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PRIMAVERA

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PRocess-based climate sIMulation: AdVances in high resolution modelling and European climate Risk Assessment

Deliverable D11.3

Sector specific case studies and other factsheets

(PRIMAVERA factsheets and other communication material)

Deliverable Title	*Sector specific case studies and other factsheets (PRIMAVERA factsheets and other communication material)*	
Brief Description	*This deliverable describes the communication material developed so far with special emphasis on the developed factsheets*	
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Content

Executive Summary

In this report we describe the material developed to date for communication and interaction with users, with special emphasis on the factsheets.

In chapter 1 we describe the motivation to develop factsheets and the User Interface Platform (UIP). For those who do not have a lot of knowledge about climate data and especially climate modelling, we prepared a number of general climate factsheets (max 2 pages), explaining some of the basic aspects of climate modelling, uncertainties in climate modelling and the models used in PRIMAVERA. This information helps them understand the information in the sector factsheets, where information is given on the potential impact of extreme events on sectors, and potential changes in the occurrence of the extreme events. The potential users of the results of the PRIMAVERA project (impact researchers, climate service providers, etc.) are often experts in their own field of work, but they do not necessarily know a lot about climate data, since they often do not have the time or inclination to read more detailed information about climate modelling. When potential users have some background knowledge about climate modelling, it is easier to communicate with them about what could be the potential benefit of the PRIMAVERA project results for their specific sector or application. The sector specific factsheets currently available, already try to link climate knowledge with risk analyses in several sectors. Showing these links helps to get potential users interested in the PRIMAVERA project.

In chapter 2 the developed factsheets are described briefly (8 climate factsheets, and 6 sector specific factsheets describing various meteorological phenomena and how they can impact different sectors). The factsheets themselves can be found on the UIP. More factsheets will be developed later on, especially focussing on presenting results from the high resolution modelling and potential impact for sectors.

Potential users are often not interested in the details of a project, but they are interested in how results of a project could be of use for them. Therefore, a separate website, the UIP, was made for users, with entries per sector. Information related to the PRIMAVERA project is also presented in a diversity of ways, through story maps (chapter 3), short presentations on YouTube, short animations of climate model results with explanation (chapter 4). By presenting results from the project in many different ways, we try to attract potentially interested people to visit our UIP. The main purpose of the UIP, hence, is to transfer knowledge from the project using communication channels and materials suitable for different, but not necessarily scientific or expertise audience.

The factsheets, as well as other communication and user-oriented materials, are expected to facilitate our future interaction with users and motivate new stakeholders to start using results of this project. The most up to date factsheets are always available on the UIP, under the resources tab: https://uip.primavera-h2020.eu/sector-factsheets and https://uip.primavera-h2020.eu/climate-factsheets. To get an idea of the impact we monitor the page visits of the various pages at the UIP, we check how many people we reach with social media, which links there are with other projects, etc. Some information on this is presented in chapter 5.

Project Objectives

With this deliverable, the project has contributed to the achievement of the following objectives (DOA, Part B Section 1.1) WP numbers are in brackets:

No.	Objective	Yes	No
A	To develop a new generation of global high-resolution climate models. *(3, 4, 6)*		X
B	To develop new strategies and tools for evaluating global high-resolution climate models at a process level, and for quantifying the uncertainties in the predictions of regional climate. *(1, 2, 5, 9, 10)*		X
C	To provide new high-resolution protocols and flagship simulations for the World Climate Research Programme (WCRP)'s Coupled Model Intercomparison Project (CMIP6) project, to inform the Intergovernmental Panel on Climate Change (IPCC) assessments and in support of emerging Climate Services. *(4, 6, 9)*		X
D	To explore the scientific and technological frontiers of capability in global climate modelling to provide guidance for the development of future generations of prediction systems, global climate and Earth System models (informing post-CMIP6 and beyond). *(3, 4)*		X
E	To advance understanding of past and future, natural and anthropogenic, drivers of variability and changes in European climate, including high impact events, by exploiting new capabilities in high-resolution global climate modelling. *(1, 2, 5)*		X
F	To produce new, more robust and trustworthy projections of European climate for the next few decades based on improved global models and advances in process understanding. *(2, 3, 5, 6, 10)*		X
G	To engage with targeted end-user groups in key European economic sectors to strengthen their competitiveness, growth, resilience and ability by exploiting new scientific progress. *(10, 11)*	X	
H	To establish cooperation between science and policy actions at European and international level, to support the development of effective climate change policies, optimize public decision making and increase capability to manage climate risks. *(5, 8, 10)*		X

