

```
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cont_pf = mv.mcont(  
    contour_label="off",  
    contour_level_selection_type="level_list",  
    contour_level_list=125,  
    contour_line_colour="blue",  
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Virtual workshop: **Weather and climate in the cloud**

8–10 February

#WeatherInTheCloudWS

Recordings

The recordings and presentation slides will be published after the talks have been given

<https://events.ecmwf.int/e/WeatherInTheCloudWS>

Join the Twitter conversation

#WeatherInTheCloudWS

Group photo

Traditionally we have a group photo (with our ducks) at workshops. If you want to be on the virtual one, please upload a photo of yours on the home page of the micro page.

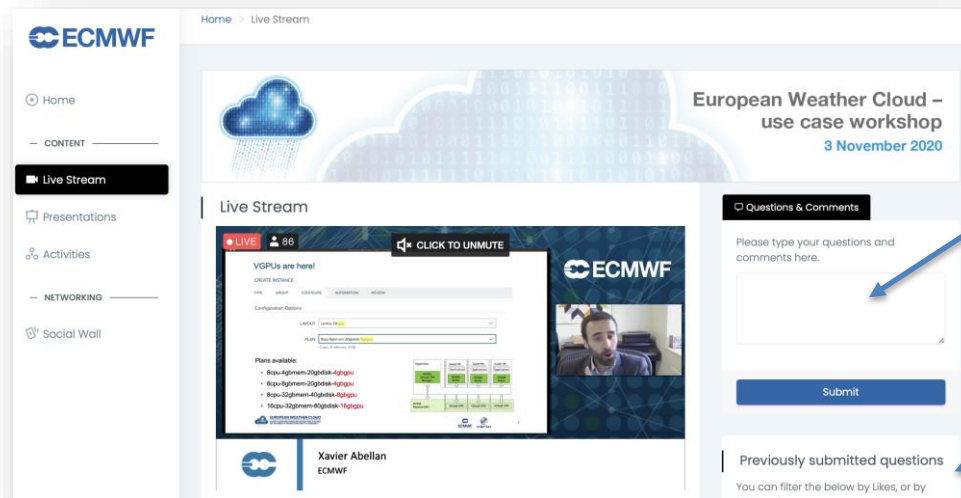
Questions? Feedback?

Contact us: events@ecmwf.int



Questions for speakers

- Post questions and comments during the talks using the question/comment box on the live stream.
- Questions will be delivered to the speaker in real-time by the session chair and answered during the live Q&A segments.
- Any questions that are not covered in the live Q&A will be posted in the “Comments” at the bottom of the relevant presentation page.

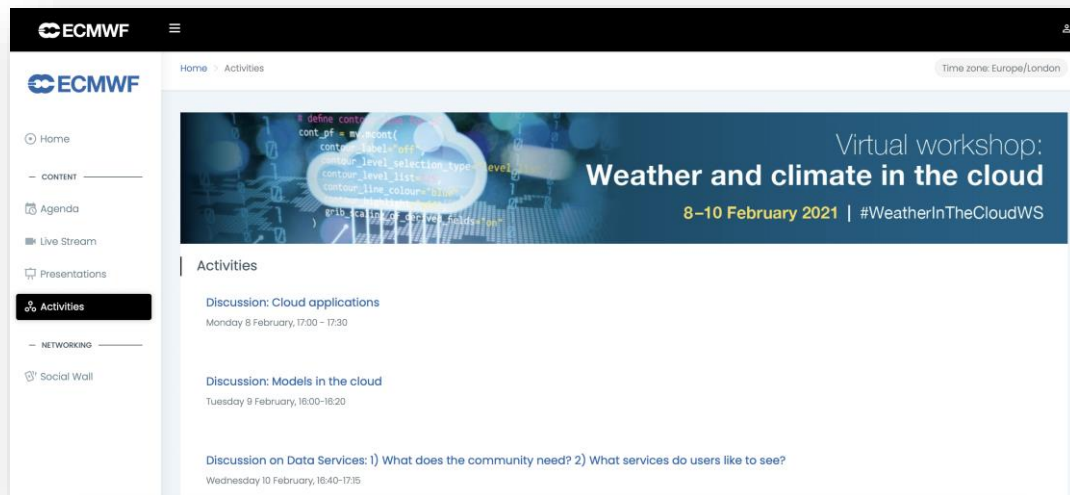


Post your
questions

Follow all
questions

Discussions times

- Your input is important for the success of the workshop, but very hard to achieve virtually
- We will use BlueJeans sessions at the end of each day to give you all a voice
 - Setup instruction
 - Please bare with us, with the setup
 - Please keep you comments and questions coming in on the micro site over the day!



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Virtual workshop: **Weather and climate in the cloud**

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Setting the Scene

Weather and Climate in the cloud

or why are we here?

