



ever-est

The Research Object Paradigm to
manage the scientific Life Cycle within the
marine domain - The EVER-EST Solution



Federica Foglini
CNR ISMAR

federica.foglini@ismar.cnr.it



Outline

- The Research Life Cycle Management within the Earth Science Community
- The relevance of Research Data life cycle results standardization and interoperability (Data ROs, Workflows ROs)
- The EVER-EST Solution - the adoption of the RO paradigm
- Sea monitoring USE Cases within the Marine Strategy Framework Directive (MSFD)
- Conclusions

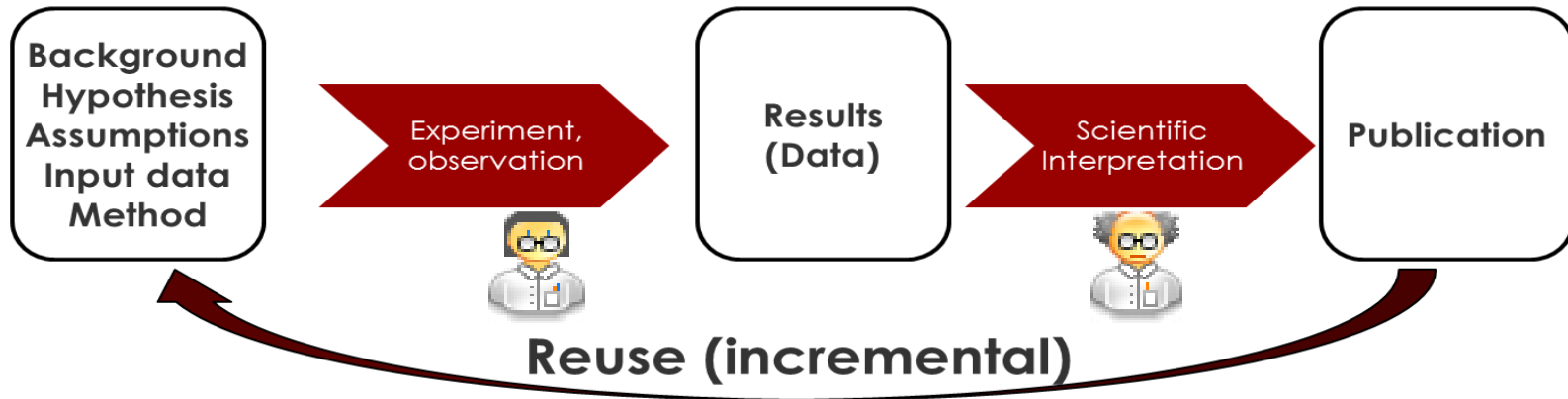
The Research Life cycle management

From data collection and
re-use to scientific
publication

1) ISI papers, 2) non ISI and
conference papers 3)
reports (grey literature)



1. The Research Life cycle management – ISI publication



Scientific publication in ISI (international Scientific indexing), peer reviewed **Journals with Impact factor and citation** (DOI and index citation)

Increase Scientist citation index and scientific credits

Possibility of supplementary materials and data if requested by the journal
And choosing paper licence (open access at different level to protect your work and ensure citation)

1. The Research Life cycle management – ISI publication



Foglini, Federica

Istituto Di Scienze Marine Bologna, Bologna, Italy
 Author ID: 23027607700
 Other name formats: Foglini, F.

Subject area: Earth and Planetary Sciences Agricu Decision Sciences

Document and citation trends: 9

h-index: View *h*-graph

11

Documents by author

32

Analyze author output

Follow this Author

View potential author matches

Physics and Astronomy Computer Science Mathematics Engineering

99



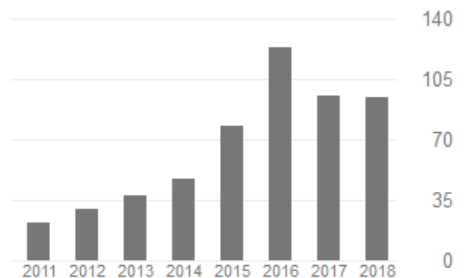
Federica Foglini

GIS manager in CNR-ISMAR Bologna (Tecnologo)
 Email verificata su bo.ismar.cnr.it
federica.foglini@bo.ismar.cnr.it

SEGUI

Citata da VISUALIZZA TUTTO

	Tutte	Dal 2013
Citazioni	616	480
Indice H	13	13
i10-index	15	15



Coautori MODIFICA

TITOLO	CITATA DA	ANNO
<input type="checkbox"/> Habitat mapping of the Maltese continental shelf using acoustic textures and bathymetric analyses M Prampolini, P Blondel, F Foglini, F Madricardo Estuarine, Coastal and Shelf Science 207, 483-498	2	2018
<input type="checkbox"/> Predictive habitat modeling in two Mediterranean canyons including hydrodynamic variables A Bargain, F Foglini, I Pairaud, D Bonaldo, S Carniel, L Angeletti, ... Progress in Oceanography		2018
<input type="checkbox"/> Geomorphology of scour holes at tidal channel confluences C Ferrarin, F Madricardo, F Rizzetto, W Mc Kiver, D Bellafiore, ... Journal of Geophysical Research: Earth Surface	1	2018

1. The Research Life cycle management – ISI publication



The screenshot shows the Web of Science search interface. At the top, there are navigation links for 'Web of Science', 'InCites', 'Journal Citation Reports', 'Essential Science Indicators', 'EndNote', and 'Publons'. The main header includes 'Web of Science' and 'Clarivate Analytics'. Below the header, there is a search bar with a dropdown menu set to 'Web of Science Core Collection'. A 'Search' button is visible. A large blue text box is overlaid on the search area, containing the text: 'No Data (input and results) No codes and/or algorithm'. Below the search bar, there are options to 'Restrict results by languages and document types', with 'All languages' and 'All document types' selected. A 'Timespan' dropdown is set to 'All years (1965 - 2018)'. On the right side, there is a list of field tags such as 'TS= Topic', 'PY= Year Published', 'CF= Conference', etc.

2. The Research Life cycle management - non ISI papers

Search for collaboration and new ideas -
CONFERENCE (e.g. conference proceedings)



AGU 100 FALL MEETING
Washington, D.C. | 10-14 Dec 2018

Code of Conduct
FAQs

AGU Meetings
Join AGU

Search
Site

ABOUT Resources
REGISTRATION About D.C.
PROGRAM Scientific Program
EXHIBIT Exhibit/Sponsor
ATTENDEES Events

Home About* Authors* Attending* Sponsorship* Dates & Deadlines*

living planet symposium | MILAN
13-17 May 2019

living planet symposium | MILAN
13-17 May 2019

2018 AGU Fall Meeting Sponsor
13-17 May 2019, Washington, D.C. | Long Hall
Milan, Italy

Welcome

The AGU 2018 Fall Meeting will mark another dynamic year of discovery in Earth and space science, serve as the advent of AGU's Centennial year, and provide a special opportunity to share our science with world leaders in Washington, D.C. As the largest Earth and space science gathering in the world, the Fall Meeting places you in the center of a global community of scientists drawn from myriad fields of study whose work protects the health and welfare of people worldwide, spurs innovation, and informs decisions that are critical to the sustainability of the Earth.

