

PROTECT training curriculum: Exploring the wide range and scope of climate services

PROTECT consortium
23rd March 2023



Welcome! Housekeeping reminders:

- Please keep your **mics and cameras off**
- **Ask questions on the chat** and we will answer them/invite you to discuss
- The **recording and the slides** will be made available on the PROTECT website in the coming weeks

What is PROTECT?

HEurope project aiming at raising awareness and building capacity for the use of pre-commercial procurement schemes in the co-development of climate services.

We look for public procurers – public authorities (regions, cities, national and regional agencies, etc.) that may be interested in exploring innovative procurement for tackling adaptation and mitigation issues in one of the 5 domains:

- **Agriculture, forestry and other land use**
- **Civil security and protection**
- **Energy and utilities**
- **Marine and coastal environment**
- **Sustainable urban communities**

What is the PROTECT training webinars curriculum?

A curriculum of 10 webinars taking place in the spring and autumn of 2023

- **Spring sessions:** Focusing on providing knowledge on **innovation procurement, climate services and Earth Observation** and related problematics
- **Autumn sessions:** Focus on each of the 5 PROTECT application domains: **AFOLU, Civil security and protection, Marine and coastal, Energy and utilities, Urban.**



Spring sessions of the PROTECT curriculum



➤ **22nd March: Introduction to Innovation procurement: PCP and PPI**

What is PCP and what is in it for you?

➤ **23rd March: Exploring the wide range and scope of climate services, including EO-based services**

Why do I need to know about CS and which CS should I know about?

➤ **4th April: Practical aspects of PCP**

How does PCP work in practice?

➤ **5th April: Matching climate services to climate targets and broader needs**

Can climate services help both with 'climate' and 'non-climate' needs in a co-benefit approach?

What will we start exploring today?

Why should I care at all about climate services? What do we mean by climate services, is it only about measuring our GHG emissions? Thanh-Tâm Lê, EIT Climate-KIC

What are the types of climate services? Stefka Domuzova, EIT Climate-KIC

What is the role of Earth observation data in climate services? Ioana-Simona Rosca, Aerospace Valley

Q and A

Exploring the wide range and scope of climate services

Why should I care about climate services (and how)?

Thanh-Tâm Lê, EIT Climate-KIC

Climate services: *a promising but still immature market*

“[...] we attribute to the term a broad meaning, which covers *the transformation of climate-related data — together with other relevant information — into customised products such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices, development and evaluation of solutions and any other service in relation to climate that may be of use for the society at large.* As such, these services include data, information and knowledge that *support adaptation, mitigation and disaster risk management (DRM).*”

- in *A European research and innovation Roadmap for Climate Services*, DGRI, 2015

MARCO



Special issue on European Climate Services Markets – Conditions, Challenges, Prospects, and Examples *Climate Services*, vol. 17 (2020)
<https://www.sciencedirect.com/journal/climate-services/vol/11/suppl/C>

Mitigation services, adaptation services *(a quick reminder)*

Mitigation services

- Help organisations mitigate their contributions to the anthropogenic negative impact of climate change
- Coordinate (at systems level) the monitoring, reporting and verification of net GHG emissions, the reduction of GHG sources, the enhancement of the GHG sinks

Adaptation services

- Adjust the behaviour of communities and individuals
- Adapt infrastructures to deal with the effects of climate change
- Interdependencies between climate mitigation and adaptation, notably with climate risks and resilience

Two layers of challenge *for CS procurement*

Not so easy to know what climate services to procure

- Needs more and more diverse
- Needs hard to define and express
- Other units in your organisation not clear that their needs can be climate-related
- Translation required between your demand and their supply
- Not knowing where to start / cannot look for the solution for every need

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Struggling to bring the market closer to your needs

- Needs are spiralling but not always in a structured way
- Lack of clarity and direction to the supply side
- Many suppliers are SMEs trying to decipher and navigate an immature climate services market

