

Shaping the future workforce of the space / geospatial sector in Poland:

EO/GI Skills needed & EO4GEO solutions

“Current status of EO/GI sector in the business community: new developments,
challenges and solutions
- Testimony by The Azores region -

Ana Martins – Oceanography - DOP/FCT-UAc
"Working Group for the Promotion of Space
Science"

(ana.mp.martins@uac.pt)



UAc
UNIVERSIDADE
DOS AÇORES



DOP
DEPARTAMENTO
DE OCEANOGRAPHIA
E PESCAS UNIVERSIDADE DOS AÇORES



CONTENTS

- Azores EO4GEO Workshop experience – brief summary
- EO/GI status in the Azores – past and present
- EO4GEO tools/training material – Azores
- Summary

AZORES EO4GEO WORKSHOP EXPERIENCE (2nd JULY 2021) - brief summary -



Friday 2nd July 2021

EO4GEO High level capacity building Workshop organized by
NEREUS and the University of The Azores (The Azores, PT)
in The Azores /Portugal:

EO4GEO- Skills development in Earth Observation and Copernicus User
Uptake: the present and future of Coastal and Maritime sector
"The Azorean case"

- Welcome and introduction
 - Rector (University of the Azores)
 - Roya Ayazi (NEREUS Secretary General)
 - Francisco Wallenstein (Regional Government)
- The integration of EO4GEO tools in the Azorean maritime ecosystem
 - Margarita Chrysaki (NEREUS)
- Current and future EO/GI skills needed in the Azorean coastal and maritime sector:
 - Pedro das Neves, Regional Director of Sea Affairs;
 - Antoni Jez (Podkarpackie region, PL)
 - Adam Siczka (Mazovia region, PL)
 - Ana Martins (Academia)
 - Pedro Freire da Silva, CTO of the EO Lab at Air Centre (Private sector)
 - Fábio Vieira, DRCT (Regional Government)
- EO4GEO solutions
 - Margarita Chrysaki (NEREUS)
 - Rob Lemmens (University of Twente)
 - Aida Monfort Muriach (Universitat Jaume I)
 - Florian Albrecht (University of Salzburg)
 - Hansje Erdem (Vito technologies)

EO/GI status in the Azores – past and present -

- EO Infrastructures & Platforms / Systems
- EO Research Areas
- EO Education & Outreach
- EO Topics for Collaboration / Development



UAc
UNIVERSIDADE
DOS AÇORES



DEPARTAMENTO
DE OCEANOGRAPHIA
E PESCAS
UNIVERSIDADE DOS AÇORES

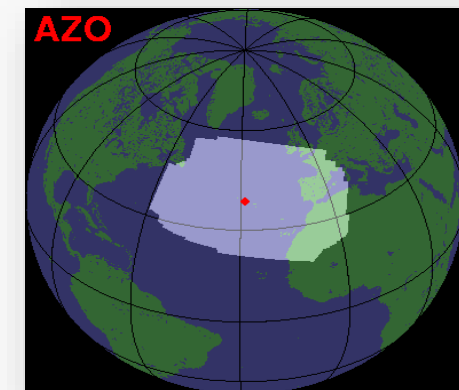


HAZO installation in the “Príncipe Alberto de Mónaco” Observatory (Faial) - April 2001



