

Status and future of the C-SRNWP module of EUMETNET

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C-SRNWP Manager

... with contributions from many of you



EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK

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**

FDCM Programme – A reminder

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

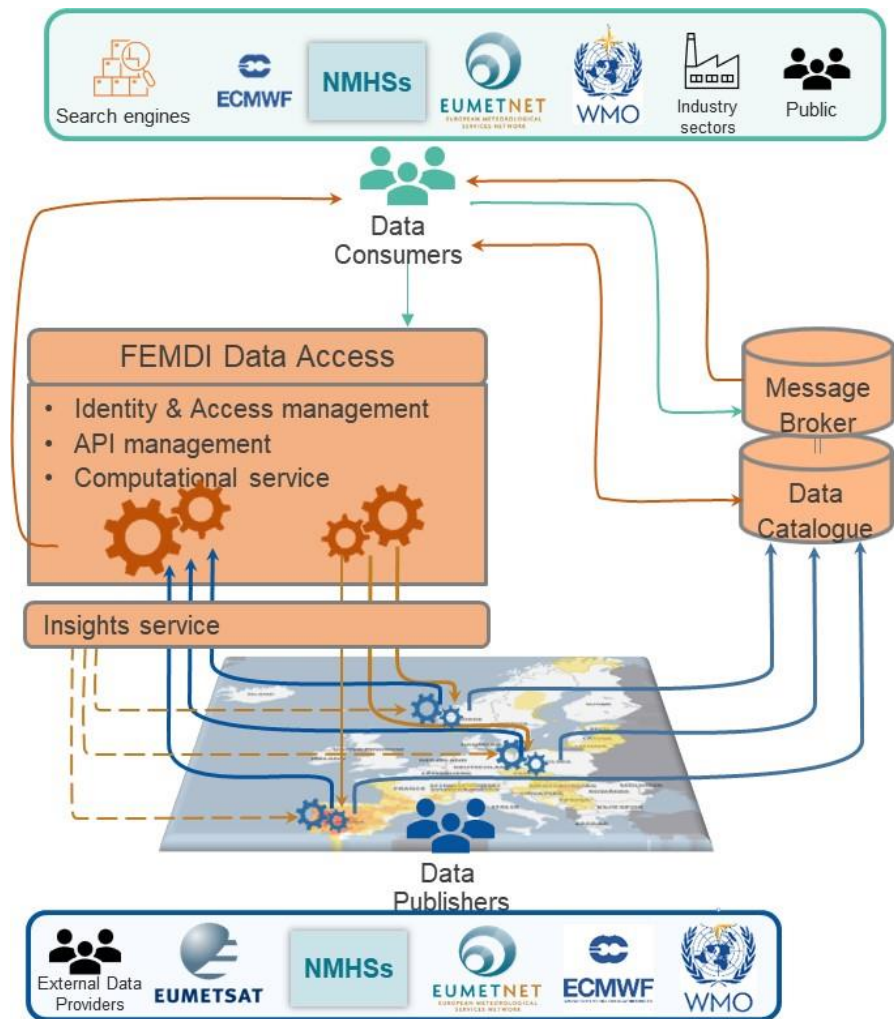
This is called the **Federated European Meteo-hydrological Data Infrastructure (FEMDI)**

