

A Methodology for the Systematic Analysis of the European Climate Services Landscape

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Poster abstract
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Climateurope2

Introduction

Why climate services?

Society is experiencing the increasingly frequent and severe impacts of climate change and natural climate variability, and needs to prepare. European (and non-European) research institutions, private companies, policymakers, funding bodies, and other stakeholders, are becoming more and more concerned about the importance of having quality climate information for supporting decision-making. In this sense, climate services are a key element for adaptation to and mitigation of anthropogenic climate change.

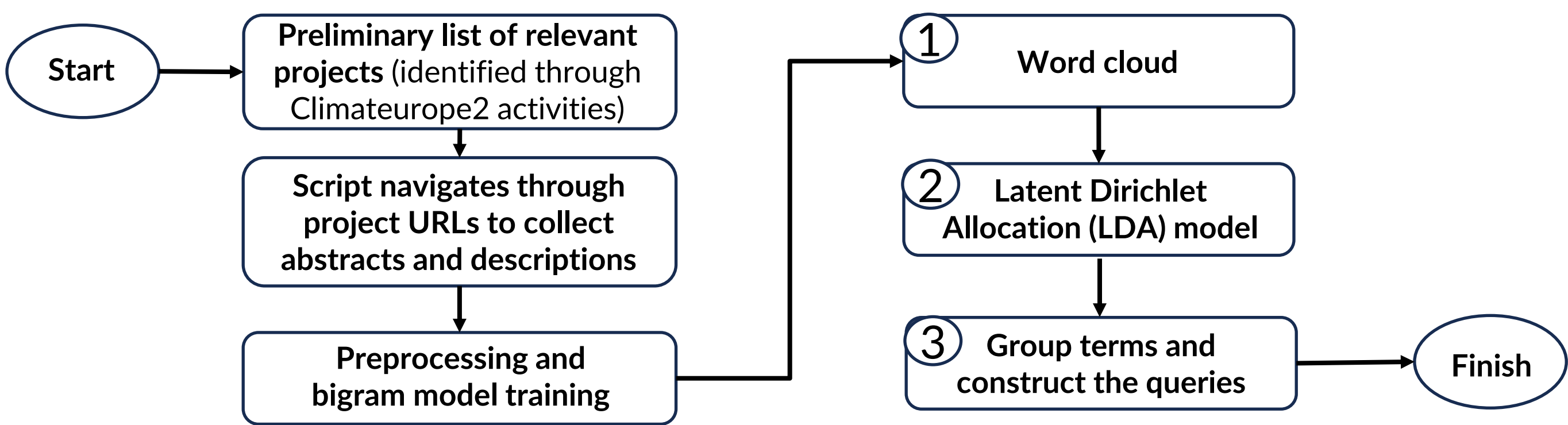
Objectives

- Develop a computational method to systematically and semi-automatically obtain and analyse social sciences information to understand the current landscape of climate services in Europe: importance placed on these services, the types of institutions and countries most involved, and where the major gaps may lie in understanding the impact of climate change.
- Provide the scientific community with a methodology and a set of tools to scale this type of analysis to future studies.

Methodology and results

Keywords identification

Natural Language Processing (NLP) techniques were used to identify relevant keywords (or combination of keywords) for searching in CORDIS and ensuring finding desirable projects.



Workflow followed for the keyword's identification [2].