HAZO = HRPT station of the **AZO**res

First HRPT SeaWiFS station in Portugal and in Central North Atlantic

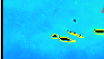



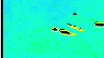



CANOPUS processing system

INDEX AREAS IMAGES STATISTICS **CANOPUS** ANA.MP.MARTINS@UAC.PT

IMAGE LIST Start Date End Date Areas Faial - m... Types Seasonal Products All

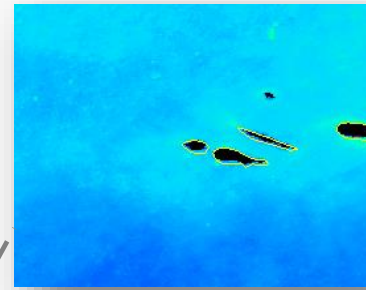
Select All

Select	Name	Start Date	End Date	Product	Image Type	Preview
<input type="checkbox"/>	A20021722002265.l2mapcomposite.summer.Faial_-_marine_birds.chlor_a...	Jun 21, 2002	Sep 22, 2002	chlor_a	Seasonal	
<input type="checkbox"/>	A20021722002265.l2mapcomposite.summer.Faial_-_marine_birds.pic.tiff	Jun 21, 2002	Sep 22, 2002	pic	Seasonal	
<input type="checkbox"/>	A20021722002265.l2mapcomposite.summer.Faial_-_marine_birds.poc.tiff	Jun 21, 2002	Sep 22, 2002	poc	Seasonal	
<input type="checkbox"/>	A20021722002265.l2mapcomposite.summer.Faial_-_marine_birds.sst.tiff	Jun 21, 2002	Sep 22, 2002	sst	Seasonal	
<input type="checkbox"/>	A20022662002355.l2mapcomposite.autumn.Faial_-_marine_birds.chlor_a.t...	Sep 23, 2002	Dec 21, 2002	chlor_a	Seasonal	
<input type="checkbox"/>	A20022662002355.l2mapcomposite.autumn.Faial_-_marine_birds.pic.tiff	Sep 23, 2002	Dec 21, 2002	pic	Seasonal	

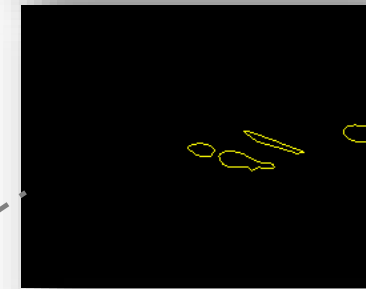
1 2 3 4 5 6 7 8 9 10 11 ... 47 48

DOWNLOAD

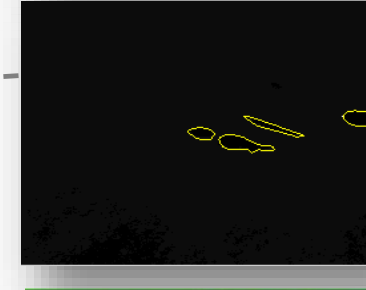
Image's



Chla



PIC

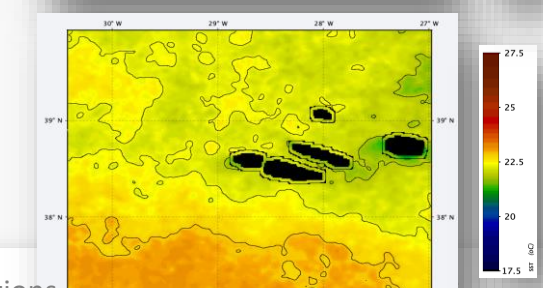
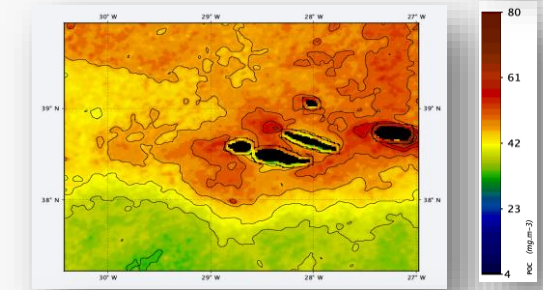
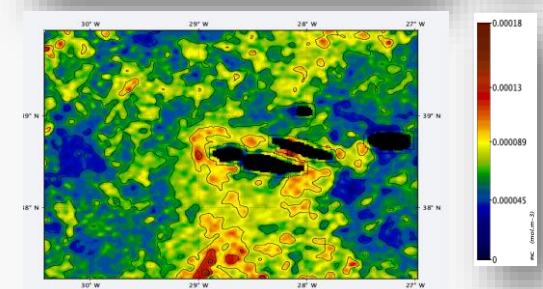
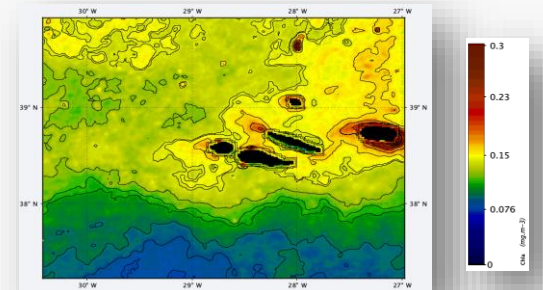