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



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

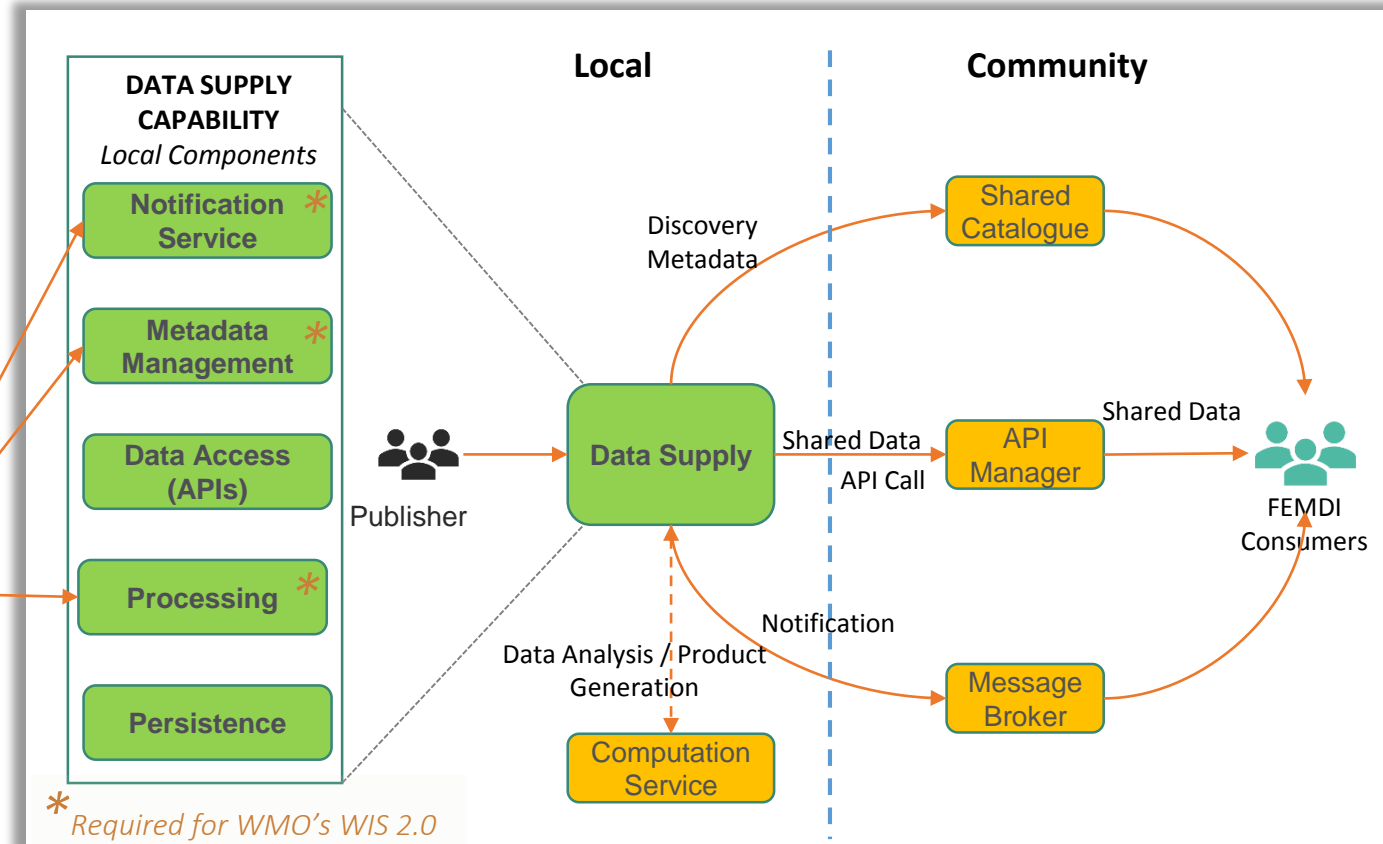
EUMETNET Members have committed to share data with WMO Members through WIS 2.0...

... 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

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.

↓ FEMDI Minimum Viable Product available for use

					Work under INF MP R&D	Work under FEMDI	Work under RODEO	Not included so far
					Transition States			
#1	#2	#3	#4	#5				
2023	2024	2025	2026-28	2029-33				
DATA CATALOGUE	Message Broker Driven Updates		Self-Service Catalogue					
File Based updates								
MESSAGE BROKER	Discovery Metadata Notifications							
Content Notification								
IDENTITY & ACCESS MANAGEMENT								
Identity & Access Management								
DATA ACCESS - API MANAGEMENT	Access through API Manager	Movement bypass API Gateway	R&D	Intelligent Aggregation				
Direct Access using APIs								
COMPUTATIONAL SERVICE(S)	Computation Service near data		Generic Computation Service					
Existing Service								
INSIGHTS SERVICE			Aggregated local Insights	Centrally Generated Insights				
Manually generated local Insights only								
CONTENT MANAGEMENT								
Using Existing Solution								
OPERATING MODEL, and POLICY STANDARDS & PROCESSES	PSP creation							
Refinement & PSP creation								
					FEMDI Management			
					Community operational			
Data supply capability design, develop and test (under INF MP R&D)								

