WP4-NA3

Debriefing slide WP4-NA3 HPC

Mario Acosta, Jean-Christophe Rioual

2nd General Assembly
4-6 October 2021
Virtual

Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

- Task 1: Development of a new Quality assurance approach for the NEMO consortium

- The work has been delayed due to staff illness and upstream dependencies with IMMERSE
- The work is currently being rescoped

- Task 2: Building a new community around a European Platform for Sea Ice modelling in NEMO

- NEMO SI3 development strategy paper (July-21)
- Partner sites tests and adoption (example: Met Office next climate model)

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Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

- Task 3: Complex Coupled Systems HPC performance evaluation

- For coupling cost evaluation improvement, a new LUCIA tool (integrated into OASIS) has been developed.
- Interaction with BSC to test the new LUCIA developed by CERFACS and the integration of BSC improvements.
- Developing postprocessing scripts for the coupling cost and load balance metrics production.
- Coordination and analysis of CPMIP metrics collected. Working on the paper publication.
- Preliminary tests with the RAPL counters to extract the energy metrics and definition of the architecture to integrate the energy consumption metrics measurement into existing open source tools

- Task 4: Machine Learning and Technology Tracking

- IS-ENES3/ESiWACE2 Virtual Workshop on New Opportunities in ML/AI for Weather and Climate Modelling celebrated in March 2021
- Exploring Deep learning based solutions for downscaling
  - Test of Keras framework with TensorFlow
- Exploring GPU based environments
  - Exploitation of TensorFlow mirrored strategies
  - Test and evaluation of a single node Volta V100 GPU for training Deep Neural Networks

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Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

- Task 5: Community Workshops

- Submission of a summary of the 5th Workshop on Coupling Technologies for Earth System Models to BAMS
- First contact with other partners and HPC-TF to organize the next HPC ENES workshop. The conference hosted in Barcelona will combine a physical and virtual meeting.

- Task 6: Innovating with software and HPC industry

- Ongoing coordination of a status report on innovation activities (UNIMAN and STFC) – Due September 22
- Graham Riley retirement, task now with STFC

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Work progress - Main achievements

Deliverables and Milestones (Delayed ones, and the next ones to complete before RP2)

CPMIP performance metrics and community advice (December 2021)

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Next steps with focus on key issues to be addressed

Next steps and issues to be addressed by the end of RP2 (December 2021)

- Rescope NEMO QA activity Task 1

Next steps and issues to be addressed during RP3 (January 2022 - December 2022)

- NEMO QA deliverable (September-22)
- Report on Innovation (September-22) – need to clarify partners involvment

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WP6-VA1

Debriefing slide WP6-VA1

U. Fladrich (SMHI) - E. Maisonnave (CERFACS)

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Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

Task 1: **Level 1 services: Maintaining and monitoring the ENES ESM resources**

- Continuous check&update of ESM/Tool pages at ENES Portal
  (e.g. contact info, ES-DOC links, done every 6 month)
- New page for ESMValTool with main description, contact info, etc.
- Rework of navigation structure
- Coordination with WP6 partners in response to external review (D6.2):
  necessary improvements on L1 service request responses

Task 2: **Level 2 services for European ESMs**

- Continuous provision of L2 services for HadGEM/UKESM, EC-Earth, NorESM, NEMO
- For example,
  - 8 new model versions produced by ~300 contributors
  - hundreds of user issues processed and messages exchanged

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Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

Task 3: **Services for European infrastructure tools**

- XIOS: in collaboration with CNRM (Gaëlle Rigoudy), organisation of 2 training sessions related to XIOS+dr2xml (March & April, 2 weeks each, half days). A Slack is created for user support on dr2xml
- OASIS: dedicated support postponed (deviation)
- Usual services for user support (releases, hotline, forums …) : Cylc workflow engine, NEMO ocean model, XIOS I/O server, OASIS coupler, CDO and ESMValTool post-processing tools

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Work progress - Main achievements

Deliverables and Milestones (Delayed ones, and the next ones to complete before RP2)

D6.2 (T1-3, M24):

First external review of model services ✓

D6.3 (T2&3, M36):

Second periodical report on service statistics for models and tools 🔨

D6.4 (T3, M36):

Report on new OASIS coupled models/interfaces ⏳

delayed to M48, due to the current travel difficulties (corrective action on going)