Detailed Report

In this report we describe the material developed to date for communication and interaction with users. First we describe the motivation to develop factsheets and the User Interface Platform (UIP; chapter 1). The UIP is developed as a separate entry for users (cf. the main project website, which is more general in nature and hence was delivered via WP7). The details of the project are often not of interest for users, but they are interested in how the results of the project could be of interest for their sector. In chapter 2 the developed factsheets are described briefly. The factsheets themselves can be found on the UIP. In chapters 3 and 4 we describe other materials developed for communication and user interaction, and in chapter 5 we give some information on the number of people reached.

1 Lessons learnt and motivation

The set-up of the factsheets and the User Interface Platform was partly based on earlier experiences of project partners from their interactions with users:

- Short descriptions of some essential aspects of working with climate models are taken up better than longer descriptions. For this reason, factsheets were developed on several subjects;
- When a link is made with the sector, subject, or regions potential users are working on, this normally generates more attention from the users. For this reason, the sector specific factsheets were developed;
- There is a wide variety of potential users with a variety of background knowledge about climate data and climate modelling. Presenting information in various ways, and with different levels of detail, will help to attract a diversity of potentially interested people. For this reason, we also developed YouTube films and story maps, and organised webinars, while the material has been promoted at various conferences and workshops;
- Communication/dissemination through an internet portal or social media alone is not enough to get to understand user needs and to provide the users with what they need. Personal contact (interviews, webinars, case studies) helps in the understanding between climate modelers and the users of climate model data (e.g. impact researchers, climate service providers, policy makers). Because of this, we also organise webinars, conduct interviews and aim to be present at conferences and workshops;
- Different people can sometimes interpret the same text and figures differently. Therefore, checking the content with several people, preferably with different backgrounds, is needed. The factsheets were checked elaborately among the project partners, also for the level of complexity of the text, the use of jargon, etc., and several factsheets were developed where we explained certain terms (e.g. the various types of uncertainties, the difference between predictions and projections);
- For interaction with users ongoing contact or regular contact is needed. To keep potential users interested, new information has to be regularly supplied or users should have the possibility to get in contact with climate scientists. Therefore, we will continue organising webinars and presentations, as well as developing new factsheets, story maps, and other materials throughout the project.

In PRIMAVERA, factsheets are short descriptions of a subject of two pages maximum length. These factsheets are produced to give a brief and fast introduction to certain subjects. The potential users of the results of the PRIMAVERA project (impact researchers, climate service providers, etc.) are often experts in their own field of work, but they do not necessarily know a lot about climate data, since

they often do not have the time or inclination to read detailed information about climate modelling. The factsheets are summaries of the most important aspects on climate modelling, and they are short enough to be read by and accessible to the potential users.

For those who do not have extensive knowledge about climate data and especially climate modelling, we prepared a number of **general factsheets**, explaining some of the basic aspects of climate modelling, uncertainties in climate modelling and the models used in PRIMAVERA. This information helps the readers understand the information in the **sector factsheets**, where information is given on the potential impact of extreme events on sectors, and potential changes in the occurrence of the extreme events. When potential users have some background knowledge about climate modelling, it is easier to communicate with them about what could be the potential benefit of the PRIMAVERA project results for their specific sector or application. The sector specific factsheets currently available, already try to link climate knowledge with risk analyses in several sectors. Showing these links helps to get potential users interested in the PRIMAVERA project. Ideally they are supplemented with case studies with PRIMAVERA data.

Some factsheets from other projects are available (see Annex 1). SPECS produced a number of factsheets mainly focusing on climate predictions. The PRIMAVERA factsheets are shorter to make them more accessible and we also tried to use simpler wording or explain more terms. Then again, the factsheets of the World Health Organisation (WHO) give information about impacts on health, but they do not provide information on climate modelling.

