



Call: H2020-SC5-2014-two-stage

Topic: SC5-01-2014

PRIMAVERA

Grant Agreement 641727



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

Deliverable D7.5

Final project dissemination and exploitation report

Deliverable Title	Final project dissemination and exploitation report	
Brief Description	This will identify opportunities and pathways for dissemination and exploitation that have been followed during the project, and the opportunities after the formal completion of PRIMAVERA	
WP number	7	
Lead Beneficiary	MET OFFICE	
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Creation Date	June 2020	
Version Number	v1, v2	
Version Date	June 2020, July 2020	
Deliverable Due Date	31 July 2020	
Actual Delivery Date	24 July 2020	
Nature of the Deliverable	R	<i>R - Report</i>
		<i>P - Prototype</i>
		<i>D - Demonstrator</i>
		<i>O - Other</i>
Dissemination Level/ Audience		<i>PU - Public</i>
		<i>PP - Restricted to other programme participants, including the Commission services</i>
		<i>RE - Restricted to a group specified by the consortium, including the Commission services</i>
	CO	<i>CO - Confidential, only for members of the consortium, including the Commission services</i>

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1. Executive Summary

This report is a brief summary of the ways in which outputs from PRIMAVERA have been disseminated and exploited during the project, and what mechanisms are in place for this to continue once the project finishes.

There have been a wide range of audiences and methods used to reach as many interested parties as possible, both to inform and to engage as potential partners and collaborators.

2. 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	

3. Scope and motivation

This plan documents the pathways that the project has used for exploitation and dissemination of results, and will outline how this will continue following the formal completion of PRIMAVERA. This aims to maximise the project's legacy and its benefits for the climate science research community, commercial organisations, and other stakeholders.

This document follows on from the Media and Communications plan (PRIMAVERA Deliverable 7.3) and End User Dissemination and Communication Plan (PRIMAVERA Deliverable 11.1) which detailed project activity plans and aims in the areas of general communications and specific stakeholder engagement at the start of the project. It also follows on from D9.4¹, D9.5² and D9.7³ which respectively

¹ D9.4: Publication of PRIMAVERA Stream 1 data set

² D9.5: Publication of PRIMAVERA Stream 2 data set

³ D9.7: Exploitation of project data by the climate research community

document the publication of the model simulation data (for Streams 1 and 2), and the exploitation of the data by the climate research community.

This dissemination and exploitation plan describes how the project results have reached the target audience of climate change scientists, climate change impacts scientists and climate change data users with an interest in exploiting PRIMAVERA outputs, and how this can be continued into the future.

Priority has been given to dissemination of information to the climate research community and climate research coordinating bodies including World Climate Research Programme/Working Group on Numerical Experimentation (WCRP/WGNE) and the Intergovernmental Panel on Climate Change (IPCC) (groups i and ii below). PRIMAVERA has coordinated its dissemination activities and shared results with international initiatives at key times in the project's timeline. For example the results of HighResMIP stream 1 outputs were timed so as to feed into the IPCC Working Group 1 Sixth Assessment Report (with a putative IPCC cut off date for including publications of end-2019). There has also been close communication with European funders of climate change research (group iii) and high level users of climate information (group iv). This plan also describes dissemination of project research and results to international agencies and commercial organisations (groups v and vi).

There are several related deliverables: D9.7 Exploitation of project data by the climate research community, D11.5 Evaluation report of project outcomes by end-users, D11.7 Document detailing where PRIMAVERA outcomes have been presented to end-users, and D8.5 Policy briefings for government target audience and general WP8 outreach activities. The contents of these will not be repeated here.

