Status and future of the C-SRNWP module of EUMETNET

Balázs Szintai

C-SRNWP Manager

… with contributions from many of you

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COSMO General Meeting

Gdańsk / online

14 September 2023

Outline

- **News from EUMETNET**
  - Next phase
  - FEMDI
- **Coordination SRNWP → EWGLAM Meeting**
- **Obs-SET**
- **Global Lake Database**
- **Physiography task**

Next phase of EUMETNET

- **Current EUMETNET phase ends in December 2023, next EUMETNET phase will cover 2024-2028**

- **Drafting Team → Modifications in the structure of Programmes**
- **Four Capability Areas: Observation, Information, Capacity, Support**
    - New Crowdsourcing Programme
    - New Programme: E-WFC (Weather Forecasting Cooperation)
        - Four modules: C-SRNWP, SRNWP-EPS, Post-Processing, E-Nowcasting
        - Same requirements and same budget proposed for C-SRNWP as in this phase

- **Bidding for programmes/modules started in May and finished in August**
- **OMSZ will not coordinate the C-SRNWP module in the next phase**

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FDCM Programme – A reminder

EUMETNET are creating a ‘One-Stop Shop’ for meteorological data and information.

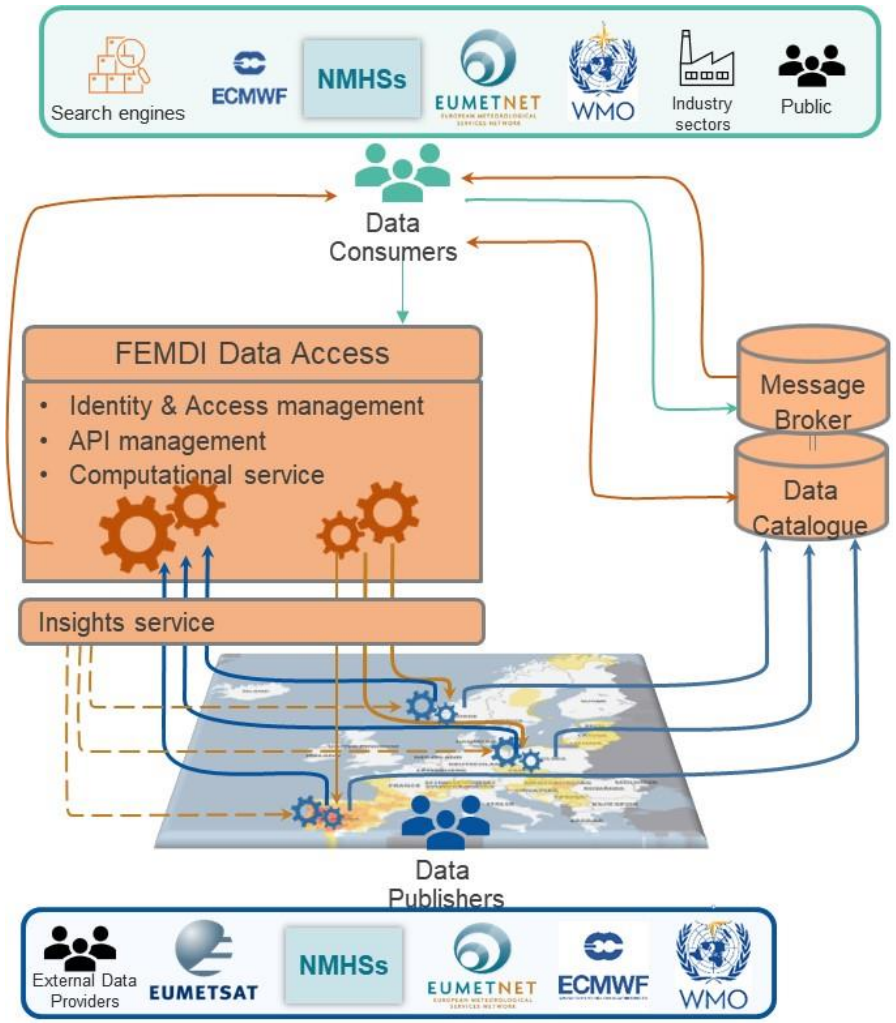
This is called the Federated European Meteo-hydrological Data Infrastructure (FEMDI)

Data consumer experience

- Send one data request; Receive one response with data from lots of Members.
- Less time and resources needed.

Data provider experience

- Ability for others, including AI, to request and use our data is as easy as possible, increasing reach and reputation
- Lower costs through pooling resources, sharing development, and cheaper build cost due to use of widely supported standards



Slide provided by: Jane Wardle

EUMETNET FEMDI

FEMDI components

FEMDI will be made up of:

- Community components, operated by EUMETNET; and
- Local components operated by a Data Supply capability provider. This is how NMSs will be able to publish their data through FEMDI.

More information on the Data Supply capabilities is available on the EUMETNET portal: INFORMATION -> FEMDI –> FEMDI Communications folder

