coastal zone management).
- **Geo-information needs:**
 - ✓ Natural risks, notably drought, floods...
- **Recommendation for further exploration of end-user needs:**
 - ✓ Food security and water extremes management:
Greece, Albania, Serbia, Tunisia, Turkey, Romania, Morocco, FYROM, Egypt
 - ✓ Climate change and water management:
Morocco, Tunisia, Egypt, Israel, Saudi Arabia, Turkey



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Relevant EC initiative: The PRIMA initiative

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

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RESEARCH & INNOVATION Environment

European Commission > Research & Innovation > Environment > Initiatives > PRIMA

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Initiatives

The PRIMA initiative

In recent years, the agricultural sector in the Mediterranean has been suffering from severe water shortages and decreasing crop yields. Today, 180 million people in the Mediterranean basin are considered 'water poor'. The lack of clean water and nutritious food has adverse effects on the health and stability of the populations.



Documents

- Commission Proposal 18 October 2016: [Press Release](#) | [Memo](#) | [EC Proposal](#)
- [PRIMA Joint Programme](#)
- [PRIMA Joint Programme – Addendum](#) (9.0 MB)
- [PRIMA Inception Impact Assessment](#)
- [PRIMA Impact Assessment Consultation Strategy](#)

Contact

For further information on PRIMA Stakeholder Consultation, please send an e-mail to: RTD-PRIMA-STAKEHOLDER.





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Relevant EC initiative: 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.
- The Commission's proposal already includes Cyprus, Czech Republic, Egypt, France, Greece, Israel, Italy, Lebanon, Luxembourg, Malta, Morocco, Portugal, Spain and Tunisia. The participation of Germany is currently under negotiation. As the initiative is evolving over time, more participants are expected to follow, both EU and non-EU countries.
- 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.



Limassol, Cyprus – 16/11/2016

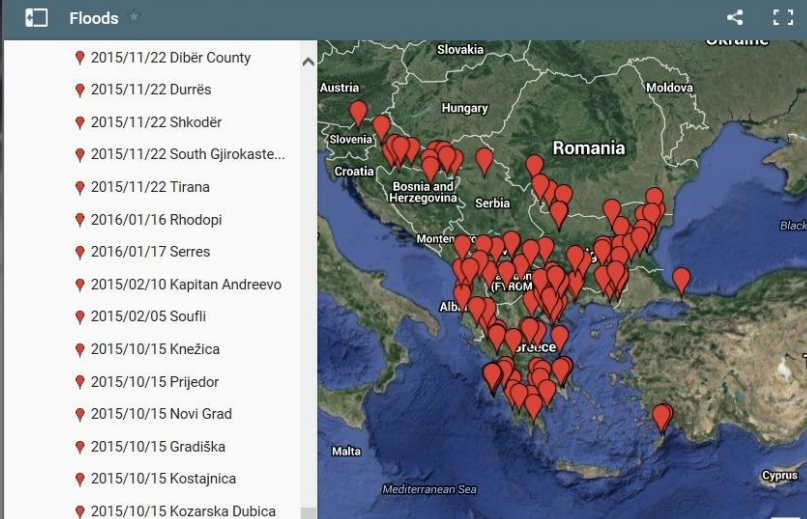


Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

BEYOND's Floods Observatory for Greece & South-Eastern Europe

FLOODS OBSERVATORY / ΠΑΡΑΤΗΡΗΤΗΡΙΟ ΠΛΗΜΜΥΡΩΝ

WITHIN THE FRAMEWORK OF THE BEYOND PROJECT SINCE JUNE 2013 / ΣΤΟ ΠΛΑΙΣΙΟ ΤΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ BEYOND ΑΠΟ ΤΟΝ ΙΟΥΝΙΟ ΤΟΥ 2013



We register major flood events and we publish the flood mapping results produced following the processing and photo-interpretation of satellite Optical and SAR images.

Bosnia and Herzegovina Flood - May 22, 2014



Limassol, Cyprus – 16/11/2016





Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

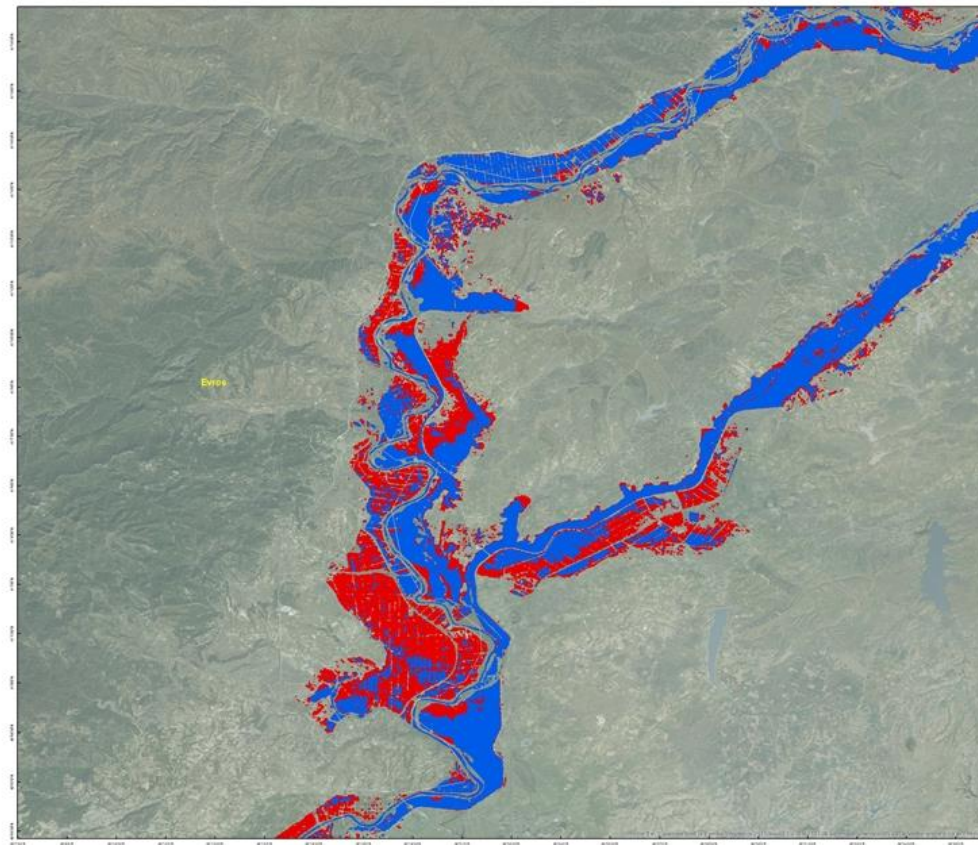
BEYOND's
Floods
Observatory
for Greece &
South-Eastern
Europe