4. Audience, dissemination and exploitation activities

The target audience for the dissemination and exploitation activities includes:

- i. Climate change modellers, Earth system researchers, climate research community, European Commission (EC) Joint Research Centre (JRC), the climate change impacts research community
- ii. Climate research coordinating bodies, International climate change organisations and climate data providers (HighResMIP, WCRP/WGNE, Earth System Grid Federation (ESGF), Coupled Model Intercomparison Project (CMIP6), IPCC)
- iii. European and national climate research funding organisations (EC, European Space Agency (ESA), Joint Programming Initiative "Connecting Climate Knowledge for Europe" (JPI Climate), Belmont Forum, Partnership for Research and Innovation in the Mediterranean Area (PRIMA)).

iv. European national and federal government organisations / policymakers (e.g. European Environment Agency (EEA), UK Department for Business, Energy and Industrial Strategy (BEIS), UK Environment Agency (EA), European federal government bodies).

v. International agencies with an interest in climate change impacts (World Bank, Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP), United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP))

vi. Commercial organisations (reinsurance, renewable energy, energy systems, water).

The majority of PRIMAVERA dissemination and exploitation of results effort will be spent on groups (i), (ii) and (iii), since these are best suited to the timescales and model simulations used in the project. Details of the dissemination channels we have used are defined below for specific audiences, including timings (when applicable) and which media was employed for best effect.

4.1 Climate change modellers, Earth System Researchers, climate research community, EC JRC and the climate change impacts research community

PRIMAVERA has actively engaged with climate researchers working in specialist research communities, and reached the broadest possible base of potential users of high resolution model output.

4.1.1. Climate /Earth system modelling centres, climate modelling initiatives (CORDEX), all relevant EC funded projects (CRESCENDO, APPLICATE, Blue Action, CRECP, EUCP)

A joint meeting of all related H2020 projects was held in May 2017 to help with common communication channels and exploitation efforts, and get oversight of each projects objectives and focus.

We provided model data, analyses and advice for the Copernicus CRECP project, to help them assess the required balance between ensemble size and model resolution.

Our HighResMIP simulations have been used by H2020 APPLICATE (e.g. their D2.6⁴) and Blue-Action projects, with several joint journal papers in preparation (e.g. Moat et al. on freshwater transport and eddy-rich ocean models). The PRIMAVERA simulations are part of the numerical data set that will be used in the MixED Layer hEterogeneity (MEDLEY) project (JPI Climate/Oceans 2019 Joint Call on Next

⁴ APPLICATE D2.6: Report on the impact of increased resolution on the simulated Arctic Ocean circulation and on Arctic-Atlantic and Arctic-Pacific oceanic linkages



Generation Climate Science in Europe for Oceans) to address the role of the ocean mixed layer as a transfer function between the atmosphere and the ocean over the North Atlantic/Arctic ocean.

Work as part of EUCP compared the PRIMAVERA-HighResMIP global model simulations with the CORDEX community regional simulations. This has led to contribution to the IPCC Ch10 on global-to-regional, and joint journal papers (e.g. (Demory et al., 2020), (Hariadi et al., 2020) comparing over Europe and SE Asia respectively).

The high resolution version of the EC-Earth3P model developed for PRIMAVERA will be used by Barcelona Computing Center (BSC) to make high resolution initialised simulations in EUCP.

4.1.2- WCRP Climate and Ocean – Variability, Predictability and Change (CLIVAR)

Following on from attendance at the CLIVAR Open Science meeting (Qingdao, 2016), discussions with the Dynamics Panel led to new work using PRIMAVERA outputs being included in the CLIVAR workplan. This has included journal papers (e.g. Gao et al., 2020) and ongoing collaborations. Shoshiro Minobe (the Dynamics Panel co-chair) became one of the PRIMAVERA external advisory board members to help with this link.

4.1.3- World Climate Research Program’s Working Group on Coupled Modeling (WCRP WGCM), IPCC (Chapter 10), CMIP6 and HighResMIP

The PRIMAVERA GA4 meeting in Barcelona was held in conjunction with the CMIP6 analysis workshop. On our joint day, PRIMAVERA presented the keynote talk, and about half of the talks and posters were PRIMAVERA-led, which was a great opportunity for communicating our science and making links with the community for collaboration.