POC

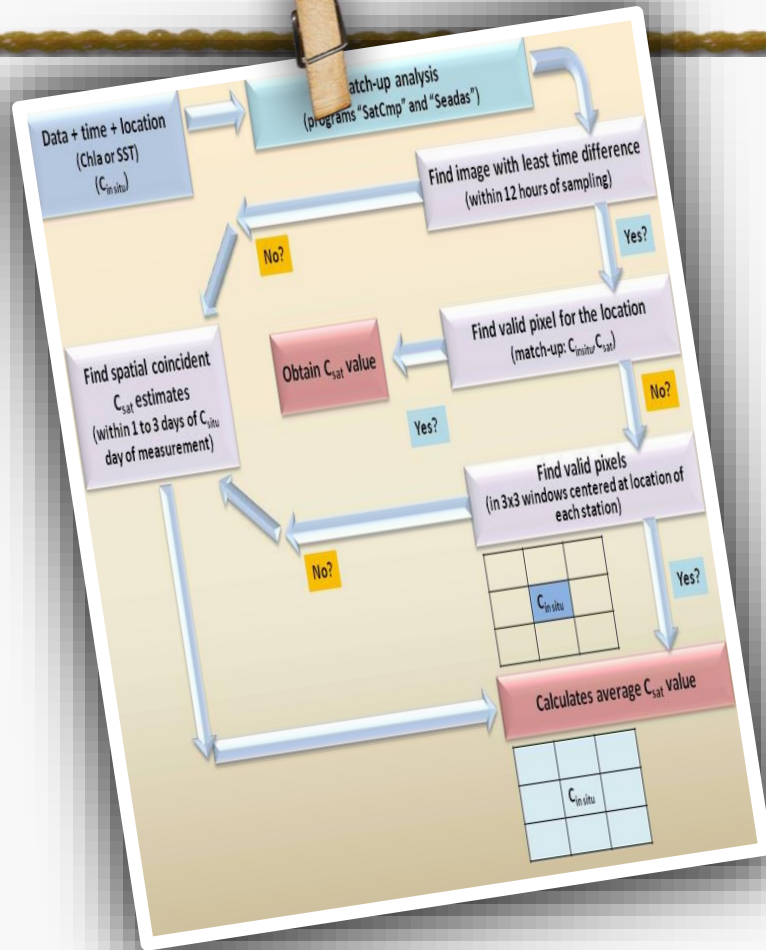


SST

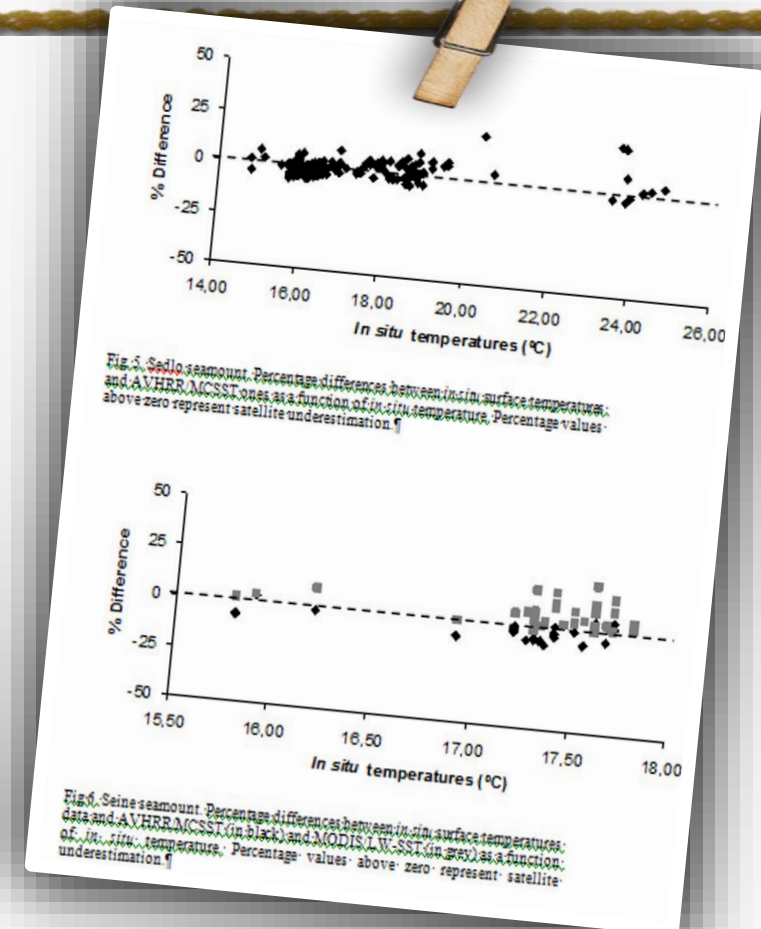
Images quick processing



EO Match-up analyses – in situ data



(Mendonça et al., JARS, 2010)



SPACE-INNOVATION ECOSYSTEM IN SANTA MARIA

The overarching goal is to promote the Azores as an ultra-peripheral region by introducing activities that bring socio-economic benefit locally, to Portugal and to Europe.