Case study:
Floods in
Greece, Evros
10/02/2015



BEYOND

Floods Observatory



Soufli Area, Greece
Flood Extent Map, 10/02/2015

Production date: 02/05/2016



Cartographic Information

1:175.000

0 25 50 Kilometers

Grid: WGS 1984 Coordinate System

Legend

- Administrative Boundaries
- Pre-flood extent: 29/01/2015
- Post-flood extent: 02/10/2015

Map Information

The map has been produced by the BEYOND Centre of Excellence. The purpose of the current product is to map the flood extent of the flood event occurred on 10/02/2015 in the area of Soufli.

Data Sources

Inset map based on: ESRI World Imagery Basemap
Processed Imagery: Sentinel 1 SAR images acquired on 29/01/2015 and 10/02/2015. Vector layer: Administrative boundaries from GADM (Global Administrative Areas) database.

Map Production

The map shows the water extent before and after the flood event that occurred in the area of Soufli on 10/02/2015. The pre-flood and post-flood Sentinel 1 SAR GRDH images have been used for the production of the current map. Image processing was done using ESA SNAP v3.0 toolbox. The steps followed were: 1. Radiometric calibration, 2. Speckle noise filtering, 3. Terrain correction, 4. Application of Dem, Permanent water and LULC masks, 5. K-means clustering, 6. Photointerpretation

Dissemination/Publication

The product is available through the BEYOND website at the following URL: <http://beyond-eo-center.eu/index.php/floods>

Framework

The map, elaborated in the framework of the BEYOND project, is realised to the best of our ability. All geographic information has limitations due to scale, resolution and date of original data sources.

Contact

E-mail: kortoes@noa.gr, alexliatsouni@noa.gr

BEYOND funded under: FP7-REGPOT-2012-2013-1



Limassol, Cyprus – 16/11/2016



Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

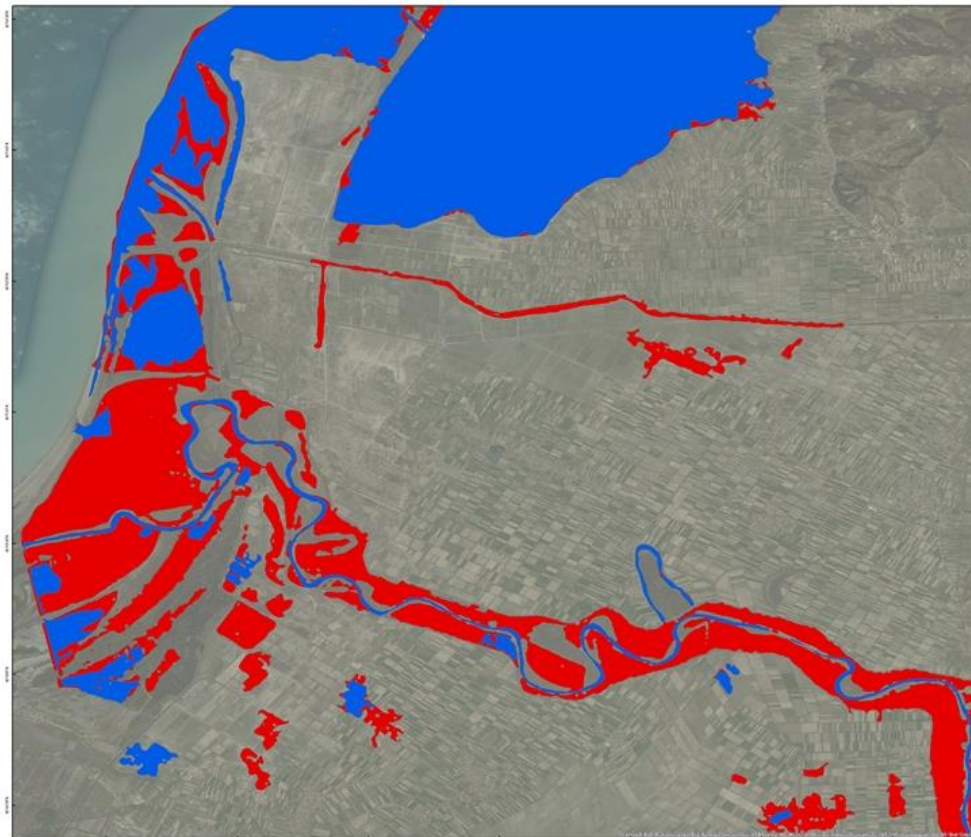
BEYOND's
Floods
Observatory
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South-Eastern
Europe