Get Social with #AGU18

My Meeting

Quick Links

JOIN AGU
ABSTRACT SUBMISSIONS

Exhibit and Sponsors
Media

Advance Your Science and Your Career

**No DOI and Citation index,
No Data (input and results)
No codes and/or algorithm**

3. The Research Life cycle management - Grey literature

Report and technical notes, project deliverables, Report on data collection and processing (data life cycle)



JRC SCIENTIFIC AND POLICY REPORTS

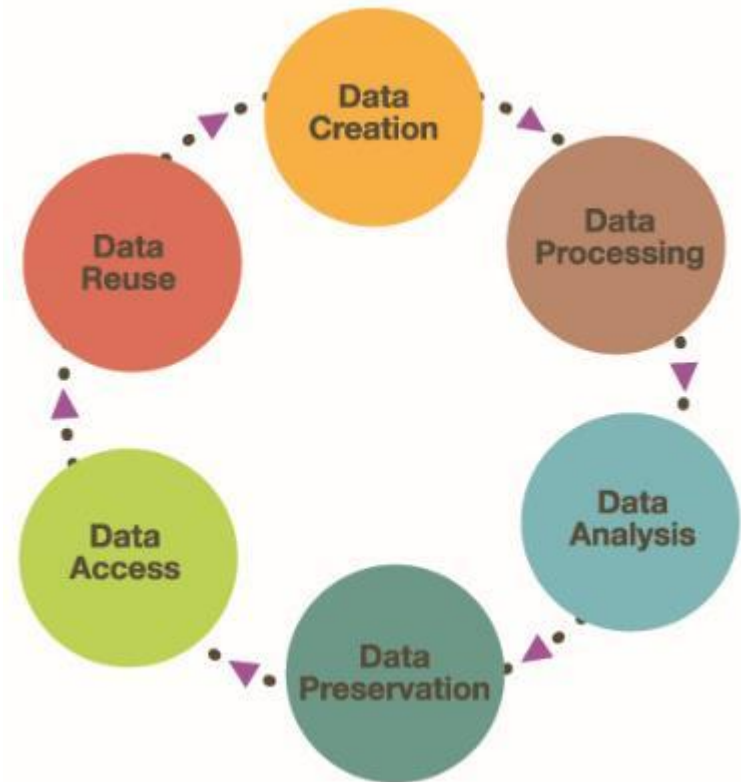
Technical guidance on monitoring for the Ma

N. Zampouk
M. Tasker,¹
S. Katsan
T. Maes, E. I
M. Penna, C.



nen,
ich,
s,
ldis,
eiss,

99 EN



The Research Life cycle management - Journals approach



Find out more about

Read o
& Scop
SCIEN

Localization Microscopy - Data
le M. Manley, Suliens
t entitled "Autonomous Illumination Control in Localization Microscopy"

ch and geodesy: is there right or wrong in software

working in geodesy companies produces always the same question: Is there the "right" decision? Do we have to choose always the way right or left or is there some kind of "grey value", changing from right to left and from the left to the right? in...

Map of Co-Seismic Landslides for the M7.8 Kaikoura, New Zealand Earthquake

Valkaniotis Panos, Papathanassiou George, Pavlides Spyros

Map on Earthquake Geology in Greece (<http://eqgeogr.weebly.com/>) Version 2 (updated) With the addition of new satellite images, and other available resources for the M7.8 Kaikoura earthquake, we present an updated map of Co-Seismic Landslides and Surfaces...

Uploaded on June 11, 2018
7 more version(s) exist for this record

Zenodo now supports DOI versioning!
Read more about it, in our newest blog post.

Using GitHub?
Just Log in with your GitHub account and click here to start preserving your repositories.

Zenodo in a nutshell

- **Research, Shared.** – all research outputs from across all fields of research are welcome! Sciences and Humanities, really!
- **Citeable, Discoverable.** – uploads gets a Digital Object Identifier (DOI) to make them easily and uniquely citeable
- **Communities** – create and outsize your own community for a workshop, project, department, journal, into which you can accept or reject uploads. Your own complete digital repository!
- **Funding** – identify grants, integrated in reporting lines for research funded by the European Commission via OpenAIRE
- **Flexible licensing** – because not everything is under Creative Commons.
- **Safe** – your research output is stored safely for the future in the same cloud infrastructure

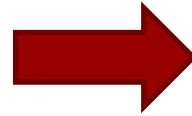
No standard approach
No standard metadata

The Research Life cycle management



Main daily challenges for a CNR scientist:

1. searching of existing data and products;
2. sharing methodologies;
3. working on the same workflows and data;
4. adopting shared powerful tools for data processing



Today solution:

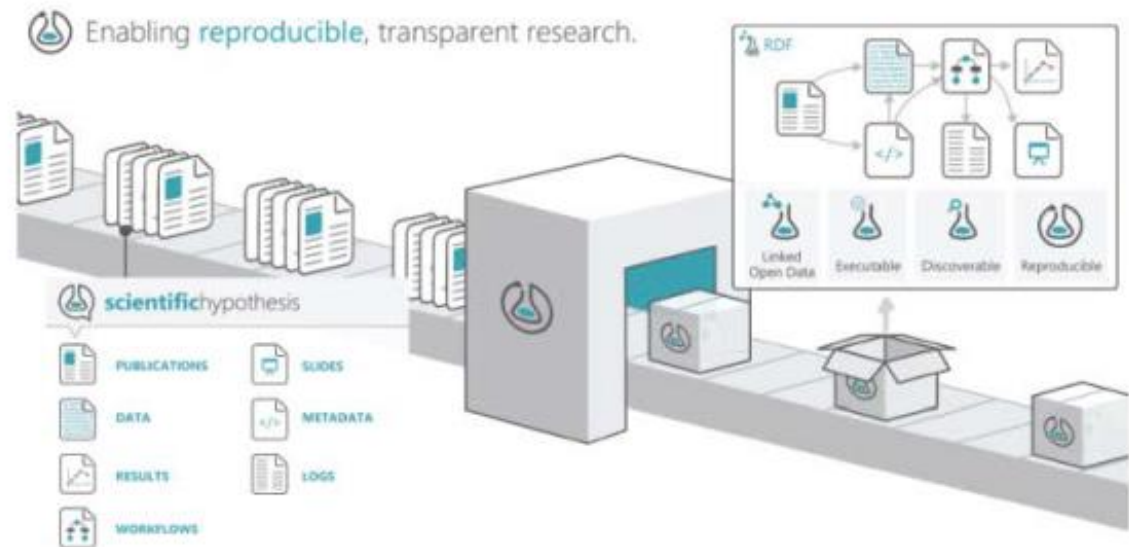
1. searching of existing data and products among many different web site, colleagues and institutional partners
2. sharing methodologies through description in scientific papers publication
3. working on the same workflows and data almost with colleagues in the same place and time (laboratory, workshops and meetings)
4. adopting shared powerful tools for data processing only if are available in the laboratory

The Research Life cycle management - Research Objects



Aggregation of resources that bundles the content of a research work to facilitate the reusability, reproducibility and better understanding. The resources are:

- Data
- Experiments
- Workflows
- Metadata
- Annotations
- Bibliography
- Results
- Provenance
- ...

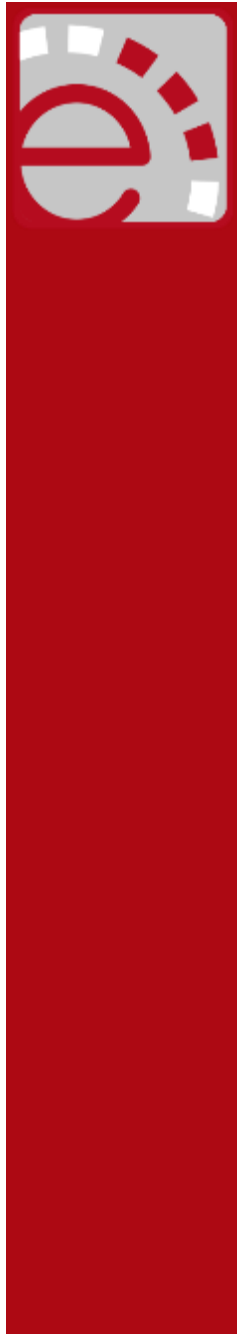
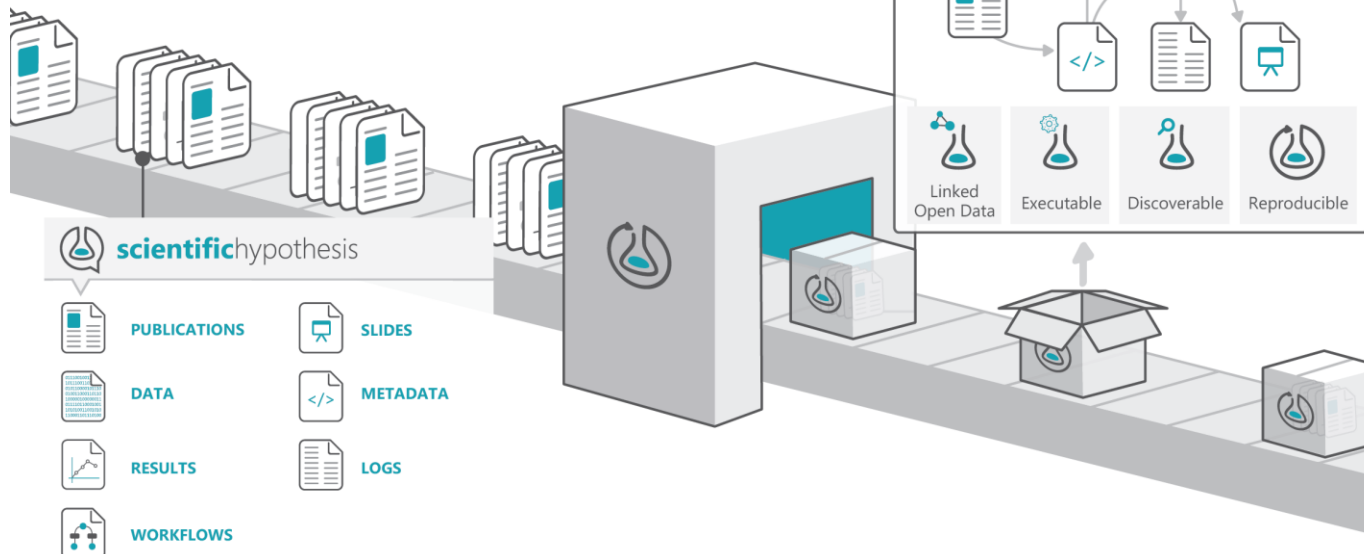


