

NorESM user workshop 2024

19 - 20 Nov. 2024

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Steve Goldhaber, Mariana Vertenstein, Matvey Debolskiy



Forskningssrådet

This work was supported by the Norwegian Research Council INES (grant no. 270061)



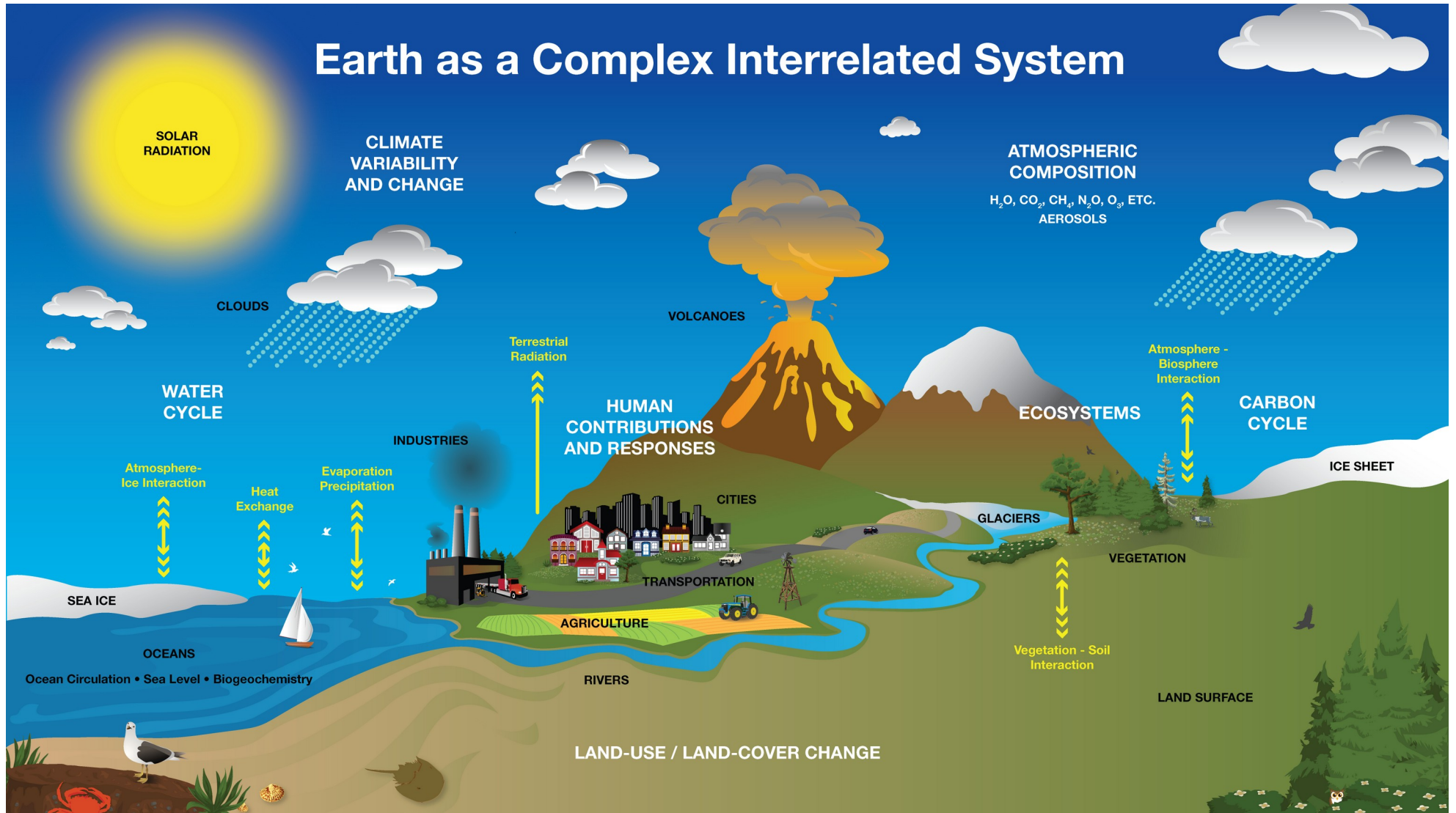
Goals for the workshop

- Understand the basic structure of the NorESM model
- Create, configure and run the NorESM model
- Understand and examine model output

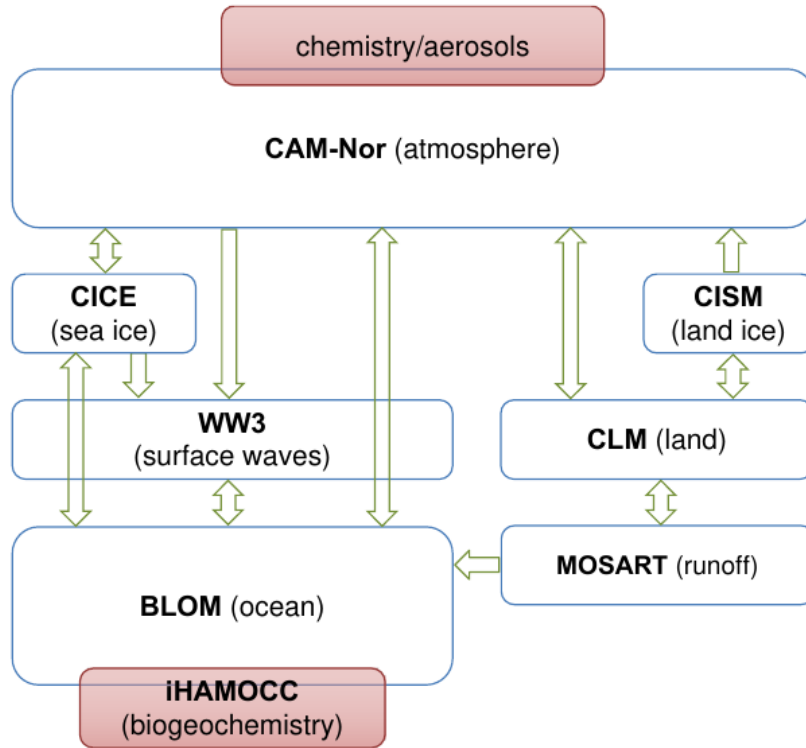
Agenda – Day 1

- What is NorESM?
- Accessing the NorESM source code
- Model structure
- Basic run procedure