Case study:
Floods in
Albania
02/02/2015



BEYOND

Floods Observatory



Central & South Albania
Flood Extent Map, 02/02/2015
Production date: 30/04/2016



Cartographic Information

1:70,000
0 7.5 15 Kilometers
Grid: WGS 1984 Coordinate System

Legend

- Administrative Boundaries
- Pre-flood extent: 21/01/2015
- Post-flood extent: 02/02/2015

Map Information

The map has been produced by the BEYOND Centre of Excellence. The purpose of the current product is to map the flood extent of the flood event occurred on 02/02/2015 in the Central and Southern areas of Albania.

Data Sources

Inset map based on: ESRI World Imagery Basemap
Processed Imagery: Sentinel 1 SAR images acquired on 21/01/2015 and 02/02/2015. Vector layer: Administrative boundaries from GADM (Global Administrative Areas) database.

Map Production

The map shows the water extent before and after the flood event that occurred in areas of Central and South Albania on 02/02/2015. The pre-flood and post-flood Sentinel 1 SAR GRDH images have been used for the production of the current map. Image processing was done using ESA SNAP v1.0 toolbox. The steps followed were: 1. Radiometric calibration, 2. Speckle noise filtering, 3. Terrain correction, 4. Application of Dem, Permanent water and LULC masks, 5. K-means clustering, 6. Photointerpretation

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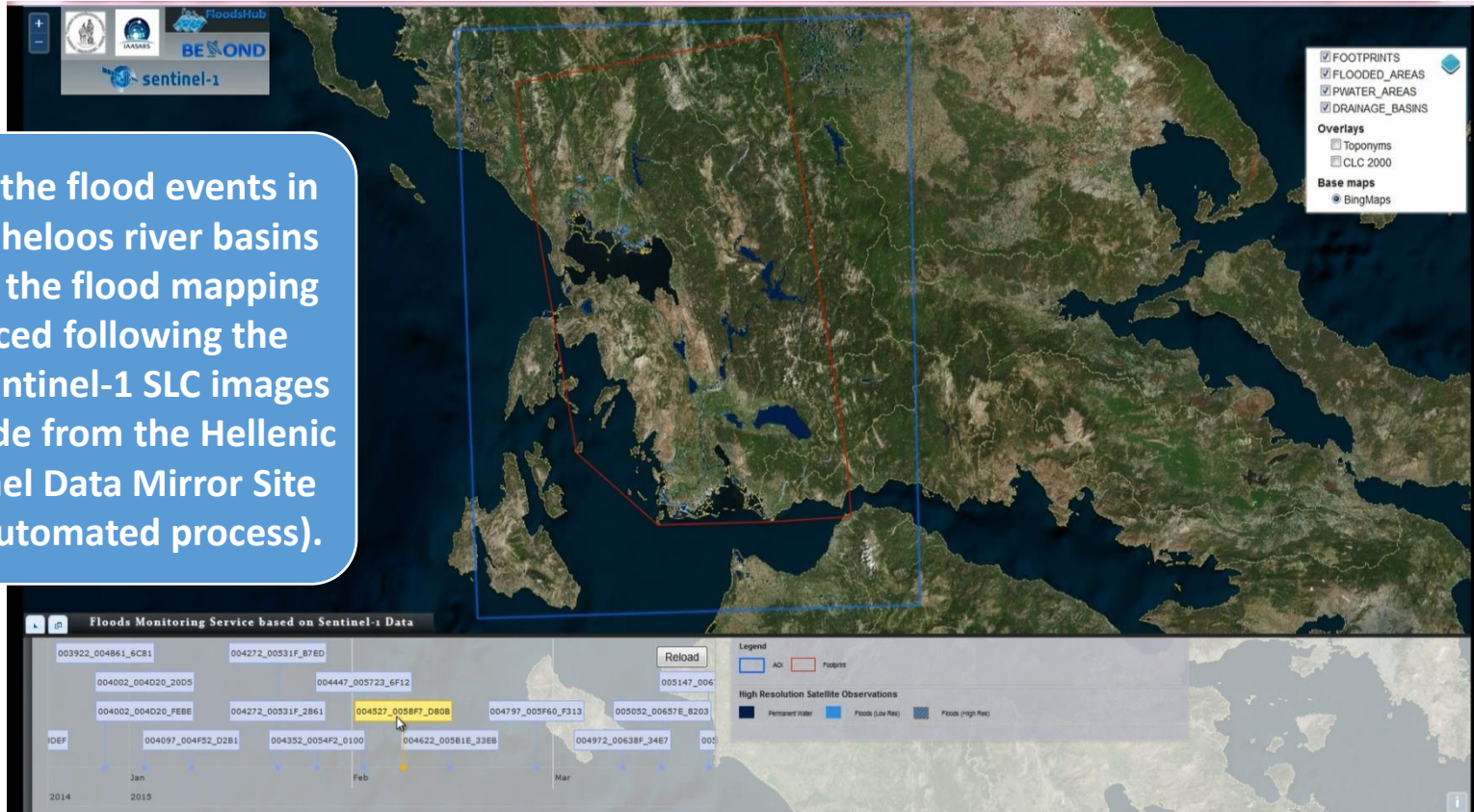


Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

FloodHub: BEYOND's Floods Monitoring Service

Overview

We monitor all the flood events in Arachthos & Acheloos river basins and we publish the flood mapping results produced following the processing of Sentinel-1 SLC images of IW swath mode from the Hellenic National Sentinel Data Mirror Site (the first fully automated process).