The Research Life cycle management - EVER-EST solutions



The solution is based on the integration of Earth Science e-infrastructures technologies - developed over 15 years - with the innovative concept of Research Object

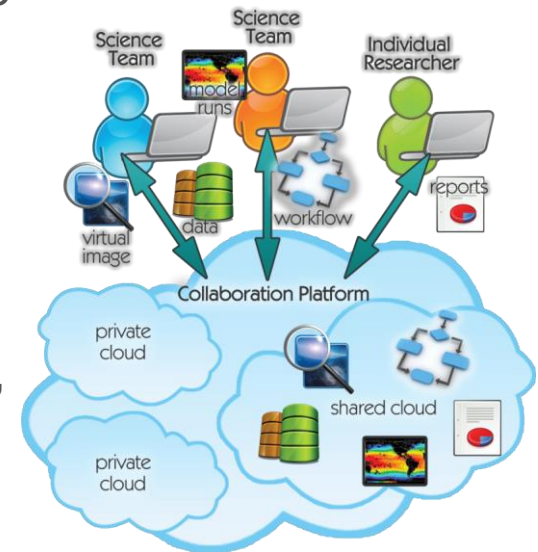
 Enabling **reproducible**, transparent research.



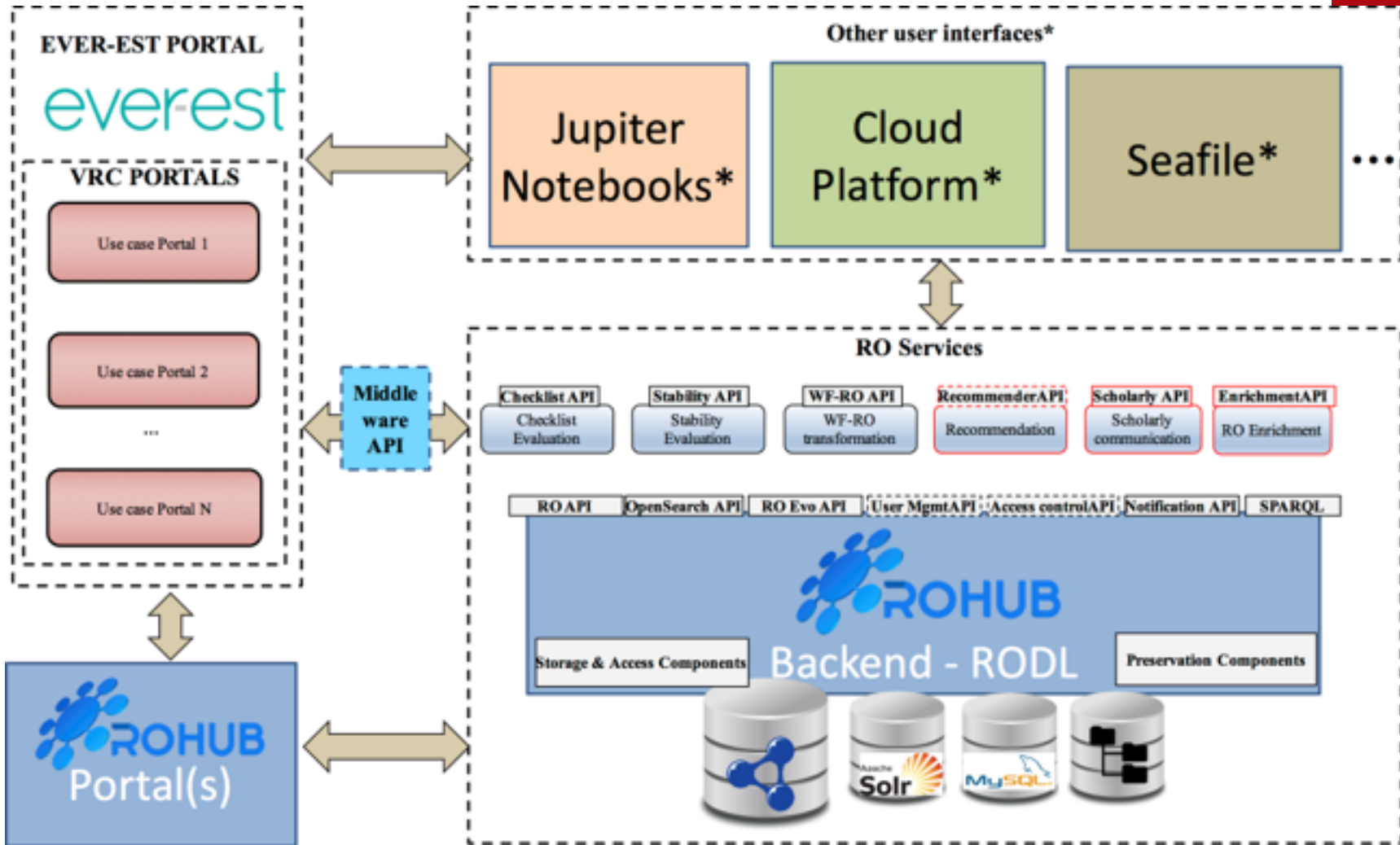
The Research Life cycle management - EVER-EST solutions