The HighResMIP project has gained a high visibility in the climate community over the last few years. The paper documenting the experimental design (Haarsma et al., 2016) has been cited 164 times and downloaded over 3200 times (as of June 2020). Results from HighResMIP are referenced in the draft IPCC AR6 Ch 3,8,9,10,11 with figures in several of these chapters.

4.1.5- iHESP (<https://ihesp.tamu.edu/>)

iHESP is the International Laboratory for High Resolution Earth System Prediction, a collaboration between the National Center for Atmospheric Research (NCAR), Texas A&M University, and Qingdao National Laboratory for Marine Science and Technology, China (QNLN). The PRIMAVERA coordinator was invited to become the independent Chair of their Steering Committee, and they were persuaded to run the HighResMIP model experiments (having nearly completed the CMIP6 standard DECK experiments) with their coupled model with 1/10° ocean resolution. iHESP

data has featured in two collaborative journal papers so far (Roberts et al., 2020; Roberts et al., 2020), and will be an ongoing collaboration. It will be particularly useful since we can compare CMIP6 DECK and HighResMIP simulations in models with a very high resolution ocean, and hence check on the robustness of the HighResMIP experimental design.

4.1.6 Additional channels of dissemination and exploitation of results

PRIMAVERA partners are active members of these research communities and are members of, or have good links with these international organisations, and we have disseminated information on the progress and achievements of this project through various methods. In addition to the above we have used:

- The PRIMAVERA website

This has developed over the project from its initial delivery in D7.2, incorporating suggestions from our external advisory board and external users. We have incorporated useful information on our model simulations (and progress), where the data can be accessed, what code and utilities we have developed for analysis, and various derived quantities such as tropical cyclone tracks. Over a 90 day period near the end of the project there were 1200 user visits to the website, with a global spread of users, some of whom returned over several weeks.

- The user interface platform (UIP)

https://www.google.com/url?q=https://uip.primavera-h2020.eu/&sa=D&ust=1594160195880000&usg=AFQjCNHB0B6Nd_B293qM0TRH5TX2wXK8wA

This has grown into an excellent and well-used interface (see D11.7 for details) for our users to find out more about the utility of our simulations and data. In addition to fact sheets, sectoral information, presentations and webinar recordings, there is now an interface (the PRIMAVERA data viewer

<https://www.google.com/url?q=https://uip.primavera-h2020.eu/data-viewer/&sa=D&ust=1594160195880000&usg=AFQjCNGGDDpdZcp4jMMzRXGGBJPnWyELYQ>) where data from the models can be visualised with simple controls.

- HighResMIP website

Available from <https://collab.knmi.nl/>, we use this as a link into information on international HighResMIP work, as well as collaborations with the tropical cyclone community (TC-PRIMAVERA) and CLIVAR (CLIVAR-PRIMAVERA).

- GitHub Organisation

A PRIMAVERA organisation has been created in the GitHub software repository at <https://github.com/PRIMAVERA-H2020/>. Software code that has been released



under an open source license has been published in this area of GitHub allowing it to be freely re-used. Code archived here can also be automatically linked to the Zenodo repository allowing DOI identifiers to be issued, making the software citable.

- Developed tools and code

Many additional analysis packages developed during PRIMAVERA have been incorporated into the ESMValTool, hence ensuring the legacy of the code and easy uptake in subsequent projects. In D1.3, 14 such functions have been documented. ESMValTool is increasingly being used as a standard community analysis package, so this is an important part of the project legacy.

- Presentations at scientific conferences such as the European Geoscience Union (EGU), American Geoscience Union (AGU), European Conference on Applications of Meteorology (ECAM), International Union of Geodesy and Geophysics (IUGG), American Meteorological Society (AMS)

PRIMAVERA has had a strong presence at all the above meetings. In addition to talks and posters, we have organised sessions focussed on resolution, workshops and town hall meetings, all with the aim to increase participation and feedback from the community in our work.

- Results published in peer-reviewed journal articles

Over 70 journal articles have been published (as of June 2020), with at least 20 further articles submitted.