Parts of some of the general factsheets are based on material collected for the C3S User Learning Services (ULS). This results in more consistent communication about aspects of climate modelling across projects. If potential users want more detailed information, they can also go to the lessons/resources on the ULS-platform (https://uls.climate.copernicus.eu/). The factsheets from the IS-ENES2 project partly treat the same subjects as in our general factsheets, but we arranged the information differently, added more explanation, etc. which should make the PRIMAVERA factsheets more accessible.

Information related to the PRIMAVERA project is also presented using other communication channels and tools, e.g. through short presentations on YouTube, short animations of climate model results with explanations, and through story maps. By presenting results from the project in many different ways, we try to attract potentially interested people to visit our UIP. The main purpose of the UIP, hence, was to transfer knowledge from the project using communication channels and materials suitable for different, but not necessarily scientific or expertise audiences.

The factsheets, as well as other communication and user-oriented materials, are expected to facilitate our future interaction with users and motivate new stakeholders to start using results of this project.

2 List of factsheets

Below a list is given of the factsheets available on the User Interface Platform[1]. The factsheets can be subdivided into more general factsheets, which are meant to give more background information on climate modelling, and sector specific factsheets, which focus on specific extreme events and their potential impact on specific sectors. Here only the title and a short abstract or introduction of each factsheet are presented. The complete factsheets can be found on the UIP (the links are provided at

[1] https://uip.primavera-h2020.eu/climate-factsheets and https://uip.primavera-h2020.eu/sector-factsheets

the top of paragraphs 2.1 and 2.2). More factsheets will be developed later in the project. In 2.3 we indicate which factsheets could be developed or how we want to find out which other factsheets are needed.

2.1 General factsheets

(See: https://uip.primavera-h2020.eu/climate-factsheets)

- **How do climate models work?** Climate models are mathematical representations of the climate system, its components and their interactions. Climate models represent the earth and the atmosphere on a three-dimensional grid of boxes, where the size of a single box represents the spatial resolution of a model. Smaller scale processes are often represented by means of parameterizations. To simulate future climate characteristics, different Representative Concentration Pathways (RCPs) (or concentration scenarios) are used that correspond to storylines of future societal and technological development, including incorporation of climate mitigation policies. High-resolution climate information is needed for climate risk and impact assessments and adaptation planning. The PRIMAVERA project high resolution Global Climate Models (GCMs) are expected to provide credible information in support of climate risk assessments in Europe.
- **PRIMAVERA climate models: Does high-resolution global modelling matter?** The PRIMAVERA project develops and uses a new generation of high-resolution climate models, which feature improvements in physics and in the simulation of small scale processes. All of these advances are intended to better represent processes and extreme phenomena that have a high impact on society and the environment, compared to existing lower-resolution models. Outcomes of the project will be used to support climate risk assessment activities focused on several sectors across Europe. In some example studies in Europe, PRIMAVERA models were found to outperform previous climate models drawn from the CORDEX and CMIP5 datasets.
- **Quality of climate models**: Climate models are complex, but even so, they are still simplifications of reality. Therefore, there will be systematic differences between the results of simulations with climate models, and observations in the real world. Such differences are called the model bias. The smaller the bias, the higher the model skill to simulate the observed climate correctly. This skill is often used as a measure for quality. Climate models can be evaluated for many different aspects such as how they represent averages, extremes or variability. PRIMAVERA aims to improve the skill of climate models by increasing the spatial resolution.
- **Uncertainties in climate projections**: "Uncertainty" has a specific meaning in climate science. It arises in climate models from a number of sources and falls broadly into three categories, with their contributions to the total uncertainty varying over time. The categories covered in this factsheet are natural/internal variability, scenario uncertainty and climate model uncertainty. In the latter category there are significant improvements expected from the PRIMAVERA project and other similar initiatives. There can also be uncertainty in impact modelling, where climate projections are used to drive other models in order to understand a particular climate impact, and in the decision-making process itself.
- **Dealing with uncertainties**: There are different types of uncertainties (natural variability, model and scenario uncertainties) and consequently different ways of how to deal with them: providing more observation data, using model ensembles and concentration scenarios. In the case of model and scenario uncertainties (due to the lack of knowledge of a system) no likelihoods can be assigned to the various climate scenarios. For dealing with these uncertainties about our future climate, it is in most cases better to ask which climate scenario is most relevant for the user, and not which one is most probable.