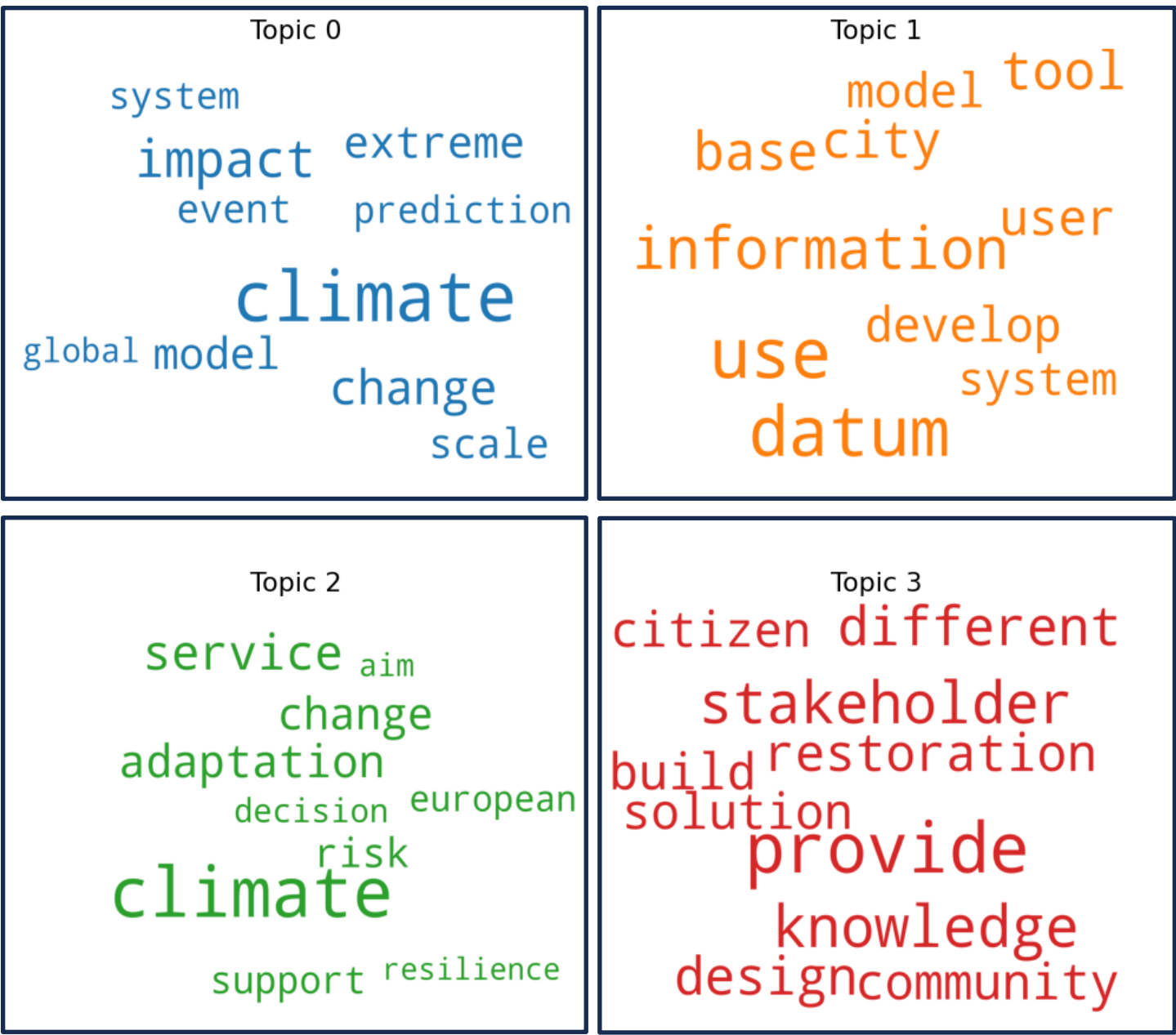
Word cloud coming from the abstracts and descriptions of an initial list of key climate services projects.

- Relevant individual words and bigrams, such as 'resilience', 'support', 'policy', 'action', 'develop', 'climate adaptation', 'risk assessment', 'decision support', 'policy maker', 'end user', or 'decision make', are highlighted.

These concepts are closely linked to the importance of climate services being fit-for-purpose.

- The Latent Dirichlet Allocation (LDA) model allows to explore how the most frequently used terms interrelate. The text is understood as a random mixture of topics, with each topic modelled as a unique distribution of the entire vocabulary [3]. Interpretation of the topics:

Topic 0 – General concepts of climate change
Topic 1 – Synonyms for climate services
Topic 2 – Uses of climate services
Topic 3 – Users, beneficiaries of climate services, and potential interventions



Climate services topics obtained by using the LDA model.

- The queries were constructed following the idea of finding a balance between the quantity of projects and their relevance.

Query number	Keywords
1st query	'climate service*'
2nd query	'climate information'
3rd query	'climate change' AND ('service*' OR 'system*' OR 'information') AND ('risk* assessment*' OR 'climate change adaptation') AND ('resilien*' OR 'decision mak*' OR 'support') AND ('poli*' OR 'action*')

Description of the three queries ultimately selected for conducting the search for climate services-related projects in CORDIS, based on the LDA results. The * character here substitutes for another character or string of characters.