There are 579 publications on

<https://explore.openaire.eu/search/find?keyword=PRIMAVERA+climate>

- User guides and training materials for those wishing to use PRIMAVERA outputs

- Newsletters, editorials, articles and press releases

These are all available from the project website.

Progress and Results will also be communicated to the wider scientific community including providers and users of climate services to share knowledge and increase the impact PRIMAVERA has via regular updates on the PRIMAVERA website and regular publication of user documentation. For more detail on this communication see the PRIMAVERA Media and Communications plan (Deliverable D7.3).

- Use of Primavera data in PhD studies funded by national governments

The Primavera dataset is used in Algorithmic Computing and Data mining for Climate integrated Energy System Models (ACDC-ESM) research project (2 PhD's) funded by the Dutch Science Organization NWO. The goal of this project is to improve the models used by energy network operators to select the best

combination of renewable and non-renewable energy sources under future weather conditions.

Primavera data are used in the PhD study funded by the Indonesian government and executed at KNMI on future changes in extreme precipitation, the onset and cessation of the rainy season and their impacts on hydrology and agriculture.

1 PhD, 3 masters and 1 post-doc supervised by Rein Haarsma (KNMI) that have used PRIMAVERA data.

2 PhDs at CMCC with Alessio Bellucci, 1 working on ROADMAP project (see below), one co-supervised with Boston University on ENSO mechanisms.

A PhD study at the University of Reading on ocean eddies and their impact on climate is using the WP4 eddy-rich PRIMAVERA simulation data.

1 masters from GEOMAR/BSC on tropical cyclones.

4.2 Climate Research Coordinating Bodies, International climate change organisations and climate data providers

PRIMAVERA has actively engaged with key contacts in the international climate research coordinating bodies and with data providers. Several presentations have been given to WGNE, and to WGCM.

CEDA and ESGF: The Centre for Environmental Data Analysis (CEDA) and ESGF has supported PRIMAVERA with exploitation of the data output during and after the project by hosting the PRIMAVERA data set for project members throughout the project and afterwards. External scientists are able to access the data via the CEDA JASMIN portal, with data descriptions (Deliverables D9.4 and D9.5) being made available.

As documented in D9.5, the PRIMAVERA simulation data has been published to the ESGF and is available to anyone for download. A tutorial for this has been included on the website (<https://www.primavera-h2020.eu/modelling/data-code/>).

Post-processed tracks of tropical and extra-tropical cyclones have been archived to the CEDA data archive (document linked to the website <https://docs.google.com/document/d/14DZBdZRpZ5P2wIEtl8se6SRtDVZ61FairXVBDKKhipQ/edit>) and are available for download by all.

Some of the standard climate extreme indices (<http://portal.nersc.gov/archive/home/projects/cascade/www/ETCCDI/>) were calculated for the models and made available on request to IPCC authors.

We continue to have over 120 users on JASMIN, both within and external to PRIMAVERA, performing analysis. These include externally:

At least 8 Japanese researchers involved in the hotspot2 project (<http://www.jamstec.go.jp/apl/hotspot2/>) which is investigating air-sea interactions and cyclones in a changing climate. Another Japanese project has just been funded under the KAKENHI fund to look at extratropical transition of TCs in the Western North Pacific, and will make use of HighResMIP and tracked data.

Two researchers working on storm and surge modelling (Muis et al., 2020), who will use the high frequency model output to drive their model at look at future risk of coastal storm surge damage, and future tropical cyclone risk.

We enabled US colleagues William Collins, Michael Wehner (Lawrence Berkeley National Laboratory, LLBL), Lai-Yung (Ruby) Leung (Pacific Northwest National Laboratory, PNNL), and Eli Dart (ESnet, associated with Department of Energy science facilities) to extract a large amount of high frequency model output (1-6 hour data) and store it on a RAID file system accessible from a Cray XC40 named Cori. This will be resource for many groups to perform various tracking and other analyses and will be an ongoing collaboration.

