

## New UWC West NWP Collaboration

The UWC West NWP collaboration will run Cycle 43h2.2 of HARMONIE-AROME at a common HPC. How does each institute retrieve the data they need from a common forecast run on a single large domain?

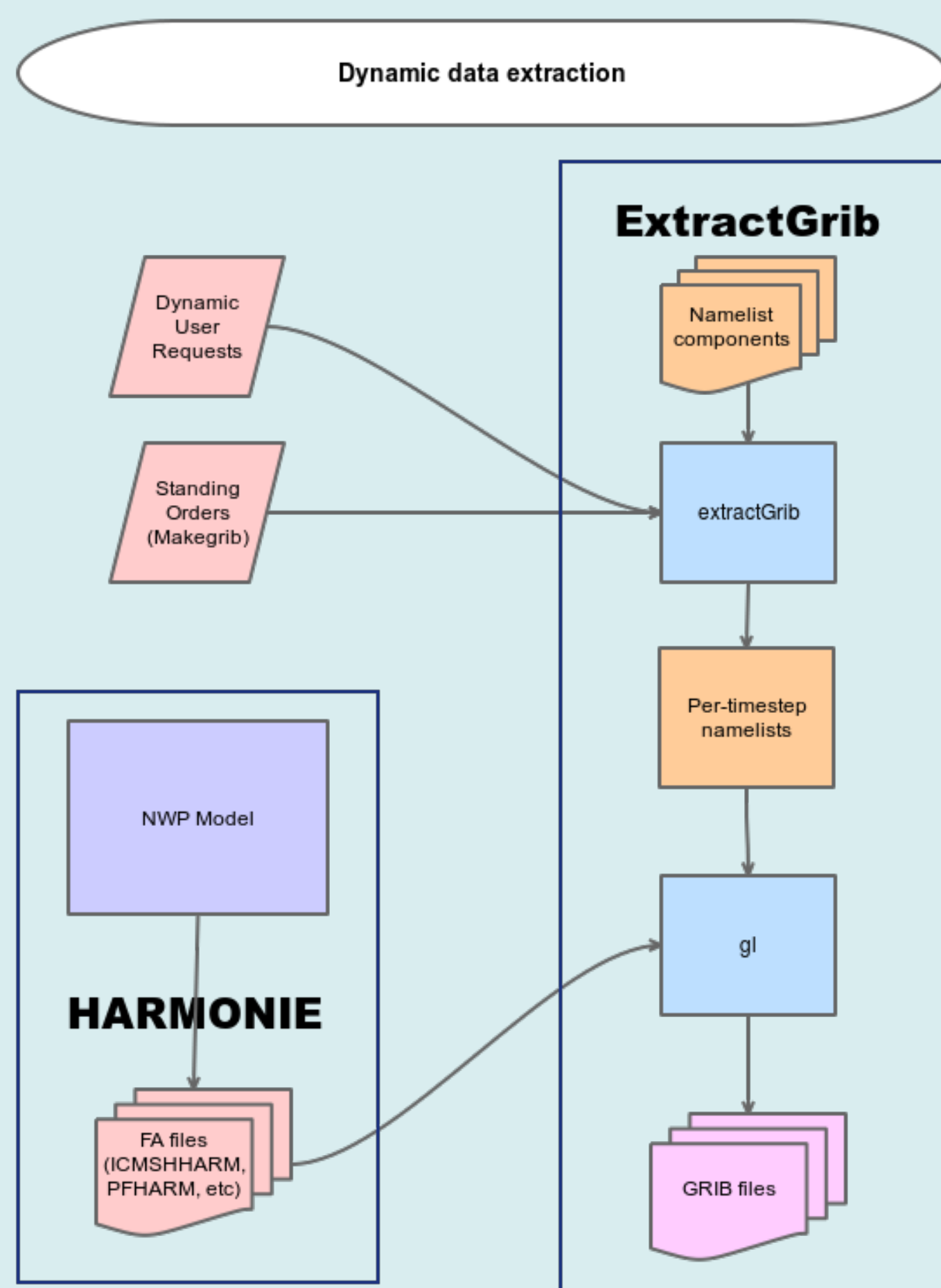
Institute	Dataset Description
Netherlands (KNMI) (yellow box)	Much of continental Western Europe, North Sea Native Lambert and rotated_II projections GRIB1/2
Ireland (Met Éireann) (green box)	North Atlantic, Western Europe Native Lambert projection GRIB2
Iceland (IMO) (blue box)	North Atlantic, part of Greenland Native Lambert projection GRIB2
Denmark (DMI) (red box)	Northwestern Europe, Scandinavia, North East Atlantic, North Sea Rotated_II projection GRIB1



