



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

TM5-MP: technical working group report

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Goodbye ERA-Interim, welcome ERA-5



“Fast track” (see #10241)

- in the trunk since September 24th
- produced at **1x1-137L** (ERA-I: 1x1-60L)
for **1989-2019** (latest)
- new variable: **stl1**
- available at ECMWF:

ec:/nlh/TM/meteo-nc/ec/ea/



Chemistry (CB05+M7) benchmark 2006 (135 cores)

1y spinup	15 % slower (no output)
1y benchmark	9 % slower (lots of output)



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	ERA-5	ERA-I	
tmm readfield 2D	608	148	every 1h for ERA5, 3 or 6h for ERA-I
tmm readfield 3D	1061	888	ERA-5: 137L , EI: 60L, both 3 hourly

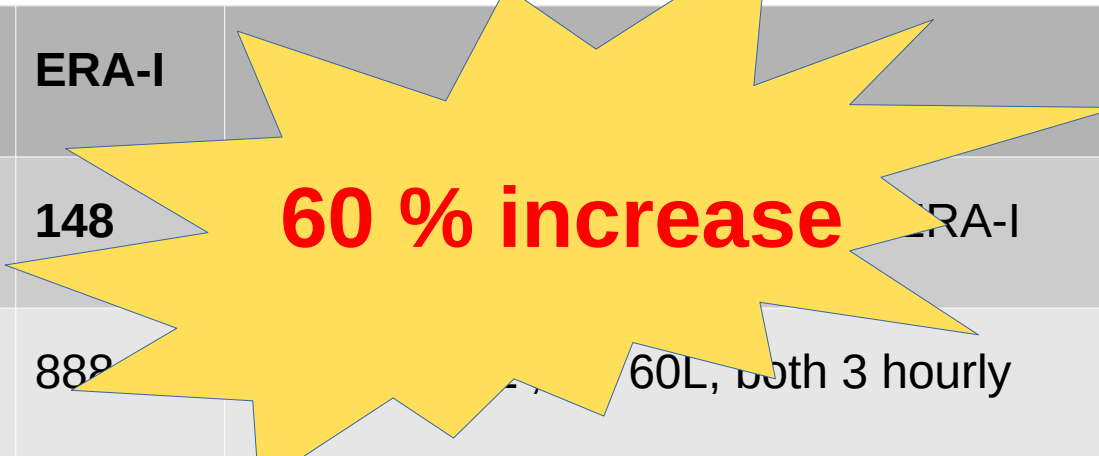
Meteo reading time (s) for one month for Chemistry benchmark



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	ERA-5	ERA-I	
tmm readfield 2D	608	148	ERA-I
tmm readfield 3D	1061	889	60L, both 3 hourly



Meteo reading time (s) for one month for Chemistry benchmark

**Chemistry** (CB05+M7) benchmark 2006 (135 cores)

1y spinup	15 % slower (no output)
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CONFIG (all 3x2-34L)	SYPD	Difference
EBI, within EC-Earth	2.3-2.8	+ 20-45%
EBI, w/ ERA-Interim	1.91	
EBI, w/ ERA-5	1.73	- 9%
KPP, w/ ERA-Interim	1.76	- 7%
KPP, w/ ERA-Interim + MOGUNTIA	1.55	- 19%



- **Target**

0.5x0.5 - 137L, hourly

- **Production**

from native T619 (30 km, 0.28°)

need to retrieve at T511 (39 km, 0.35°)

instead of T255 (80 km, 0.7°) so far → **DOUBLE**

- **Need one month **TODO****



Chemistry benchmark at 0.5x0.5

- 2D data-to-read x 4
- 3D data-to-read x 12
 - **380% increase w/r/t ERA-Interim 1x1**
- computation can scale
 - x24 → total runtime x 24 (135 cores)**
 - x4 → total runtime x 4.12 (700 cores)**
 - x1 → total runtime x 1.6 (~2.5k cores)**



Chemistry benchmark at 0.5x0.5

- 2D data-to-read x 4
- 3D data-to-read x 12
 - **380% increase w/r/t ERA-Interim**
- computation can scale

x24 → total runtime x 24 (135 cores)

x4 → total runtime x 4.12 (700 cores)

As fast as TM5-zoom at 3x2 !