4.3 European climate research funding organisations

The project has routinely reported progress to the EC via the Project Officer. It also periodically updated other interested funders and policy makers, examples listed below:

- European Space Agency Climate Change Initiative (ESA-CCI) and their Climate Modelling User Group (CMUG) who produce high resolution climate observations for climate model verification and initialisation. We have presented at CMUG meetings, and been involved in the assessment of new ESA-CCI products. For more detail see the PRIMAVERA Media and Communications plan (Deliverable D7.3)
- For the ROADMAP project funded under the "JPI Climate and Oceans Joint Transnational Call on the Next Generation of Climate Science in Europe for Oceans" CMCC will be exploiting the HighResMIP/PRIMAVERA data to investigate "the influence of North Atlantic ocean surface variability on the extratropical atmospheric circulation, with a focus on high-impact weather and climate extremes under present-day and future climate conditions" Details of ROADMAP can be found here: <http://www.jpi-climate.eu/joint-activities/joint-calls/CPILoud/ROADMAP>.

4.4 European national and federal government organisations / policymakers

Engagement in advising governmental climate policy on both national and European/international levels was mainly through contribution to IPCC AR6 (via HighResMIP, and by comparing PRIMAVERA results with lower resolution CMIP6 Earth System Models). We have also attended various relevant EC meetings (e.g. EU-Japan Workshop, Workshop on the Convergent Use of EU HPC, Cloud, Data & AI Resources for Earth System Modelling).

PRIMAVERA data is widely used for the coming KNMI national climate reports: Signaal'21 and KNMI'23.

4.5 Commercial organisations

Results produced by scientific projects often are not directly in the format that can be used by private business stakeholders. The main aim of PRIMAVERA Work Packages 10 and 11 was to engage with business sector stakeholders. The WP10/11 End-user dissemination and communication plan (Deliverable D11.1) described a strategy for the dissemination and communication activities specifically designed to engage with commercial organisations. Document D11.1 also defined target sectors, describes the planned user-engagement measures and provides a detailed action plan to implement these measures and evaluate their impact throughout the project.

The successful engagement with various sectors and end users in WP11 (and WP10) are all documented in the respective deliverables, e.g. D11.2-D11.7. Some case studies and storylines are presented in D10.4.

The D11.7 has an extensive list of the links that have been built between PRIMAVERA and many commercial and other projects, the mechanisms of engagement and feedback from these users.

Measures included:

- Meetings with potential stakeholders to demonstrate the use of PRIMAVERA outputs and inform on advances during the project; Interviews and surveys with commercial stakeholders; User workshops/ side events at sector specific conferences to get direct feedback from users from outside the weather and climate research community; Specific guidance material created to describe the value of climate projections for the target sectors e.g.: sector specific case studies and climate projection factsheets, also published on the PRIMAVERA website; direct interaction and collaboration between project impact researchers (WP10&11) and champion users from the energy and insurance sectors on new knowledge coproduction.

- User Interface Platform (UIP) – a separate user-oriented section of the PRIMAVERA website was designed to facilitate communication and maximise the dissemination of the user-relevant outcomes of the project to the target sectors (D11.2). It also features the Data Viewer (D11.4) which shows project results, focusing on the visualisation of different models' resolutions.

WP10/11 interacted with WP Leads to ensure coherence between D11.1 and the project's communications and science dissemination plans (D7.3 and D7.4) regarding economic sector users/stakeholders. The communications to commercial organisations in this plan are of the more general type which will raise the profile of these new climate research results in the business community.

5. Other channels of Dissemination & Exploitation

A variety of channels have been used in order to share model results with scientific leads and groups in addition to those documented above, to share project information with EC, funders and other shared panels, and to share project findings with other groups. PRIMAVERA achievements will be disseminated via the following channels:

Several presentations (<https://uip.primavera-h2020.eu/presentations>) and webinars (<https://uip.primavera-h2020.eu/webinars>) were held to showcase aspects of the project. Social media such as the project Twitter account (https://twitter.com/primavera_h2020) was used to publicise results and project events.