Recent EO facilities:

- ESA Tracking station, the Azores International Satellite Launch Programme (Azores ISLP), under the responsibility of the Regional Government
- ESA Lab@Azores for Earth Observation, as a pole of the Atlantic International Research Centre (AIR Centre)
- Business incubation services, as developed over the last few years (e.g., TERINOV);
- Existing large airport infrastructures and related installations.



Future EO facilities:

- The Azores International Satellite Launch Programme (Azores ISLP) based on a vertical spaceport for mini and micro launchers;
- A landing facility for Space Rider, the future European transportation vehicle for microgravity experiments;
- A Teleport to support ground segment operations and data flow;
- Test facilities for engines and stages for micro launchers;
- A business incubator network for small start-ups and innovative firms;
- Expansion of existing large airport infrastructures.



<https://pt.space.pt/space-innovation-hub-santa-maria/>

EO Ocean Research areas

(since 2000: 21 years)

- NE Atlantic near-surface ocean mesoscale and large scales space and time variability
- Climate studies
- Ocean productivity
- Ocean and Atmosphere phenomena (Teleconnections)
- Coupled Ocean biogeochemical and physical processes
- Marine Pollution
- Satellite calibration / validation studies
- ...



DOP's **Courses** (Education/Training Skills)



PhD program

Ocean
Sciences



Master program

Integrated Studies
of the Ocean
(MEIO)
(RS course since 2007)



License degree

Ocean
Sciences
(LCMAR)



Technical degree

Resources and
Maritime Activities
(TesP)
(new)

Other past Courses



Erasmus Mundus

Master course:
 Marine Spatial Planning
 (Dept. Biology coordination)
 (lectured in Spain, Azores, and Italy)



ERASMUS Summer School Master Program

FORMation of Multi-disciplinary
 Approaches to Training in Earth
 Observation (FORMAT-EO)
 (lectured in UK)

Sumário

2. Princípios Físico-Matemáticos da Detecção Remota (Aula 3)

- 2.3. A REM
 - 2.3.5. Fontes da Radiação Electromagnética
 - 2.3.5.1. De Origem Atómica e Molecular
 - 2.3.5.2. Produzida pelos Corpos
 - 2.3.5.3. Corpo Negro - Leis Gerais da Radiação
 - a) Corpo Negro
 - b) Corpo Branco
 - c) Corpo Cinzento
 - d) Leis Fundamentais da Radiação
 - 2.3.5.4. A Radiação Solar
 - a) Distribuição da Radiação Solar no Topo da Atmosfera
- (próxima aula)
- 2.3.5. Interação da Radiação Solar com a Atmosfera
 - 2.3.5. Interação da Radiação Solar com o Oceano

23/11/1998 - Terceira Aula Teórica

Marine Biology

License course: Marine
 Biology (Dept. Biology
 coordination)
 (lectured in the Azores)
Oldest course in RS: (1998 – 2002)

Satellite Oceanography master course (for the last 14 years)

- Course -1 semester – 4 ECTS (T: 16; TP: 12, S:2)
- Weekly classes provide basic concepts in RS and cement these through practical classes where students process different types of ocean satellite imagery (particularly applied for meso to large scale ocean variability)

meio
 mestrado em estudos integrados dos oceanos

Oceanografia por Satélite

(disciplina de 2º semestre)

Aula 10

Natureza e
Princípios Físico-Matemáticos da
Detecção Remota

11-06-21


Responsável de Disciplina: Ana Martins

EO Topics for Collaboration / Development


- **Education:** collaboration in summer courses and/or license / master / PhD national / international programs and/or students (co-)supervision



<https://www.facebook.com/CIMA.UAlg/photos/pcb.3075979185784077/3075971042451558/?type=3&theater>

 UAc
 UNIVERSIDADE
 DOS AÇORES

Ocean Colour Summer School
 Centro de Investigação Marinha e Ambiental (CIMA) da Universidade do Algarve
 com o apoio da Portugal Space e FCT
 Algarve, 10-14 agosto de 2020