Earth as a Complex Interrelated System

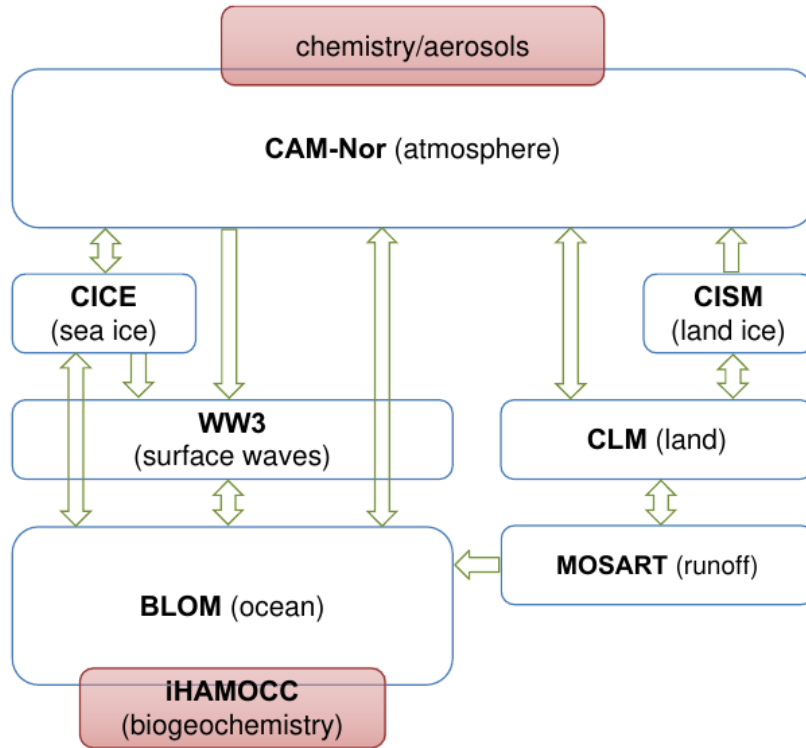


NorESM model structure



Based on CESM
(Community Earth
System Model) of
NCAR, Boulder, USA.

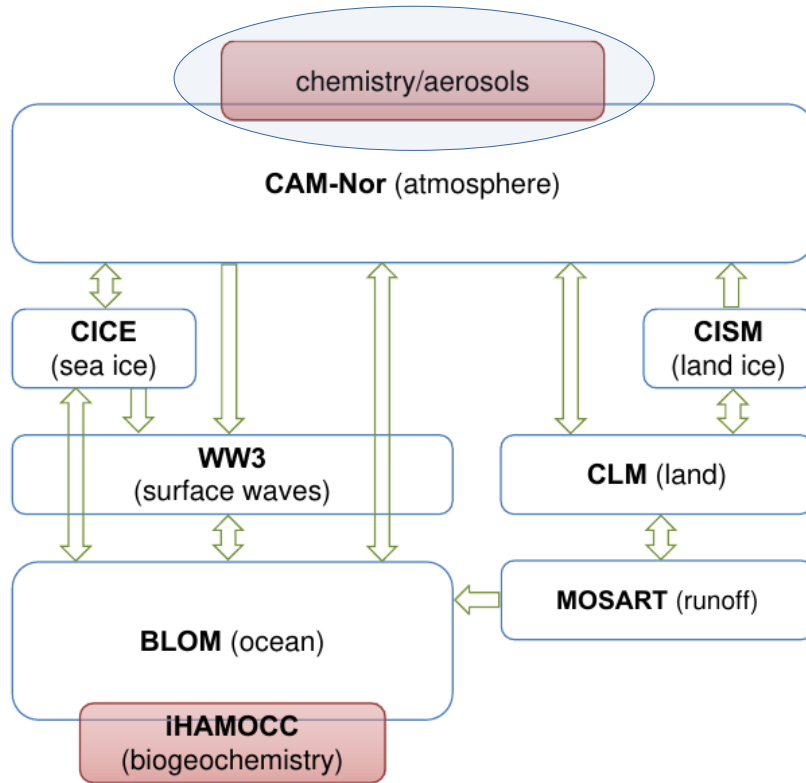
NorESM model structure



Developed and maintained by
the NorESM consortium



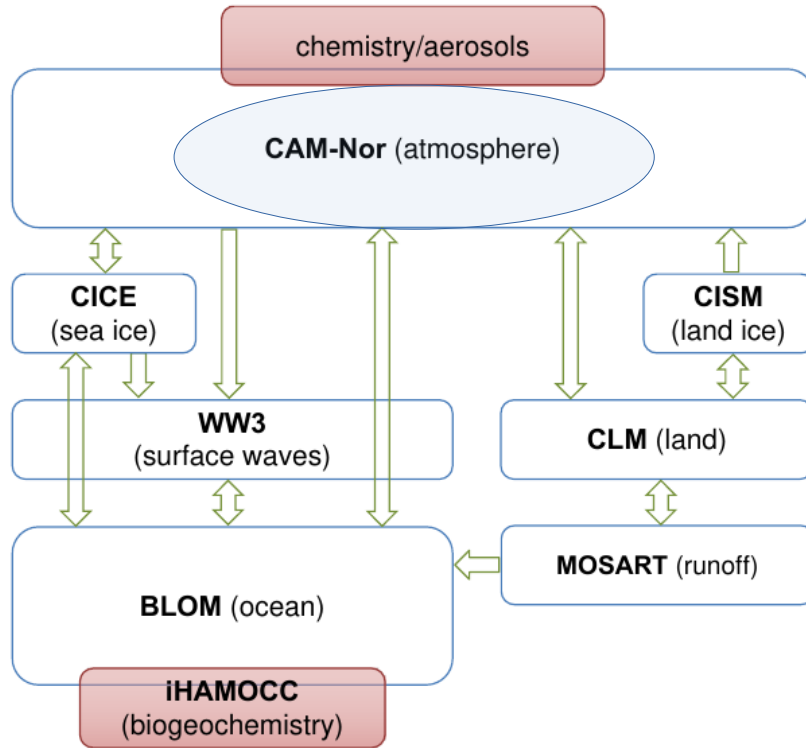
NorESM model structure



Specific NorESM additions to CESM:

- Atmospheric chemistry/aerosol/cloud module

NorESM model structure

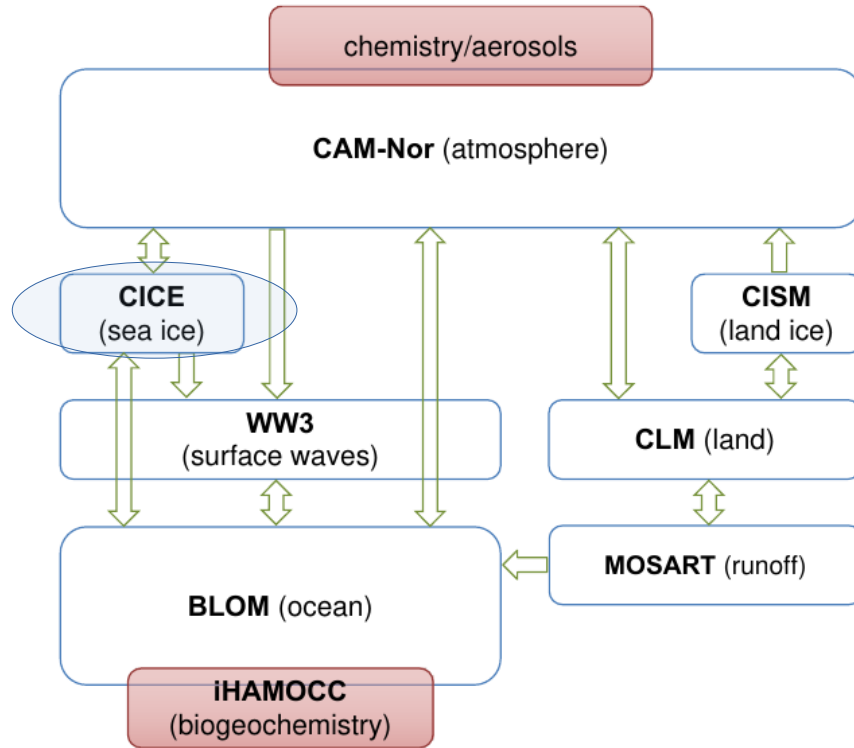


Specific NorESM additions to CESM:

- Atmospheric chemistry/aerosol/cloud module
- Atmospheric dynamics/physics: Improved conservation of energy and angular momentum



NorESM model structure



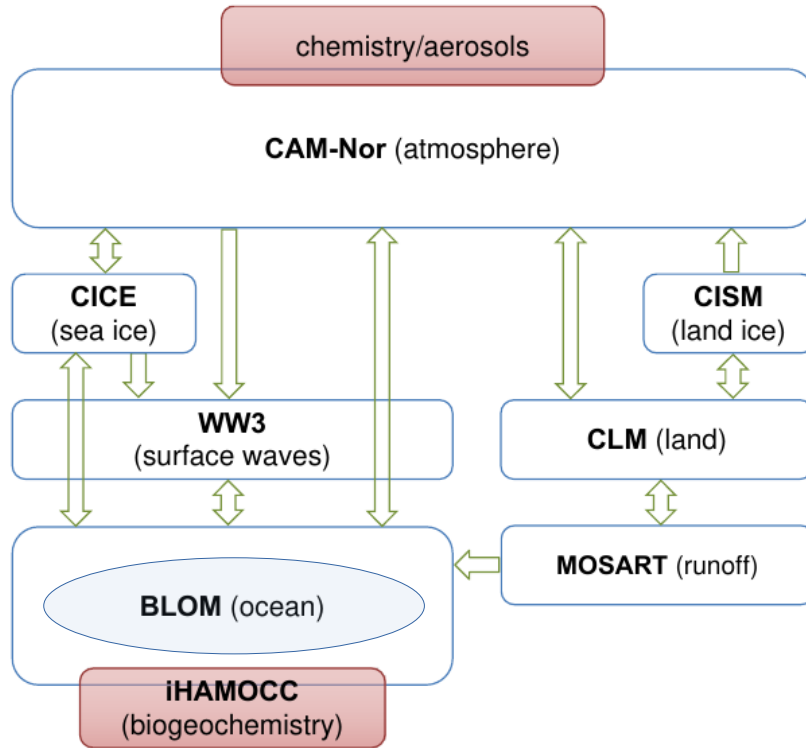
Specific NorESM additions to CESM:

- Atmospheric chemistry/aerosol/cloud module
- Atmospheric dynamics/physics: Improved conservation of energy and angular momentum
- Wind drift of snow



Norwegian
Meteorological
Institute

NorESM model structure

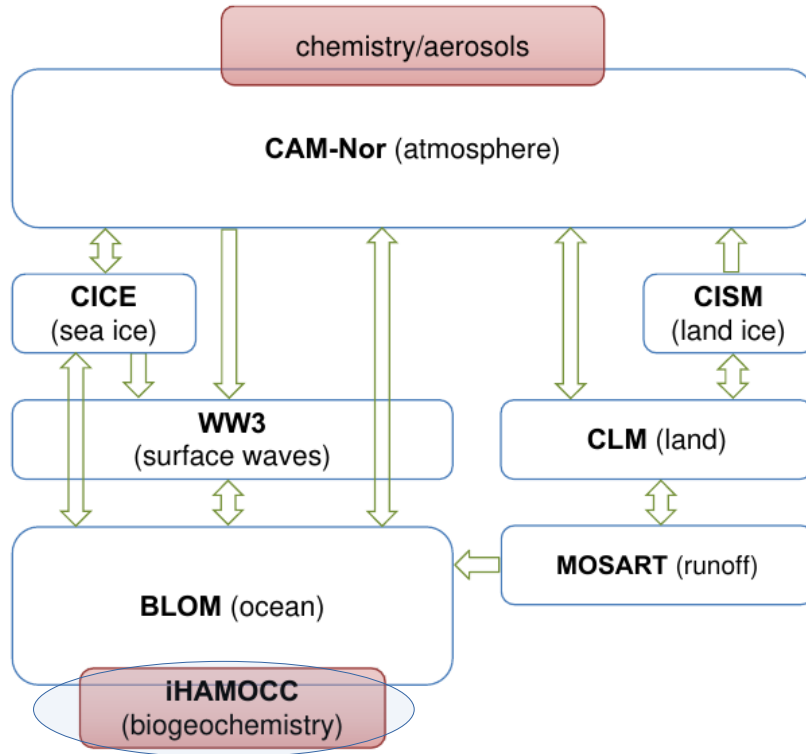


Specific NorESM additions to CESM:

- Atmospheric chemistry/aerosol/cloud module
- Atmospheric dynamics/physics: Improved conservation of energy and angular momentum
- Wind drift of snow
- Ocean component with isopycnic vertical coordinate



NorESM model structure



Specific NorESM additions to CESM:

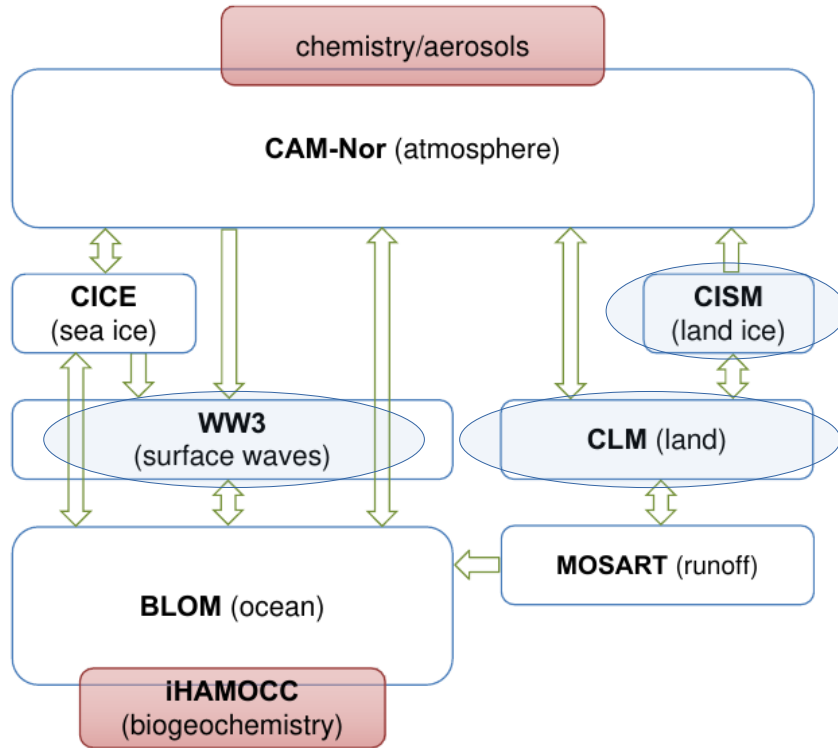
- Atmospheric chemistry/aerosol/cloud module
- Atmospheric dynamics/physics: Improved conservation of energy and angular momentum
- Wind drift of snow
- Ocean component with isopycnic vertical coordinate
- iHAMOCC – modified version of the Hamburg Model of Ocean Carbon Cycle (HAMOCC)



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NorESM model structure



Development towards NorESM3

CISM – land ice is available in experimental versions of NorESM2

CLM – include support for the Functionally Assembled Terrestrial Ecosystem Simulator (FATES)

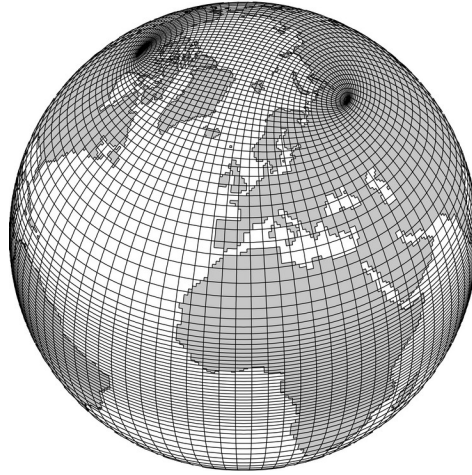
WW3 – ongoing work to include surface waves as a model component

Component discretization

CAM finite volume



BLOM/CICE tripolar

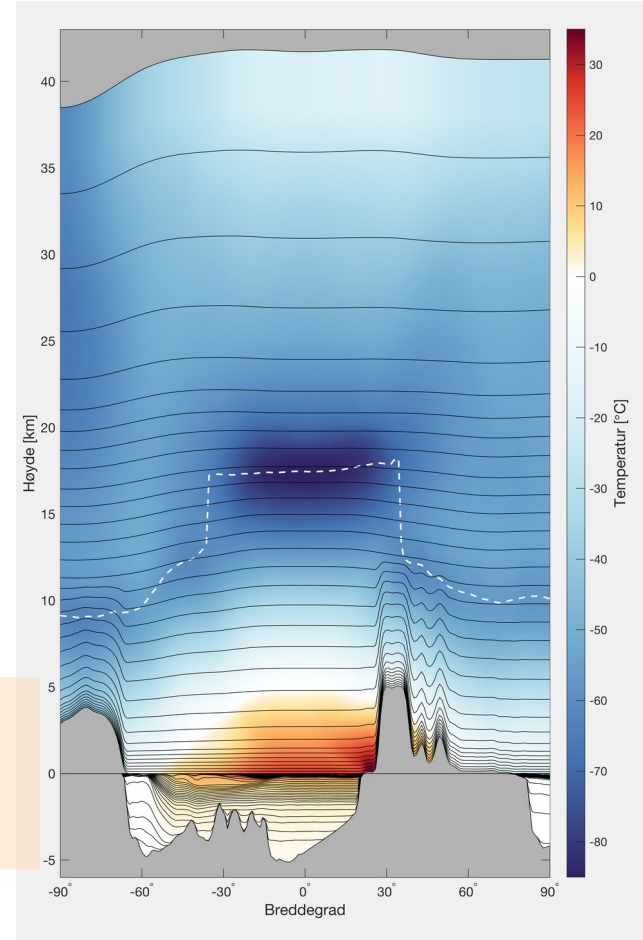


NorESM2 variants:

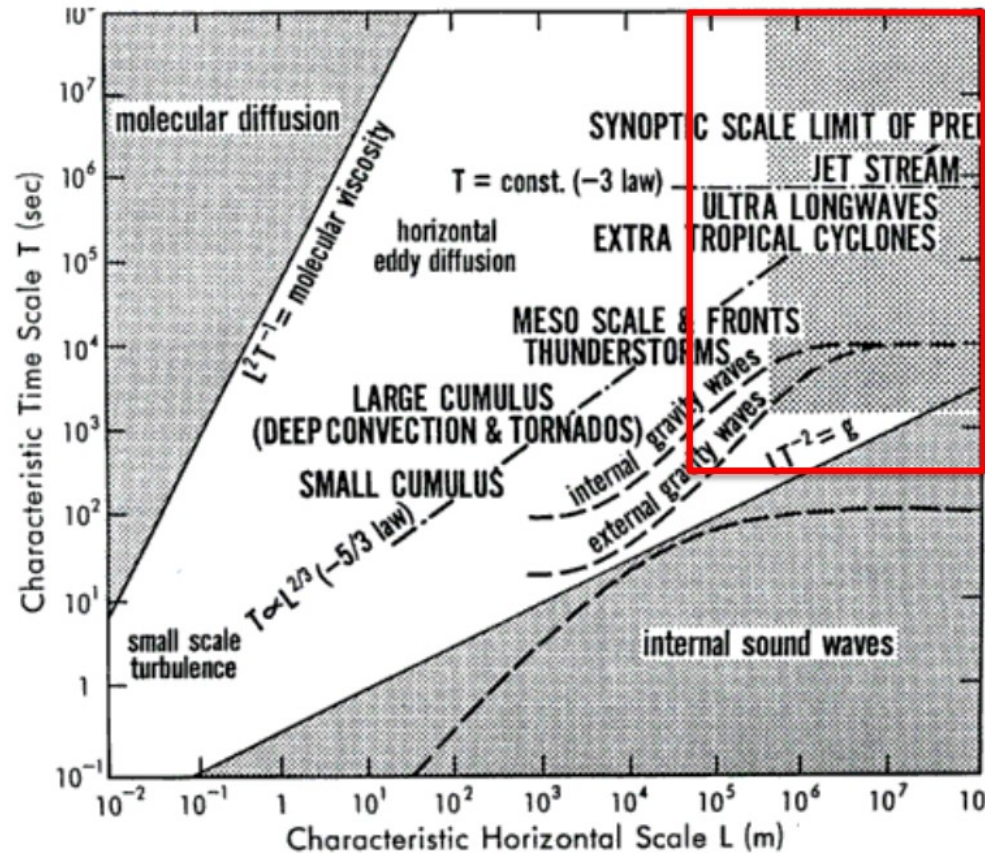
NorESM2-LM: $\sim 2^\circ$ atm; $\sim 1^\circ$ ocn
NorESM2-MM: $\sim 1^\circ$ atm; $\sim 1^\circ$ ocn