FEMDI and WMO's WIS2.0

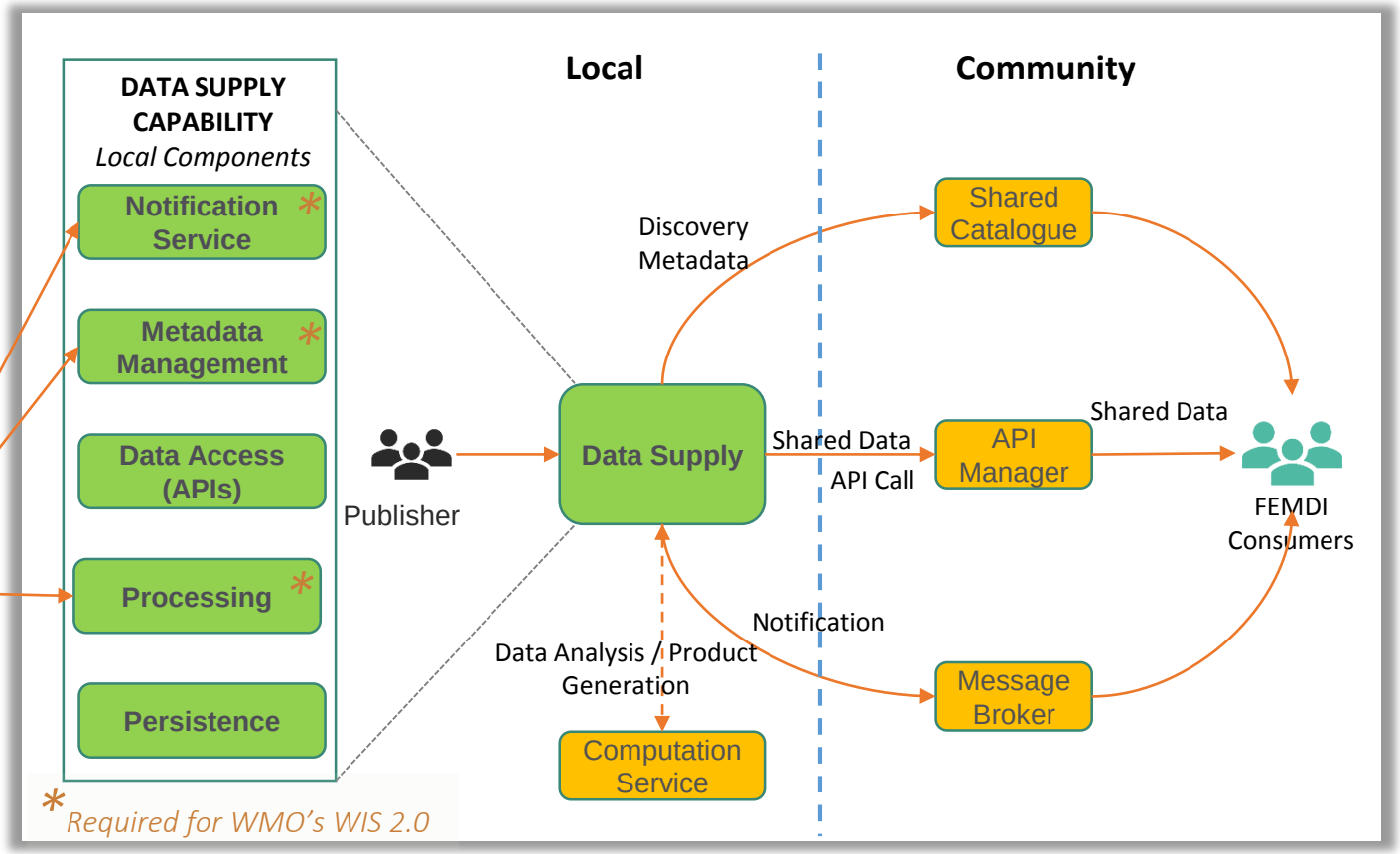
EUMETNET Members have committed to share data with WMO Members through WIS 2.0…

… FEMDI Data Supply implementation will enable EUMETNET members to meet their WMO commitments!

So NMSs should view delivery of their FEMDI Data Supply capability as helping them deliver their WIS 2.0 commitments, rather than a separate requirement.

The main difference is their data exchange mechanism:

- FEMDI needs to enable data exchange using APIs
- WIS 2.0 requires data exchange using data files and does not mandate use of APIs



In general, FEMDI = WIS2.0 + a little bit more

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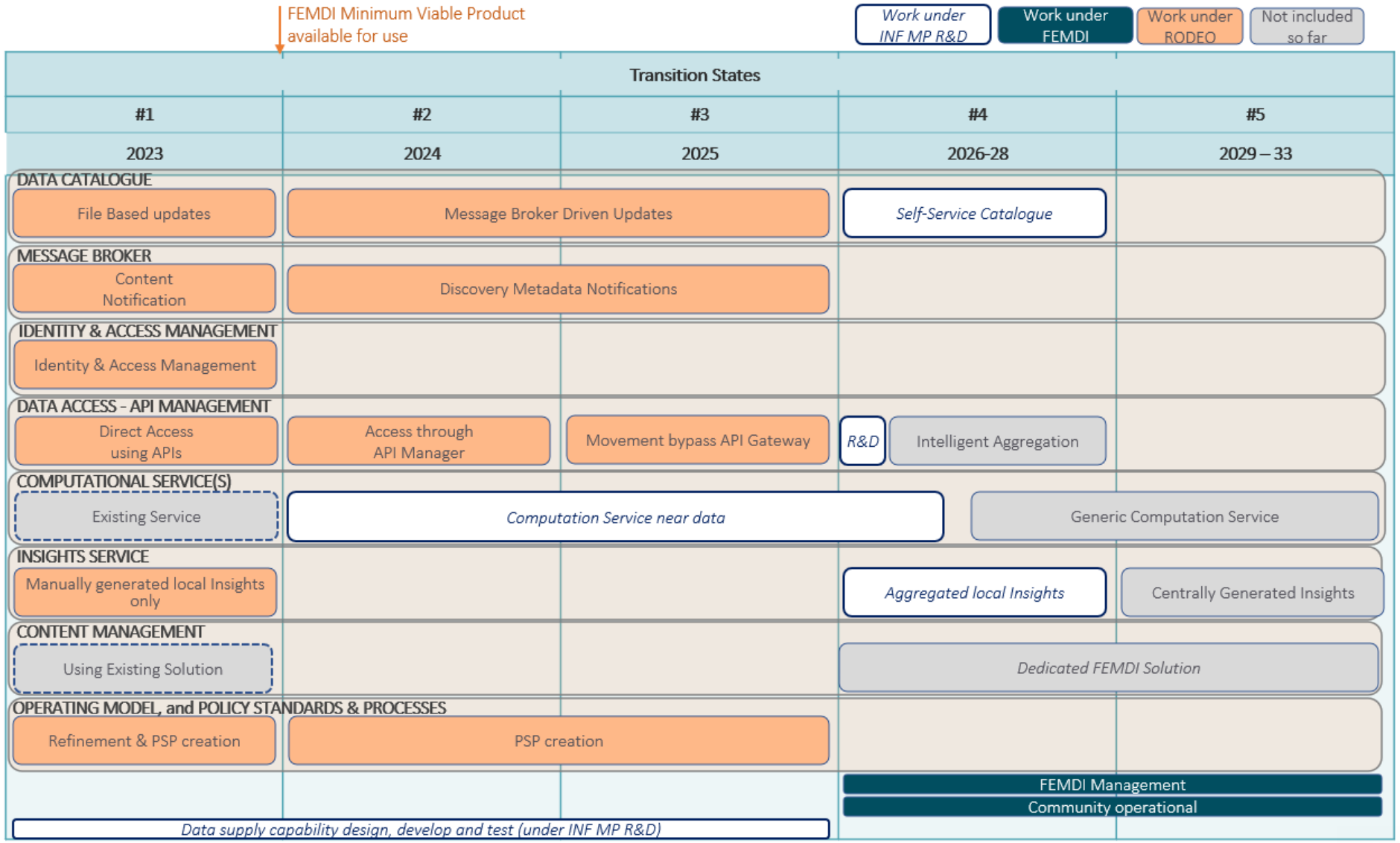
FEMDI plan

The FEMDI Community components will be developed and implemented over the next 3 years, as part of the RODEO project.
RODEO also has work packages to develop FEMDI Local components for radar data, as well as surface and climate observations.