 OKEANOS

**Detecção de blooms de E. coli expostos à infecção por E. coli
 em oceano aberto no Atlântico Norte:**

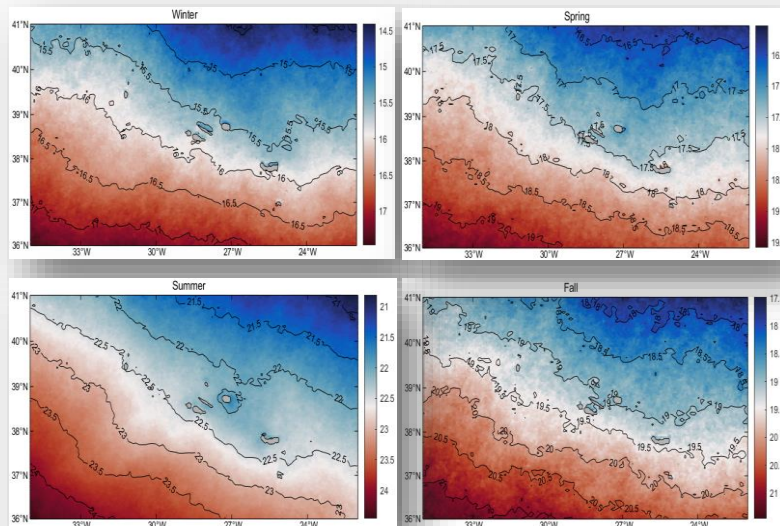
- um caso de processamento de satélite NRT
 a bordo do cruzeiro Na-Vice - (Açores - Islândia)

Ana Martins - DOP/FCT - UAç e Okeanos - UAç
 (ana.mp.martins@uac.pt)

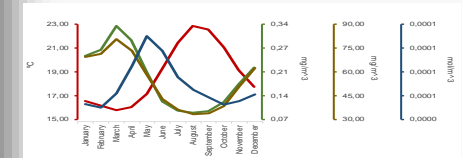
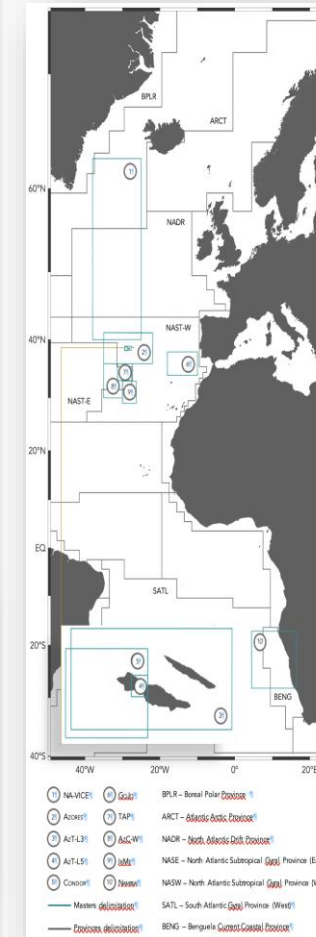
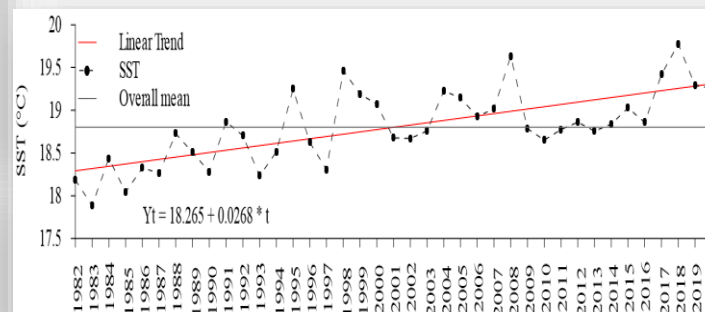
Horta, 14 de Agosto de 2020 (via Zoom)

