

Migration to GRIB2

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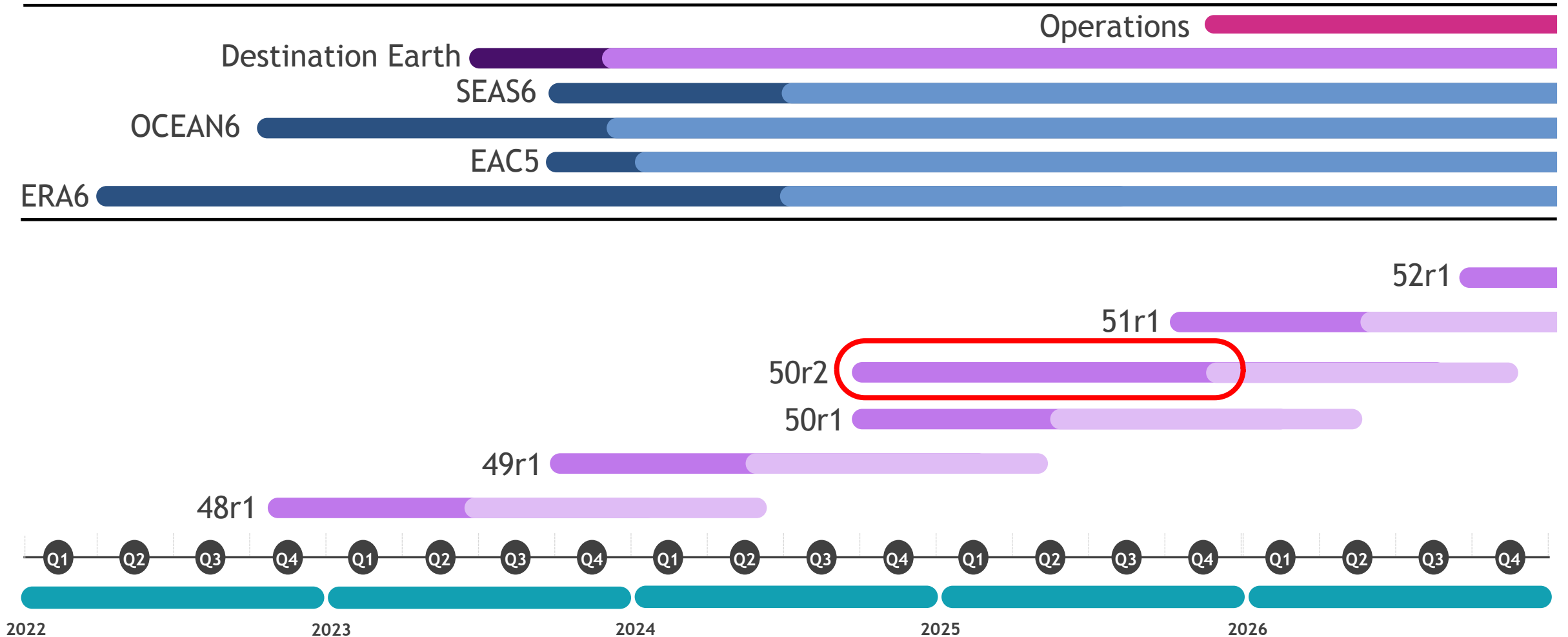
Data archive and Dissemination, Data Governance

Migration to GRIB edition 2 – why are we doing this ?

- Recommended in 2021 by the TAC subgroup on the future direction of GRIB at ECMWF
- Required by ECMWF 10-year strategy: increased model resolution
 - GRIB1 grid encoding limitations
 - Starting soon with DestinE
- Move away from a deprecated edition of GRIB
 - GRIB1 has been deprecated for almost 20 years
- Increase data interoperability within the organisation and partners
 - Stop using local encoding that only ecCodes can decode
 - Stop producing a mixture of GRIB1/GRIB2 in the same file
- Improve data discovery with richer metadata
 - Extremely useful for data portal (CDS, Open data, etc.)
- **All existing GRIB1 data archived in MARS will not be migrated**

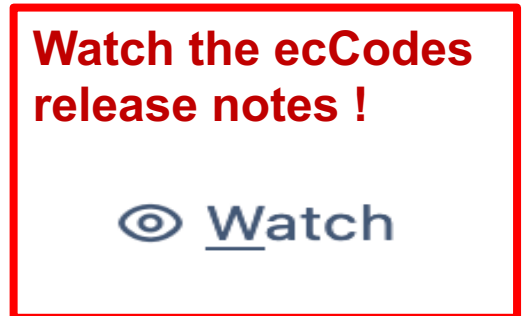
Migration to GRIB2 Roadmap (operations + datasets)

- Expected to switch to full GRIB2 during technical cycle IFS 50r2
- Several standalone datasets will be full GRIB2 prior to operations
- Longer esuite planned to allow all stakeholders to be ready



Impact on users

- Period of frequent changes in the definitions of parameters
 - The changes will be announced in ecCodes release notes
- Kind of changes to be expected:
 - paramIds and shortNames may change
 - underlying GRIB2 definitions of parameters may change
 - MARS keyword mapping may change
 - ecCodes behaviour may change (in very specific situations)
 - Re-ordering of ecCodes GRIB2 definition files and templates
 - Sub-hourly time steps – coming soon !
- Balance between handling legacy practice without adding more technical debt
 - Minimise impact on users where possible
 - Break things when necessary



Change of MARS requests to use edition independent keys: param => paramId

- The change to paramId is backward compatible
- using paramId will **not** do an edition conversion

⚠ The following MARS retrieval is provided only as an example of the sort of change that users will need to make once the data are provided in GRIB2. If this request is run at the moment, it will return data encoded in GRIB1.