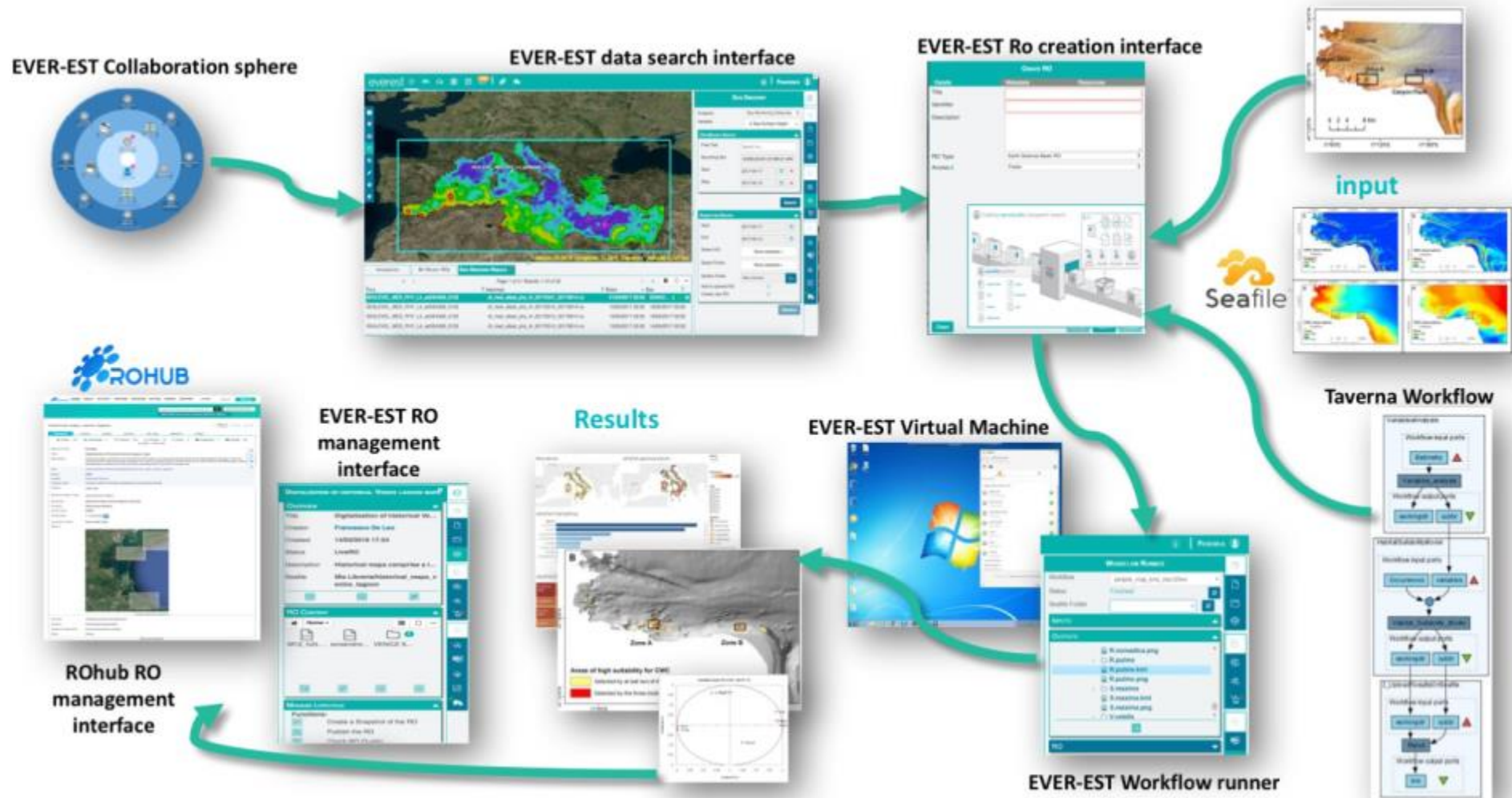
- Remotely access data, software, research results, and documentation
- Organize a scientific workflow in a single digital object, findable and reusable, maintaining attribution through DOI placement
- Collaborate with colleagues located in different parts of the world
- Document scientific work, e.g., encapsulate in a single digital object data and/or results related to a single Supersite event (an eruption)
- Publish grey literature (e.g., project reports, bulletins, etc.) maintaining attribution
- Ensure long term preservation of research work (data, software, results, interpretations)



EVER-EST solutions – the architecture



The EVER-EST solution for the Sea Monitoring community

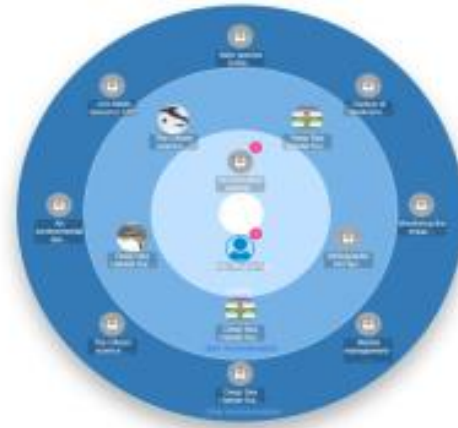


The EVER-EST solution

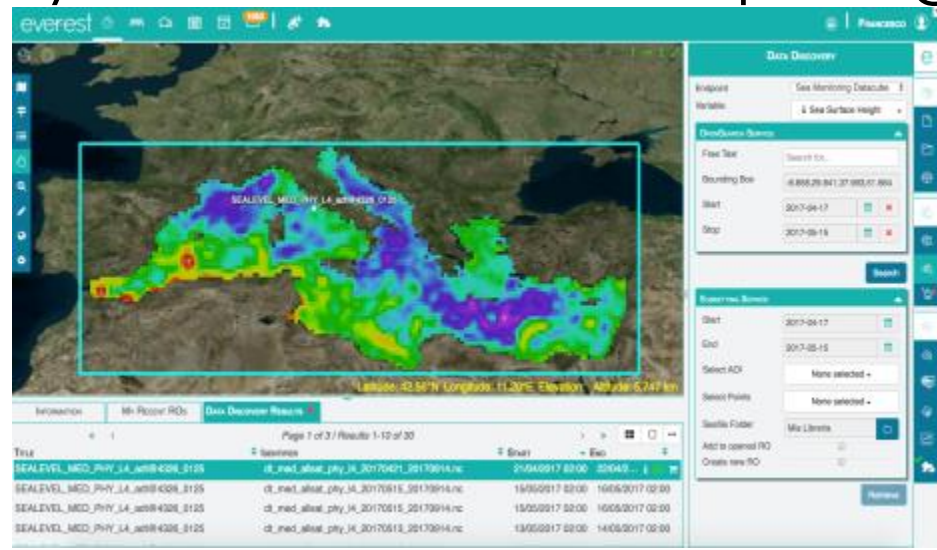


1. Data sharing and Harmonization- reduction of data and knowledge fragmentation.

**EVER-EST ROHUB and
Collaboration sphere**



2. Easy data Discovery Re-Use and Re- Purposing of open data

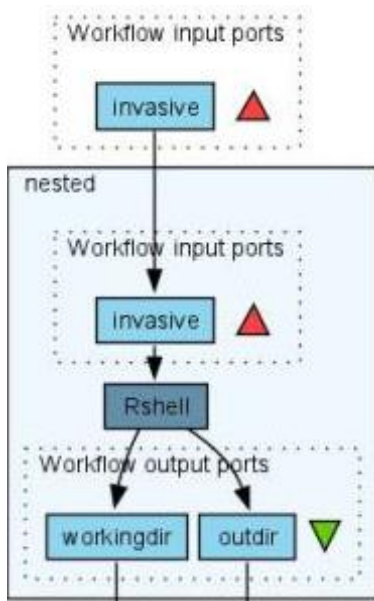




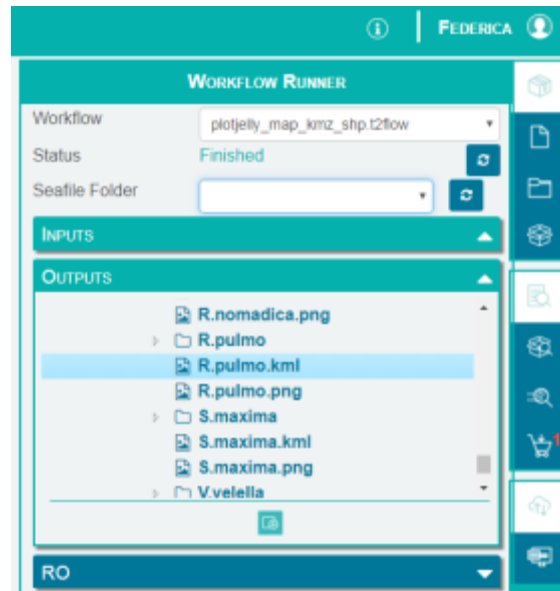
The Ever-Est solution

3. On line Data processing – resources and collaboration using a virtual lab

Taverna Workflow



EVER-EST Workflow runner



EVER-EST Virtual Machine



4. Implementing **FAIR** data principles through the adoption of Research Object able to encapsulate, share and reproduce the entire research cycle