EO Topics for Collaboration / Development

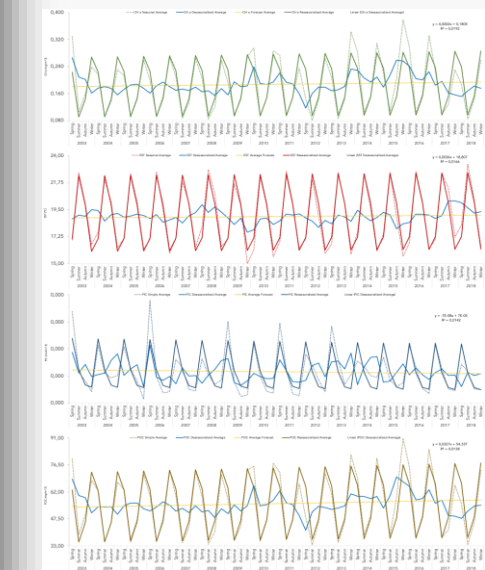
- **Science:** Ocean productivity and space-time variability, relations to climate change and variability, marine pollution, development of new algorithms (e.g., HABs, PFTs, jellyfish, tracking marine litter, etc).



(Tokat et al., 2021) - in prep



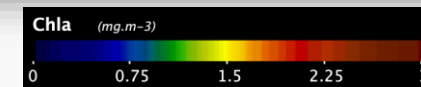
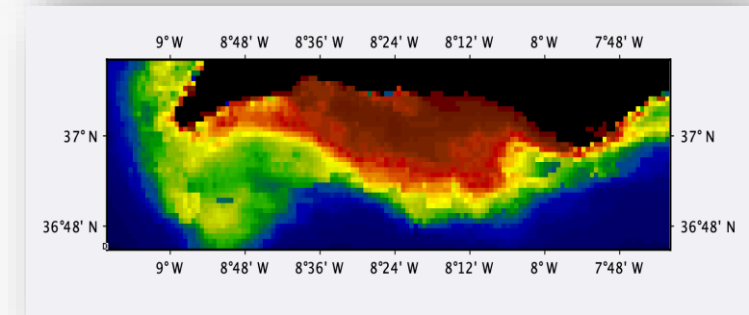
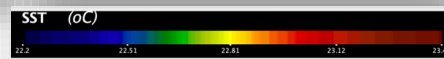
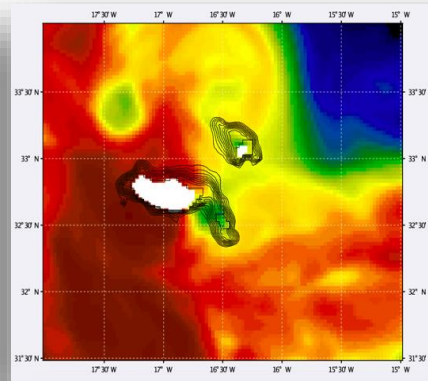
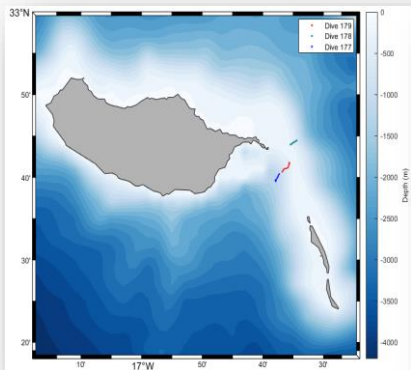
— SST — Chl a — POC — PIC



(Loureiro et al, 2021) – in prep

EO Topics for Collaboration / Development

- Science (with private sector): Ocean productivity and space-time variability, relations to climate change and variability, marine pollution, development of new algorithms (e.g., HABs, PFTs, jellyfish, tracking marine litter, etc).



EO Topics for Collaboration / Development

- Outreach:** Contribution to EO dissemination to public authorities and general public



EO public talks



EO/GI solutions

Body Of Knowledge

200 EXPERTS



Tools



Occupational Profile Tool



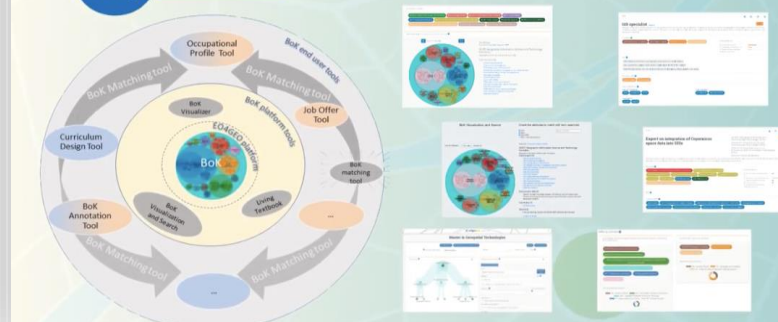
- CARTOGRAPHY AND VISUALIZATION ✓✓
- GEOCOMPUTATION ✓
- WEB-BASED GI ✓
- IMAGE PROCESSING AND ANALYSIS ✓✓✓
- THEMATIC AND APPLICATION DOMAINS ✓✓✓