- Flyers / brochures (including e-brochures)

The EC has identified gender equality as a key issue in Horizon 2020, and the PRIMAVERA gender strategy (MS19) described how this will be addressed within the project. Dissemination of project results to, and the participation of travel restricted parties (e.g. working parents) at PRIMAVERA meetings by the use of tele- or e-conferencing was enabled.

6. Final General Assembly GA5

GA5 became a virtual meeting, which we advertised through a range of forums, and we invited a range of international colleagues to present work related to PRIMAVERA. These included from H2020 projects (CRESCENDO) and Japanese and USA collaborators. At peak there were more than 100 attendees during the 3 days of the meeting.

7. Post-project plans

7.1 Exploitation of data

There will be a strong project legacy from the model output archived at ESGF, which will continue to be used for the foreseeable future. Given that CMIP6 HighResMIP is a new experimental design, its strong presence in IPCC AR6 and increasing publication record is likely to gradually engage more researchers. With additional international groups continuing to contribute to the HighResMIP database, this will be exploited for many years to come - particularly given that papers using a specific CMIPx generation of model continue to be published 5-10 years after the datasets are produced.

Exploitation will also continue from the climate information and user side. D11.5 and D11.7 document how PRIMAVERA has interacted with end-users. In some of these interactions, use of model climate output (rather than perturbed versions of the relatively short observational record) was quite novel, and often competitive to old methods. It is likely that in time, these new methods may well become the norm, and hence our current archive and new simulations will be needed to satisfy demand.

7.2 Collaborations

As noted above, there are ongoing collaborations (e.g. iHESP with US and China, hotspot2 with Japan, storm surge modelling with the Netherlands, US groups using high frequency HighResMIP data) that will last for many years into the future and lead to new results, journal papers and advances in our understanding.

The US CLIVAR "Air-Sea Interactions Working Group" have a focus on mesoscale interactions, and will be exploiting the HighResMIP data to assess how this works in models compared to observations. Malcolm Roberts is an international member of this group. The CLIVAR Dynamics Panel, and other Panels, will also continue to exploit the datasets for understanding.

Many masters, PhD and post-doc studies have been started during PRIMAVERA, and these will continue after the project. There will be a legacy in the number of young researchers who have been engaged with the project and whose research paths will be influenced by it.

7.3 Dissemination

Project members will continue to work, write joint papers and present research based on our data, so there will be a continuing presence at international meetings. As we have already seen, future projects (national, European and international) will continue to be developed with a view to exploiting the datasets that we have produced, as well as adding to them.

The project web site will continue to be available for the foreseeable future. There is a large amount of reference information on the project, from the model simulation details to the UIP platform and user engagement aspects. Many project members frequently point enquiries to the information contained on the web site. It is currently the top hit when searching “high resolution climate project”.

7.4 HighResMIP, CMIP7 and beyond

Plans for CMIP7 (and HighResMIP) are only in their infancy currently, but some discussion at the CMIP6 analysis workshop suggested one future avenue would be to produce more HighResMIP ensemble members, with boundary conditions saved to drive new CORDEX regional simulations. This would have the benefit of using both high resolution driving models to produce further downscaled detail.

8. Lessons learnt

There is a considerable amount of work involved in starting productive dissemination and exploitation collaborations. From the scientific perspective, most of these had to wait until we had final datasets to share. Working with the end-users, particularly those less experienced with handling such datasets (and with the delays in producing them), more work was needed to illustrate what PRIMAVERA could provide in terms of useful information. The website and particularly the UIP played a very important role in this once we had the data and information to drive it.

9. Links build

The above information describes all the links we have built, both within and outside the project.