The Sea Monitoring community

Use cases

<https://ever-est.eu/>

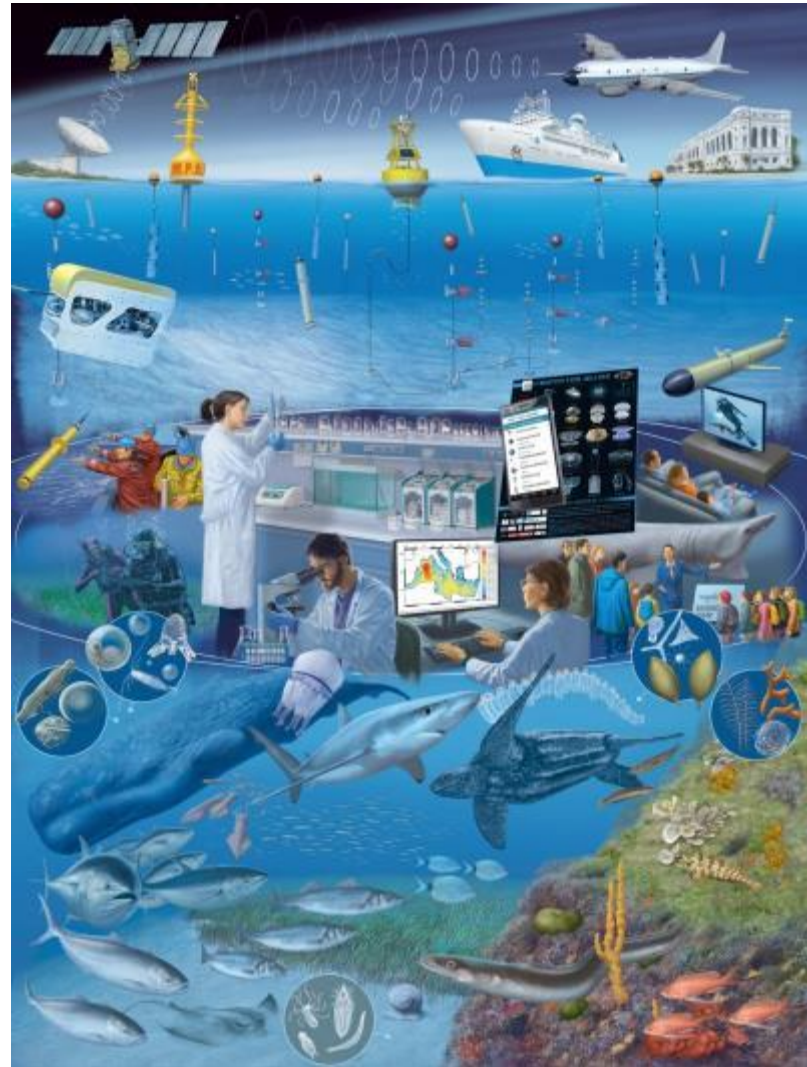
<https://vre.ever-est.eu/demovrc/>

<http://www.rohub.org/>

The Sea monitoring Community



The sea monitoring community is wide and heterogeneous including both multi-disciplinary scientists, national/international agencies and authorities dealing with the adoption of a better way of measuring the quality of the environment.



Marine Strategy Framework Directive



According to the Marine Strategy Framework Directive (MSFD), the environmental status of marine waters is defined by 11 descriptors, and forms a proposed set of 29 associated criteria and 56 indicators.



The objective of the Sea Monitoring VRC is to test Ever-Est platform provide useful and applicable contributions to the evaluation of the descriptors: D1.Biodiversity, D2.Non-indigenous species, D4. Marine Food Web and D6.Seafloor Integrity.

EVER-EST Seamonitoring CASE STUDIES (12 Golden ROs)



everest v1.0 | FRANCESCO

CWCs Habitat Suitability Model - Bari Canyon

Posidonia regres Posidonis regressionalongi Apulia coast monitoring VRC

RSOBIA southern Adriatic Sea

Altitude: 477 km

INFORMATION | My RECENT ROs | **RO RESULTS**

TITLE	STATUS	CREATED	CREATOR	VRC	DESCRIPTION
human_impact_letterature	LiveRO	05/07/2018 13:31	Francesco De Leo	Sea Monitoring	
WELCOME project	LiveRO	27/06/2018 11:40	Francesco De Leo	Sea Monitoring	Italy study area
Correlation between environment sat...	LiveRO	11/06/2018 11:33	Francesco De Leo	Sea Monitoring	Quantification of deterministic an...
Deep-sea Habitat Suitability Model	LiveRO	28/05/2018 17:37	Giorgio Castellan	Sea Monitoring	Habitat Suitability Model of Cold Wat...

RO SEARCH

Identifier:

Title:

Creator:

Status: Live

Date From:

Date To:

Description:

Geometry: None selected

Only VRC ROs:

Marine Strategy Filters

Sub-Region: None selected

Search

1 Data RO, 7 Workflow ROs, 4 Process ROs

EVER-EST Seamonitoring CASE STUDIES (> 200 Biblio RO about MSFD)



Help

Research Objects

search a Research Object...

human impact

My Research Objects
Collaborations
All Research Objects

- Reference: Bozelli R.L.-interactive e...
- Reference: Bozelli R.L.-interactive e...
- Reference: Fontolan G.-Human impact a...
- Reference: Fontolan G.-Human impact a...
- Reference: Piyanekarage S.C.-Human imp...
- Reference: Piyanekarage S.C.-Human imp...
- Multiple and pervasive human impacts ...
- Multiple and pervasive human impacts ...

Scientists

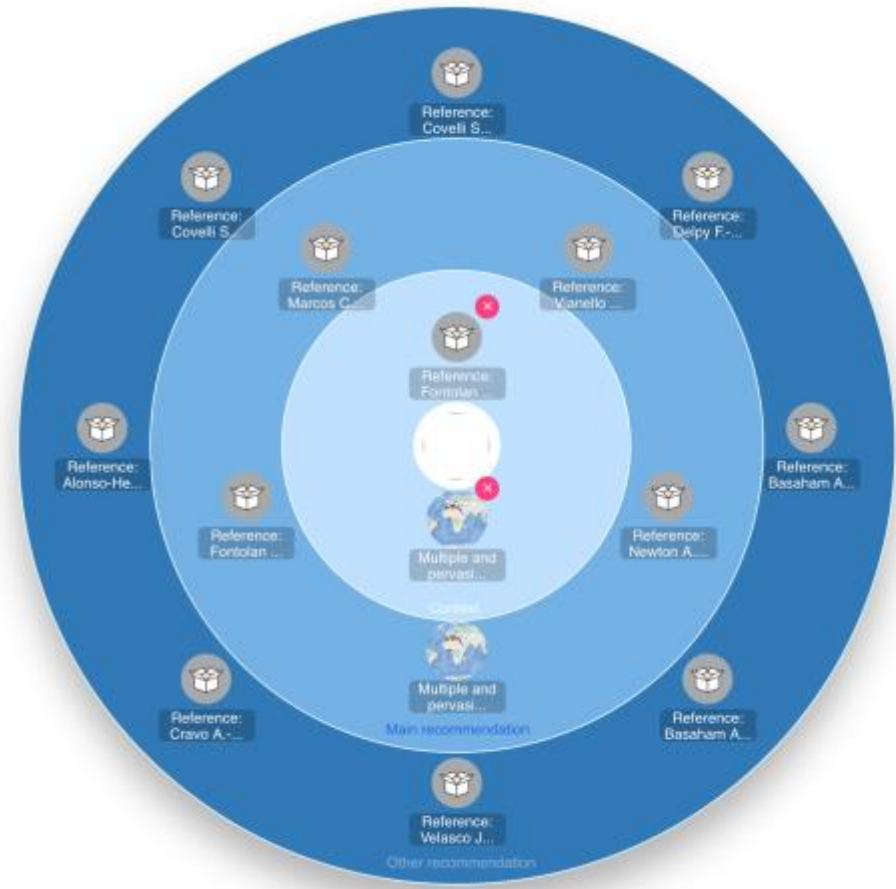
search a scientist/specialist...

Collaborators
Related
All Scientists

More information:

Multiple and pervasive human impacts in coastal lagoons literature review
on: 2018-07-10 15:18:02.518 by: Francesco De Leo

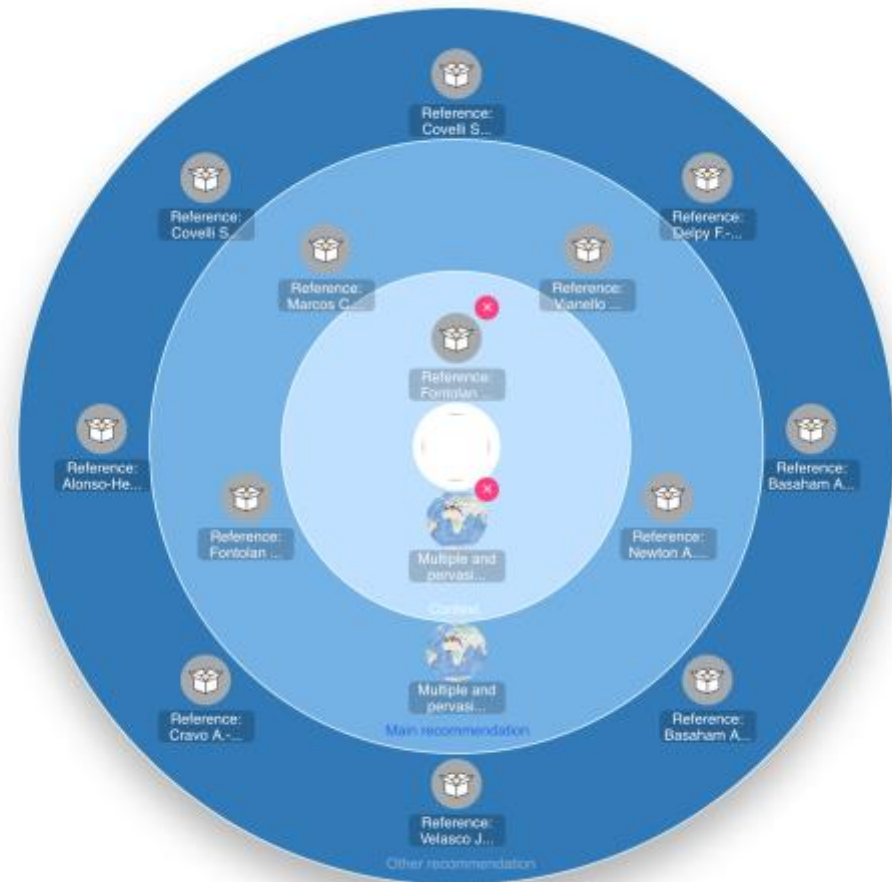
Main topics: floor, footprint, integrity
Areas of knowledge: hydrography
Description: Coastal wetlands are among the most studied, most vulnerable, and economically most important ecosystems on Earth, nevertheless, little attention has been paid, so far, to their sea-floor integrity and the human footprint on their deepest reaches