To be introduced this year to the 13th edition Master students – 2nd semester at University of the Azores

Job Offer Tool



Tools



Curriculum Design Tool



SUMMARY

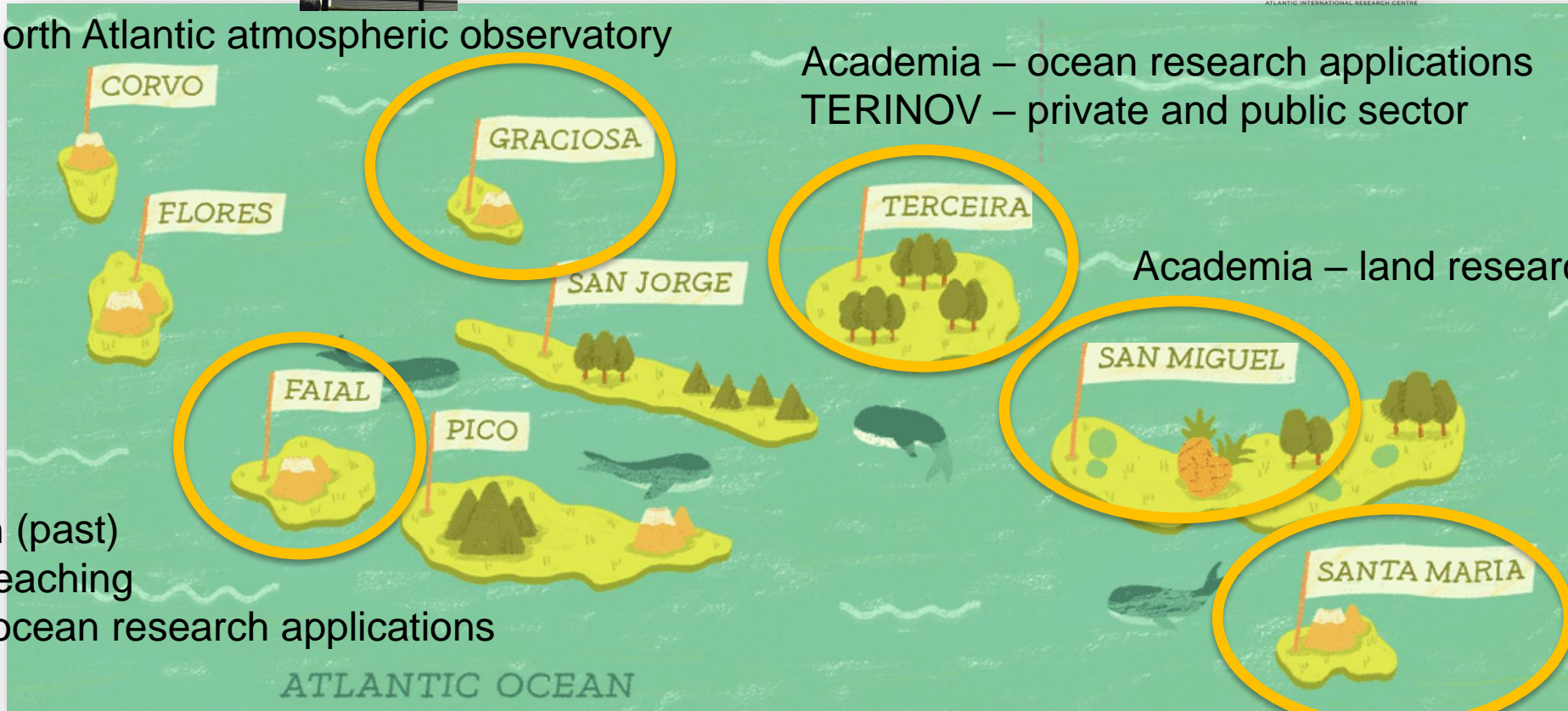


Co-funded by the Erasmus+ Programme of the European Union



Eastern North Atlantic atmospheric observatory

Academia – ocean research applications
TERINOV – private and public sector



Academia – land research applications

HRPT station (past)
Academia - teaching
Academia – ocean research applications



Space infrastructures – public and private sectors



Thank you very much!