- **Ensembles of climate models** and how they can be used: A climate model ensemble consists of model runs with slight differences in settings or initial conditions, or with different climate models or forcings. Ensembles are an important tool to quantify variability and uncertainty inherent in Earth's climate system. In certain situations ensembles can yield probability distribution functions (PDFs) which give the user confidence about the expected outcomes (mean, max/min). Ensembles are widely used both in climate science and weather forecasting. Apart from increasing the spatial and temporal resolution of climate models, generating output from ensembles of climate models is another key improvement in advancing the quality of climate risk assessments.
- **Observations and climate model data:** advantages and disadvantages for risk assessments: For climate-related risk assessments, climate information about extremes is typically required. There are many different sources of climate data, all with their advantages and disadvantages. Observations only provide data for the past, while using models allows simulated data for the future climate to be provided. Models can also be used to fill in gaps in observations (in time and space), using a technique called re-analysis. The possibility to create ensembles with models helps to quantify extremes and the uncertainties about extremes.
- **Climate predictions and projections:** A climate prediction or climate forecast attempts to produce a most likely description or estimate of the actual evolution of the climate in the future, at lead times of months to decades ahead. A climate projection is the response of the climate system to different future greenhouse gas (GHG) scenarios, often based upon simulations by climate models. The emission or concentration scenario used to make the projection is based on assumptions, that ultimately may or may not be realized. Within PRIMAVERA we focus on climate projections.

2.2 Sector specific factsheets

(See: https://uip.primavera-h2020.eu/sector-factsheets)

- **Atmospheric blockings and the European energy system**: Almost all aspects of national and global energy systems are exposed to some form of climate risk attributable to scales ranging from extreme weather to long term climate change. The impact of climate is further exacerbated with the growing use of weather-dependent renewable generation, the output from which cannot be directly controlled in the same way as traditional power stations. Blocking events – where the usual eastward wind from the Atlantic into Europe is paused or reversed – have significant regional weather impacts throughout the year, affecting European temperature, wind, and precipitation; and thus energy production and demand. Some climate models project a reduced frequency of blocks over the Atlantic and Europe, but significant uncertainties remain. New high-resolution PRIMAVERA simulations offer new opportunities to explore this important phenomenon.
- **Heatwaves and energy over Europe**: Almost all aspects of national and global energy systems are exposed to some form of climate risk attributable to scales ranging from extreme weather to long term climate change. The impact of climate is further exacerbated with the growing use of weather-dependent renewable generation, the output from which cannot be directly controlled in the same way as traditional power stations. Heat waves are an extreme event that significantly affects the energy sector. Future projections from previous generations of climate models suggest an increase in the severity and frequency of heat waves over Europe. Further insight into the evolution of heat waves and their inherent impacts are of utmost relevance for climate risk management in the energy sector.
- **The winter North Atlantic Oscillation, wind and energy over Europe**: Almost all aspects of national and global energy systems are exposed to some form of climate risk attributable to scales ranging from extreme weather to long term climate change. The impact of climate is further exacerbated with the growing use of weather dependent renewable

generation, the output from which cannot be directly controlled in the same way as traditional power stations. During winter, the North Atlantic Oscillation (NAO) is the dominant mode of climate variability affecting Europe and is associated with damaging events such as large snowstorms, cold spells and drought that impact the energy sector significantly. Further insight into the evolution of NAO and its inherent impacts are of utmost relevance for climate risk management in the energy sector.

- **Extratropical cyclones**: Extra-tropical cyclones, also known as European wind storms, can bring violent winds, intense rain and battering waves to Europe. They are capable of major disruption, causing damage to transport networks, energy infrastructure, and even loss of life. Because extreme storms at a particular location are relatively rare events, observational data is often insufficient to fully understand the risk that they pose. Some businesses and governments use climate models to provide additional information on storm statistics in the present day, as well as predicting any changes in the future. This factsheet gives some examples of how PRIMAVERA high-resolution models will be able to improve our understanding of extra-tropical cyclone risk.
- **Flooding impacts on the European transport system**: Intense rainfall can cause direct significant and long lasting impacts on transport operations, due to flooding, while indirectly impacting transport safety and bringing damage to transport infrastructure. Submerged roads and railway tracks become unusable, towns become inaccessible, movement of people and goods becomes disrupted, and floods could even lead to human casualties. Knowledge about projected future changes in extreme rainfall events and in factors contributing to the occurrence of floods is needed. Such knowledge, combined with better understanding of the transport sector's vulnerability to these events, will allow transport organizations to develop strategies to minimize the potential risks brought about by changes in the characteristics of flood events in the future.
- **Representation of windstorms by PRIMAVERA models**: PRIMAVERA models have high spatial and temporal resolution and feature improved parameterizations and representation of some physical processes. This factsheet includes examples of how the PRIMAVERA models are able to represent European wind storms, also called extra-tropical cyclones. A comparison with the lower resolution CMIP5 Global Climate Models (GCMs) serves as a baseline for these examples. The PRIMAVERA models show reduced biases in the frequency of more intense storms, and also improve the representation of the track density of the wind storms.