Conclusions & next steps

- A bigger importance has been given in Europe to climate services as tools to support communities, organisations, and institutions in adapting to climate change and variability.
- It is worth noting the low use of the term 'mitigation' in the climate services-related projects, highlighting the current focus on adaptation strategies within the field.
- Climateurope2 aims to work towards equitable and quality-assured climate services by engaging more with actors from the private sector, as well as Eastern European countries, which have traditionally been less represented in this field.
- Web scraping is a powerful tool for the automated extraction of data from websites. However, the choice between web scraping and other extraction methods depends on factors such as API availability, the frequency of changes on the website, usage limitations, and legal and ethical considerations.
- This methodology has the potential to be reproduced and scaled to other sources, documents, and topics.

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Our approach

A mixed-methods approach draws on the potential strengths of both quantitative and qualitative methods, allowing the exploration of diverse perspectives and the uncovering of themes, patterns and relationships that may exist in the research questions [1]. Information relevant in the climate services field includes both quantitative and qualitative data. By combining quantitative and qualitative approaches with computational methods, a deeper understanding of the climate services landscape is possible.

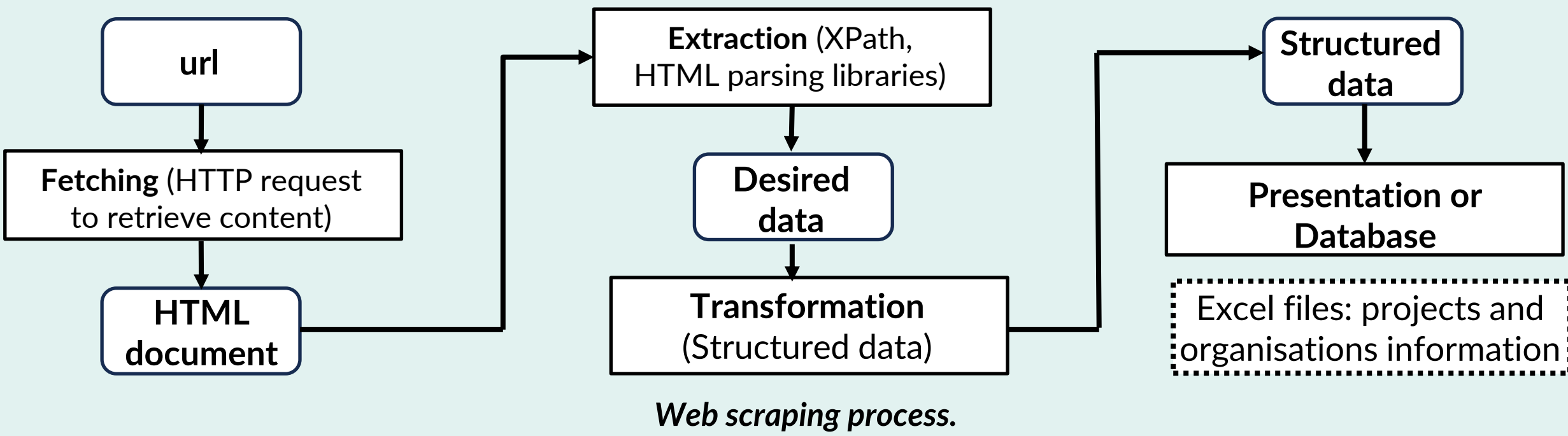
Data

EU-funded projects related to climate services listed in CORDIS (<https://cordis.europa.eu>), the European Commission's platform on the results of projects funded by the EU's Research and Innovation framework programs. The fields of information gathered are:

- Projects' general information:** name, abstract, description, funding program, subprogram, topic, funding scheme, start and end date, and EU contribution.
- Participating organisations' information:** name, country, sector, EU funding, and role.

Information retrieval and analysis

Web scraping was chosen for the automated extraction of data from CORDIS. It enables navigation of web pages, downloading of content, and extraction of specific information based on predefined criteria, which is then stored in a database according to a user-defined structure [4].