The Expert team would be happy to talk to NWP producers who are interested in setting up their Local Data supply capability

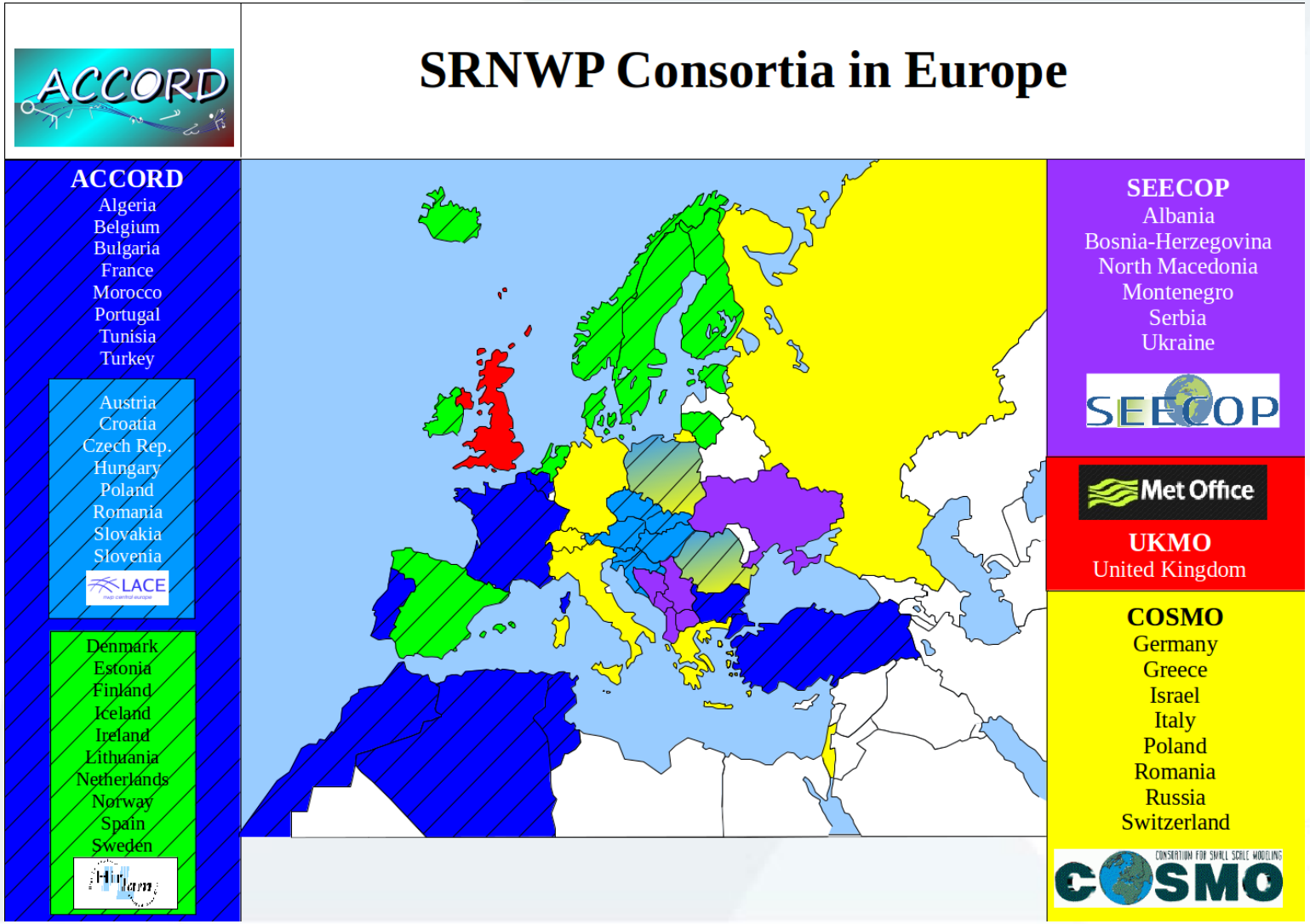
Contact:
jane.wardle@eumetnet.eu

Slide provided by: Jane Wardle

EUMETNET FEMDI

C-SRNWP Module of EUMETNET

- Coordination of Short Range Numerical Weather Prediction in Europe
- In the NWP Cooperation Programme
- 28 Member States,
  2 Cooperating States
- New Members: Germany, Ireland
- Module Manager: 0.3 FTE
- Coordinating Member: Hungary



C-SRNWP Expert Teams

To foster communication between Limited Area NWP groups in Europe

8 C-SRNWP Topical Expert Teams (ETs)

- Data Assimilation (chair: Bruce Macpherson)
- Diagnostics and verification (chair: Marion Mittermaier)
- Dynamics and lateral boundary coupling
- Link with applications (chair: Jeanette Onvlee)
- Physical parameterisation (upper air) (chair: Mike Bush)
- Predictability and EPS (chair: Chiara Marsigli)
- Surface and soil processes (chair: Patrick Samuelsson)
- System aspects

Advisory Expert Team (AET):

- Heads of NWP consortia
- C-SRNWP Topical ET Chairs
- Observers: FCAM, Post-processing MM, SRNWP-EPS MM

Core Members

	ACCORD	COSMO	HIRLAM	MetOffice	RC LACE	SEECOP	ECMWF contact
Data assimilation and use of observations	**Roger Randriamampianina**	Christoph Schraff	Magnus Lindskog	Marco Milan	Benedikt Strajnar	Bojan Kasic	
Diagnostics, validation and verification	Carl Fortelius	Flora Gofa	Bent Hansen Sass	**Marion Mittermaier**	Simona Tascu	Angel Marcev	Dave Richardson
Dynamics and lateral boundary coupling	Ludovic Auger	Michael Baldauf	Sander Tijm	Ben Shipway	Petra Smolikova		Michail Diamantakis
Link with applications	Eric Bazile	Anastasia Bundel	**Jeanette Onvlee**	Simon Jackson	Simona Tascu	Bojan Cvetkovic	
Physical parameterisation (upper air)	Yann Seity	Matthias Raschendorfer	Emily Gleeson	**Mike Bush**	Bogdan Bochenek		Irina Sandu
Predictability and EPS	Henrik Feddersen	**Chiara Marsigli**	Inger-Lise Frogner	Aurore Porson	Clemens Wastl		Martin Leutbecher
Surface and soil processes (model and data assimilation)	**Patrick Samuelsson**	Jean-Marie Bettems	Ekaterina Kurzeneva	Martin Best	Stefan Schneider		Gianpaolo Balsamo Patricia de Rosnay
System aspects	Daan Degrauwe	Massimo Milelli	Daniel Santos	Richard Gilham	Oldrich Spaniel		Jenny Rourke