Stephan Siemen

Head of Development Section, Forecast Department



```
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    contour_line_colour="blue",  
    contour_highlight="off",  
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)  
  
# plot contour for pf  
pf = {}  
for i in range( 1, 10 ):  
    type = "gr"
```

Virtual workshop:
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 **ECMWF**

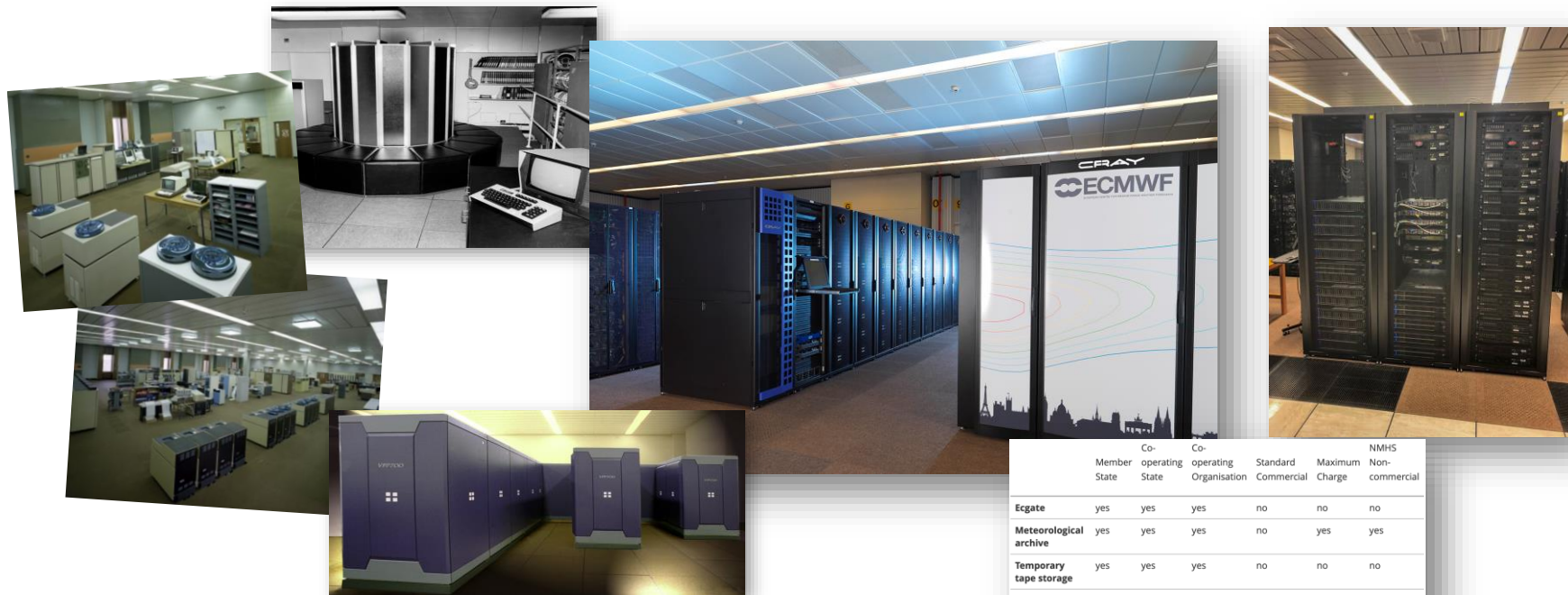
European Centre for Medium-range Weather Forecasts

- Independent intergovernmental organisation established in 1975
 - 23 Member States + 11 Cooperation States
 - Headquarter in Reading, UK + Bologna, Italy + Bonn, Germany (from mid-2021)
 - 350+ staff
- 24/7 operational services + research
 - Operating weather forecast models
 - HPC centre with two supercomputer clusters
 - Data services delivering TBs of output data to users in real time world wide
 - Operate archive of observations and model data (> 300 PB)
 - Operates Copernicus services on behalf of the European Commission



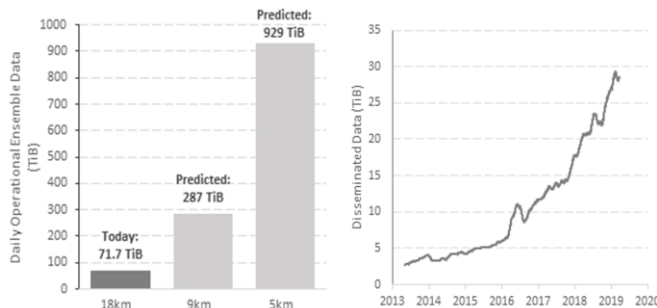
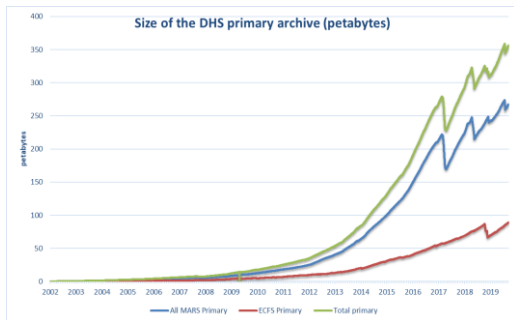
ECMWF always offered processing resources to its Member States

HPC & Ecgate



	Member State	Co-operating State	Co-operating Organisation	Standard Commercial	Maximum Charge	NMHS Non-commercial
Ecgate	yes	yes	yes	no	no	no
Meteorological archive	yes	yes	yes	no	yes	yes
Temporary tape storage	yes	yes	yes	no	no	no
Permanent tape storage	yes	no	no	no	no	no
Supercomputer	yes	no	no	no	no	no
ECPDS transmission	yes	yes	no	no	yes	yes
ECPDS requirements	yes	yes	no	no	yes	yes

The challenge of ever-growing data ...