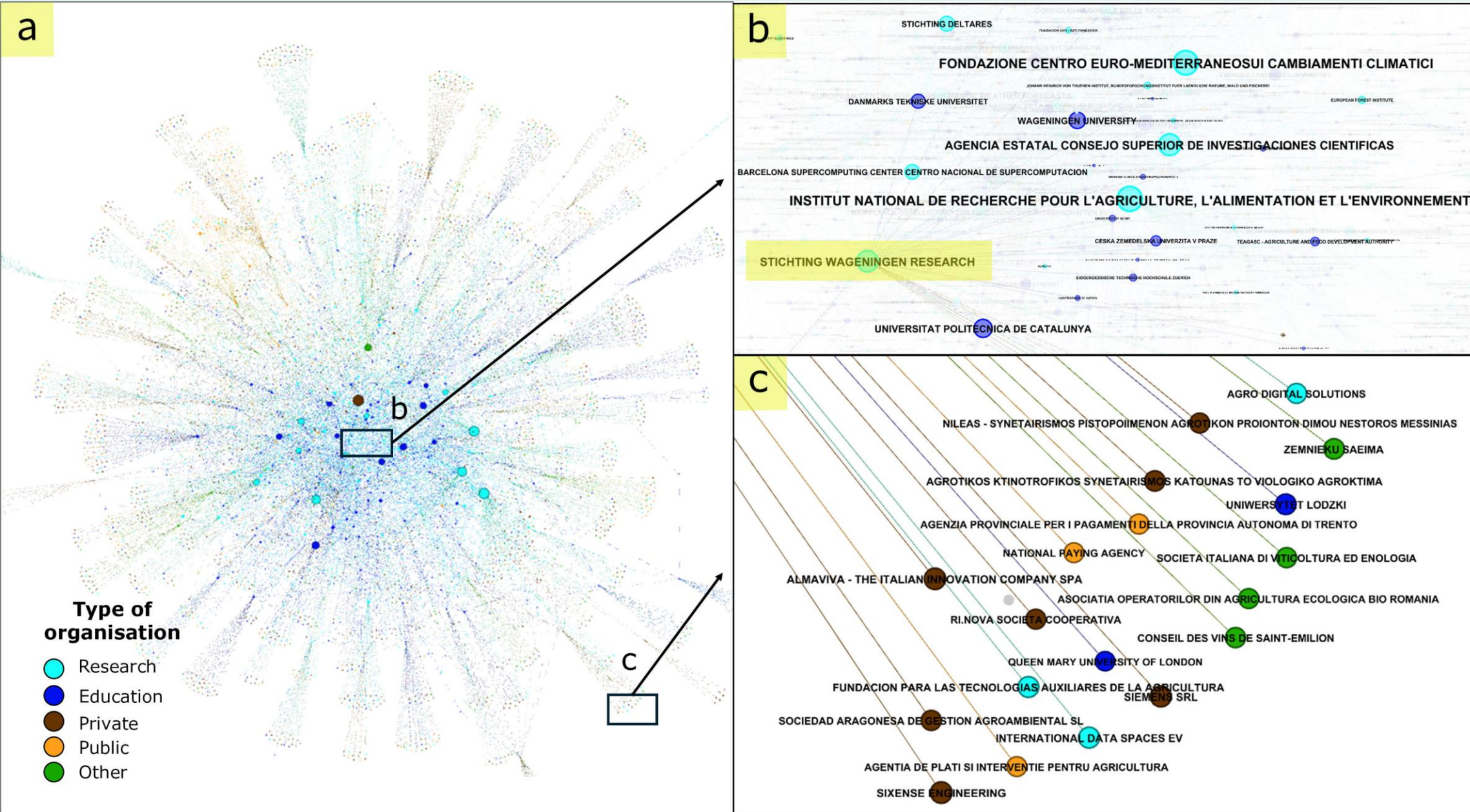