UWC West (purple) and National domains

## extractGrib

extractGrib is a new tool to streamline production of data requests from multiple users and for multiple purposes.

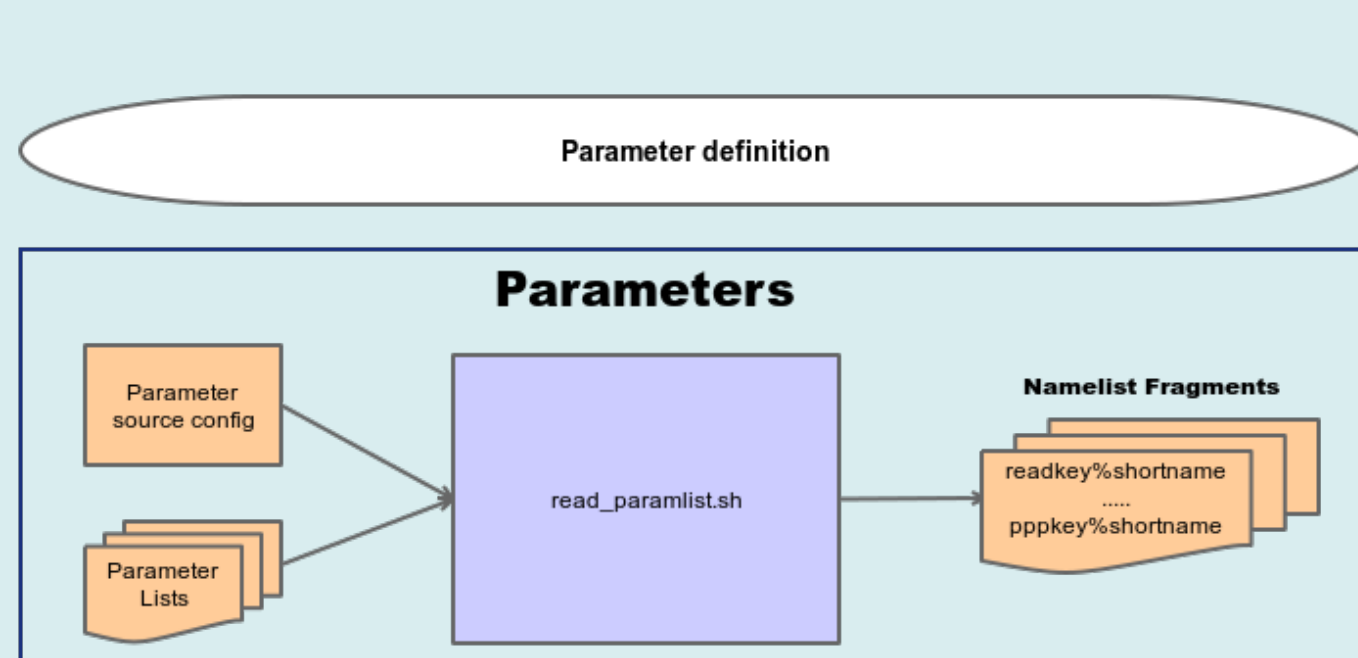


Dynamic generation of namelists for gl

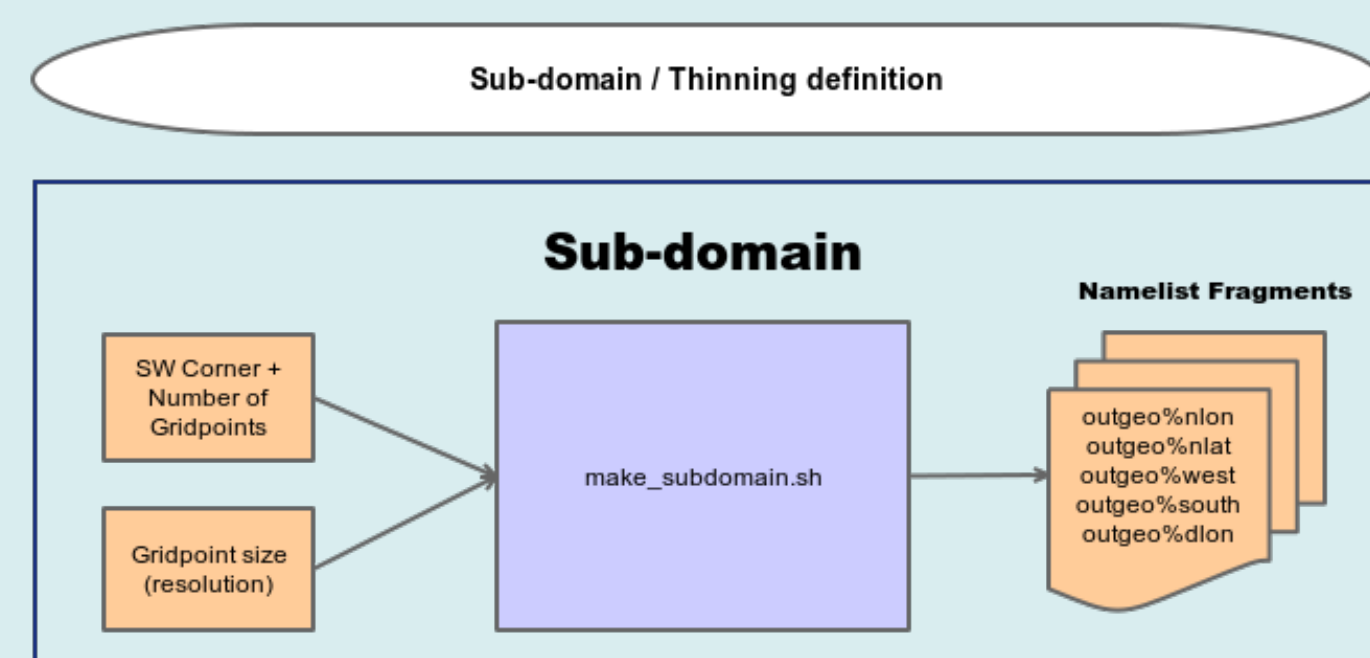
- ▶ Per-institute data definitions
  - ▶ Dataset
  - ▶ Sub-domain
  - ▶ Projection
- ▶ Product type discrimination
  - ▶ Operational
  - ▶ User
- ▶ Forecast type discrimination
  - ▶ Control vs EPS member
  - ▶ Hourly vs Sub-Hourly
- ▶ Destination discrimination
  - ▶ Transport data to your institute
  - ▶ Leave data at HPC for further processing
- ▶ Insert your own GRIB tables

## Parameter sets, sub-domains

extractGrib can produce your parameter set in your projection over your desired domain.