2.3 More factsheets?

Additional fact sheets will be prepared later on in the project:

- A few more general factsheets can be made. We would like to consult potential users on which subjects they would like to have some more information. An example of an additional factsheet could be “Components of climate models”.
- When more analyses with the PRIMAVERA models become available we can also provide some more information on weather events that are relevant for specific sectors, including other sectors that are not included now, e.g. forestry or health. The final factsheet mentioned in par. 2.2 is already an example of a factsheet with PRIMAVERA results.
- At the fourth PRIMAVERA General Assembly (March 2019), we received suggestions from the PRIMAVERA EEAB about topics for further factsheets, which are now being reviewed.

3 List of story maps

The texts of the sector specific factsheets were used to make story maps. In these story maps more visual material was added (photographs, short videos, and animations, such as one on accumulated precipitation in 6 hour intervals in mm, according to the ERA-Interim reanalyses between 11th and 14th of August 2002 for the story map on flooding). The following story maps are available at the User Interface Platform as of April 23, 2019:

- Blockings and energy over Europe
- Heatwaves and energy
- NAO
- Flooding impacts on the European transport system
- Tropical cyclones[2]
- Extra-tropical cyclones

The story maps are linked to webpages that focus specifically on some sectors (agriculture, transport, energy, health, water and finance and insurance).

While the factsheets aim to present their material in a way which engages the reader, the story maps encourage further interaction with the content (e.g. playing the videos, scrolling through the content).

4 Other materials available on the User Interface Platform

The UIP also provides some presentations in the form of relatively short **YouTube videos** (https://uip.primavera-h2020.eu/presentations). These presentations may be interesting to some potential users of climate data. The videos were made during a splinter session at the EGU conference (Vienna, April 2018). The subjects partly overlap with some of the factsheets:

- What is a tropical cyclone and why high resolution matters for its modelling
- Post-tropical and extra-tropical cyclones, storm tracks and impact of high resolution
- Soil moisture drought and high resolution. Impact on the European agriculture
- Use of PRIMAVERA data (use case)

Under "science snippets" (https://uip.primavera-h2020.eu/videos) some short **animations** of climate model results with explanation are available:

- Clouds animation from a flagship Global Climate Model
- Global simulations of precipitation
- Global simulations of Sea Surface Temperature and Wind Speed
- Simulations of the Sea Surface Temperature over the North Atlantic

As with the story maps, the aim here is to provide content that is both informative and interactive for the user. For example, in the clouds animation, the user can watch the evolution of interesting phenomena such as extra-tropical cyclones and play back sections of the video that are especially appealing for them. A snapshot from the clouds animation is shown in Figure 4.1 below, where a particularly striking example of an extra-tropical cyclone has formed over the North Atlantic, between Iceland and the UK.

[2] The focus of this story map is those tropical cyclones which ultimately reach Europe as post-tropical cyclones.