Atm: hybrid-pressure layers

Ocn: near-isopycnal layers

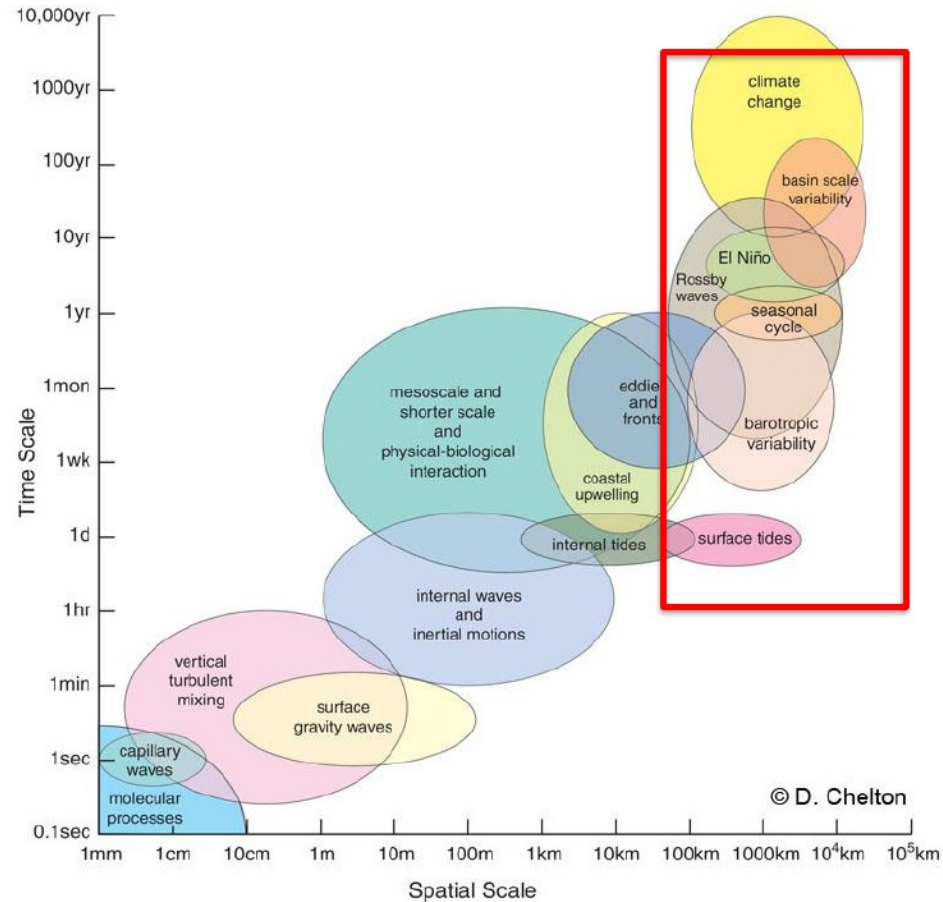


Atmosphere: Spatial & temporal scales



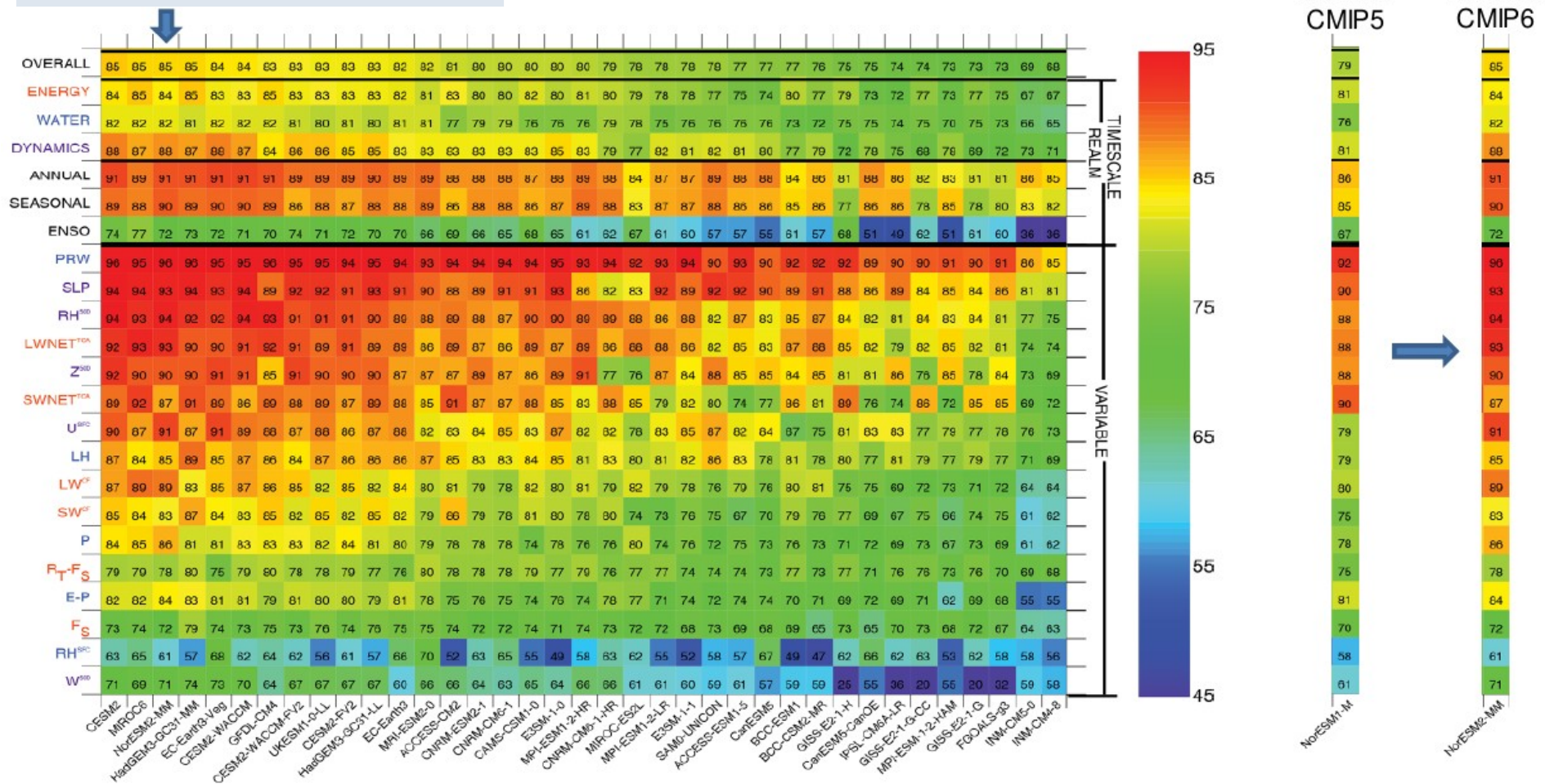
Courtesy: Smagorinsky (1974).

Ocean: Spatial & temporal scales



CESM2/NorESM2 capability

Courtesy: Fasullo (2020)