10. References, including deliverable names

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List of referenced deliverables

- D1.3: Strategy and metrics for PRIMAVERA and CMIP6 experiments analysis. https://www.primavera-h2020.eu/primavera/static/media/uploads/d1.3_strategy_and_metrics.pdf
- D7.2: Public website. <https://www.primavera-h2020.eu/>
- D7.3: Project Media and Communications Plan.
- D7.4: Project Dissemination and Exploitation Plan.
- D8.5 Policy briefings for government target audience.
- D9.4: Publication of PRIMAVERA Stream 1 data set. https://www.primavera-h2020.eu/primavera/static/media/uploads/d9.4_stream1_dataset.pdf
- D9.5: Publication of PRIMAVERA Stream 2 data set.
- D9.7: Exploitation of project data by the climate research community.

D10.4: Scientific input for risk assessment.

D11.1: End-user dissemination and communication plan. https://www.primavera-h2020.eu/primavera/static/media/uploads/Documents/project/primavera_deliverable_11-1.pdf

D11.2: PRIMAVERA user interface platform. https://www.primavera-h2020.eu/primavera/static/media/uploads/deliverable_11_2_final.pdf

D11.3: Sector specific case studies and climate projection factsheets. https://www.primavera-h2020.eu/primavera/static/media/uploads/d11.3_case_studies.pdf

D11.4: Data viewer. https://www.primavera-h2020.eu/primavera/static/media/uploads/d11.4_data_viewer.pdf

D11.5 Evaluation report of project outcomes by end-users.

D11.6: Report on end-user requirements. https://www.primavera-h2020.eu/primavera/static/media/uploads/d11.6_v1.0_end_user_reqts.pdf

D11.7: Document detailing where PRIMAVERA outcomes have been presented to end-users

APPLICATE D2.6: Report on the impact of increased resolution on the simulated Arctic Ocean circulation and on Arctic-Atlantic and Arctic-Pacific oceanic linkages.

11. List of abbreviations used several times

ADP: Ad Hoc Working Group on the Durban Platform for Enhanced Action

CLIVAR: Climate and Ocean – Variability, Predictability and Change

CMIP: Coupled Model Intercomparison Project

CEDA: Centre for Environmental Data Analysis

CORDEX: Coordinated Regional Climate Downscaling Experiment

DECK: Diagnostic, Evaluation and Characterization of Klima

EA: UK Environment Agency

EC: European Commission

EEA: European Environment Agency

ESA: European Space Agency

ESGF: Earth System Grid Federation

IPCC: Intergovernmental Panel on Climate Change

JPI-Climate: Joint Programming Initiative "Connecting Climate Knowledge for Europe"

JRC: Joint Research Centre

NCAR: National Center for Atmospheric Science

NWO: The Dutch Research Council

PRIMA: Partnership for Research and Innovation in the Mediterranean Area

QNLN: Qingdao Laboratory for Marine Science and Technology, China

UK BEIS: UK Department for Business, Energy and Industrial Strategy

UNEP: United Nations Environment Programme

UNDP: United Nations Development Programme

WCRP: World Climate Research Programme

WGNE: Working Group on Numerical Experimentation

WGCM: Working Group on Coupled Modeling

12. List of related projects and web sites

ACDC-ESM: <https://www.laurensstoop.nl/project/acdc-esm/>

APPLICATE: <https://applicate.eu/>

Blue Action: <http://blue-action.eu/>

CORDEX: <https://cordex.org/>

CRECP: <https://climate.copernicus.eu/copernicus-roadmap-european-climate-projections>

CRESCENDO: <https://www.crescendoproject.eu/>

EUCP: <https://www.eucp-project.eu/>

Hotspot2: <http://www.jamstec.go.jp/apl/hotspot2/>

iHESP: <https://ihesp.tamu.edu/>

MEDLEY: <https://www.era-learn.eu/network-information/networks/jpi-climate/next-generation-climate-science-in-europe-for-oceans-joint-call-with-jpi-oceans/mixed-layer-heterogeneity>

ROADMAP: <http://www.jpi-climate.eu/joint-activities/joint-calls/CPILoud/ROADMAP>

US CLIVAR Air-sea interactions working group: <https://usclivar.org/working-groups/air-sea-interactions-working-group>