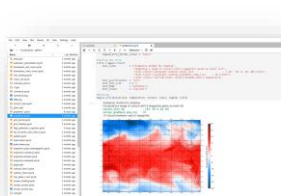


The amount of data is growing fast ...

How can we make sure users can exploit the full potential from it?

		OBSERVATIONS	MODELS
TODAY	<u>volume</u>	40 million = 4×10^7	10 million grid points 100 levels 10 prognostic variables = 1×10^{10}
	<u>type</u>	98% from 60 different satellite instruments	physical parameters of atmosphere, waves, ocean
		OBSERVATIONS	MODELS
TOMORROW	<u>volume</u>	100-200 million = $1-2 \times 10^8$	500 million grid points 200 levels 100 prognostic variables = 1×10^{13}
	<u>type</u>	98% from 80 different satellite instruments	physical and chemical parameters of atmosphere, waves, ocean, ice, vegetation
		FACTOR 5	FACTOR 1000

Bringing the processing close to the data ... so what is ECMWF doing?



Environments for ML
data analytics

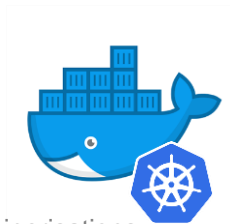


Cloud services
Copernicus CDS & ADS

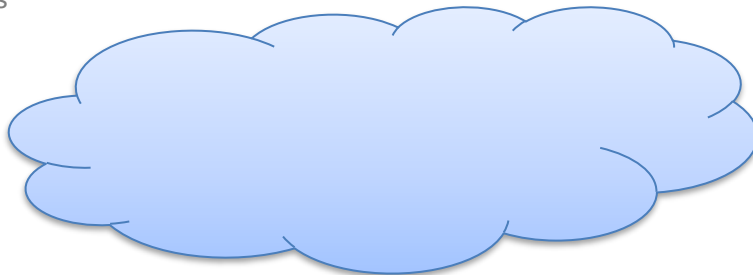


EUROPEAN WEATHER CLOUD
CLOUD COMPUTING-BASED INFRASTRUCTURE, FOCUSED
ON THE NEEDS OF THE METEOROLOGICAL COMMUNITY

Building
community clouds



Containerisations
of services



Explore distributed processing
through H2020 projects
(e.g. LEXIS, HiDALGO, ...)



Novel storage
solutions



Deliver forecasts to users
of public cloud providers

Explore the future of computing



Destination Earth



And we cover many topics in the next three days ...

- Monday
 - Various cloud providers for our community
 - Selection of cloud applications (Training, ML, ...)
- Tuesday
 - Standards (WMO & OGC)
 - Models in the cloud
- Wednesday
 - The future of Big Data processing

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Agenda

Monday Tuesday Wednesday

Change your time zone:
London

Monday

Times are displayed according to the time zone you select.

8 February 2021

Session 1: Cloud services		
13:00 to 13:10	Opening	Florian Pappenberger (ECMWF)
13:10 to 13:15	Organisational notes	Stephan Siemen (ECMWF)
13:15 to 13:30	Setting the scene - Weather and climate in the cloud	Stephan Siemen (ECMWF)
13:30 to 13:50	WEKEO, the DIAS platform powered by EUMETSAT, ECMWF and MERCATOR OCEAN	Brice Mora (CS Group)
13:50 to 14:00	Climate (CDS) and Atmospheric (ADS) Data Stores: a cloud hosted infrastructure	André Lopez-Alco (ECMWF)

Great opportunities to get involved at ECMWF ...



S2S AI/ML Competition

Provide the “best possible” forecast of 2-metre temperature and precipitation, at forecast lead times of weeks 3-4 globally

- Expected start in April 2021 for a period of 6 months
- The data for this competition will be open-access and provided by WMO or its partners.
- A monetary prize for the winners

More information at:

<http://www.s2sprediction.net/xwiki/bin/view/Phase2/MachineLearning>

<https://community.wmo.int/activity-areas/wwrp>

The banner features logos for ECMWF, European Weather Cloud, WEKEO, Copernicus, and the European Union flag. The main text reads 'ESoWC Summer of Weather Code'. Below this, it says 'TEAM UP WITH METEOROLOGY, CLIMATE, ATMOSPHERE, MACHINE-LEARNING AND CLOUD COMPUTING EXPERTS TO DEVELOP INNOVATIVE OPEN-SOURCE SOFTWARE'. A trophy icon is next to the text '£5,000 STIPEND'.

An online programme to develop weather, climate and atmosphere related - **open source** and **innovative** software. Up to **10 projects** will be selected. Teams will get a **£5000** stipend.

For more information see <https://esowc.ecmwf.int>

Follow us on Twitter: #ESoWC2021 @esowc_ecmwf

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