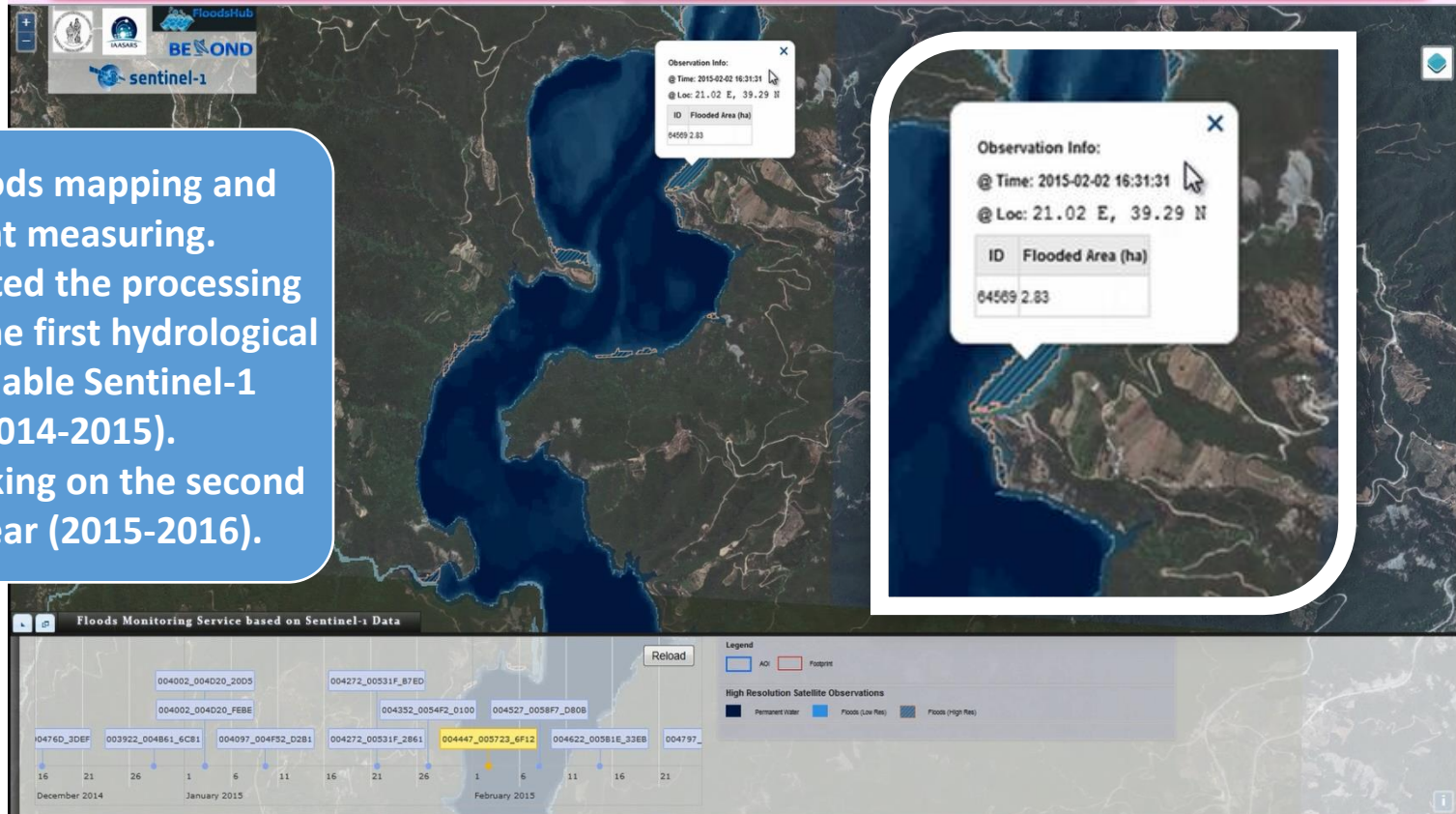


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FloodHub: BEYOND's Floods Monitoring Service

Detail

We provide floods mapping and floods extent measuring.
We have completed the processing and analysis for the first hydrological year with available Sentinel-1 images (2014-2015).
We are now working on the second hydrological year (2015-2016).