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

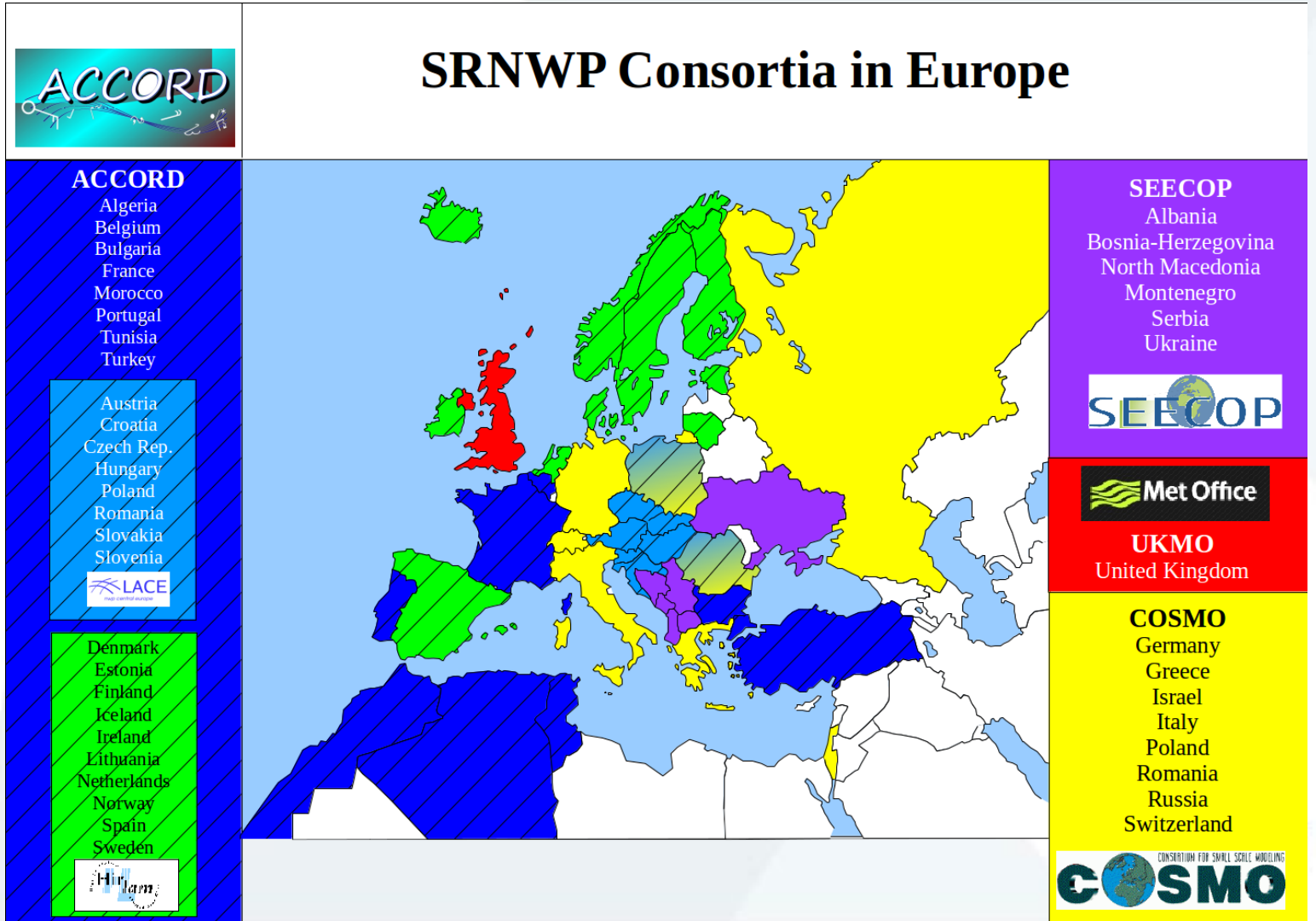
Contact:
jane.wardle@eumetnet.eu

Slide provided by: Jane Wardle



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
<i>Data assimilation and use of observations</i>	Roger Randriamampianina	Christoph Schraff	Magnus Lindskog	Marco Milan	Benedikt Strajnar	Bojan Kasic	
<i>Diagnostics, validation and verification</i>	Carl Fortelius	Flora Gofa	Bent Hansen Sass	Marion Mittermaier	Simona Tascu	Angel Marcev	Dave Richardson
<i>Dynamics and lateral boundary coupling</i>	Ludovic Auger	Michael Baldauf	Sander Tijn	Ben Shipway	Petra Smolikova		Michail Diamantakis
<i>Link with applications</i>	Eric Bazile	Anastasia Bundel	Jeanette Onvlee	Simon Jackson	Simona Tascu	Bojan Cvetkovic	
<i>Physical parameterisation (upper air)</i>	Yann Seity	Matthias Raschendorfer	Emily Gleeson	Mike Bush	Bogdan Bochenek		Irina Sandu
<i>Predictability and EPS</i>	Henrik Feddersen	Chiara Marsigli	Inger-Lise Frogner	Aurore Porson	Clemens Wastl		Martin Leutbecher
<i>Surface and soil processes (model and data assimilation)</i>	Patrick Samuelsson	Jean-Marie Bettems	Ekaterina Kurzeneva	Martin Best	Stefan Schneider		Gianpaolo Balsamo Patricia de Rosnay
<i>System aspects</i>	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
<i>Data assimilation and use of observations</i>	Loik Berre, Maria Monteiro	Mihail Tsyrlunikov	Jelena Bojarova, Kasper Hintz	David Simonin Lee Hawkness-Smith	Florian Meier, Michal Nestiak		
<i>Diagnostics, validation and verification</i>	Boryana Tsenova, Fabien Stoop	Joanna Linkowska	Xiaohua Yang, Ulif Andrae, Carl Fortelius	Nigel Roberts	Christoph Wittmann, Christoph Zingerle		
<i>Dynamics and lateral boundary coupling</i>	Piet Termonia				Jozef Vivoda		
<i>Link with applications</i>		Flora Gofa	Per Unden	Mike Bush	Martina Tudor, Benedikt Bica		Stéphane Vannitsem
<i>Physical parameterisation (upper air)</i>	Eric Bazile, Neva Pristov	Dmitrii Mironov Frederico Grazzini	Bent Hansen Sass	Anke Finnenkoetter	Jan Masek, Neva Pristov		
<i>Predictability and EPS</i>	François Bouttier, Geert Smet	André Walser, Christoph Gebhardt	Jan Barkmeijer	Anne McCabe	Mihály Szűcs, Martin Bellus	Alfons Callado Pallares	
<i>Surface and soil processes (model and data assimilation)</i>	Patrick Le Moigne, Rafiq Hamdi	Jürgen Helmert, Jan-Peter Schulz		Breogan Gomez Cristina Charlton-Perez	Jure Cedilnik, Balázs Szintai, Alena Trojáková		
<i>System aspects</i>	Alexandre Mary	Uli Schaettler	Ulif 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	<u>OmA</u> , <u>OmB</u> , observation error	<u>OmA</u> , <u>OmB</u> .	<u>OmA</u> , <u>OmB</u> , 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