Environment (lib, python, svn,...)



It is now possible to run TM5 without compiling against HDF4, but:

- some **output** is **missing**
- requires new input files (part. CB05)
- not in the trunk yet

No HDF4



(issue #8931)

HOW

- just remove **with_hdf4** from your main rc file

**“no-hdf” branch
only**

MUTED OUTPUT

- base:
 - budget, mmix(*)
- proj/cb05:
 - photolysis
- proj/ouput:
 - user_output_station.F90(*), user_output_noaa.F90

(*) must be explicitly set to F in rc file, else code stops

Not considered (need porting to MP)

- user_output_cf.F90
- user_output_flask.F90



TODO ?

As is, enough for EC-Earth, but not standalone

Requirement #1

- convert non-CMIP6 input data (MSR2 mainly, MSR?)

Requirement #2 ?

- **mmix**, **budget**, and **photolysis** converted to netCDF ???
- mmix, photolysis : one file/routine (easy)
 - mmix: Mike Trudeau & Andy done some work in TM5-zoom
- budget: **nightmare** → all over the place

Opinion?



Remove old restart options

remove?	Option	Description
	1	tracers mass set to 0.
	2	computed in <i>sources_sinks/trace1</i>
yes	30	“save” file (hdf)
yes	31	“save” file (hdf)
	32	restart (nc), partial reading
	33	restart (nc), full reading
yes	4	“saveoldfile” (hdf)
yes	5	mmix file (hdf)
	9	user defined in <i>user_input</i>



(From now on: 4.1.1 or above)

Recommendation: don't use parallel I/O

- Removed from read/write restart
- Still needed
 - to output some timeseries in chemistry (pdump, aerocom)
[but **aerchemMIP** or **general** output are available]
 - to read meteo in parallel (optional, hasn't proved useful)



- python-2 EOL : 01-01-2020
- Already not supported at ECMWF, and won't be available on Bologna HPC
- **pycasso** is not ready
- **2to3** pass + edits not enough → unicode error

```
[ERROR ] File "/home/ms/nl/nm6/TM5MP/bin3/pycasso_tools.py", line 55, in diff_text_files
[ERROR ]     lines1 = f.readlines()
[ERROR ] File "/usr/local/apps/python3/3.6.8-01/lib/python3.6/codecs.py", line 321, in decode
[ERROR ]     (result, consumed) = self._buffer_decode(data, self.errors, final)
[ERROR ] UnicodeDecodeError: 'utf-8' codec can't decode byte 0xb5 in position 1046: invalid start byte
```

- but needs to be fixed at some point
- Option: **utopya** is ready and will come with TM5-MP 4D-var (Arjo talk)

subversion



redmine

RedmineWiki | Footnotes / T | IKM Gebruik | Verbinding n | Hooks for Ph | Restart simul | Issues - EC-E | mnoGoSearch | Intranet R&D | Issues - T X | Restart options - | M: 29th Internal | +