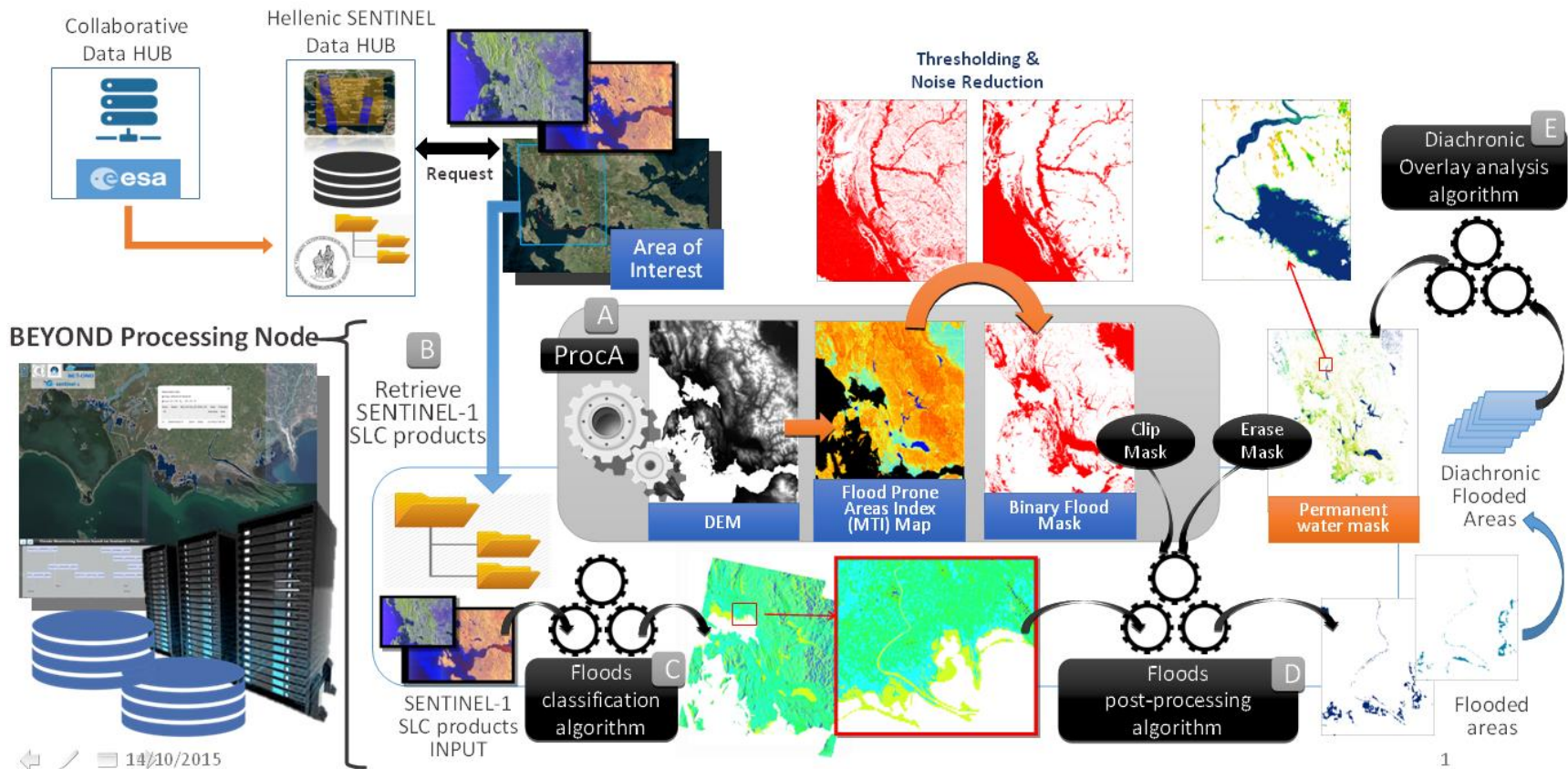




Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

FloodHub: BEYOND's Floods Monitoring Service

Architecture

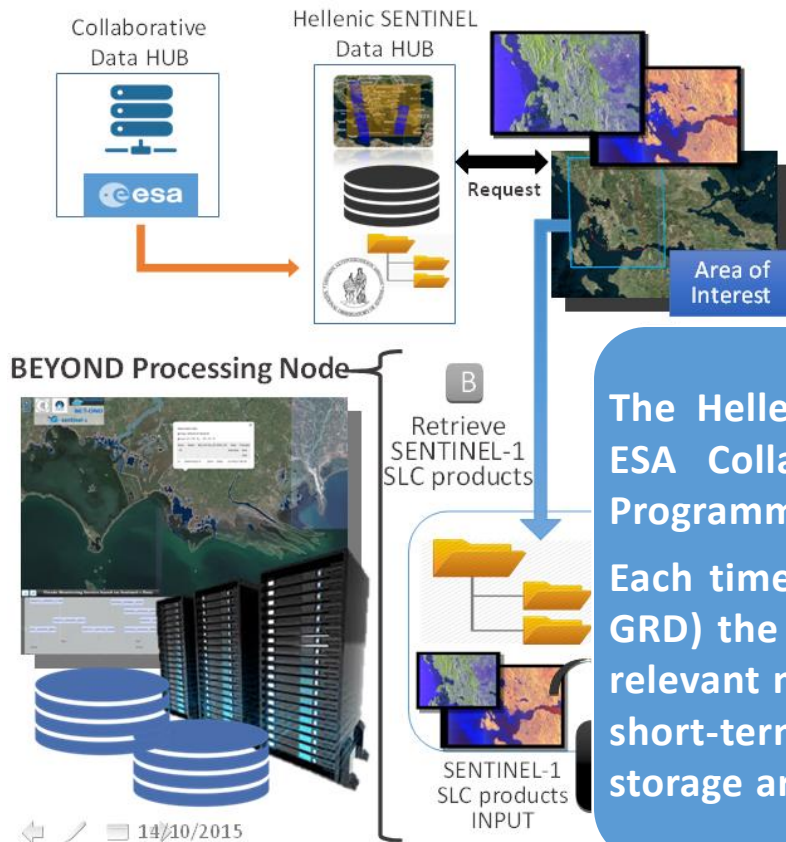




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FloodHub: BEYOND's Floods Monitoring Service

Architecture



DATA RETRIEVAL

The Hellenic SENTINEL Data HUB continuously monitors the ESA Collaborative Data HUB via a dedicated Application Programming Interface (API).