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.

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

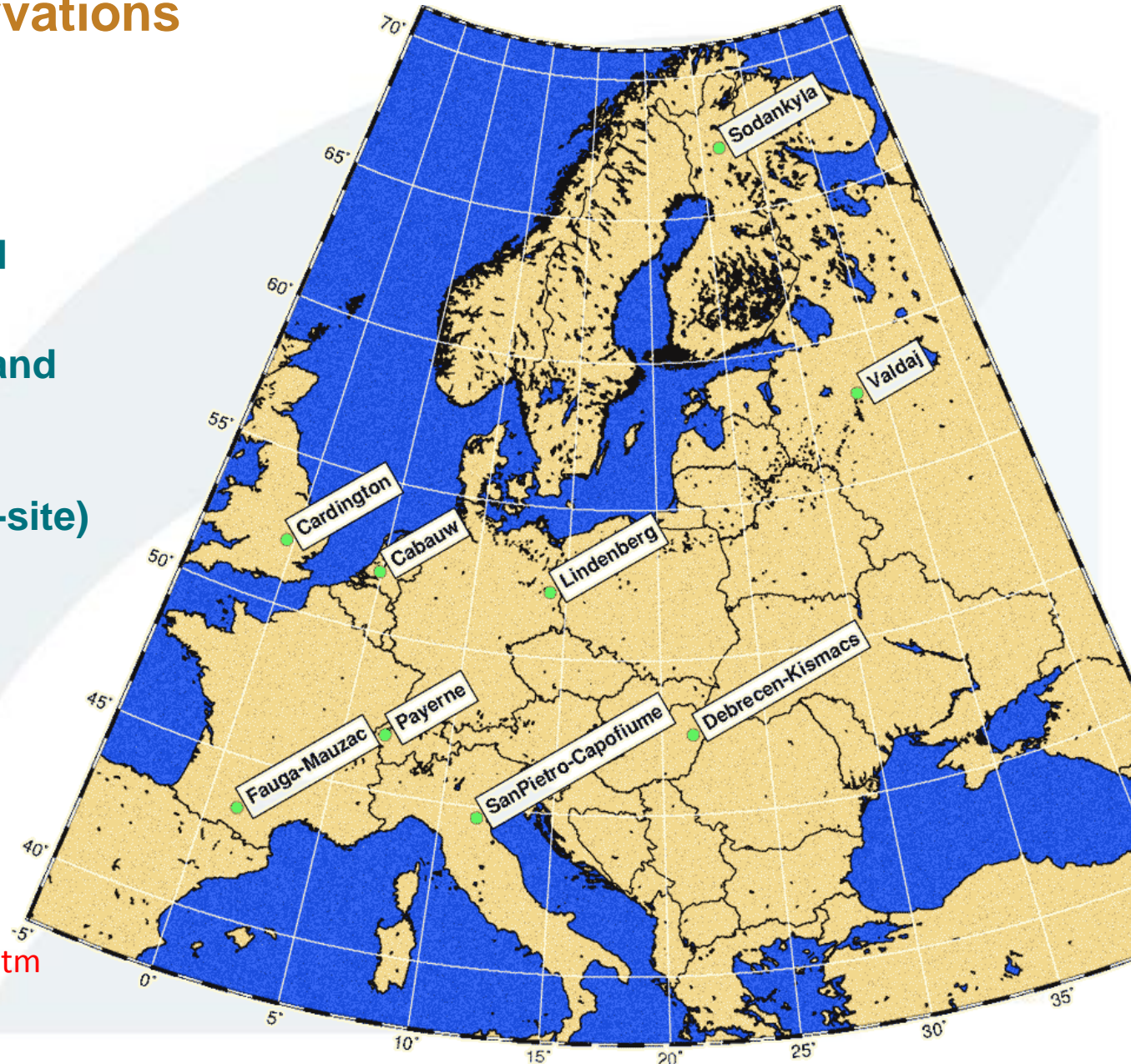
Contact: eucos@metoffice.gov.uk

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



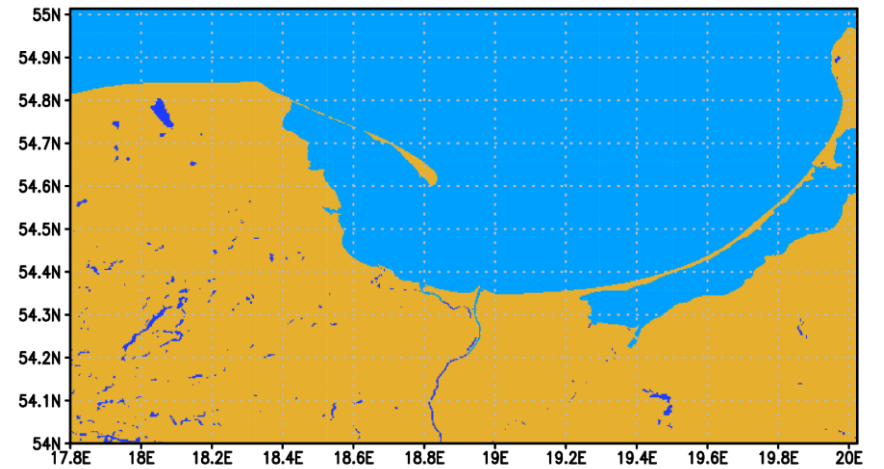
Website: <http://srnwp.cosmo-model.org/content/default.htm>
Account request: <http://srnwp.cosmo-model.org/content/register.htm>

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.

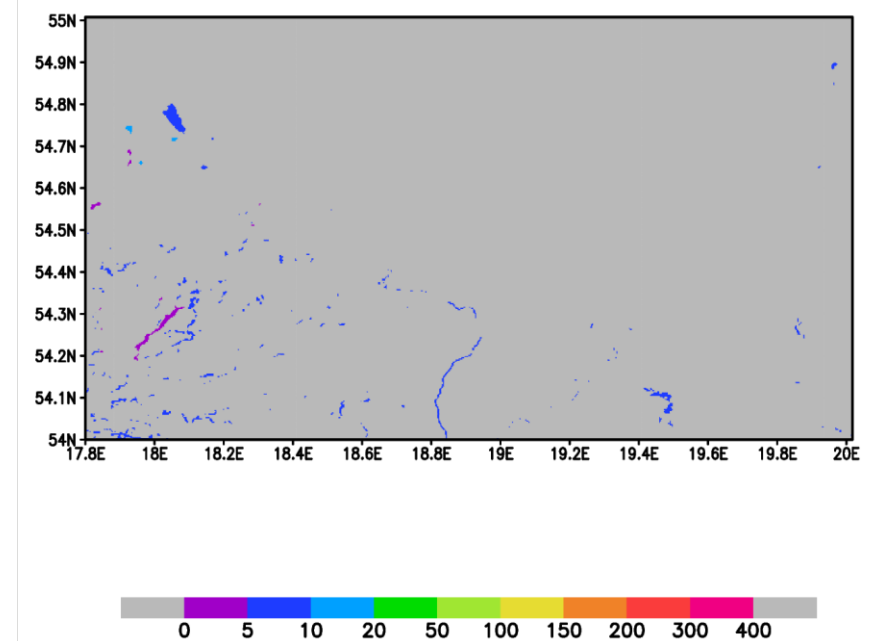
Global Lake Database

- 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.