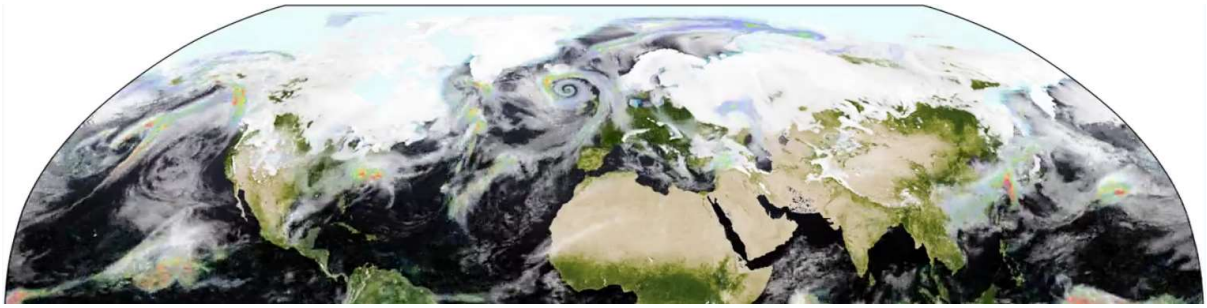

Figure 4.1. Snapshot of the clouds animation at https://uip.primavera-h2020.eu/videos showing an extra-tropical cyclone over the North Atlantic. The user can play the video to see this storm system form in the central North Atlantic and later dissipate over the UK.

Although we try to avoid to use too much jargon on the UIP, it is sometimes impossible to avoid to use certain technical terms. However, we developed a **glossary**, which is linked to these terms, as a popup window that opens when a reader hovers the cursor over the term.

5 Usage statistics

5.1 User Interface Platform

All factsheets and other communication and dissemination materials are placed on the UIP. The UIP tracks the usage statistics, and we can see whether the pages with the factsheets, story maps, or some others are the most visited ones. Figure 5.1 gives an overview of the 10 most visited pages on the UIP. The story maps and factsheets are among the most visited pages. The number of visitors is still relatively small. However, only in 2019 we have started adding the general (or climate) factsheets and they were visited already 77 times (only 3 factsheets available on April 15). Figure 5.2 shows where the users of the UIP come from. The visitors are not limited to Europe.

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate
1.	/	**1,232** (45.95%)	870 (41.99%)	00:02:01	849 (66.43%)	57.71%
2.	/glossary	**116** (4.33%)	90 (4.34%)	00:00:43	13 (1.02%)	100.00%
3.	/storymaps	**110** (4.10%)	63 (3.04%)	00:00:34	5 (0.39%)	40.00%
4.	/storymaps/heatwaves	**106** (3.95%)	92 (4.44%)	00:01:25	52 (4.07%)	82.69%
5.	/storymaps/nao	**79** (2.95%)	76 (3.67%)	00:02:01	39 (3.05%)	97.44%
6.	/videos	**74** (2.76%)	45 (2.17%)	00:00:49	16 (1.25%)	62.50%
7.	/factsheets	**59** (2.20%)	50 (2.41%)	00:01:25	13 (1.02%)	84.62%
8.	/index.html	**58** (2.16%)	58 (2.80%)	00:00:00	58 (4.54%)	100.00%
9.	/news	**56** (2.09%)	43 (2.08%)	00:00:32	1 (0.08%)	100.00%
10.	/node/19	**53** (1.98%)	45 (2.17%)	00:00:26	1 (0.08%)	0.00%

Figure 5.1. Top 10 of the most visited pages on the UIP from 14 March 2018 until 15 April 2019.

