



NWP Test Suite

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Hindcast mode

Configuration

- IC/BCs fields from ECMWF HRES analysis and forecast (at 3, 9, 15, 21UTC with 3 hours forecast-range)
- Soil: IC from ICON-EU, then free soil (both at 7km and 2.8km)
- July and December 2017
- integration domain covering the full Mediterranean area and Central Europe
- fc +24h @ 7km starting at 00UTC
- fc +24h @ 2.8km starting at 00UTC
- output in grib1
- xcdp/sms suite

Hindcast mode vs Forecast mode

<i>COSMO_v5.05</i>	<i><u>Hindcast</u></i>		<i><u>Forecast</u></i>		Improvem ent
HRES → 7p0 (EC_total_tasks=72, EC_nodes=1)	~ 17 BU	~1.5min	~ 40 BU	~6min	-58% BU
7p0_SP (EC_total_tasks=720, EC_nodes=20)	~ 712 BU	~ 4 min	~ 1650 BU	~9 min	-57% BU
7p0_DP (EC_total_tasks=720, EC_nodes=20)	~ 890 BU	~ 5 min	~ 2500 BU	~ 13 min	-64% BU
7p0_DP → 2p8_DP (EC_total_tasks=72, EC_nodes=2)	~ 115 BU	~ 6 min	~ 278 BU	~ 14 min	-59% BU
2p8_DP (EC_total_tasks=972, EC_nodes=27)	~ 13.535 BU	~ 53 min	~ 27.250 BU	~ 105 min	-50% BU

Cost and time consumed for a 24h run on ECMWF HPC

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7p0: forecast range 72h → 24h
2p8: forecast range 48h → 24h

Performed test

Simulation of comparison test COSMO v5.05 vs v5.06 in hindcast mode is complete

- @ 7km in SP and DP
- @ 2.8km in DP only (nested in @7km DP)

	<u><i>COSMO-5.05_1</i></u>		<u><i>COSMO-5.06</i></u>	
HRES → 7p0 (EC_total_tasks=72, EC_nodes=1)	~ 17 BU	~1.5min	~ 17 BU	~1.5min
7p0_SP (EC_total_tasks=720, EC_nodes=20)	~ 712 BU	~ 4 min	~ 761 BU	~ 4 min
7p0_DP (EC_total_tasks=720, EC_nodes=20)	~ 890 BU	~ 5 min	~ 800BU	~ 5 min
7p0_DP → 2p8_DP (EC_total_tasks=72, EC_nodes=2)	~ 115 BU	~ 6 min	~ 121BU	~ 6 min
2p8_DP (EC_total_tasks=972, EC_nodes=27)	~ 13.535 BU	~ 53 min	~ 12.708 BU	~ 50 min

Cost and time consumed for a 24h run on ECMWF HPC

Performed test

Simulation of comparison test COSMO v5.05 vs v5.06 in hindcast mode is complete

- @ 7km in SP and DP
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2p8_DP (EC_total_tasks=972, EC_nodes=27)	~ 13.535 BU	~ 53 min	~ 12.708 BU	~ 50 min

DP consumes ~5% more than SP

DP consumes ~25% more than SP

Cost and time consumed for a 24h run on ECMWF HPC

Performed test

Simulation of comparison test COSMO v5.05 vs v5.06 in hindcast mode is complete

- @ 7km in SP and DP
- @ 2.8km in DP only (nested in @7km DP)

	<u><i>COSMO-5.05_1</i></u>		<u><i>COSMO-5.06</i></u>	
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7p0_DP (EC_total_tasks=720, EC_nodes=20)	~ 890 BU	~ 5 min	~ 800BU	~ 5 min
7p0_DP → 2p8_DP (EC_total_tasks=72, EC_nodes=2)	~ 11	V5.06 consumes ~ 6-10% less than v5.05		6 min
2p8_DP (EC_total_tasks=972, EC_nodes=27)	~ 13.535 BU	~ 53 min	~ 12.708 BU	~ 50 min

Cost and time consumed for a 24h run on ECMWF HPC

Issues

Grib keys	COSMO output	After regrib
centre	78	80
subcentre	255	98
GeneratingProcessIdentifier	131	123
P1	0	hour
TimeRangeIndicator	13	1
setLocalDefinition		1
localDefinitionNumber		1
marsClass		co
marsType		fc
MarsStream		oper
experimentVersionNumber		0001
perturbationNumber		0
NumberOfForecastInEnsemble		0

Modification introduced due to an error with TimeRangeIndicator=13

timeRangeIndicator = 13
[local use: Fields from analyses valid at reference time for P1 = 0]

timeRangeIndicator = 1
[Initialized analysis product for reference time (P1=0)]

Next steps

COSMO TEST SUITE

Simulation of the comparison test COSMO v5.06 vs v6.0 foreseen in Autumn 2019 using the same test suite @7p0 in SP, DP and @2p8 in DP

ICON-LAM TEST SUITE

Simulation of the comparison test COSMO v6.0 vs ICON-LAM foreseen in Autumn 2019 using new ICON-LAM test suite @7p0 in SP, DP and @2p8 in DP

From 2020, only ICON-LAM test suite and only @2.8km in DP, SP

Towards ICON-LAM test suite

Preparation steps

1) Grid definition: it will be published as official COSMO ICON-LAM Testsuite grid files



	ICON-LAM-CTS7	ICON-LAM-CTS2
H.RESOLUTION	R3B7 (6.576km)	R4B8(2.466km)
CENTER	13.65625W, 48.58875N	13.4125W, 48.6625N
ROTATION	0	0
HALF WIDTH	20.65625	19.8375
HALF HEIGHT	14.71875	14.3375
lwrite_parent	ON	ON
CENTRE, SUBCENTRE	250, 0	250, 0
NUMBER GRID USED	1001	1002

Towards ICON-LAM test suite

Preparation steps

- 1) Grid definition: it will be published as official COSMO ICON-LAM Testsuite grid files
- 2) Physiographic fields: same as COSMO ones
- 3) IC/BC from IFS: IFS data downloaded directly in an ICON compliant format (through mars2icon_smi) with a 3 hour frequency
 - In a first test at DWD, Daniel managed to remap the 3hourly data. However, in running ICON the update frequency of the lateral boundary is set to 6h. This is because the 3UTC, 9UTC, ... data do not contain GEOP_ML or GEOP_SFC.
 - sstice_mode=1, as the extpar file does not contain a sst climatology
 - Test at ECMWF to be done

Towards ICON-LAM test suite

Preparation steps

4) Integration ICON soil in IC:

- As in COSMO TS: before running COSMO, the ICON soil interpolated by INT2LM substitute the one interpolated from IFS
- ICON has an `init_mode` for IFS+GME soil which should read two files, one from IFS for the atmosphere and one from GME for soil

5) Access to updated ICON source through GIT: done

6) Duplicate COSMO TS for ICON, migrate it in ECFLOW, migrate from `grib_api` to `eccodes`: to be done

Thank you for your attention!