EU approach to boost climate action

leading by example: first movers with 2030 targets

Adaptation Mission

- Support at least 150 European regions and local authorities to become climate resilient by 2030
- Build a community of practice on adaptation to climate change
- Support delivering the European Green Deal and the Climate Adaptation Strategy
- 284+17 regions and communities signed the Adaptation Mission Charter

Cities Mission

- Deliver at least 100 European climate-neutral and smart cities by 2030
- Ensure that these cities also act as experimentation and innovation hubs for others to follow, to enable all European cities to become climate-neutral by 2050
- 100+12 cities selected by the Cities Mission



How to reshape climate services procurement: *shifting to a systemic approach*

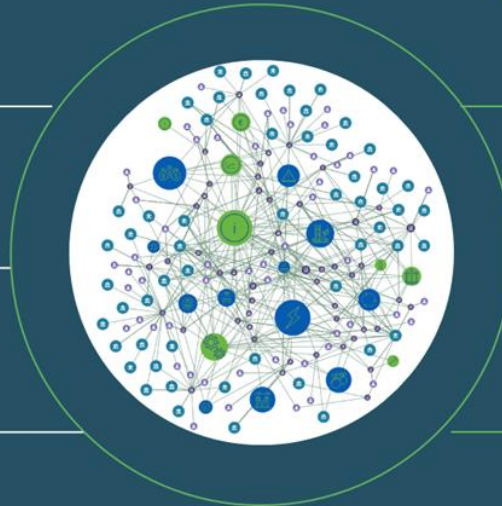
Incremental

Tool purchase model

Specific services and incremental improvements

Fragmented interventions within silos, focused on single levers

System innovation



Transformational

Portfolio procurement model

Portfolio of connected innovative solutions that learn from each other

Wide appreciation of change levers

Shifting the mindset for climate action *and what it means for CS procurement*

Boost the use and the effectiveness of climate services

- Widen the circle of engaged teams and organisations
- Largely shift from a point solution logic to an integrated, systemic approach
- Determine which systems you aim to transform as a priority
 - using what combinations of levers, intervention points, transversal sets of metrics and indicators

Support the boost with climate services

- Within a coordinated procurement strategy for CS services at whole org level
- Not just adding fragmented needs, which does not allow public authorities to take full advantage of the procurement

Exploring the wide range and scope of climate services

What are the main types of climate services?

Stefka Domuzova, EIT Climate-KIC

Climate services sound great!

But...what is a climate service?

European Roadmap for Climate Services, EC, 2015:

“Transformation of climate-related data — together with other relevant information — into customised products such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices, development and evaluation of solutions and any other service in relation to climate that may be of use for the society at large. As such, these services include data, information and knowledge that support adaptation, mitigation and disaster risk management.”

TL;DR:

Transforming climate and non-climate data into customised tools that may serve the society for climate adaptation, mitigation and disaster risk management.

What types of climate services are out there?

Well, it depends whom are you asking...



What types of climate services are out there? *... and what are you asking about...*



What climate services is PROTECT looking at?

Let's have a glimpse at taxonomy...

| PROTECT domain | Agriculture, forestry and other land use | Civil security and protection | Energy and utilities | Marine and coastal environment | Sustainable urban communities |
|--------------------------------|--|---|---|--|--|
| Sub-domains | Environmental monitoring Natural resources monitoring Operations management Weather services for agriculture Operations management | Early warning Migration and settlement Post-event analysis Preparedness Rapid mapping Search and Rescue Infrastructure Planning Insurance for natural disasters Critical infrastructure | Renewable energy Energy - other Waste Drinking water | Environmental monitoring Maritime engineering Navigation Ocean services Ports Vessel tracking Aquaculture Fisheries | Environmental monitoring Smart cities operations Urban planning and monitoring Urban mobility |
| Categories of climate services | ... | ... | ... | ... | ... |

The PROTECT taxonomy has three levels:
 Application domain /
 Sub-domain / Climate service.

(Zooming on levels 2 and 3 in the next slide...)