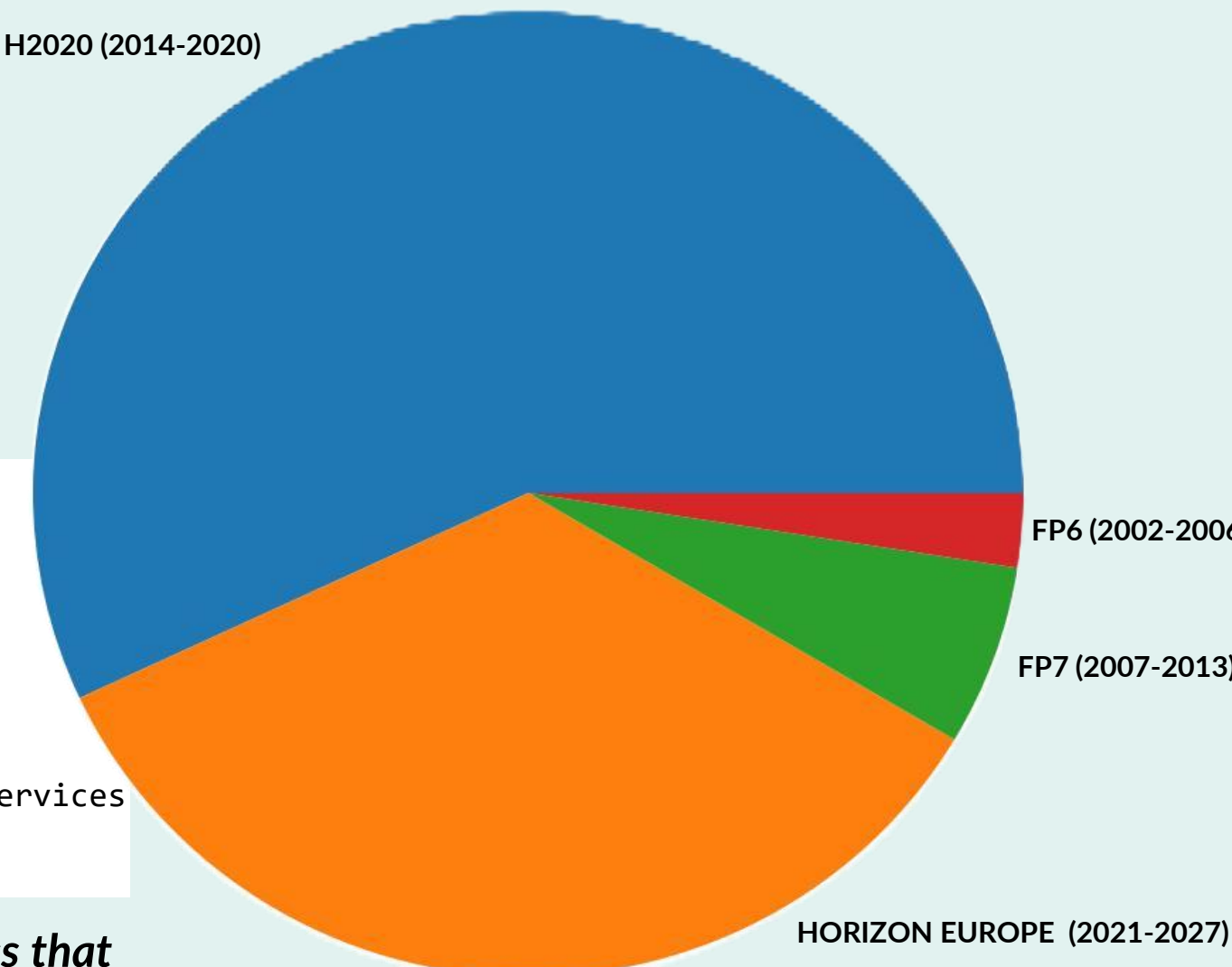
Web scraping process.