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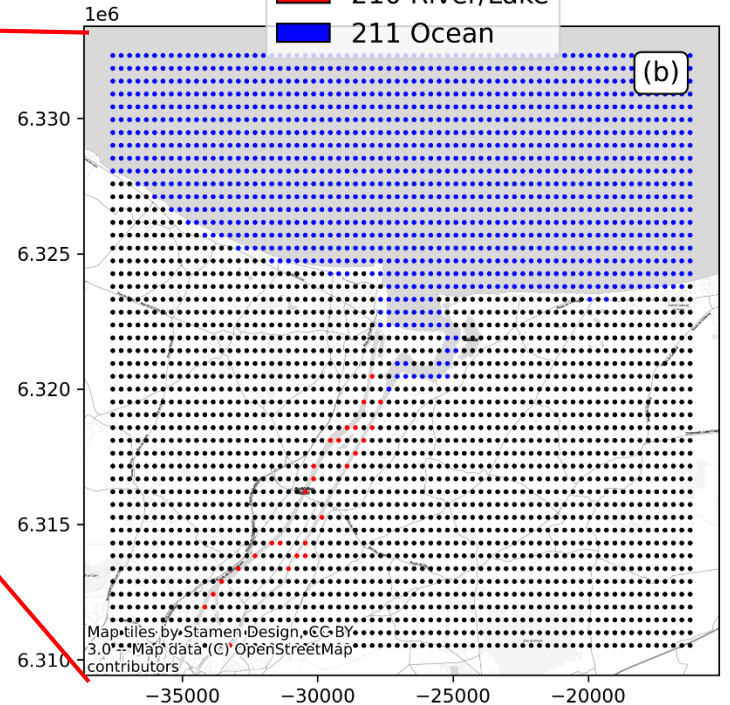
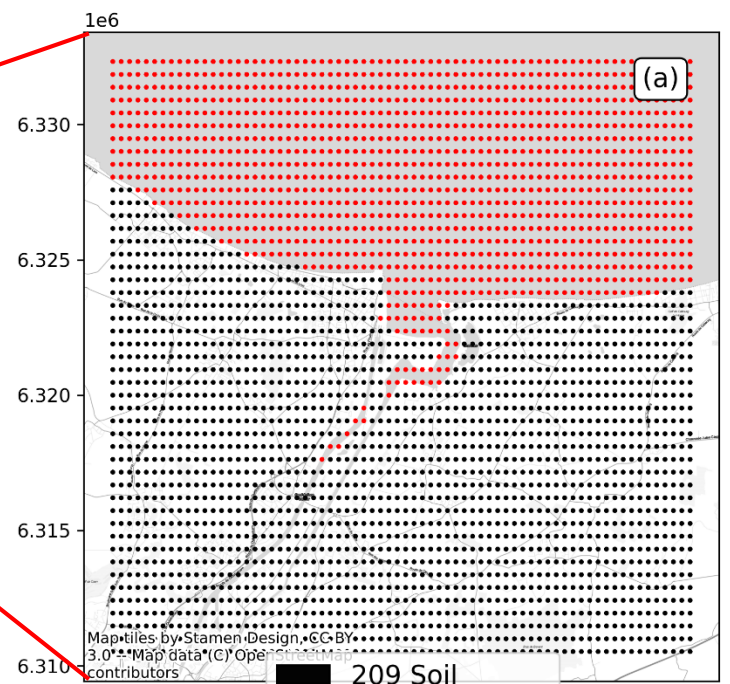
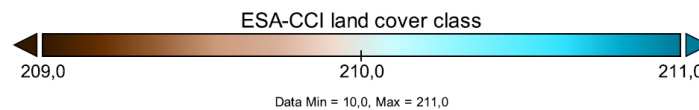
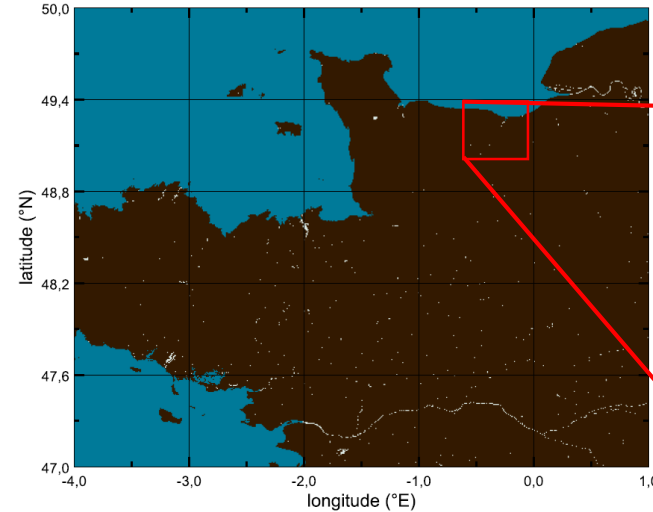
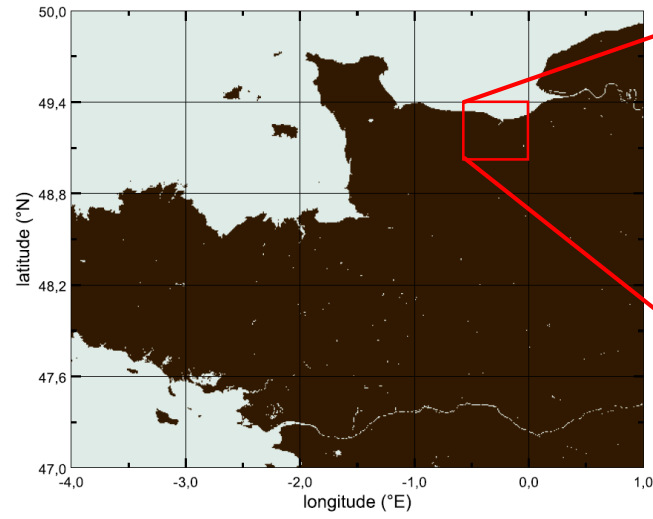
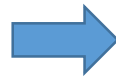
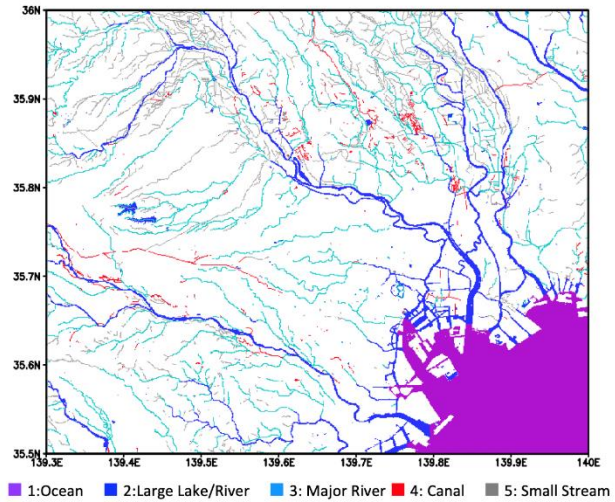
Correction: 54.800000 19.888888 New
Separate sea from rivers.....
size of floating window M= 6
the value of the reverse stroke of the floating window in pixels U= 12
Number of iterations L= 18
Nlon= 795 NLat= 363
Start numbering lakes.....
NSpot= 222
LonRege= 793
InFrAd= 34
Start reading Lake Database ...
NIL= 73
Start making links ...
1 0 DIRUZZONO 19.4559991 54.6999985
2 149 ZGARNDWIECKIE 18.9588886 54.7669983
3 220 RADUNJSKIE_DOLNE 18.0458891 54.2879982
4 0 WIDZYDZE_PYOLIIINOCNE 17.9379997 54.6188816
5 220 RADUNJSKIE_GYORNE 17.9699993 54.2219984
6 220 OSTRZYCKIE 18.8919991 54.2568888
7 163 CHOZESKIE 17.9388883 54.7369995
8 0 GODZISZEWSKIE 18.5129993 54.0769997
9 0 SUDOMIE 17.9029999 54.6950012
10 220 LIAPALICKIE 18.1229992 54.3530006
11 204 LUBOWIDZKIE 17.8349991 54.5569992
12 0 SUNINO 17.8029995 54.1749992
13 216 KAMIENTKIE 17.9709998 54.4000015
14 0 WYRYDOWO 17.8269997 54.0558883
15 0 ZAGNANIE 18.0379997 54.0688888
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20 0 GARCZYNI 17.9099998 54.1188880
21 0 PULIME 18.1258888 54.6899997
22 0 POJASZKOWSKIE 18.1689998 54.0488883
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Start to analyse links ...
Write depth and status fields ...
    