Each time a SENTINEL acquisition is available (Level-1, SLC or GRD) the Hellenic SENTINEL Data HUB extracts and stores the relevant metadata as well as the acquisition raw data first at a short-term and finally at a local (NOA premises) long-term storage archive (100 TB volume).



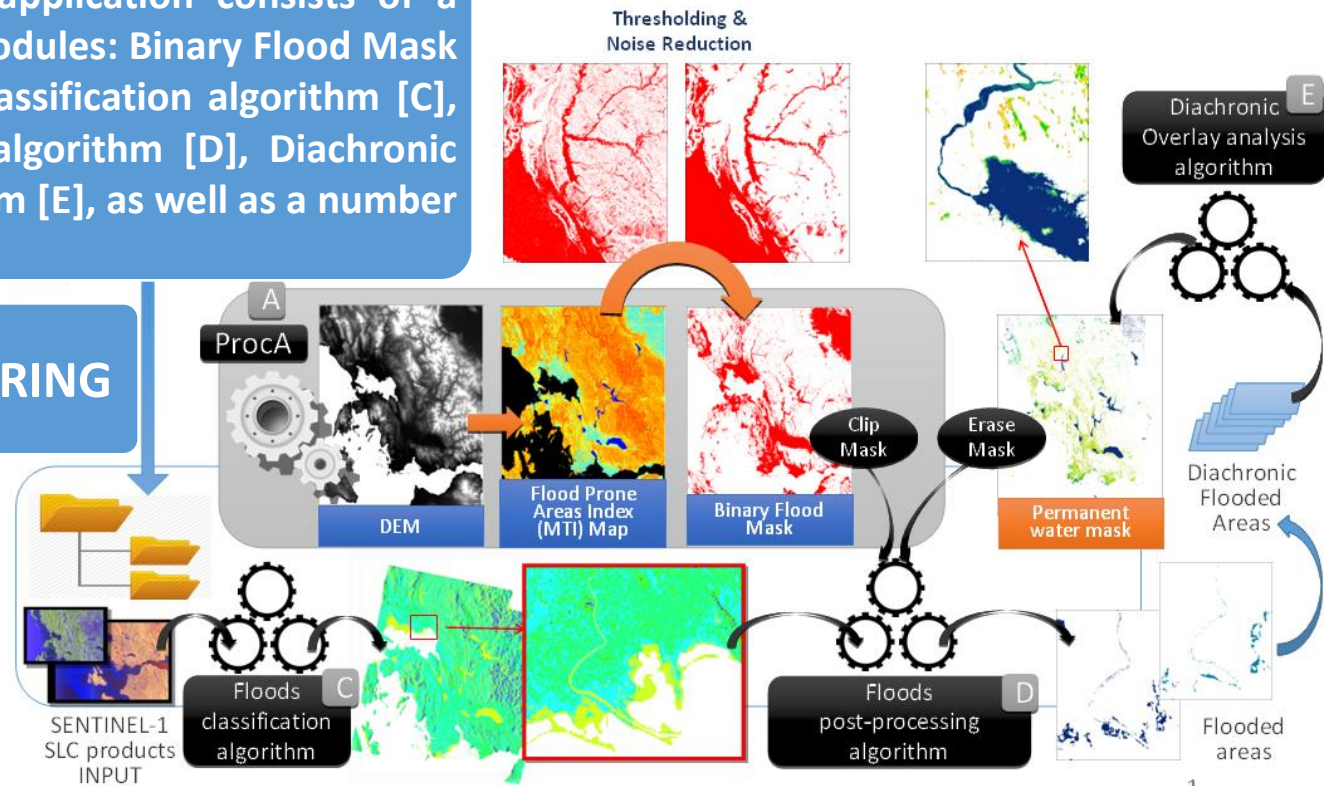
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FloodHub: BEYOND's Floods Monitoring Service

Architecture

The floods monitoring application consists of a number of processing modules: Binary Flood Mask extraction [A], Floods classification algorithm [C], Floods post-processing algorithm [D], Diachronic Overlay analysis algorithm [E], as well as a number of input data layers.