Retrieval of U-component of 10m wind in GRIB1	Retrieval of U-component of 10m wind in GRIB2
<pre>retrieve, class=od, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=sfc, param=165.128, target="output_10u.grib1"</pre>	<pre>retrieve, class=od, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=sfc, param=165, target="output_10u.grib2"</pre>

Change of indexing – split over two or more keys

⚠ The following MARS retrieval is provided only as an example of the sort of change that users will need to make once the data are provided in GRIB2. The values taken by the chem keyword are not yet finalised.

Retrieval of NO ₂ mass-mixing ratio in GRIB2 - current	Retrieval of NO ₂ mass-mixing ratio in GRIB2 - new
<pre>retrieve, class=mc, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=ml, levelist=1/to/137, param=210121, target="output_no2.grib1"</pre>	<pre>retrieve, class=mc, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=ml, levelist=1/to/137, param=402000, # Mass mixing ratio chem=no2, # Nitrogen dioxide target="output_no2.grib2"</pre>

Change of indexing – new levtypes

⚠ The **levtype=sol** keyword for multi-layer snow depth parameters in GRIB2 will be introduced with the Implementation of IFS Cycle 48r1.

Retrieval of snow depth in GRIB1	Retrieval of snow depth in GRIB2
<pre>retrieve, class=od, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=sfc, param=141.128, target="output_sd.grib1"</pre>	<pre>retrieve, class=od, stream=oper, expver=1, date=-2, time=00:00:00, type=fc, step=0, levtype=sol, levelist=1/2/3/4/5, param=228141, target="output_sd.grib2"</pre>

Sub-hourly forecast time steps

- Archiving of sub-hourly forecast output will be archived in MARS starting in November 2023
- Requires changes to step and stepRange ecCodes keys
- New **stepUnits** keyword will be added to the MARS language and as an ecCodes key

```
$ grib_ls -p dataDate,dataTime,stepType,stepUnits:s,startStep,endStep,stepRange 121_s2_enfo.grib2
20220523 0 max h 25 49 25-49
20220523 0 max m 45 60 45m-60m
20220523 0 instant m 61 61 61m
20220523 0 max m 45 60 45m-60m
4 of 4 messages in 121_s2_enfo.grib2

4 of 4 total messages in 1 files
```

- **No changes for hourly data ... yet**

Current status of the migration to GRIB2: extending the specs

WMO Fast-Tracks for GRIB and BUFR

- Deadline for submissions to Fast-Track
- Codes are officially operational

Parameters: hydrological, heat and new wave parameters

Fast-Track 2022-1

[WMO Manual on Codes](#)

Parameters: ERA6 budget, new ocean, wetland and CAMS parameters

Fast-Track 2022-2

Parameters: ERA6, DestinE, fire parameters for burning surfaces

Templates: Waves, Wave spectra, anomalies, EFI/SOT, Significances, true-colour imagery

Fast-Track 2023-1

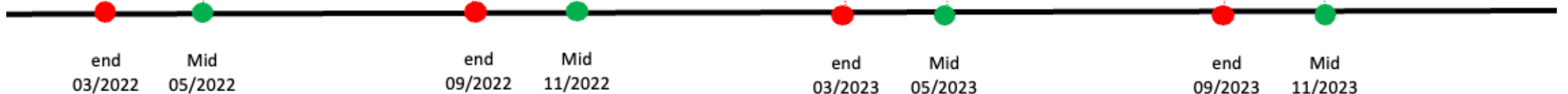
Parameters: Parameters missing for Tiles

Templates: Tiles, HEALpix

Fast-Track 2023-2

Parameters / Templates:
missing operational parameters

Fast-Track 2024-1



Be proactive

- The migration to GRIB2 will be **disruptive** in many ways, stay informed!
- Read carefully the release notes when moving to a new ecCodes
- Don't stay behind
 - Use module ecmwf-toolbox/new whenever possible (use default for operations)
- Adapt your workflow for GRIB2
 - use edition independent keys as much as possible in your scripts/applications
- Avoid parsing raw grib_ls output
 - use the json output (grib_ls -j) => more robust
- Report any unexpected change of behaviour
 - After checking the release notes!

Stay informed!

- ecCodes [release notes](#)
- More details in the article in ECMWF newsletter - Spring 2023: [Migration to GRIB2](#)
- Sign up to our mailing list: mtg2@lists.ecmwf.int

Mailing List

Users who wish to receive regular updates about the progress in the migration to GRIB2 can subscribe to the mailing list mtg2@lists.ecmwf.int.

To subscribe, send an email to sympa@lists.ecmwf.int with the subject "SUBSCRIBE mtg2@lists.ecmwf.int".

- [Migration to GRIB edition 2 Information page](#)
 - Includes ecCodes changes to parameters or templates
 - GRIB2-related only