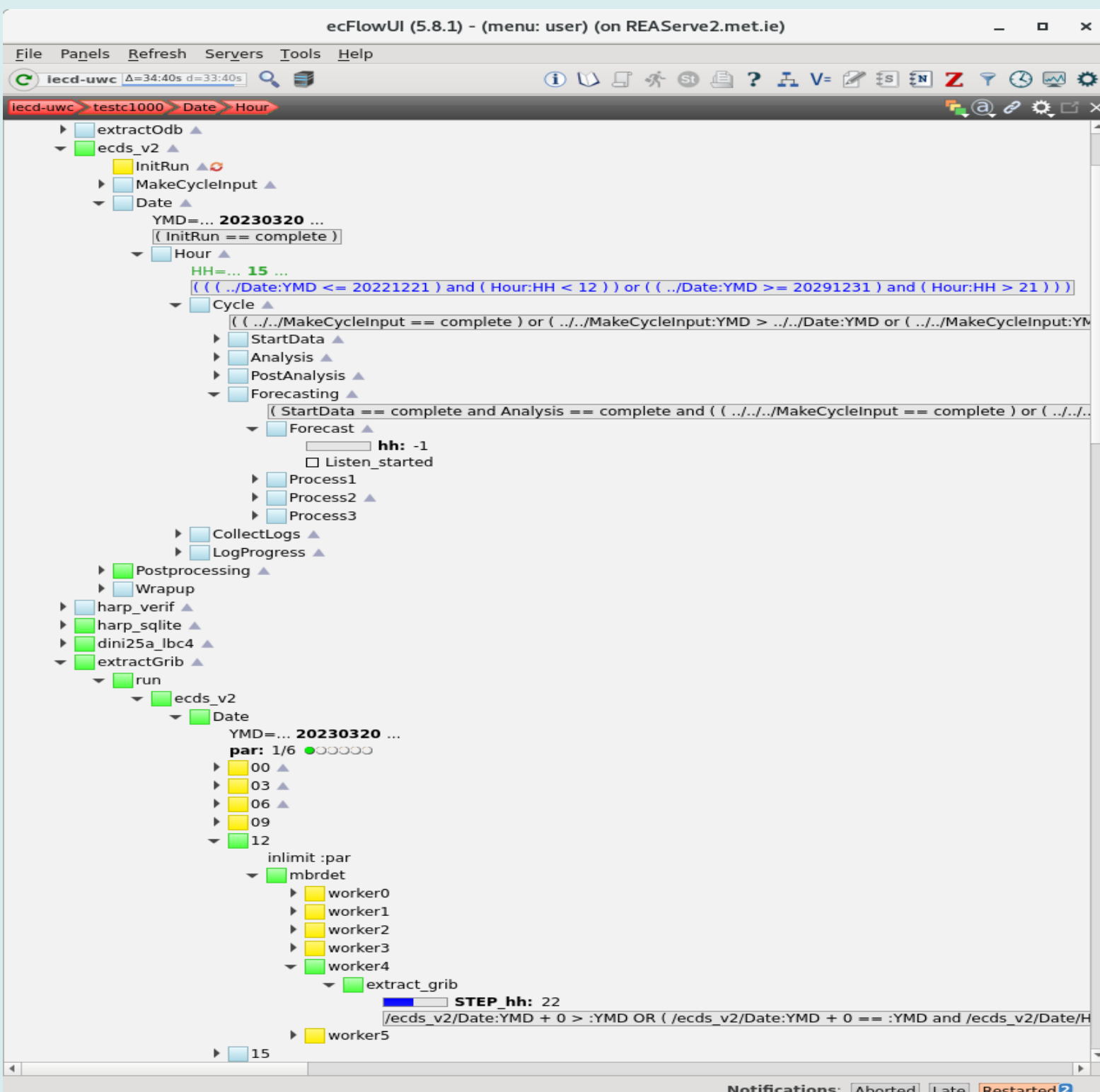
Create your list of parameters. extractGrib translates these to appropriate gl 'readkey' or 'pppkey' entries.



Want a sub-domain? Just give SW/NE corners and gl will do the rest.  
Thinned data? Just supply appropriate dlat/dlon values.

## ecFlow

extractGrib comes with full ecFlow integration including triggering from your HARMONIE-AROME suite.



- ▶ Replaces Makegrib
  - ▶ CONVERTFA=no
- ▶ Triggers on Date/Hour/Cycle/Forecast task
- ▶ Parallelises for prompt, asynchronous output
- ▶ Derives numbeOfMembersInEnsemble from max(ENSMSEL)
- ▶ Understands 'STREAMS' configuration for continuous eps
- ▶ Understands sub-hourly outputs

Because extractGrib runs asynchronously, the forecast can run on without having wait for large I/O operations.

extractGrib will read your HARMONIE-AROME suite config\_exp.h, configure itself from LL LIST, ENSMSEL, TFLAG and trigger from your HARMONIE-AROME suite

## How does it work?

extractGrib builds a large namelist for the gl program from 'namelist fragments' and then passes this namelist to gl to do the actual data extraction.