What climate services is PROTECT looking at?

| Sub-domain | Category of climate services |
|-------------------------------|--|
| Environmental monitoring | Air quality monitoring in urban environments |
| Environmental monitoring | Thermal auditing |
| Environmental monitoring | Urban greening |
| Environmental monitoring | Urban heat islands |
| Smart cities operations | Smart waste management |
| Urban planning and monitoring | Cultural heritage monitoring |
| Urban planning and monitoring | Surveying and mapping of urban areas |
| Urban planning and monitoring | Urban modelling, 3D modelling, Digital Twins |
| Urban planning and monitoring | Urban planning |
| Urban mobility | Climate data and modelling for urban mobility monitoring and forecasting |

Extract from the PROTECT taxonomy, from the domain “**Sustainable urban communities**”

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Let's take an example

Zooming in: Cultural heritage monitoring

- **A building like any other?**
- **Different users**
- **Different levers**
- **Different impediments**

Why is it important to know about types of climate services and what is important to know about their taxonomies?

- **It helps to know the structure of the market** → knowing where to search for a service provider or for someone with similar needs as your own (e.g. for a PCP)
- **If the taxonomy categories do not match your needs, it probably means that there is a market gap** → and probably the service you are looking for does not exist off-the shelf (i.e. you may need a PCP)
→ Either way, you may need/benefit from PCP
- **And even if you are not doing a PCP, knowing the market can help formulate your demand, or assess if the climate services you are currently using correspond to your needs**

Exploring the wide range and scope of climate services

**What is the role of Earth Observation in climate services?
How can climate services apply to the PROTECT application domains?**

Ioana-Simona Rosca

European Project Manager for Space and Climate,
Aerospace Valley

What is Earth Observation?



Credits: [ESA - Earth observation data access portal](#)

According to <https://business.esa.int/newcomers-earth-observation-guide>, Earth Observation (EO) is defined as the process of acquiring observations of the Earth's surface and atmosphere via sensors mounted on satellites, aircrafts, drones or at the surface, resulting in data in the form of digital imagery.

Two supporting technologies enable this intermediate step of processing EO data:

- ✓ artificial intelligence (AI)
- ✓ cloud computing

Copernicus Programme

- One of the largest EO programmes. Managed by the European Commission
- Monitor and forecast the state of the environment on land, sea and in the atmosphere
- Support climate change mitigation and adaptation strategies
- Efficient management of emergency situations and the improvement of the security of every citizen
- Applications of EO data from the Copernicus programme



Credits: [À propos de Copernicus | Copernicus](#)

What is the role of Earth Observation in climate services (CS)?



- ✓ EO data is playing a crucial role
- ✓ Satellites provide vital information regarding the state, evolution of the environment and human activities on Earth
- ✓ CS support the governments and businesses

Credits: [Earth observation big data for climate change research - ScienceDirect](#)

How can climate services apply to the five application domains?