FLOODS MONITORING





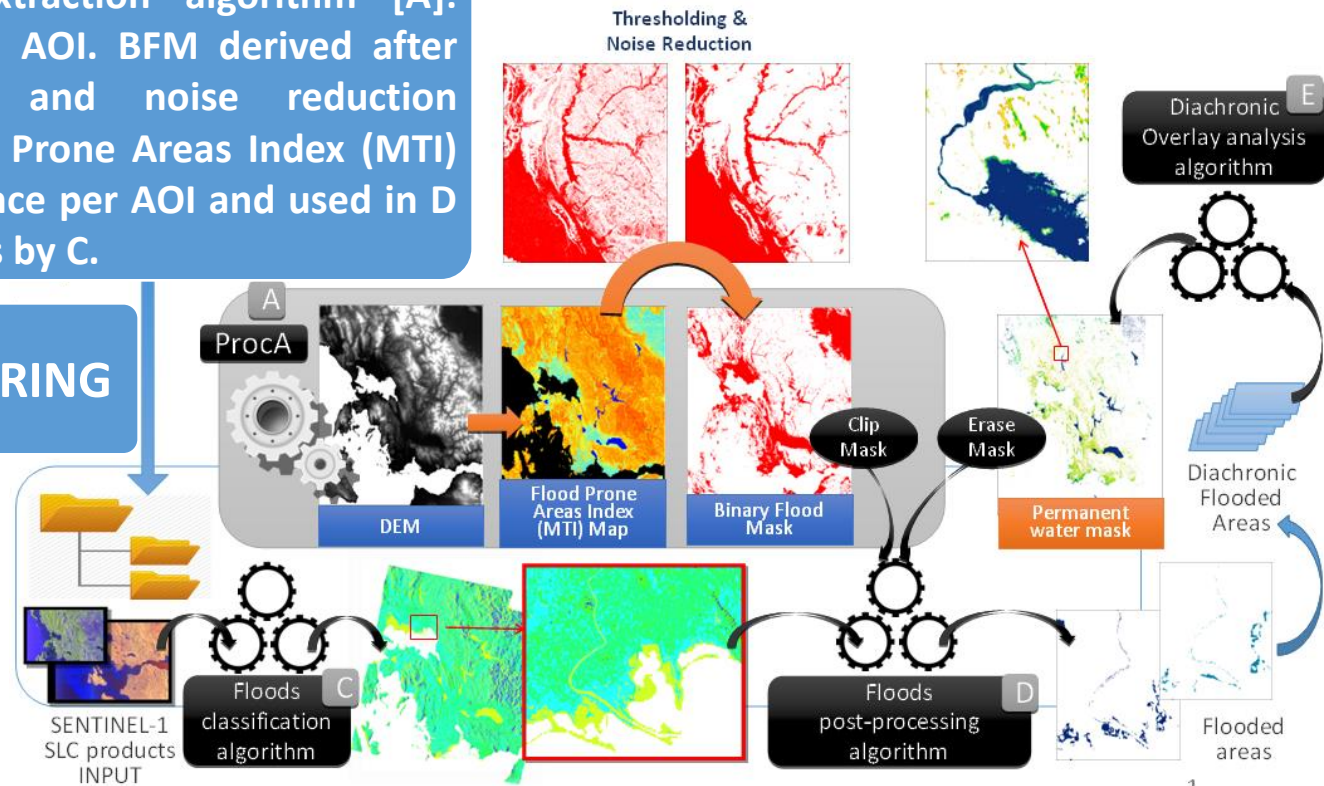
Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

FloodHub: BEYOND's Floods Monitoring Service

Architecture

Binary Flood Mask extraction algorithm [A]: HR DEM input for each AOI. BFM derived after applying thresholding and noise reduction techniques to the Flood Prone Areas Index (MTI) Map. BFM calculated once per AOI and used in D to validate flooded pixels by C.

FLOODS MONITORING





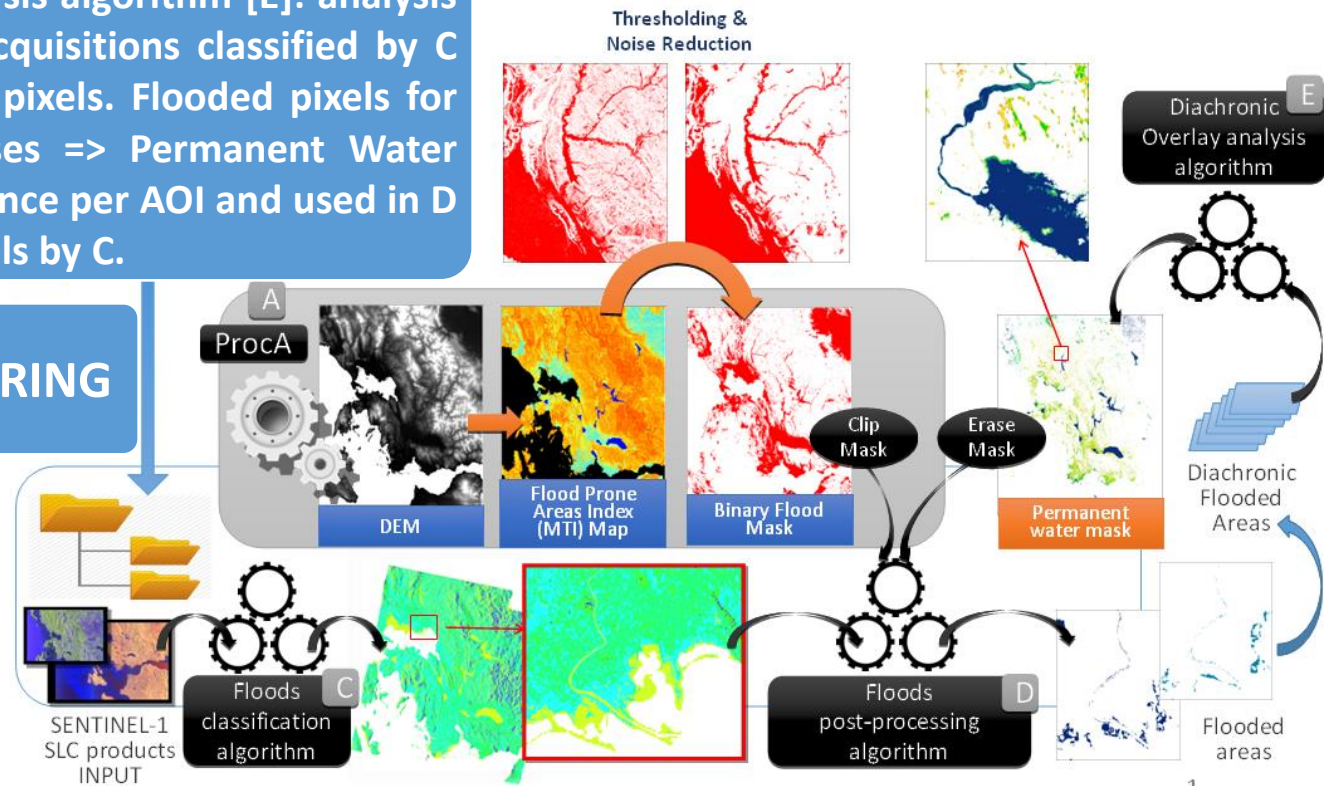
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FloodHub: BEYOND's Floods Monitoring Service