EVER-EST Seamonitoring CASE STUDIES (> 150 Biblio RO about human impact)



Help



Research Objects

search a Research Object...

human impact

My Research Objects
Collaborations
All Research Objects

- Reference: Bozelli R.L.-Interactive e...
- Reference: Bozelli R.L.-Interactive e...
- Reference: Fontolan G.-Human impact a...
- Reference: Fontolan G.-Human impact a...
- Reference: Piyankarage S.C.-Human imp...
- Reference: Piyankarage S.C.-Human imp...
- Multiple and pervasive human impacts ...
- Multiple and pervasive human impacts ...

Scientists

search a scientist/specialist...

Collaborators
Related
All Scientists

More information:

Multiple and pervasive human impacts in coastal lagoons literature review

on: 2018-07-10 15:18:02.518 by: Francesco De Leo

Main topics: floor, footprint, integrity

Areas of knowledge: hydrography

Description: Coastal wetlands are among the most studied, most vulnerable, and economically most important ecosystems on Earth; nevertheless, little attention has been paid, so far, to their sea-floor integrity and the human footprint on their deepest reaches

EVER-EST Seamonitoring CASE STUDIES



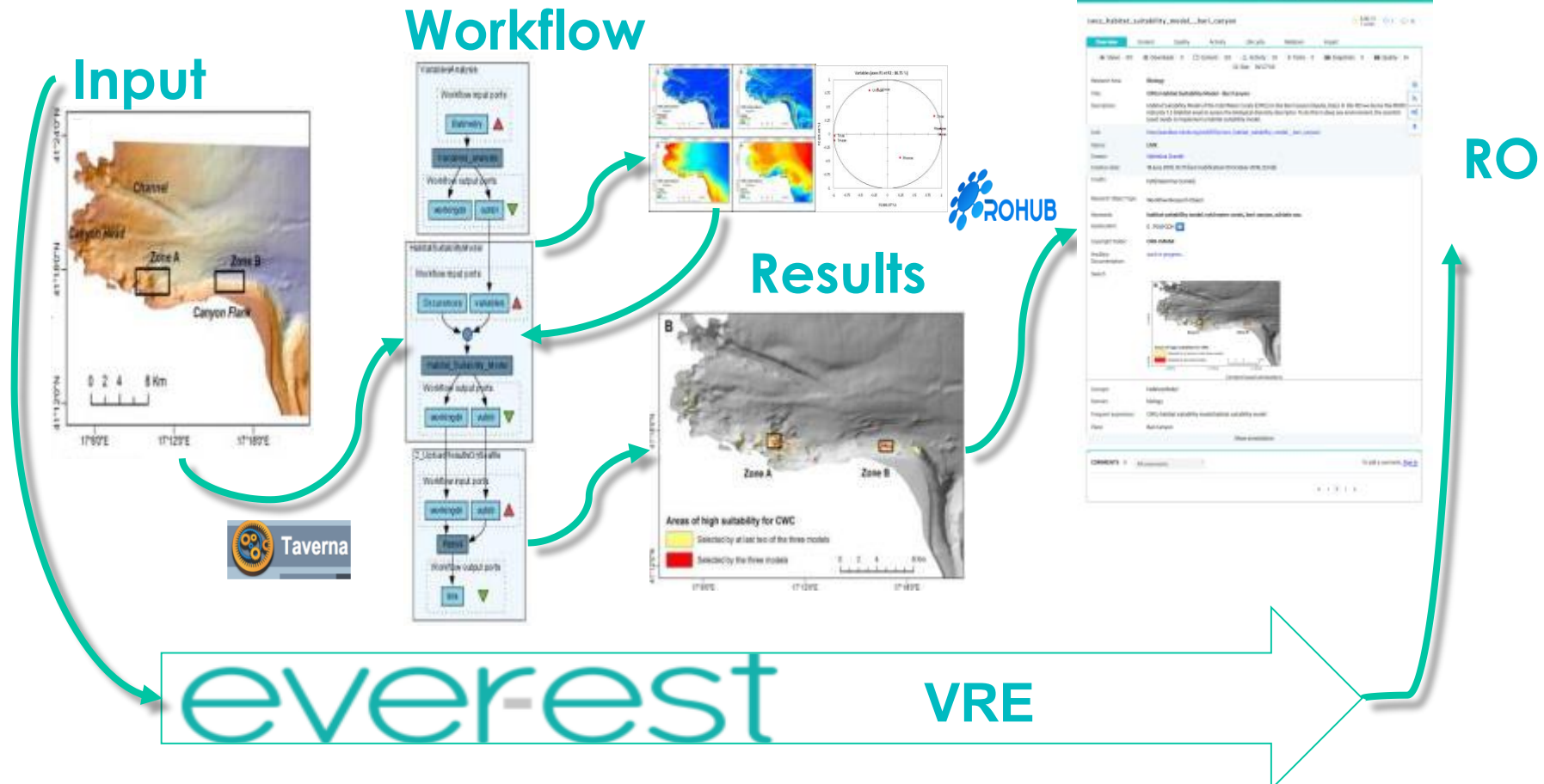
- Habitat extent Cold Water Corals Habitat suitability model (**Workflow RO**)
- Jellyfish role to assess indicators in Marine strategy: Trending Species distribution and citizen science, evolution of invasive species (**Workflow RO**)
- Mapping *posidonia* regression along the Apulian coast (**Process RO**)
- Preserving ancient map of the lagoon of Venice for assessing changes of human footprint (**Data RO**)