Koninklijk Nederlands Meteor... (NL) | https://dev.knmi.nl/projects/tm5mp/issues

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TM5-MP

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Issues

Filters: Status open

Options: Add filter

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#	Tracker	Status	Priority	Subject	Assignee	Updated
8931	Feature	In Progress	Low	removing dependence on HDF4		11/18/2019 02:07 PM
10231	Feature	In Progress	Normal	ERA5 meteo		09/24/2019 12:39 PM
20341	Support	In Progress	Normal	Python 2 becoming obsolete		08/30/2019 09:31 AM
20141	Bug	In Progress	Low	PDUMP temperature field is zero		07/26/2019 02:45 PM
12101	Feature	New	Low	Updating Corner halo grid boxes		10/10/2018 03:39 PM
11771	Feature	In Progress	Normal	Windspeed as new met field		10/05/2018 03:35 PM
11761	Bug	New	Low	overflow in PDUMP		09/26/2018 09:44 AM
10221	Feature	In Progress	Normal	MOGUNTIA and KPP		09/20/2018 01:59 PM
10261	Task	In Progress	Normal	single site for TM5-MP with directions for new users		07/06/2018 07:32 AM
10391	Feature	In Progress	Low	Running on one processor		07/04/2018 09:53 AM
338	Feature	New	Low	Modifying and extending input data for refractive indices	Twan van Noije	07/03/2018 12:53 PM
440	Feature	New	Low	Assumption in calculation of friction velocity over land		07/03/2018 12:51 PM
10281	Task	New	Low	Dry deposition of gas-phase H2SO4 and DMS		07/03/2018 12:51 PM
595	Bug	In Progress	Normal	Generation of qsub job file seems broken		07/03/2018 12:39 PM
351	Bug	New	Low	NH3 budget terms		07/03/2018 12:36 PM
367	Feature	New	Low	Heterogeneous reaction rates for bulk aerosol version	Jason Williams	07/03/2018 12:36 PM
439	Task	New	Low	Treatment of ice clouds in photolysis		07/03/2018 12:35 PM
373	Bug	New	Normal	Diurnal cycle biomass burning emissions		07/03/2018 12:34 PM
521	Bug	New	Low	Inconsistent NOx emissions		07/03/2018 12:30 PM
10251	Feature	New	Normal	High resolution ERA5		07/02/2018 10:29 AM
10211	Task	New	Normal	Aerosol optics	Tommi Bergman	07/02/2018 09:38 AM
681	Feature	New	Low	Mineral dust absorption		07/02/2018 08:50 AM
574	Support	In Progress	Normal	Optimization of ebischeme can be problematic	Philippe Le Sager	12/20/2017 12:29 PM
2161	Bug	New	Normal	Python datetime.strptime function does not support dates before 1900		08/21/2017 12:35 PM
549	Bug	In Progress	High	Restarbilty broken	Philippe Le Sager	03/17/2017 11:40 AM
627	Bug	New	Normal	difference between netcdf and hdf met files		07/04/2016 10:23 AM
320	Bug	In Progress	Low	Budget inconsistencies	Philippe Le Sager	01/28/2016 01:00 PM
336	Feature	In Progress	Normal	budget consistent with mmix	Philippe Le Sager	12/01/2015 10:05 AM
362	Bug	New	Normal	Dry deposition total for aggregated NOx	Jason Williams	06/24/2015 02:06 PM

(1-29/29) Per page: 25, 50

Also available in: Atom | CSV | PDF | XLSX

Issues

- View all issues
- Summary
- Calendar
- Gantt
- Import



- Hosted at KNMI
- KNMI in middle of **IT-migration**, but
 - Redmine part of contractual obligations w/ ESA
 - Scatterometry group has standardized with svn
- **here to stay, no rush for us to migrate**
 - *only when we feel ready*



Considerations for a conversion to DVC+issue tracking

- Which repositories?
 1. TM (inactive since 2009)
 2. TM5 (the tm5-zoom model)
 3. TM5-MP
 4. TM5-4DVAR (the 4Dvar based on TM5-MP)
 5. TM5-zoom-4DVAR (hg, sourceforge)



Considerations for a conversion to DVC+issue tracking

- Which repositories?
 1. ~~TM (inactive since 2009)~~ obsolete (del?)
 2. TM5-zoom does it make sense? who?
 3. + 4. TM5-MP (w/ 4Dvar) → easy, tested (git)
 - 4.
 5. ~~TM5-zoom-4DVAR~~ already done



Considerations for a migration...

Issue tracking + wiki + forums

- As important as VC
- Wealth of information on the Redmine portal
 - 52 TM5-zoom issues
 - 68 TM5-MP issues (incl. some benchmarks)
 - links to commits
 - 13 TM5-zoom benchmarks documented
 - TM5-MP wiki



Considerations for a migration...

Issue tracking + wiki + forums

- attempt to convert to a gitlab project **failed**
- major problem to keep
 - tracking open issues
 - records of closed ones



Considerations for a conversion to DVC+issue tracking

Workflow

- 100s of workflows possible with DVC
- Have to choose one (simple for our needs)
- Have to define responsibilities
- See <https://www.endpoint.com/blog/2014/05/02/git-workflows-that-work> and references therein
 - <https://git-scm.com/book/en/v2/Distributed-Git-Distributed-Workflows#ch05-distributed-git>



Conclusion svn/redmine

- ♦ Select & convert repository (MP: easy, zoom: ??)
- ♦ Find a solution to migrate Redmine portal content
- ♦ Choose a workflow, set responsibilities

all three at the same time....