Additional Members

	ACCORD	COSMO	HIRLAM	MetOffice	RC LACE	SRNWP-EPS Activity	Post-Processing Activity
Data assimilation and use of observations	Loik Berre, Maria Monteiro	Mihail Tsyrulnikov	Jelena Bojarova, Kasper Hintz	David Simonin Lee Hawkness-Smith	Florian Meier, Michal Nestiak		
Diagnostics, validation and verification	Boryana Tsenova, Fabien Stoop	Joanna Linkowska	Xiaohua Yang, Ulf Andrae, Carl Fortelius	Nigel Roberts	Christoph Wittmann, Christoph Zingerle		
Dynamics and lateral boundary coupling	Piet Termonia				Jozef Vivoda		
Link with applications		Flora Gofa	Per Unden	Mike Bush	Martina Tudor, Benedikt Bica		Stéphane Vannitsem
Physical parameterisation (upper air)	Eric Bazile, Neva Pristov	Dmitrii Mironov Frederico Grazzini	Bent Hansen Sass	Anke Finnenkoetter	Jan Masek, Neva Pristov		
Predictability and EPS	François Bouttier, Geert Smet	André Walser, Christoph Gebhardt	Jan Barkmeijer	Anne Mccabe	Mihály Szücs, Martin Bellus	Alfons Callado Pallarés	
Surface and soil processes (model and data assimilation)	Patrick Le Moigne, Rafiq Hamdi	Jürgen Helmert, Jan-Peter Schulz		Breogan Gomez Cristina Charlton-Perez	Jure Cedilnik, Balázs Szintai, Alena Trojáková		
System aspects	Alexandre Mary	Uli Schaettler	Ulf Andrae, Xiaohua Yang		Martina Tudor		

EWGLAM Meeting 2023

- **25-28 September 2023**
- **Meeting will take place in Reykjavík, Iceland, on the kind invitation of IMO**
- **Hybrid format**

- **Special subject this year:**
  Uncertainty of modelling components and their impact

- **Website is available with programme, on-site registration closed, online registration is open until 15 September:**

  https://events.bizzabo.com/467647/home

- **Invited speakers:**
  - David John Gagne (NCAR)
  - Isla Finney (Lake Street Consulting)

- **Travel funding approved for two participants from C-SRNWP Member States**

Optimizing investment in E-ABO - MODE-S versus AMDAR

Opportunity:
MODE-S is a relatively new(ish) way of getting access to observations from aircraft. It provides an opportunistic access to huge volume of data (free of charge, unlike AMDAR).

Questions:
Can we replace AMDAR data with MODE-S data?
What is the optimum balance of investment for Aircraft-based observations?

How:
Running data denial experiments of limited area models (e.g. UKV).
Three NWP centre are involved running the same scenarios but on completely differently designed and operated models, to provide more robust results and inform decisions.

Total cost - 200.4 k€

Table 3: Overview of Study A3.02 R&D proposals

	RMIB	DWD	Met Office
Model	ALARO or AROME.	ICON-D2, LEKF, 40 members.	UKV, 4d-Var, hourly cycling.
Domain	Belgium AROME.	Germany and surrounding areas.	UK, Ireland and large parts of France, Germany, Northern Italy.
Datasets for the OSE	2 separate 30-day periods – summer and winter.	2 separate 30-day periods – summer and winter.	2 separate 30-day periods – summer and winter.
Evaluation	Forecast T+36 every 12 hr.	Forecast T+36 every 6 hr.	Forecast T+30 every 6 hr.
Case studies	Analysis of a number of fog and high-impact weather events.	Not specified	Analysis of a small number of high-impact weather events. Forecasts to T+8 hourly.
Monitoring	OmA, OmB, observation error	OmA, OmB.	OmA, OmB, profiles of bias and stdev, distribution maps
Verification	Radiosonde & SYNOPS.	Classical score (radiosonde, ABO), categorical score with respect to SYNOPS, Fractional skills score.	Classical score (radiosonde, ABO), categorical score (SYNOPS), Fractional skills score.
Resources	RMIB	Post Doc	Met Office
Timeline	52 weeks	26 weeks	28 weeks
Cost	€ 60,165	€ 55,000	€ 85,250.52

Slide provided by: Jacqueline Sugier

Planning the replacement of AMDAR with MODE-S

Following the outcome of Study A3.02, there is a clear consensus in the EUMETNET scientific community that AMDAR data can be replaced by MODE-S data, where good quality MODE-S coverage exists.
In addition, the MODE-S coverage is about to be hugely expanded via the Met Office project to make Global MODE-S data available to the community.

➢These present a clear opportunity to review the E-ABO coverage, and to re-identify observations gaps and their priorities.

Met Office:

- Met Office recommend starting a parallel Suite trialling of UKV model using Scenario 4 (i.e. removing AMDAR data in 'good' Mode-S coverage areas in higher altitudes (above 850 hPa).

RMI:

- Given the neutral to positive impact on forecast skill, RMI support the idea of replacing AMDAR by EMADDC data.

DWD:

- DWD recommendation is to replace the AMDAR data by MODE-S in regions of good MODE-S coverage in flight level and, in a second step, to replace the upper part of the AMDAR profiles at Airports by MODE-S data.

Slide provided by: Jacqueline Sugier

Planning the replacement of AMDAR with MODE-S

OBS SET accept the conclusions of Study A3.02 and agree that the community should start planning the replacement of AMDAR with MODE-S data (where good quality MODE-S coverage exist) during the next 5 years.