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Physiography work

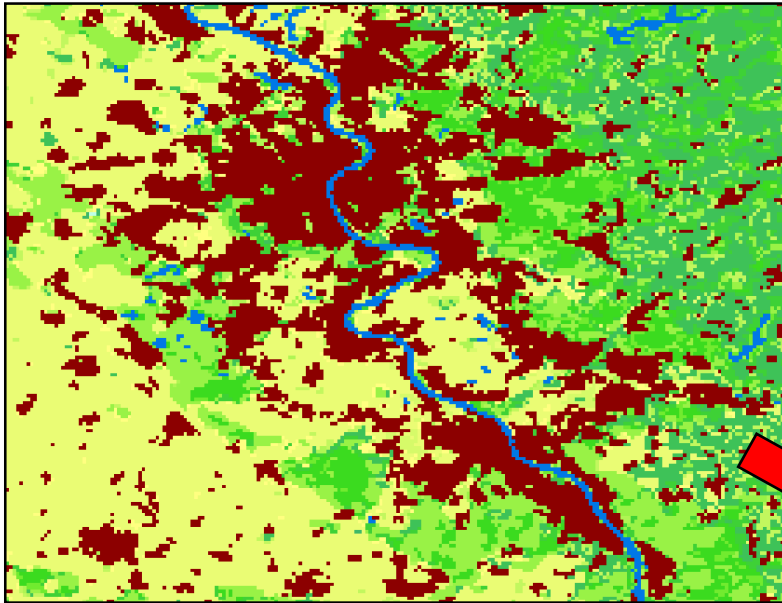
- **Goal: checking and correction of ESA-CCI land cover map for NWP purposes**
- **Budget: 27.000 EUR for three years: 2021-2023 (money not spent in other C-SRNWP tasks)**
- **Supervisory team defined on 24 February 2021:**
 - C-SRNWP Surface ET Chair: Patrick Samuelsson (SMHI)
 - NWP expert: Ekaterina 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)**