- ▶ Read FA files into MEMORY (fullpos, his and sfx), 40% of processing time
- ▶ Do the gl postprocessing step from MEMORY to MEMORY, 40% of processing time
- ▶ Write out each data request from MEMORY to GRIB1/2, 20% of processing time

extractGrib reads the HARMONIE-AROME suite's config\_exp.h, then reads user configuration from \$HOME/extractGribConfig/EXP/

- ▶ extractGribConfig/EXP/share/griblists
  - ▶ bicc
    - ▶ control.list
    - ▶ standing.list
  - ▶ eidb
    - ▶ sub\_hourly.list
- ▶ Griblists define each product to output.
  - ▶ control.list runs on hourly steps control member only
  - ▶ standing.list runs on all members hourly steps
  - ▶ sub\_hourly.list runs on every step between hours

extractGribConfig/EXP/share/paramlists

- ▶ bicc
  - ▶ dataset1.list
  - ▶ dataset2.list
  - ▶ dataset3.list
- ▶ eidb
  - ▶ dataset4.list
- ▶ ekmi
- ▶ knmi

▶ Paramlists define the individual parameters in a dataset

shortName	typeOfLevel	tri	level
t	hybrid	0	20-30
r	isobaricInhPa	0	700,850,925
t	heightAboveGround	0	2
tp	heightAboveGround	4	0

▶ levels can be comma-separated lists and/or range (hybrid levels only)

▶ extractGribConfig/EXP/share/namelist.inc

- ▶ ekmi
  - ▶ DINI20rl.inc # Rotated\_II projection
  - ▶ dmi.FIR.10k.inc # FI Region at 10k resolution

▶ Namelists define the sub-domains and/or projections for a product

```
# Iceland and surrounding seas cut from DINI
outgeo%gridtype = 'crop'
outgeo%south = 60.926
outgeo%west = -26.261
outgeo%north = 68.266
outgeo%east = -9.890
ldemand_inside=F
```