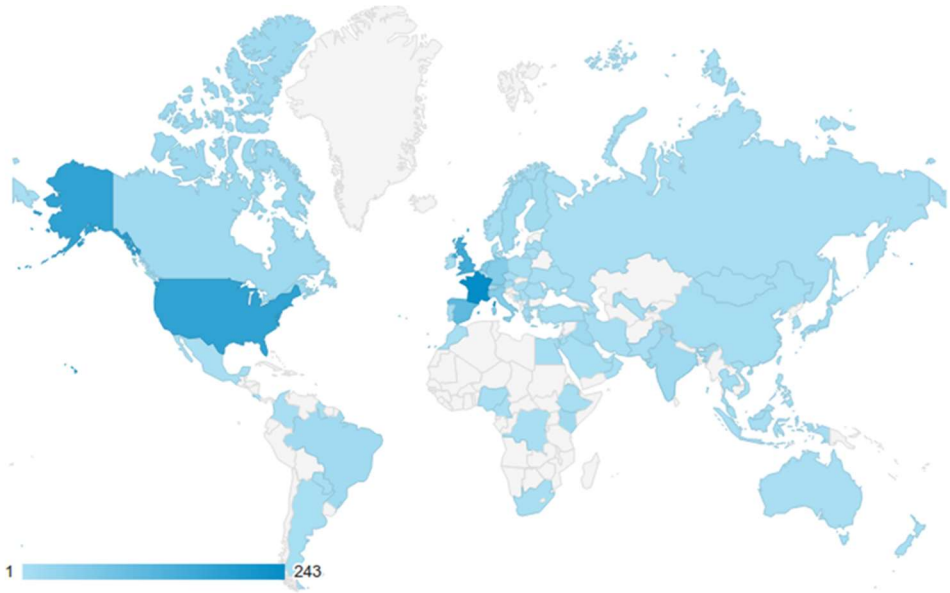

Figure 5.2. The countries the users of the UIP come from, detected from 14 March 2018 until 15 April 2019.

5.2 Use of social media

The PRIMAVERA Twitter account, @PRIMAVERA_H2020, has 148 followers (as of April 16, 2019). Followers include individual scientists (both working on the project, and external to it); PRIMAVERA partner organisations; other EC-funded projects; divisions and staff of the EC; members of the EEAB; global initiatives; and members of the user community.

A range of engagement methods are used, including engagement with:

- relevant global hashtags (e.g. #WorldOceansDay)
- relevant national hashtags (e.g. #NationalCodingWeek)
- trending hashtags (e.g. #WorldEmojiDay)
- hashtags for conferences where PRIMAVERA has a presence (e.g. #JASMIN2018; #EGU19)

Other users' tweets, where PRIMAVERA is tagged, are also retweeted to increase engagement. More unusual engagement approaches are also used, such as presenting PRIMAVERA results and updates as poems. Table 5.1 shows the top tweets by month, over the past six months. The diversity of the subject matter represented by these tweets reflects the diversity of the audience.

Table 5.1. Subjects of top @PRIMAVERA_H2020 tweets by month (by [1]number of impressions, and [2]number of engagements respectively), Oct'18-Mar'19. (Impressions: number of times users saw the tweet; engagements: number of times users interacted with the tweet; engagement rate: engagements divided by impressions.)

Month	Subject of the tweet	Impressions	Engagements	Engagement rate
Oct'18	Upload of the EGU2018 splinter session talks to the UIP[1]	2356	8	0.3%
	Poem about PRIMAVERA for UK National Poetry Day[2]	1787	40	2.2%
Nov'18	*Data unavailable*			
Dec'18	Stream 2 simulations[1,2]	3046	28	0.9%
Jan'19	Blog by PRIMAVERA scientist on post-tropical cyclones[1]	2148	6	0.3%
	Global lightning climatology produced with PRIMAVERA convection-resolving models[2]	1935	93	4.8%
Feb'19	Collaboration between CLIVAR and PRIMAVERA[1]	661	4	0.6%
	Poem for Women in Science Day[2]	635	7	1.1%
Mar'19	ESMValTool[1]	3733	14	0.4%
	Feedback from EEAB member at Fourth General Assembly[2]	478	32	6.7%

The factsheets have also been publicised via Twitter:

(1897 impressions and 25 engagements)

(894 impressions and 1 engagement; original tweet received 5 likes)

The second image of Twitter messages demonstrates a further dimension of user engagement – namely that copies of the factsheets are taken to conferences and other events attended by WP11

participants. Copies were also provided by BSC at the Fourth General Assembly (March 2019), so that other scientists participating in the project could see how PRIMAVERA science is represented.

The conferences where PRIMAVERA factsheets were promoted include: ECCA2017 in Glasgow, C3S 1st General Assembly in Toulouse, EGU2018 in Vienna, Adaptation Futures 2019 in Cape Town, EMS2019 in Budapest, 2nd C3S General Assembly in Berlin. Factsheets were also distributed at the two Climateurope festivals (April 2017 and October 2018).

5.3 Other Links Built

Links with other WPs in PRIMAVERA

One of the aims of WP11 is to inform potential users about results from the PRIMAVERA project. As such we try to translate results from other WPs to factsheets, into story maps, presentations etc. Especially the link with WP10 (risk assessments; sector focussed factsheets) is strong, but where possible we try to use also results from other WPs. Scientists from other WPs also help with presentations, review of factsheets, etc.

The development of the factsheets demanded an interdisciplinary collaboration between scientists from different scientific disciplines and work packages of the project. This collaboration helped providing this material in a plain language, while preserving scientific robustness, as well as developing user friendly scientific figures.