There are however several steps still need to be completed before starting this transition:

- **All Members must be given enough time** to implement the assimilation of MODE-S in their Global and Regional models
- An **additional study** should be conducted early next phase to investigate the impact of reducing AMDAR where good MODE-S coverage exists
- Reassurance on the **sustainability of the provision** of MODE-S data via the EMADDC
- Access to **detailed documentation** of the processing performed by the EMADDC

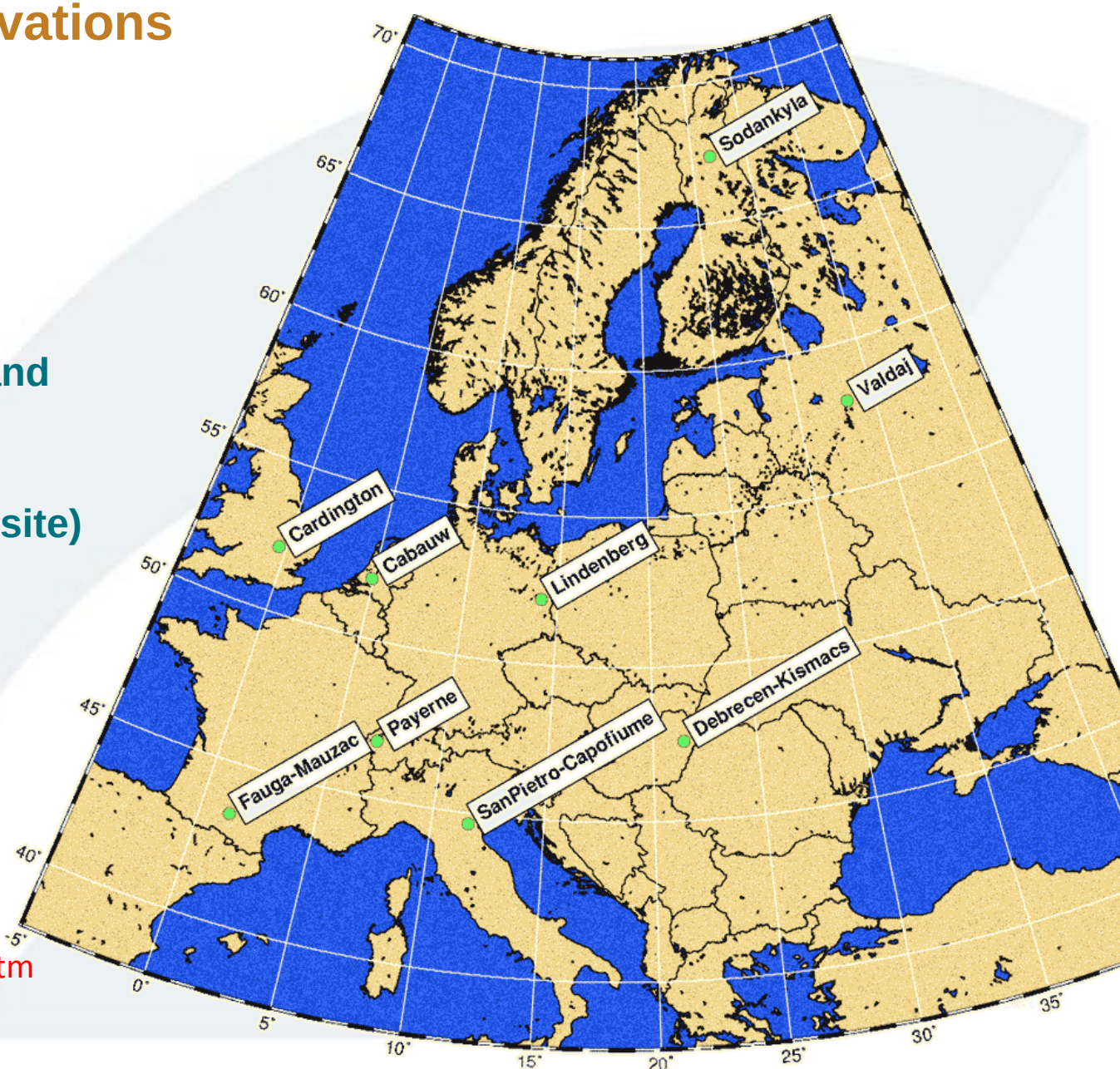
The OBS PMT would be happy to receive feedback from NWP experts about this transition

Contact: eucos@metoffice.gov.uk

Slide provided by: Jacqueline Sugier

SRNWP Data Pool of surface observations

- Database of surface and boundary layer observations → validation of PBL and land surface models
- Freely available for EUMETNET Members and collaborating universities
- Important in-kind contribution from DWD (collecting the data) and HNMS (web-site)



Statistics for Sept 2020 – Aug 2022:

- 4 new users
- 730 monthly files downloaded

Website: http://srnwp.cosmo-model.org/content/default.htm
Account request: http://srnwp.cosmo-model.org/content/register.htm

Global Lake Database

- **Database of lake location and depth**
- **Important input for NWP models running a lake parameterization**
- **In the past ~10 years: work financed by different LAM consortia**
- **Financial support of EUMETNET since 2017: 8500 EUR/year (for maintenance and development) → since 2019 included in the C-SRNWP budget**
- **Work coordinated by FMI (Ekaterina Kurzeneva), person involved: Georgy Kurzenev**
- **Currently ongoing work:**
    - The algorithm to correct miss-classification errors between sea, lakes, river estuaries and coastal lagoons (C. Fortelius et al., 2020, p. 47) was adapted to the fine resolution datasets (e.g. ECOCLIMAP SG and JRC GSW).
    - The algorithm of mapping lakes (Kourzeneva et al., 2012) was adapted to the fine resolution datasets.
    - Now, a new dataset on lake depth will be projected on the fine resolution map globally.