## Ensembles, sub-hourly, Post-processing inputs

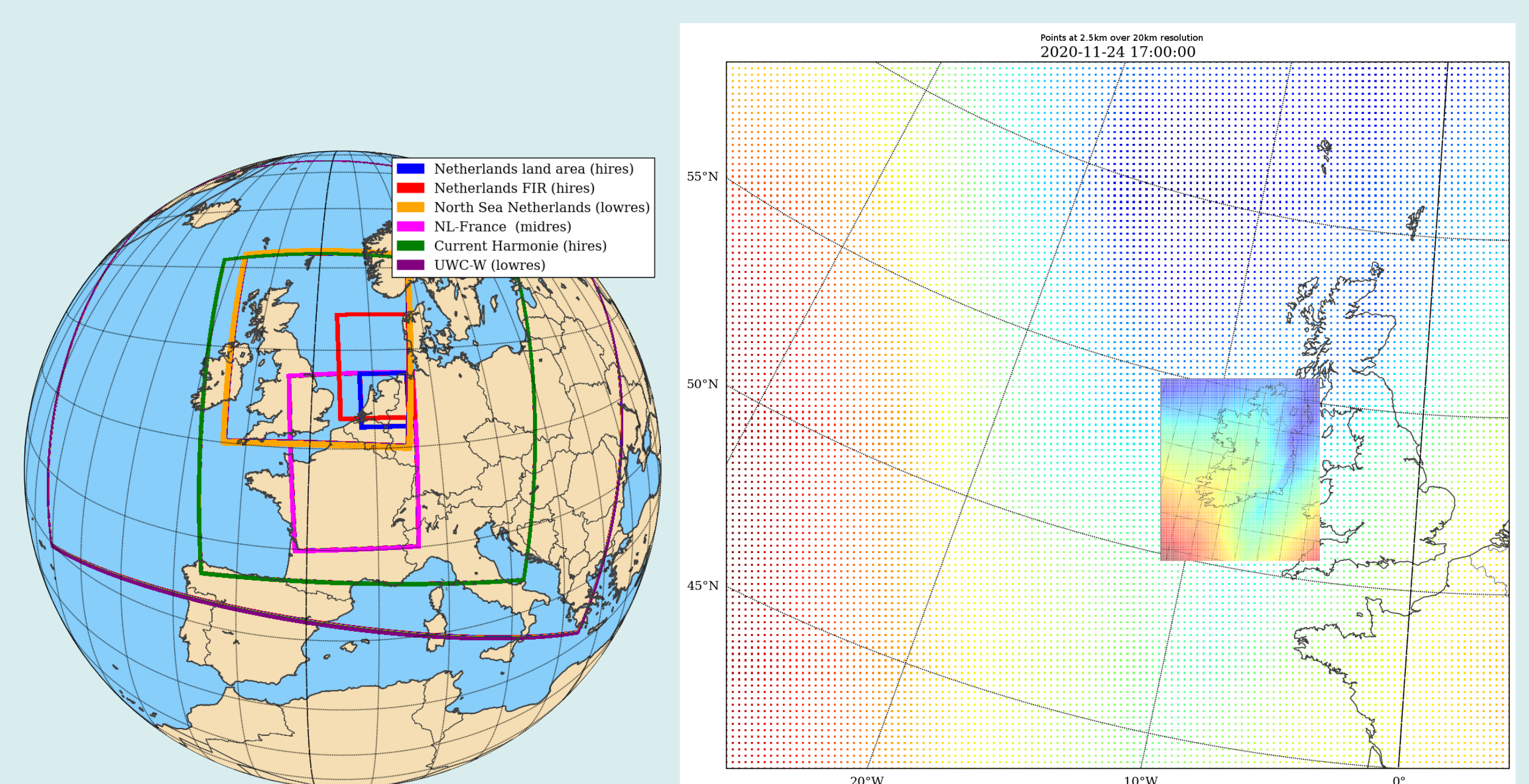
You may have different requirements for data depending on its purpose. extractGrib allows for datasets depending on what forecast you run

- ▶ extractGribConfig/share/griblists/cccc
  - ▶ Hourly steps only all eps members
    - ▶ standing.list
    - ▶ postp.list
  - ▶ Hourly steps control member only
    - ▶ control.list
    - ▶ postp.control.list
  - ▶ All eps steps in a sub-hourly configuration
    - ▶ sub\_hourly.list
  - ▶ All control-only steps in a sub-hourly configuration
    - ▶ sub\_hourly.ct.list

What will I use this data for?

- ▶ EPS member outputs back to my institute
  - ▶ standing.list
- ▶ Control member outputs back to my institute
  - ▶ control.list
- ▶ EPS member data as input to a post-process on HPC
  - ▶ postp.list
- ▶ EPS member outputs between hours in a sub-hourly forecast
  - ▶ sub\_hourly.list

## A Product for each Task



Low resolution over large domain, high resolution over small domain allows you to maximise the value of the data you return to your institute. extractGrib allows you to do this.

## Technical Information

- ▶ extractGrib requires at minimum gl from harmonie-43h2.2 bf
- ▶ 90% bash, 10%python (ecFlow create\_suite.py script)
- ▶ Code currently in UWC West gitlab, will be released later this year.
- ▶ License to be decided, hoping to use an open-source license.
- ▶ Running at ECMWF Atos HPC, extractGrib uses more than 100G RAM and occupies one node per output step.
- ▶ Author: Conor Daly - Met Éireann
- ▶ Contact: conor.daly@met.ie

## Future Plans

- ▶ Release to the ACCORD community shortly. Release under an open-source license later.
- ▶ Working with United Weather Centres West (UWC-West) with an aim of joint operations by the middle of 2023.

## Acknowledgements

- ▶ Rónán Darcy, Met Éireann for assistance with ecFlow scripting
- ▶ Ulf Andrae, SHMI for mentoring in gl code