M6.3 (T1, M36):

ENES ESM resources updated, RP2 🔨

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Next steps with focus on key issues to be addressed

Next steps and issues to be addressed by the end of RP2 (December 2021)

- KPIs collected for model and tools services Q3+4/2021
- Next OASIS coupler release
- End of 2nd round of the OASIS dedicated support, preparation of the last call

Next steps and issues to be addressed during RP3 (January 2022 - December 2022)

- Second external report on model and tools services (D6.5, M40)
- Last round of OASIS dedicated support + summary report (D6.4, M48)
- Last report on service statistics for services on models and tools (D6.6, M48)

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WP8-JRA1

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S. Valcke, I. Epicoco

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Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

- Task 1: Improving Nemo computational performance

- Integration of MPI3 neighbourhood collective as new communication library (NEMO 4.2) (CMCC)
- Halo size optimisation depending on kernels to reduce the communication frequency (NEMO 4.2) (CMCC)
- -Development of tools and workflows to automatically optimize numerical precision of any Earth System code (BSC)
- Mixed precision version of NEMO low resolution produced as an example (BSC)
- Investigation of computational performance of the MetOffice GO8 configuration, based on NEMO 4 (MetOffice)

- Task 2: Developing the unified European platform for sea ice modelling

- Upgrades to the SI3 code (melt-ponds, rheology, radiation scheme, ice strength) and environment (CNRS-IPSL, MetOffice)
- Technical SI3 code testing and validation in NEMO 4.0.3-4.0.7 and NEMO 4.2 beta (CNRS-IPSL, MetOffice)
- Implementation of SI3 in all CMCC global ocean-sea ice configurations (CMCC) and MetOffice coupled model configuration (MetOffice)
- Work on SI3 documentation (CNRS-IPSL, MetOffice, CMCC)

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Work progress - Main achievements

Significant results and activities in RP2 (including deviations from Description of Activities) – From July 2020 to Sept. 2021

- Task 3: OASIS-MCT development

- Definition, implementation and run of regridding benchmark (quality and performance) for SCRIP, ESMF, YAC and XIOS (CERFACS)
- Finalization, testing and validation of Python & C & C++ interface (UKRI, CERFACS)
- Implementation and validation of conservative remapping for runoffs (CERFACS)

- Task 4: XIOS development

- Development of new XIOS core infrastructure, which enables service and coupling functionality, reducing memory footprint and increasing scalability for high resolution
- Achievement of a first 2-way coupling test case
- Presentation of XIOS road map to the XIOS Advisory Board in a teleconference on 15/10/2020

- Task 5: Cylc/Rose development

- Release of 1st Cylc 8 beta in April 2021; release candidate for Cylc 8.0 now imminent
- Migration of Rose workflow installation functionality into Cylc
- Conversion of Cylc UI server into a Jupyter Server extension (easier maintenance, standalone use)

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Work progress - Main achievements

Deliverables and Milestones (Delayed ones, and the next ones to complete before RP2)

Deliverables/Milestones submitted :
M8.3: Final list of developments for OASIS3-MCT_5.0 (Dec 2020)
M8.4: Definition of NEMO optimization strategy, January 2021, Mo25
D8.1: NEMO sea ice model code, Sept 2021, Mo 33, initially planned for Dec 2020
Deliverables/Milestones planned to be submitted from Sept. 2021-Dec. 2021 :
M8.5: Documentation of the NEMO sea ice model, Dec 21, Mo 36, initially planned for June 2021
D8.2: OASIS3-MCT_5.0 release, Dec 2021, Mo 36

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Next steps with focus on key issues to be addressed

Next steps and issues to be addressed by the end of RP2 (December 2021)

- Continue work on NEMO, SI3, OASIS3-MCT, XIOS and Cylc as planned to finalize the deliverables
- Find beta tester for OASIS3-MCT python, C & C++ new interface
- Wider community consultation for dr2xml extension

Next steps and issues to be addressed during RP3 (January 2022 - December 2022)

Final approval of NEMO 4.2

Deliverables/Milestones planned to be submitted from Jan. 2022-Dec. 2022 (RP3):
D8.3: XIOS new release, April 2022, Mo 40
D8.4: Cylc/Rose development summary, April 2022, Mo 40
D8.5: Update of the NEMO code, August 2022, Mo 44

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