Habitat Extent: Cold Water Corals Habitat suitability model



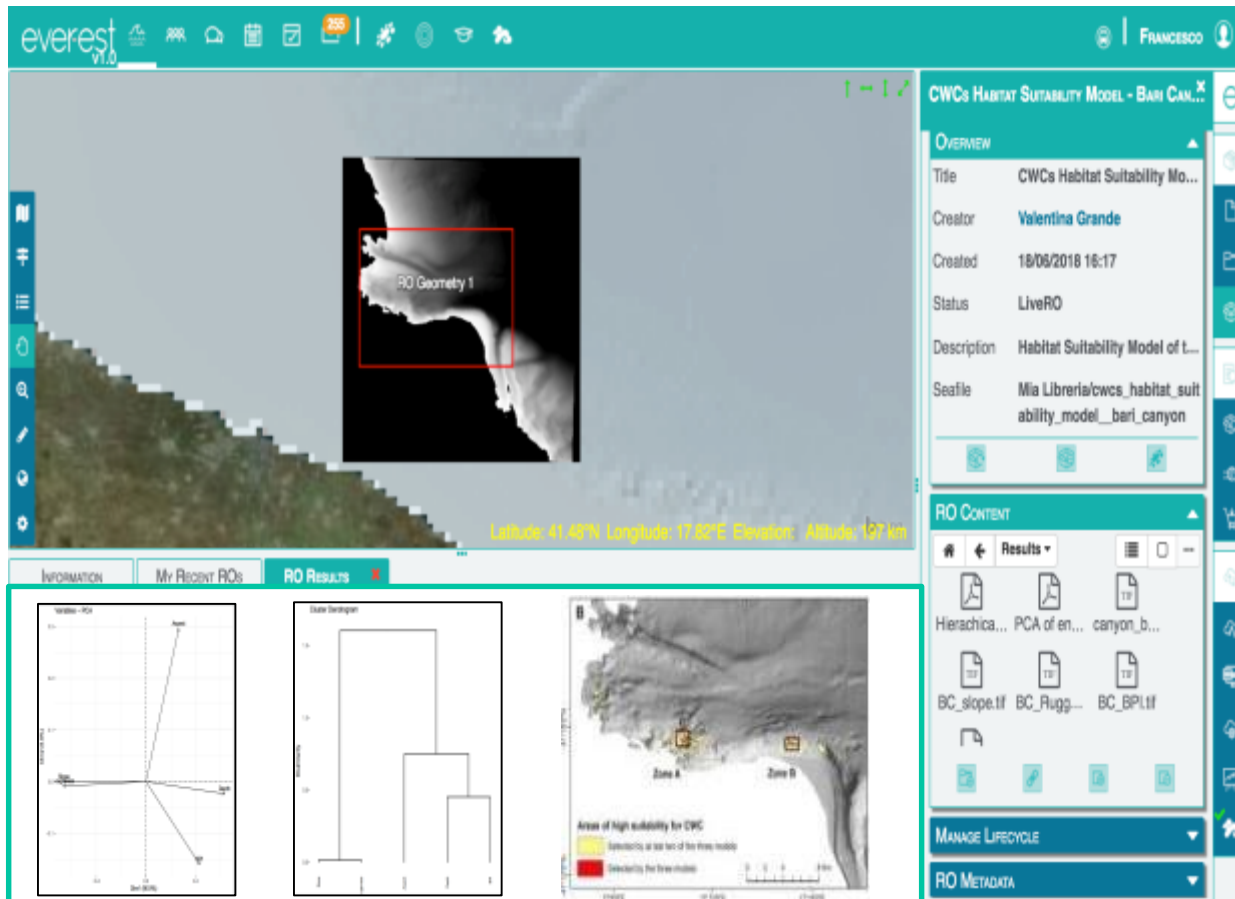
Habitat Suitability Model of the Cold Water Corals (CWCs) in the Bari Canyon (Apulia, Italy). In this RO we derive the MSFD indicator 1.5 (Habitat area) to assess the biological diversity descriptor. To do this in deep sea environment, the scientist (user) needs to implement a habitat suitability model.



Habitat Extent: Cold Water Corals Habitat suitability model



http://www.rohub.org/rodetails/cwcs_habitat_suitability_model__bari_canyon/overview



- RO Type: Workflow RO
- Required tool : R, SeaFile, Taverna Workbench on VM, Workflow runner.
- Input: Workflow, high resolution bathymetry, CWC occurrence
- Output: CWCs Habitat Suitability Model

Species distribution & Non-indigenous species

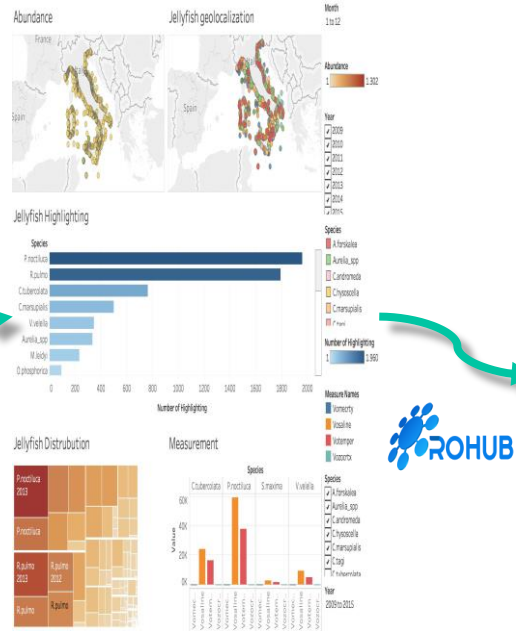
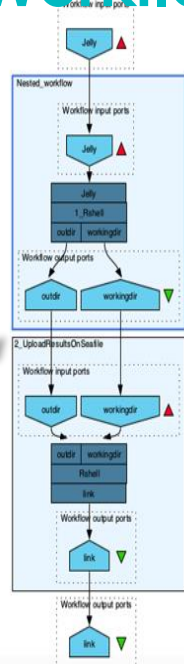


Starting from Jellyfish sightings, we elaborate data to produce explicit geographical information concerning trend about the evolution and distribution of alien species according to MSFD directive

Input



Workflow



Results



RO

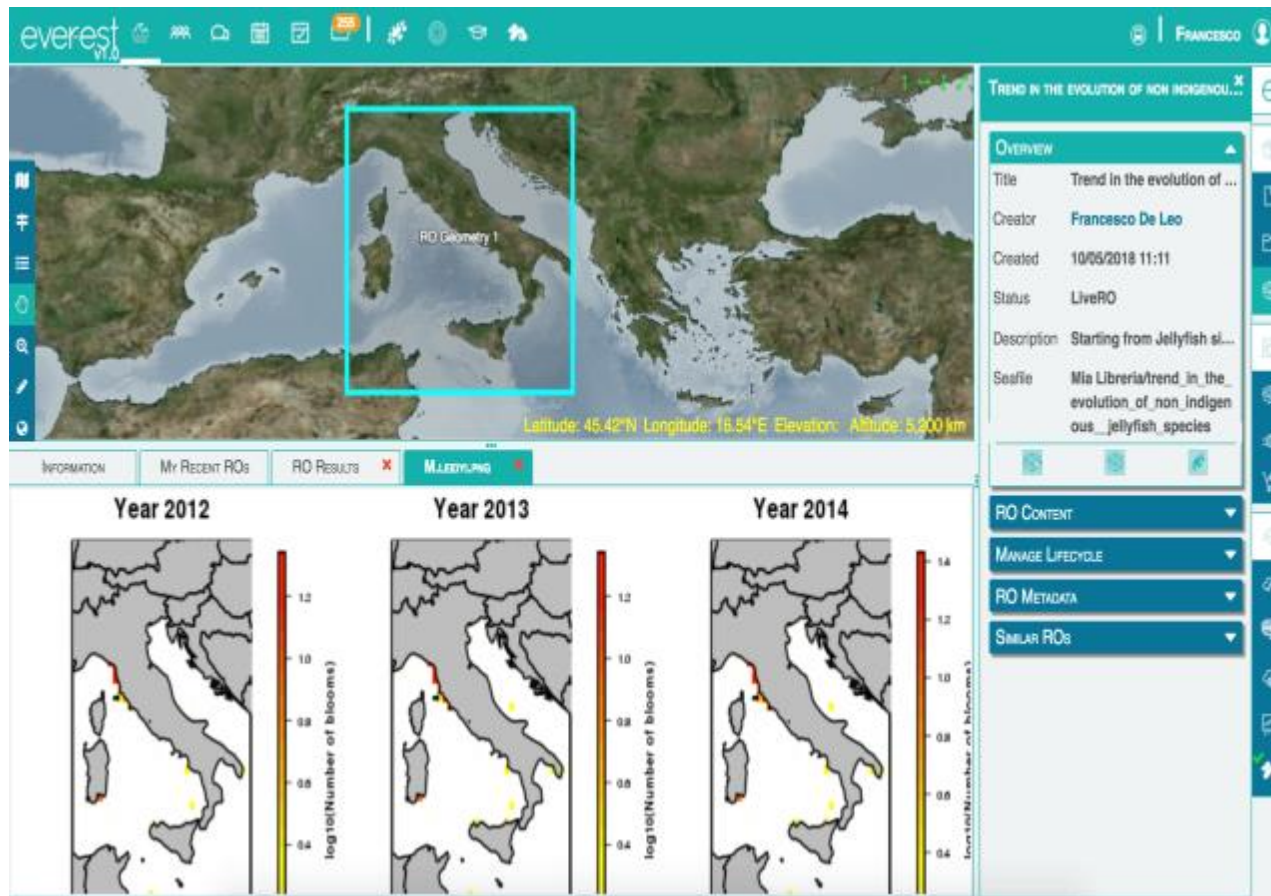
ever-rest

VRE

Study case: Trend in the evolution of non indigenous jellyfish species



http://www.rohub.org/rodetails/trend_in_the_evolution_of_non_indigenous_jellyfish_species/overview