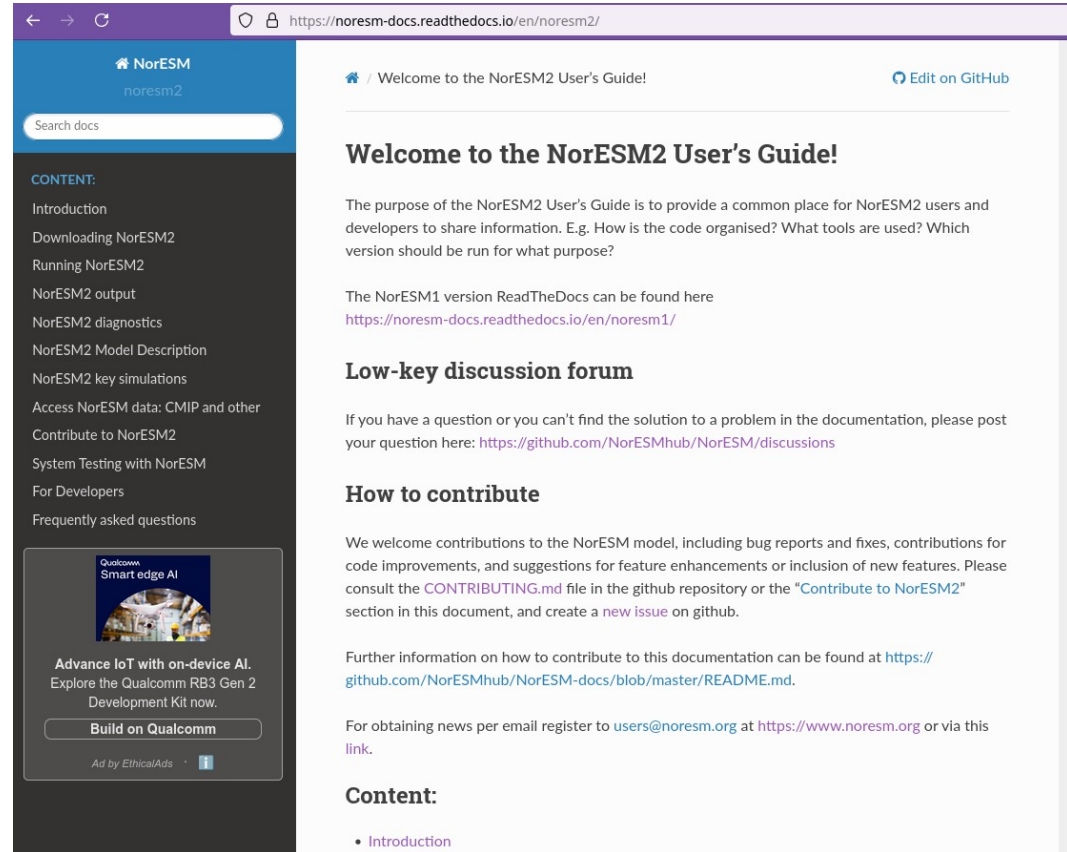


Where to learn about NorESM

- Seland et al. “Overview of the Norwegian Earth System Model (NorESM2) and key climate response of CMIP6 DECK, historical, and scenario simulations”, GMD, 13, 6165–6200, 2020
<https://doi.org/10.5194/gmd-13-6165-2020>
- Repository hub for NorESM code: <https://github.com/NorESMhub>
- NorESM documentation and user guide: <https://noresm-docs.readthedocs.io>
- NorESM homepage: <https://www.noresm.org>

NorESM documentation page

Documentation pages have been created for different major versions of NorESM



The screenshot shows the NorESM2 documentation page on ReadTheDocs. The browser address bar displays <https://noresm-docs.readthedocs.io/en/noresm2/>. The page has a blue header with the NorESM logo and a search bar. A dark sidebar on the left lists the table of contents: Introduction, Downloading NorESM2, Running NorESM2, NorESM2 output, NorESM2 diagnostics, NorESM2 Model Description, NorESM2 key simulations, Access NorESM data: CMIP and other, Contribute to NorESM2, System Testing with NorESM, For Developers, and Frequently asked questions. Below the sidebar is a Qualcomm advertisement for on-device AI. The main content area has a light blue header with a welcome message and a link to 'Edit on GitHub'. The main text includes a welcome message, the purpose of the guide, a link to the NorESM1 documentation, a section for a low-key discussion forum, and a section for how to contribute. The 'Content:' section lists 'Introduction' as the first item.

← → ↺ <https://noresm-docs.readthedocs.io/en/noresm2/>

NorESM
noresm2

Search docs

CONTENT:

- Introduction
- Downloading NorESM2
- Running NorESM2
- NorESM2 output
- NorESM2 diagnostics
- NorESM2 Model Description
- NorESM2 key simulations
- Access NorESM data: CMIP and other
- Contribute to NorESM2
- System Testing with NorESM
- For Developers
- Frequently asked questions

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Ad by EthicalAds

Welcome to the NorESM2 User's Guide! [Edit on GitHub](#)

Welcome to the NorESM2 User's Guide!

The purpose of the NorESM2 User's Guide is to provide a common place for NorESM2 users and developers to share information. E.g. How is the code organised? What tools are used? Which version should be run for what purpose?

The NorESM1 version ReadTheDocs can be found here
<https://noresm-docs.readthedocs.io/en/noresm1/>

Low-key discussion forum

If you have a question or you can't find the solution to a problem in the documentation, please post your question here: <https://github.com/NorESMhub/NorESM/discussions>

How to contribute

We welcome contributions to the NorESM model, including bug reports and fixes, contributions for code improvements, and suggestions for feature enhancements or inclusion of new features. Please consult the [CONTRIBUTING.md](#) file in the github repository or the "Contribute to NorESM2" section in this document, and create a [new issue](#) on github.

Further information on how to contribute to this documentation can be found at <https://github.com/NorESMhub/NorESM-docs/blob/master/README.md>.

For obtaining news per email register to users@noresm.org at <https://www.noresm.org> or via this [link](#).

Content:

- Introduction

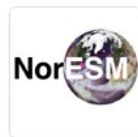
NorESM2 documentation: <https://noresm-docs.readthedocs.io/en/noresm2/>

Accessing the NorESM source code

NorESMhub

<https://github.com/NorESMhub>

- NorESM source code
- Components source code
- Common tools
- Documentation



Norwegian Earth System Modeling hub

Repository hub for NorESM code, documentation and tools

25 followers

<https://NorESM-docs.readthedocs.i...>

Unfollow

Pinned



NorESM Public

Norwegian Earth System Model and Documentation

Python 35 73



BLOM Public

Bergen Layered Ocean Model

Fortran 17 25



CAM Public

Forked from [ESCOMP/CAM](#)

Community Atmosphere Model including CAM6-Nor branches

1 22



NorESM-docs Public

Documentation of the NorESM model system and components

Python 4 9



CTSM Public

Forked from [ESCOMP/CTSM](#)

Community Terrestrial Systems Model (includes the Community Land Model of CESM)

Fortran 3 9



WW3 Public

Forked from [NOAA-EMC/WW3](#)

WAVEWATCH III

Fortran 1

Repositories

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Type

Language

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You are viewing the README and pinned repositories as a public user.

You can [create a README file](#) visible to anyone.

People



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Top languages

Fortran Python HTML Shell
NCL

Most used topics

Manage

[noresm](#) [climate](#) [cesm](#) [api](#)

NorESMhub: NorESM

The screenshot shows the GitHub repository for NorESM. The 'Discussions' tab is highlighted with a red box. A red arrow points from the 'Code' tab to the 'About' section, which contains the link noresm-docs.readthedocs.io/en/latest/, also highlighted with a red box. Another red arrow points from the 'Releases' section to the 'List of code releases, i.e. NorESM versions' text box. The repository file list includes .github/ISSUE_TEMPLATE, cime_config, img, manage_externals, .gitignore, .readthedocs.yaml, CONTRIBUTING.md, Copyright-CESM.txt, Externals.cfg, Externals_continuous_development.cfg, LICENSE-CESM.txt, LICENSE.txt, and README.md.