Application domains

Marine and coastal environments



Energy & Utilities



Sustainable urban communities



Agriculture, Forestry and other land use

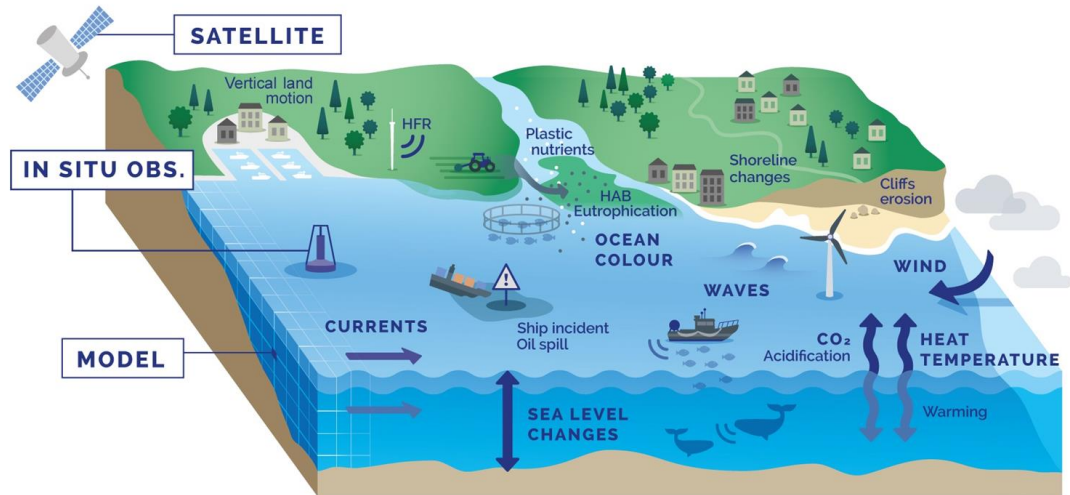


Civil security & protection



Marine and coastal environment - Definition

- Aquatic environments with high levels of dissolved salt
- Includes open ocean, the deep-sea ocean and coastal marine ecosystems
- CS rely on EO data for precise nowcasting and forecasting, informing ocean weather algorithms, and monitoring parameters influencing water quality



Credits: [Monitoring Marine Coastal Hazards with Earth Observations and Copernicus Data | CMEMS](#)

Marine and coastal environment – Examples of usage

Challenges

- Sedimentation
- Flooding & sea level rise
- Climate change impact on natural coastal processes and ecosystems

Satellite solutions

- Time-series data for water constituents and other parameters
- Continuous monitoring
- Contribution to models for ocean surface

Credits: [Space Opportunities for Climate Challenges - Eurisy](#)

Energy and utilities - Definition



Credits: [Globe's solar and wind energy sites mapped for the first time \(smart-energy.com\)](https://www.smart-energy.com)

- Includes all activities related to water supply, sewage services, electricity, dams, and natural gas
- CS rely on EO data for forecasting and nowcasting, planning and optimisation of renewable energy (onshore and offshore wind, solar, tidal and wave), and monitoring of strategic for the utilities sector infrastructure (e.g. dams, pipelines)

Energy and utilities – Examples of usage

Solar power :

▪ Challenges

- ❑ Weather dependent
- ❑ Difficult to determine energy production

▪ Satellite solutions

- ❑ Site assessment
- ❑ Solar forecasting
- ❑ Solar yield monitoring for grid optimization

Energy corridors :

▪ Challenges

- ❑ Leakages
- ❑ Complex energy grid
- ❑ Conservative regulators

▪ Satellite solutions

- ❑ Reliable, safe and sustainable monitoring service
- ❑ Frequent detection of activities in energy corridors

Large-scale water services :

▪ Challenges

- ❑ Lack of information for different variables (e.g. snow information or soil moisture)
- ❑ Seasonal forecasting

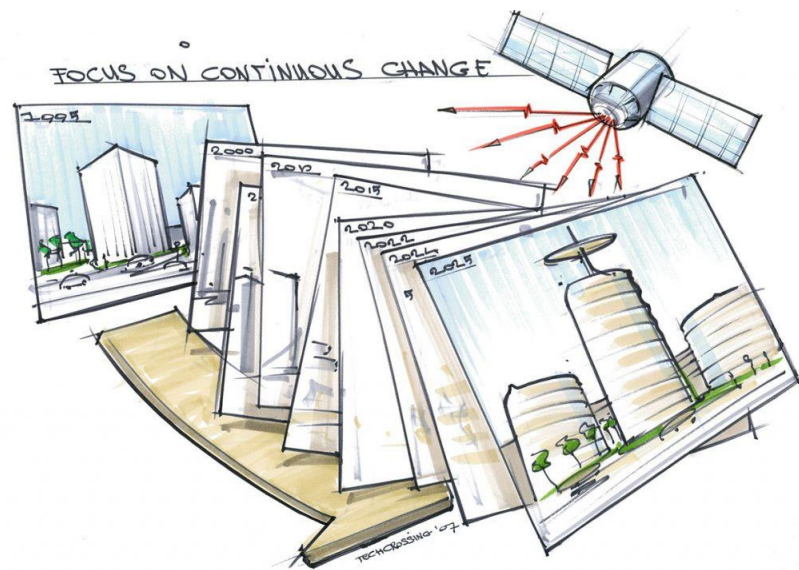
▪ Satellite solutions

- ❑ Reliable service line for the water industry
- ❑ Hydrological model evaluation
- ❑ Historical data availability for water quality and quantity