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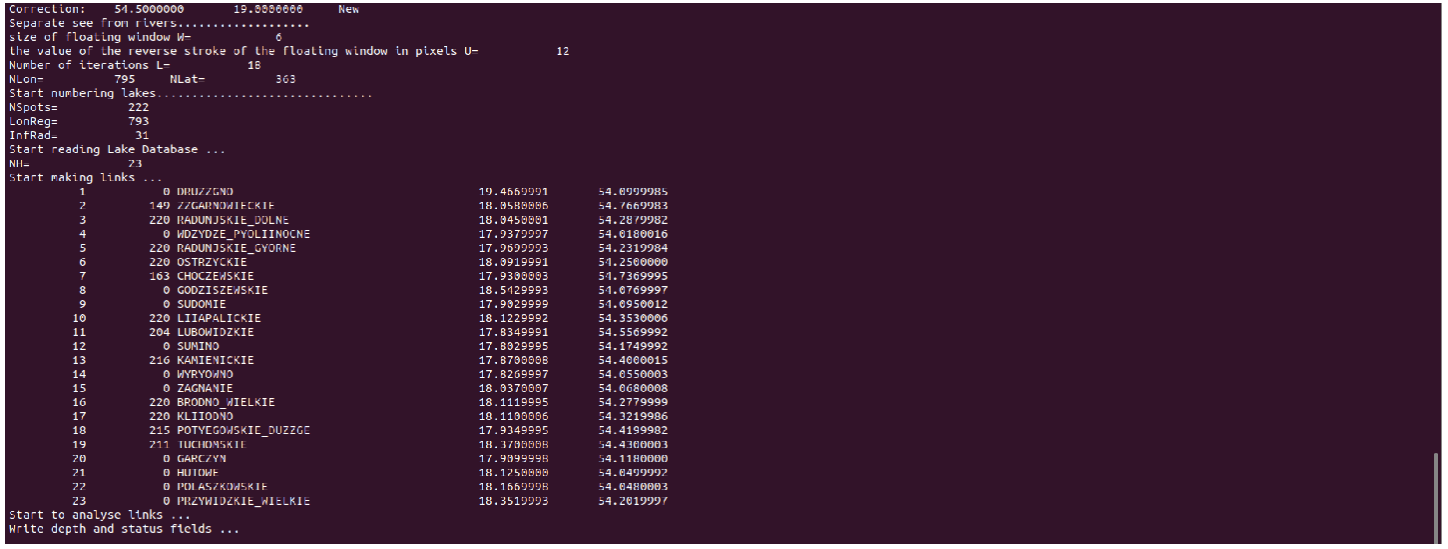
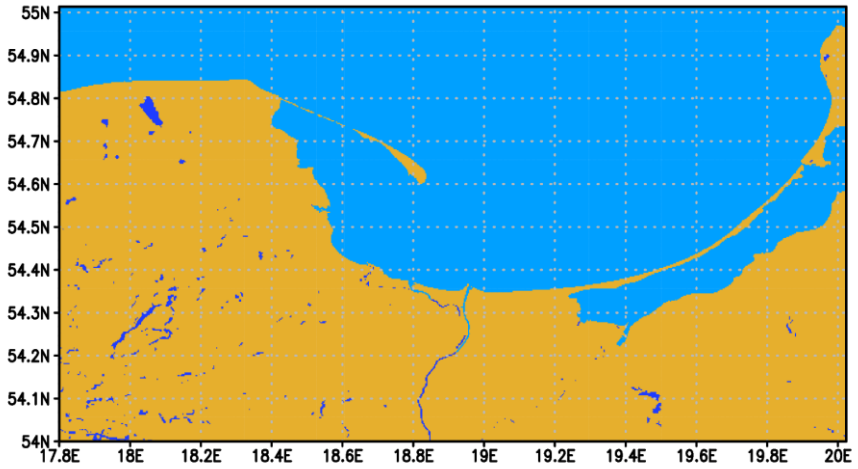
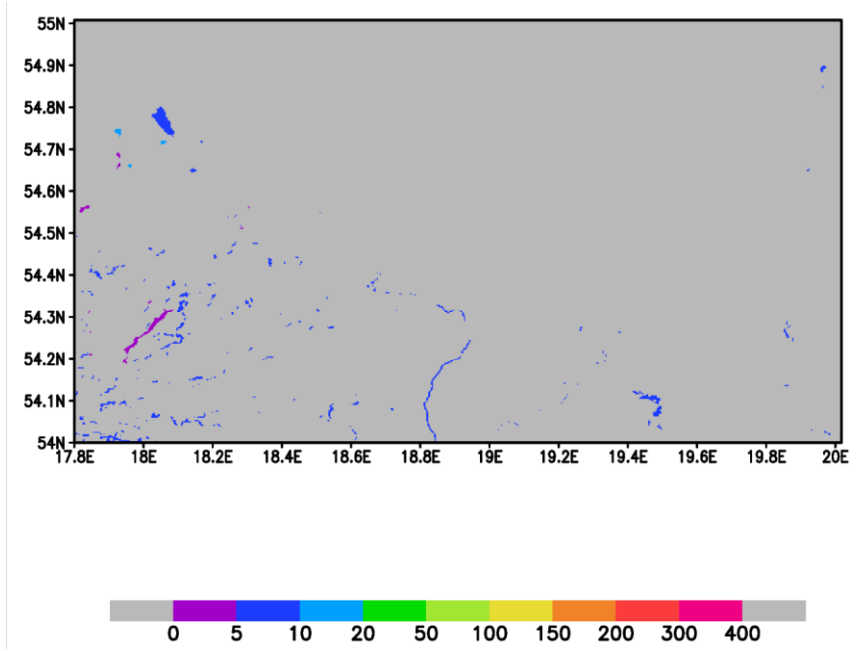
Global Lake Database

- Example of processing data over Poland:
- Land-water map, ECOCLIMAP SG:
  Dark yellow – land, light blue – sea, blue – lake
- Lake depth (m) projected on the map.
- List of lakes projected on the map.







Slide provided by: Ekaterina Kurzeneva

Physiography work

- **Goal: checking and correction of ESA-CCI land cover map for NWP purposes**
- **Budget: 27.000 EUR for three years: 2021-2023 (money not spent in other C-SRNWP tasks)**

- **Supervisory team defined on 24 February 2021:**
  - C-SRNWP Surface ET Chair: Patrick Samuelsson (SMHI)
  - NWP expert: Ekaterina Kurzeneva (FMI)
  - GIS expert: Bolli Pálmason (IMO)

- **Successful application: Sandro Oswald (ZAMG) on 24 March 2021**

- **Questionnaire to collect user needs (autumn 2021) → fine tune the goals of the work**

- **First version of corrected dataset distributed via C-SRNWP Surface ET in August 2023**

- **Feedback will be discussed in the Surface Parallel Session at the EWGLAM Meeting (27 September)**