NorESMhub / NorESM

Type to search

Code Issues 23 Pull requests 5 Discussions Actions Projects Wiki Security Insights Settings

NorESM Public Edit Pins Unwatch 24 Fork 73 Starred 35

master 17 Branches 36 Tags Go to file Add file Code About

TomasTorsvik Remove the docs submodule (#516) 9694189 · 7 months ago 1,355 Commits

File	Commit Message	Time
.github/ISSUE_TEMPLATE	Remove fixed assignees	last year
cime_config	From noresm2: Update config_compsets.xml file (#424)	last year
img	Update README.md file in master with correct links. (#457)	last year
manage_externals	Avoid error on python > 3.8	3 years ago
.gitignore	Ignore "doc/_build" folder.	4 years ago
.readthedocs.yaml	Replace "doc" directory with "docs" directory for submod...	last year
CONTRIBUTING.md	Update CONTRIBUTING.md	2 years ago
Copyright-CESM.txt	Updated NorESM specific copyright and license in LICEN...	4 years ago
Externals.cfg	From noresm2: Update Externals*.cfg files (#425)	last year
Externals_continuous_development.cfg	From noresm2: Update Externals*.cfg files (#425)	last year
LICENSE-CESM.txt	Updated NorESM specific copyright and license in LICEN...	4 years ago
LICENSE.txt	Updated NorESM specific copyright and license in LICEN...	4 years ago
README.md	Update README.md on master branch (#510)	8 months ago

Readme Unknown, Unknown licenses found Activity Custom properties 35 stars 24 watching 73 forks Report repository

Releases 16

release-noresm2.1.3 Latest on Oct 8 + 15 releases

Packages No packages published Publish your first package

Link to download source code

Link to NorESM documentation

List of code releases, i.e. NorESM versions

The code download link

The screenshot shows the GitHub interface for the repository **NorESMhub / NorESM**. The repository is public and has 17 branches and 36 tags. The **Code** button is highlighted, and a dropdown menu is open showing the **Clone** option. The **HTTPS** clone URL is `https://github.com/NorESMhub/NorESM.git`, which is highlighted in a red box. A red arrow points from this URL to a text box on the right. The repository description is "Norwegian Earth System Model and Documentation". The repository has 35 stars, 24 watchers, and 73 forks. The latest release is **release-noresm2.1.3** (Latest) on Oct 8. The repository also has 16 releases and 15 packages.

Code Issues 23 Pull requests 4 Discussions Actions Projects Wiki Security Insights Settings

NorESM Public Edit Pins Unwatch 24 Fork 73 Starred 35

master 17 Branches 36 Tags Go to file Add file Code

Clone ?

HTTPS SSH GitHub CLI

`https://github.com/NorESMhub/NorESM.git`

Clone using the web URL.

Download ZIP

About

Norwegian Earth System Model and Documentation

noresm-docs.readthedocs.io/en/latest/

norwegian climate cesm noresm

Readme

Unknown, Unknown licenses found

Activity

Custom properties

35 stars

24 watching

73 forks

Report repository

Releases 16

release-noresm2.1.3 (Latest) on Oct 8

+ 15 releases

Packages

No packages published

[Publish your first package](#)

Link to
download
source code

The HTTPS clone option
can be used by anyone
to download the source
code.

NorESM code releases

The “releases” panel shows

- Code releases for different model version
- Purpose of code release
- Changelog highlights
- Current component tags

Current CMIP6-compatible release tag is:

release-noresm2.0.9

Oct 8

 TomasTorsvik

 release-noresm...

 867f735 

Compare 

release-noresm2.0.9

release-noresm2.0.9 is a minor management update to release-noresm2.0.8

There are no answer or experiment changes in this release.

The purpose of release-noresm2.0.9 is to enable running NorESM2.0 experiments on Betzy after machine upgrade in October 2024. Older tool chain modules are being removed, hence this version introduces new tool chain modules through CIME. Model output is bit identical to previous results. Other HPC systems should not be affected by changes introduced in this release.

What's Changed

- Update tag for cime to cime5.6.10_NorESM2_3_r5 by [@TomasTorsvik](#) in [#569](#)



Full Changelog: [release-noresm2.0.8...release-noresm2.0.9](#)


Component tags


component	tag
cam	cam_cesm2_1_rel_05-Nor_v1.0.5
cice	cice5_20181109-Nor_v1.0.3
cime	cime5.6.10_NorESM2_3_r5
cism	wrapper_noresm2.0.6_v0
clm	release-clm5.0.14-Nor_v1.0.4
mosart	release-cesm2.0.03-Nor_v1.0.0
blom*	v1.4.2


Component (**updated/not updated**) relative to release-noresm2.0.8


NorESM Discussions page


**Welcome to NorESM Discussions!**
 Announcements · MichaelSchulzMETNO


 Sort by: Latest activity ▾ Label ▾ Filter: Open ▾ New discussion


Categories 


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 1


 **Upcoming noresm2_5_alphaxx tags (for planning purposes)**
[mvertens](#) started last month in [General](#)


  0



 1


 **noresm2_5_alpha07 created**
[mvertens](#) announced 3 weeks ago in [Announcements](#)


  3



 1


 **release-noresm2.1.X**
[TomasTorsvik](#) announced on Sep 11 in [Announcements](#)


  0



 1


 **release-noresm2.0.X**
[TomasTorsvik](#) announced on Aug 21 in [Announcements](#)


  2



 1

 **Suggetion for structure and management of NorESM system testing baselines**
[TomasTorsvik](#) started on Sep 26 in [General](#)

  5

 2

 **Question on Ocean Vertical Velocity Data**
[oyvindseland](#) asked on Sep 11 in [Q&A](#) · [Unanswered](#)

  7

Most helpful

Be sure to mark someone's comment as an answer if it helps you resolve your question — they deserve the credit! ❤️

 Community guidelines