Physiography work



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

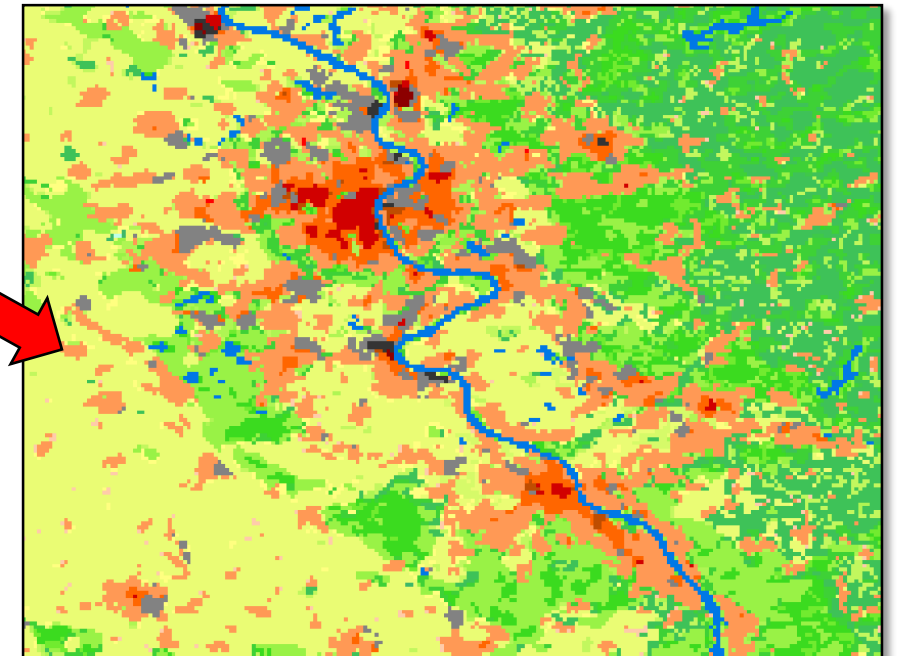
Physiography work



Example for Cologne, Germany

Built types		Land cover types	
1	Compact highrise Dense mix of tall buildings to tens of stories. Few or no trees. Land cover mostly paved. Concrete, steel, stone, and glass construction materials.	A	Dense trees Heavily wooded landscape of deciduous and/or evergreen trees. Land cover mostly pervious (low plants). Zone function is natural forest, tree cultivation or urban park.
2	Compact midrise Dense mix of midrise buildings (3-9 stories). Few or no trees. Land cover mostly paved. Stone, brick, tile, and concrete construction materials.	B	Scattered trees Lightly wooded landscape of deciduous and/or evergreen trees. Land cover mostly pervious (low plants). Zone function is natural forest, tree cultivation, or urban park.
3	Compact lowrise Dense mix of lowrise buildings (1-3 stories). Few or no trees. Land cover mostly paved. Stone, brick, tile, and concrete construction materials.	C	Bushy, scrub Open arrangement of bushes, shrubs, and short, woody trees. Land cover mostly pervious (bare soil or sand). Zone function is natural scrubland or agriculture.
4	Open highrise Open arrangement of tall buildings to tens of stories. Abundance of pervious land cover (low plants, trees). Concrete, steel, stone, and glass construction materials.	D	Low plants Featureless landscape of grass or herbaceous plants/crops. Few or no trees. Zone function is natural grassland, agriculture, or urban park.
5	Open midrise Open arrangement of midrise buildings (3-9 stories). Abundance of pervious land cover (low plants, scattered trees). Concrete, steel, stone, and glass construction materials.	E	Bare rock or paved Featureless landscape of rock or paved cover. Few or no trees or plants. Zone function is natural desert (rock) or urban transportation.
6	Open lowrise Open arrangement of lowrise buildings (1-3 stories). Abundance of pervious land cover (low plants, scattered trees). Wood, brick, stone, tile, and concrete construction materials.	F	Bare soil or sand Featureless landscape of soil or sand cover. Few or no trees or plants. Zone function is natural desert or agriculture.
7	Lightweight lowrise Dense mix of single-story buildings. Few or no trees. Land cover mostly hard-packed, lightweight construction materials (e.g., wood, thatch, corrugated metal).	G	Water Large, open water bodies such as seas and lakes, or small bodies such as rivers, reservoirs, and lagoons.
8	Large lowrise Open arrangement of large lowrise buildings (1-3 stories). Few or no trees. Land cover mostly paved. Steel, concrete, metal, and stone construction materials.	VARIABLE LAND COVER PROPERTIES Variable or ephemeral land cover properties that change significantly with synoptic weather patterns, agricultural practices, and/or seasonal changes.	
9	Sparsely built Sparse arrangement of small or medium-sized buildings in a natural setting. Abundance of pervious land cover (low plants, scattered trees).	b. bare trees	Leafless deciduous trees (e.g., winter). In sky view factor. Reduced albedo.
10	Heavy industry Lowrise and midrise industrial structures (towers, smoke stacks). Few or no trees. Land cover mostly paved or hard-packed. Metal, steel, and concrete construction materials.	s. snow cover	Snow cover >10 cm in depth. Low admittance. High albedo.
		d. dry ground	Patched soil. Low admittance. Large Bowen ratio. Increased albedo.
		w. wet ground	Waterlogged soil. High admittance. Small Bowen ratio. Reduced albedo.

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



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!)**

Thank you for your attention!



EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK

CONTACT DETAILS

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