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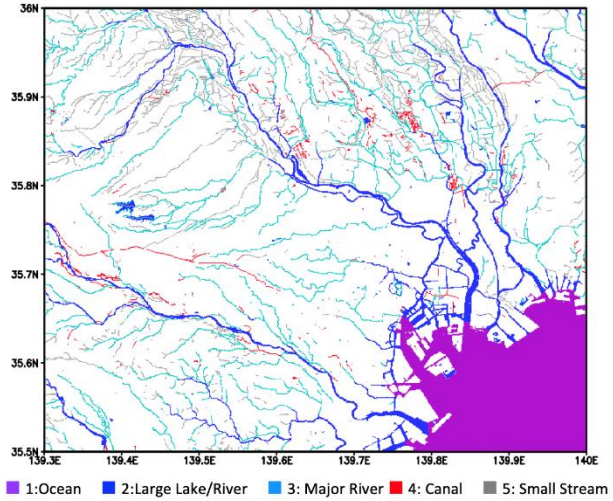
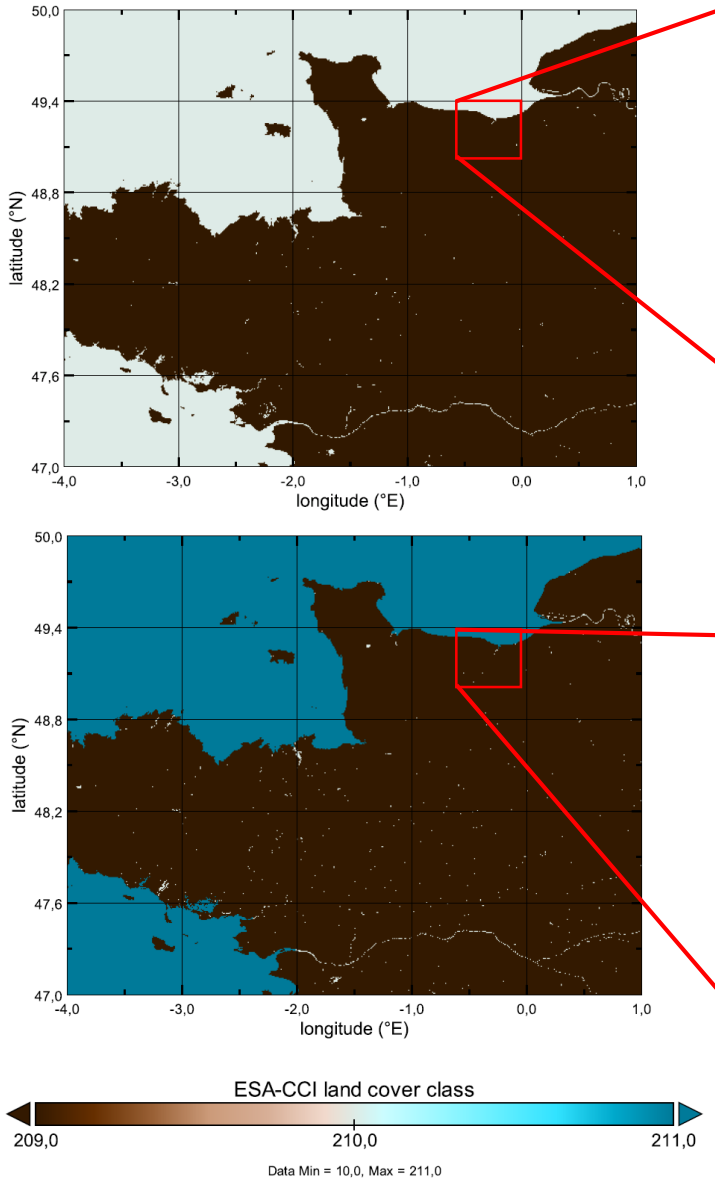
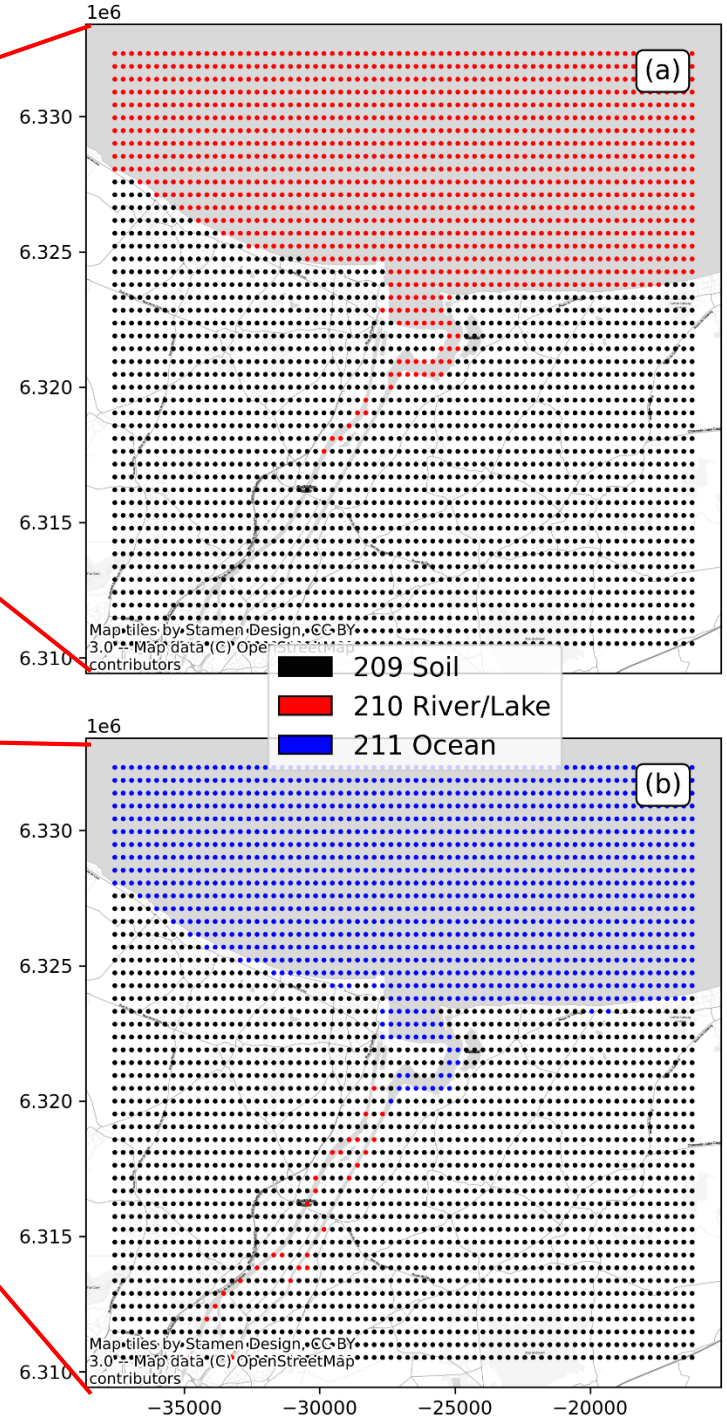
Physiography work