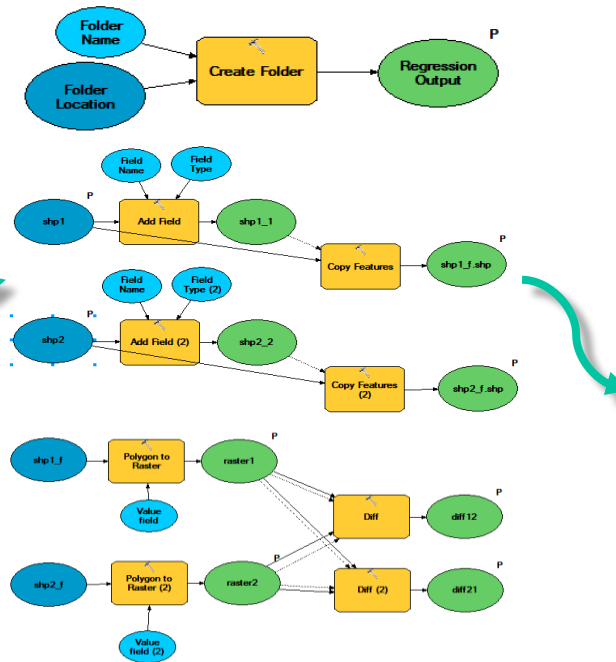
- RO Type: Workflow Ro
- Required tool : R, SeaFile, Taverna Workbench on VM, Workflow runner.
- Input: Workflow, Jellyfish sightings
- Output: density annual map of the NIS jellyfish blooms

Mapping posidonia regression along the Apulian coast

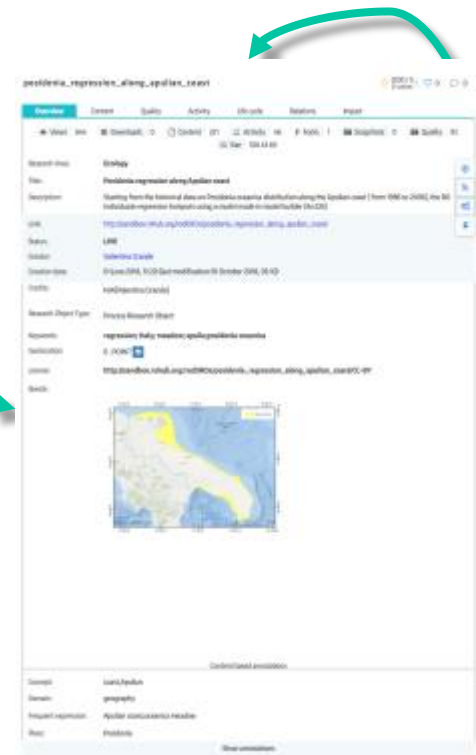
Starting from the historical data on *Posidonia oceanica* distribution along the Apulian coast (from 1986 to 2006), the RO individuate regression hotspots using a model made in model builder (ArcGIS)



Input



Process



RO

ever-est

VRE

Posidonia regression along Apulian coast



http://sandbox.rohub.org/rodl/ROs/posidonia_regression_along_apulian_coast/

everest v7.0

FRANCESCO

RO Geometry 1

Latitude: 40.94°N Longitude: 18.49°E Elevation: Altitude: 331 km

Information My Recent ROs RO Results **sketch_P08.JPG**

Posidonia regression along ...

Creator: Valentina Grande

Created: 01/06/2018 11:20

Status: LiveRO

Description: Starting from the historical d...

Seafile: EVER-EST/ROs/posidonia_regression_along_apulian_coast

RO CONTENT

Input

Posidonia... Posidonia... Posidonia...

Posidonia... Posidonia...

MANAGE LIFECYCLE

sketch.JPG

Mostra tutte

- RO Type: *Process Ro*
- *Required tool : ArcGIS on Platform Virtual Machine and SeaFile*
- *Content: High Resolution Tiff, GeoTiff*

Long-term “active” data preservation for ancient map

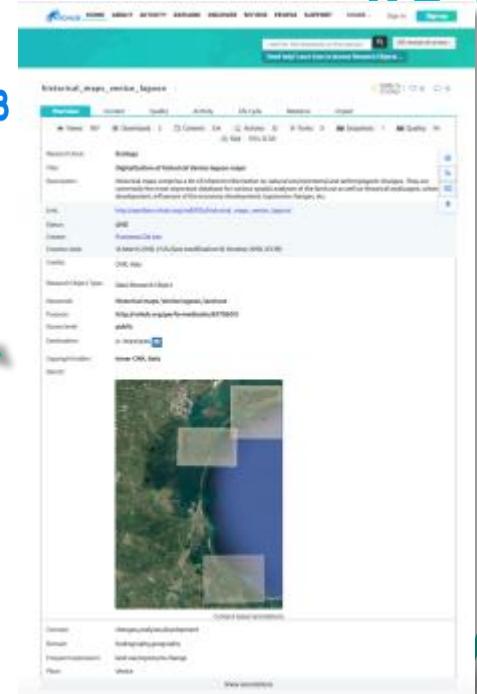
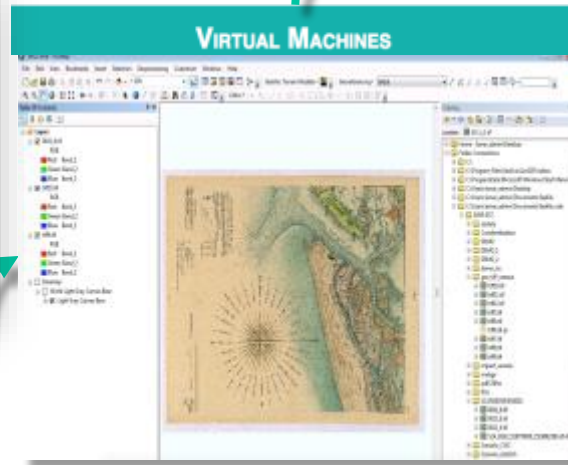


Historical maps comprise a lot of inherent information on natural environmental and anthropogenic changes. They are commonly the most important database for various spatial analyses of the land use as well as historical landscapes, urban development, influences of the economy development, toponyms changes

Input



Process



RO

ever-est

VRE



Preserving ancient map of the lagoon of Venice for assessing changes of human footprint



The screenshot shows the Everest v1.0 web interface. The main map area displays a historical map of the Venice Lagoon, with a red rectangular area highlighted. The map is overlaid on a modern satellite image. The interface includes a search bar, navigation tools, and a sidebar with metadata and content sections.

DIGITALIZATION OF HISTORICAL VENICE LAGOON MAPS

OVERVIEW

Title	Digitalization of historical Ve...
Creator	Francesco De Leo
Created	14/03/2018 17:24
Status	LiveRO
Description	Historical maps comprise a l...
Seafile	Mia Libreria/historical_maps_v... enice_lagoon

RO CONTENT

Home

tiff2_hc3..., screensho..., VENICE S...

MANAGE LIFECYCLE

RO METADATA

- RO Type: *DATA*
Ro
- *Required tool :*
ArcGis on
Platform
Virtual
Machine and
SeaFile
- *Content: High*
Resolution Tiff,
GeoTiff

http://www.rohub.org/rodetails/historical_maps_venice_lagoon/overview

Conclusions



- The EVER-EST project has demonstrated the relevance of Research results (Research Object) standardisation and interoperability to boost innovation and open science (**FAIR principle**)
- ROS (**data ROs, Workflow ROs, Bibliographic ROs**) complemented by Data and Publication DOIs enable the bi-directional link between the data and the research output results and assure the automatic recording and tracking of the quality of the research results and ROs
- The EVER-ES solutions and the adoption of the RO concept proved to be effective for managing the entire **Research Life Cycle** and to effectively share and re-use scientific results.
- The functionality of **GeoReferencing ROs** proves invaluable for Data Provider to assess data set valorisation requirements including historical maps ingestion to built long term data series.

Next steps....



- **Enlarge the community** of RO adopters for Earth Scientists
- Improve tools for RO **quality and check**
- **Make the RO a standard**
- Improve Workflow annotation and documentation
- Improve flexibility for Workflows usage
- **Disseminate** the RO concept and the usage to boost the real **OPEN SCIENCE**

Thanks for your attention!



Email: federica.foglini@ismar.cnr.it