The number of European-funded projects related to climate services has increased since 2006. To date, H2020 program encompasses most of the projects.

The term 'climate service' is explicitly mentioned in several project topics under the most recent funding programs.

SC5-01-2016-2017 - Exploiting the added value of climate services
LC-CLA-12-2020 - Advancing climate services
SC5-03-2016 - Climate services market research
SC5-02-2015 - ERA for Climate Services
SS-05b-2015 - Earth-system modelling and climate services
ENV.2021.6.1-1 - Seasonal-to-decadal climate predictions towards climate services
HORIZON-CL5-2021-D1-01-06 - Supporting and standardising climate services

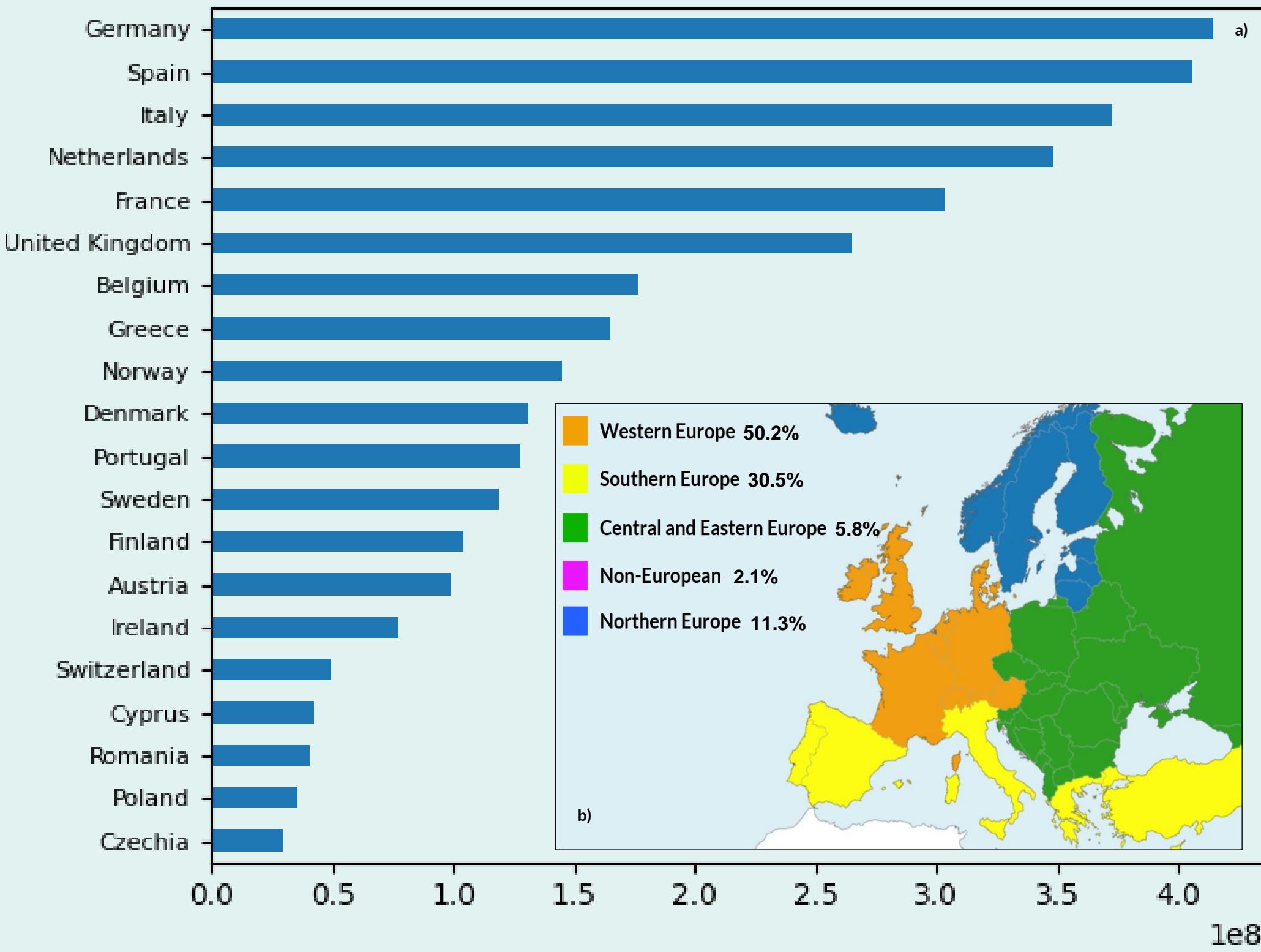
Distribution of projects by funding program (right), and examples of topics that mention climate services (above). Total number of projects = 646.



Climate services-related social network. The dots represent the organisations. The size represents the total funding they have received in the projects. The connections indicate that they have participated together in a project (a). Zoom in on the organisations that jointly participate in projects with Stichting Wageningen Research (b). Zoom in on the external part of the network with organisations that participate in only one project (c).

The landscape of climate services encompasses different types of institutions with a prominent role of academic actors (research and universities) and some particular cases from the private sector.

Academic actors conform a well-connected network involved in the major part of projects, while other types of institutions engage in a few.



Distribution of EU funding by country (a). Map showing the different regions of Europe according to EuroVoc and the respective percentages of EU funding they received (b).

Institutions involved in climate services are predominantly located in Western and Southern European countries.

Central and Eastern European countries do not seem to have greater interaction among themselves.

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