Credits: [Space Opportunities for Climate Challenges - Eurisy](#)

Sustainable urban communities - Definition

- Green and sustainable urban communities operate their human, natural, and financial capital with the goal to meet current and future needs in a sustainable manner, while prioritising a long-term perspective
- CS rely on EO data for assessing and forecasting air quality and pollen concentration and assisting urban planning and operations (monitoring and preventing heat islands, building greener cities) and optimizing green cities, in particular when these are implementing elements of a smart (e.g., IoT) infrastructure



Credits: [Earth observation for Smart Cities \(neo.nl\)](https://www.neo.nl)

Sustainable urban communities – Examples of usage

Urban vegetation :

- **Challenges**
 - ❑ Urbanization
 - ❑ Heat island effect
- **Satellite solutions**
 - ❑ High-resolution vegetation data
 - ❑ Measure carbon storage capacity
 - ❑ Local climate zones mapping

Air quality :

- **Challenges**
 - ❑ Air pollution is detrimental to human health and can cause damage to the climate or to materials
- **Satellite solutions**
 - ❑ Mapping air quality
 - ❑ Adapting cities' policies and reducing the exposure to pollution

Smart infrastructure :

- **Challenges**
 - ❑ Urban planning
 - ❑ 3D motion monitoring of buildings, landslides, pipelines, bridges, etc.
- **Satellite solutions**
 - ❑ Analyzing rooftops and calculating the potential for solar power
 - ❑ Thermal imaging to identify heat losses and assess electrical consumption

Credits: [Space Opportunities for Climate Challenges - Eurisy](#)

Agriculture, forestry and other land uses - Definition



Credits: [Precision Agriculture Solutions For Agribusiness Needs \(eos.com\)](https://eos.com)

- Includes crops, forests, animals, micro-organisms
- CS using EO in the domain of AFOLU can contribute to a more optimised and sustainable exploitation of the land (based on precision agriculture, natural resources management) as well as counter the growing challenges related to the climate crises (e.g., providing forecasting and alerts on extreme weather events)

Agriculture, forestry and other land uses – Examples of usage

Forest monitoring :

▪ Challenges

- ❑ Dispersed tree plantations
- ❑ Illegal clear cuts, disease outbreaks, forest fires, altered land use etc.
- ❑ Regulations demand new tools and more information

▪ Satellite solutions

- ❑ Digital service to automatically monitor the state of a forest inventory
- ❑ Regular tracking and detection of changes

Early detection of plant stress :

▪ Challenges

- ❑ Spread of plant pests through globalization & trade
- ❑ Climate change effects such as droughts and floods
- ❑ Threat to human health and food security

▪ Satellite solutions

- ❑ Regular monitoring of large areas
- ❑ Identify and map plants and trees
- ❑ Detection of stress in plants before they are visible to the naked eye

Credits: [Space Opportunities for Climate Challenges - Eurisy](#)

Civil security and protection - Definition

- Includes the policies, bodies and mechanisms that a country or region has in place to protect it against new and urgent threats to the security of people and/or the functioning of critical infrastructures
- CS using EO can feed into systems monitoring extreme events and sending automated alerts to civil authorities and/or the population



Credits: [Civil Security From Space Industry Day | ESA TIA](#)

Civil security and protection – Example of usage

Civil security and protection :

- **Challenges**

- Migration
- Preparedness
- Search and rescue
- Infrastructure planning

- **Satellite solutions**

- Forecast
- Post-event analysis
- Preparedness
- Rapid mapping
- Monitoring and forecasting of the climate impact of migration, of climate drivers for migration

Q&A



Thank you!

Register for the webinars at:
<https://www.protect-pcp.eu/training-curriculum/>