Architecture

Diachronic Overlay analysis algorithm [E]: analysis over many SENTINEL acquisitions classified by C as flooded/non-flooded pixels. Flooded pixels for at least 85% of all cases => Permanent Water Mask. PWM calculated once per AOI and used in D to eliminate flooded pixels by C.

FLOODS MONITORING

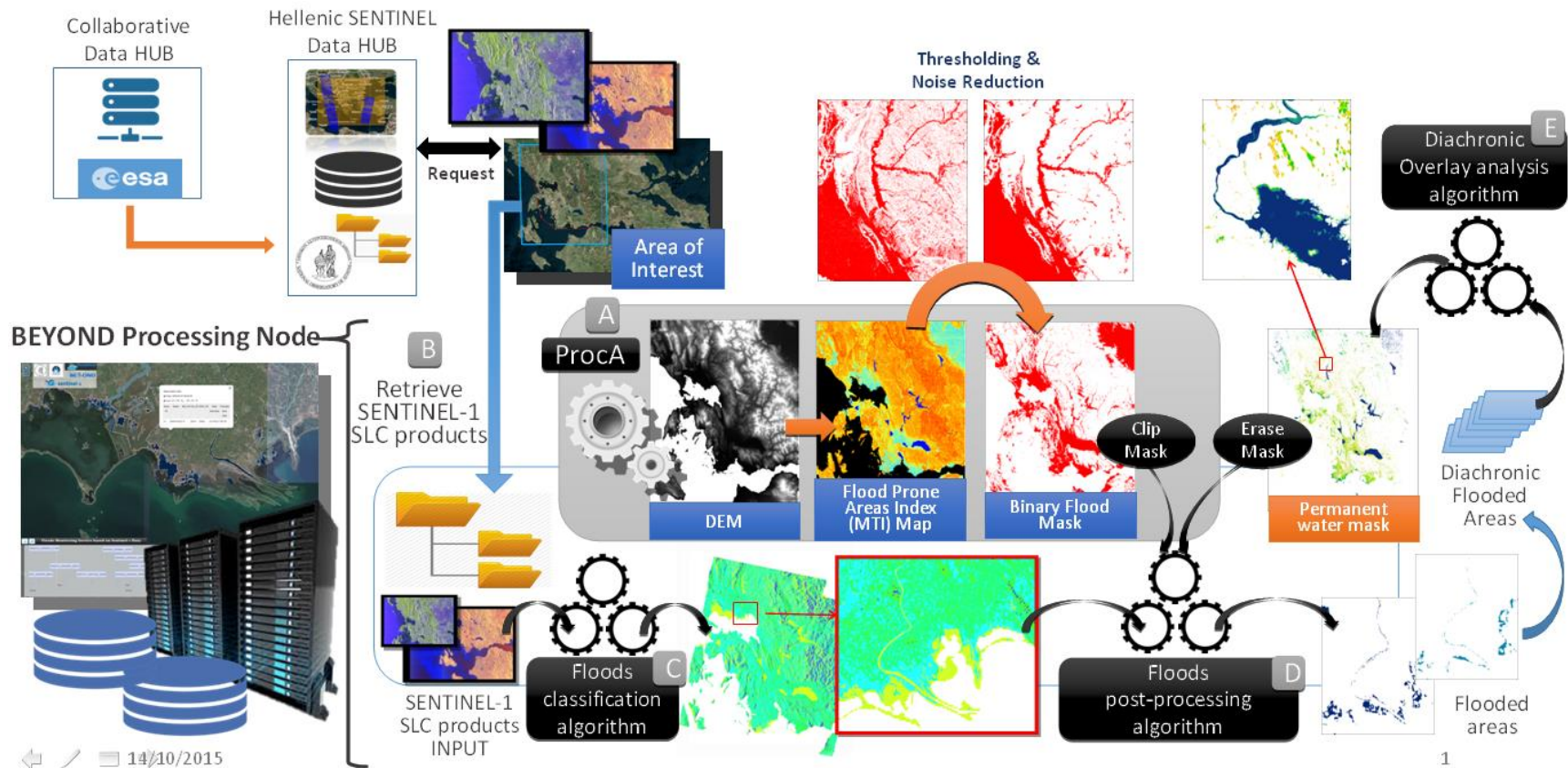




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FloodHub: BEYOND's Floods Monitoring Service

Architecture





Water extremes mapping with EO: the FloodHub service of the BEYOND Center of Excellence

תודה
Dankie Gracias
Спасибо شكراً
Merci Takk
Köszönjük Terima kasih
Grazie Dziękujemy Děkojame
Ďakujeme Vielen Dank Paldies
Kiitos Täname teid 谢谢
Thank You Tak
感謝您 Obrigado Teşekkür Ederiz
Σας ευχαριστούμε 감사합니다
Боданд
Bedankt Děkujeme vám
ありがとうございます
Tack