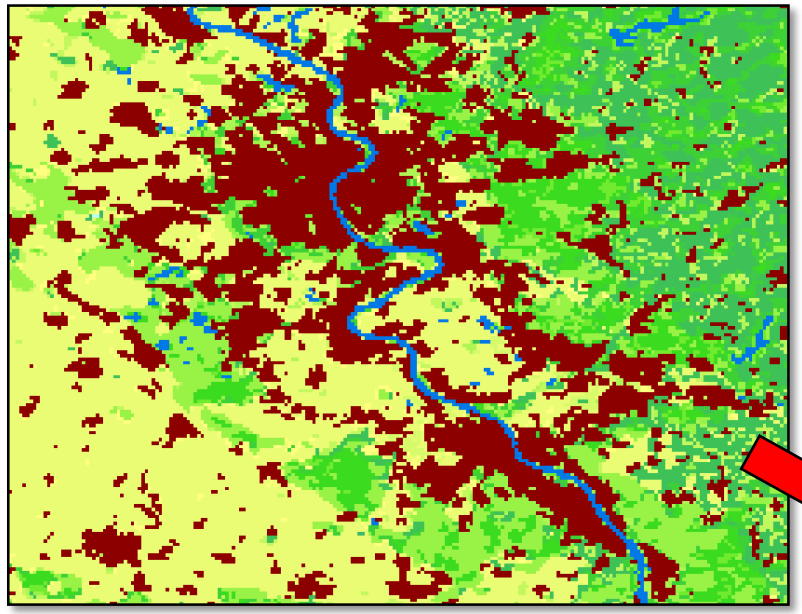
Use the **Open Street Map** and **GlobalLand30** to correct the land-water mask and to distinguish between fresh and salt water



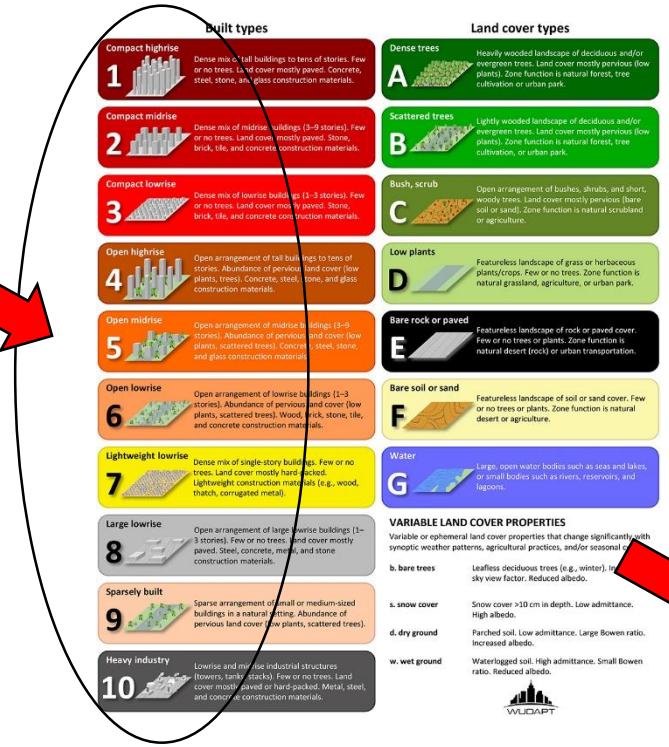


Slide provided by: Sandro Oswald

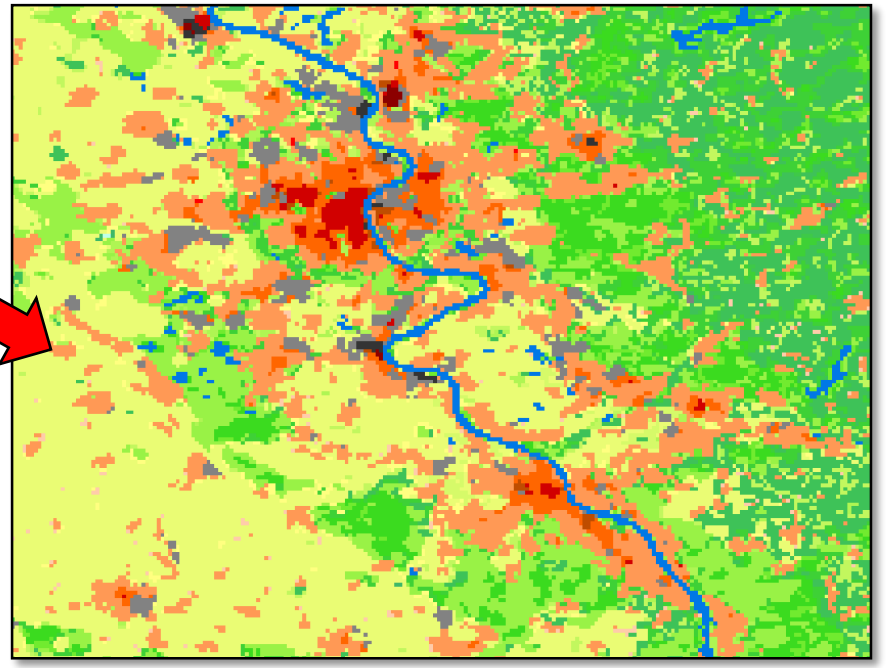
Physiography work



Example for Cologne, Germany



Use the **Local Climate Zones (LCZ)** to correct the urban class →
10 classes instead of 1



Slide provided by: Sandro Oswald

Short Term Scientific Missions

- NWP consortia have the funds to support internal exchange, however, this is usually not applicable for travel outside the consortia
- Yearly 1-2 missions (2000 EUR/year) will be funded to deal with cross-consortia issues (either technical or scientific).
- A typical stay would last 1-2 weeks and participation of young scientist is encouraged.

- Application form have been prepared and sent to Contact Points and consortia PMs
- Decision to be taken by AET
- 2019 autumn: Martin Imrisek (SHMU) work on GNSS STD assimilation (ALADIN-LACE-HIRLAM) at KNMI for four weeks (shared funding with LACE)
- 2020-2021: no travels due to COVID, funds carried forward to 2022
- 2022: two weeks travel by Ivan Bastak Duran (University Frankfurt) to CHMI to work on ICON and ALARO turbulence schemes
- 2023: one stay planned at Meteo-France, funding available for more (cannot be carried forward for next year!)

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Thank you for your attention!

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CONTACT DETAILS

Balázs Szintai

C-SRNWP Manager

EIG EUMETNET
European Meteorological Services' Network
www.eumetnet.eu

Phone: +36 1 346 4705

Email: szintai.b@met.hu