Synergies and links created with other projects

As explained in chapter 1 we used our experiences from other national and EU-projects to develop our factsheets and UIP. Many of the partners in WP11 have years of experience in other projects, and they use their experience and contacts for the interactions with users within the PRIMAVERA project.

For the factsheets we also made a list of existing factsheets from other projects. A few factsheets prepared in the SPECS-projects were referred to in the PRIMAVERA climate factsheets. The User Learning Service (ULS, https://uls.climate.copernicus.eu) does not provide factsheets, but more elaborate lessons (often 30-60 minutes). Some of the PRIMAVERA climate factsheets use material from these lessons.

Contacts in other projects (especially EU projects) were used to promote results of PRIMAVERA through e.g. Twitter messages, presentations at e.g. the Climateurope festivals, and to inform potential users about e.g. splinter meetings at the EGU or about webinars organised by PRIMAVERA.

Links with user groups

As indicated above, many partners in WP11 have many years of experience in user interaction and tailoring of climate data for specific user groups, from projects in their own countries and from EU-projects. These contacts with user groups were used again in PRIMAVERA, and we also tried to extend these user groups and engage with new users e.g. through presentations at conferences, workshops, webinars and through social media.

In addition, the topics of the sector specific factsheets were motivated by user needs from various sectors, such as energy, transport and insurance. In particular, these factsheets focused on the climate impacts that were marked as most significant in the survey and interviews with representatives from these sectors.

Annex 1 Factsheets in other projects

SPECS

Some links are made to factsheets 1 and 2 in PRIMAVERA climate factsheets.
http://www.specs-fp7.eu/Fact%20sheets

- Factsheet #8: Use of climate information in the wind stakeholder chain (October 2016)
- Factsheet #7: Seasonal wind speed predictions (October 2016)
- Factsheet #6: Tropical Cyclone Forecasts (May 2015)
- Factsheet #5: How detectable are improvements in forecast quality? (April 2015)
- Factsheet #4: Climate prediction with multiple sources of information (March 2015)
- Factsheet #3: Climate forecast reliability (March 2015)
- Factsheet #2: What is a decadal prediction? (October 2014)
- Factsheet #1: What is a seasonal prediction? (October 2014)

IS-ENES2

Guidance and use cases:
https://climate4impact.eu/impactportal/documentation/guidanceandusecases.jsp?q=generic_work_flow
Background & topics:
https://climate4impact.eu/impactportal/documentation/backgroundandtopics.jsp

- General concepts: Some background information on the global climate system.
- Scenarios: How scenarios are created and used, and what differs them.
- Climate models: Information on global and regional climate models.
- Climate model data: What comes out of a climate model and how to use it.
- Seasonal to decadal predictions: What is a seasonal and decadal prediction?
- Observed Climate data: Available observed climate

WHO

http://www.who.int/news-room/fact-sheets/
For example a factsheet on Climate change and health.

C3S User Learning Services

The User Learning Service (ULS, https://uls.climate.copernicus.eu) does not provide factsheets, but more elaborate lessons (often 30-60 minutes). Some of the PRIMAVERA climate factsheets use material from these lessons.

Annex 2 Page views of the UIP in days with new published or updated content

(up to 15 April 2019)

Type of content	Content	Date	Page views this date
Page	Results from the PRIMAVERA user survey Interviews	12/03/2018	182
Storymap	• Flooding impacts on the European transport system • Blockings and Energy over Europe	22/05/2018	88
Video	Global simulations of precipitation	17/09/2018	82
Presentation	• Soil moisture drought and high resolution. Impact on the European agriculture • Post-tropical and extra-tropical cyclones, storm tracks and impact of high resolution • What is a tropical cyclone and why high resolution matters for its modelling	15/10/2018	129
Sectors	• Transport • Finance and insurance	24/01/2019	47
Factsheet	• Heatwaves and energy • Atmospheric blockings and the European energy system • North Atlantic Oscillation, wind and energy over Europe • Flooding impacts on the European transport system • Extratropical cyclones • How do Climate Models work? • Quality of climate models • Dealing with uncertainties	21/02/2019	97
Factsheet	Does high-resolution global modelling matter?	08/03/2019	13
Video	Clouds animation from a flagship Global Climate Model	19/03/2019	79