MPAS
Model for Prediction Across Scales

MPAS-Atmosphere Resources

MPAS-Atmosphere Users' Guide: On the MPAS-Atmosphere download page

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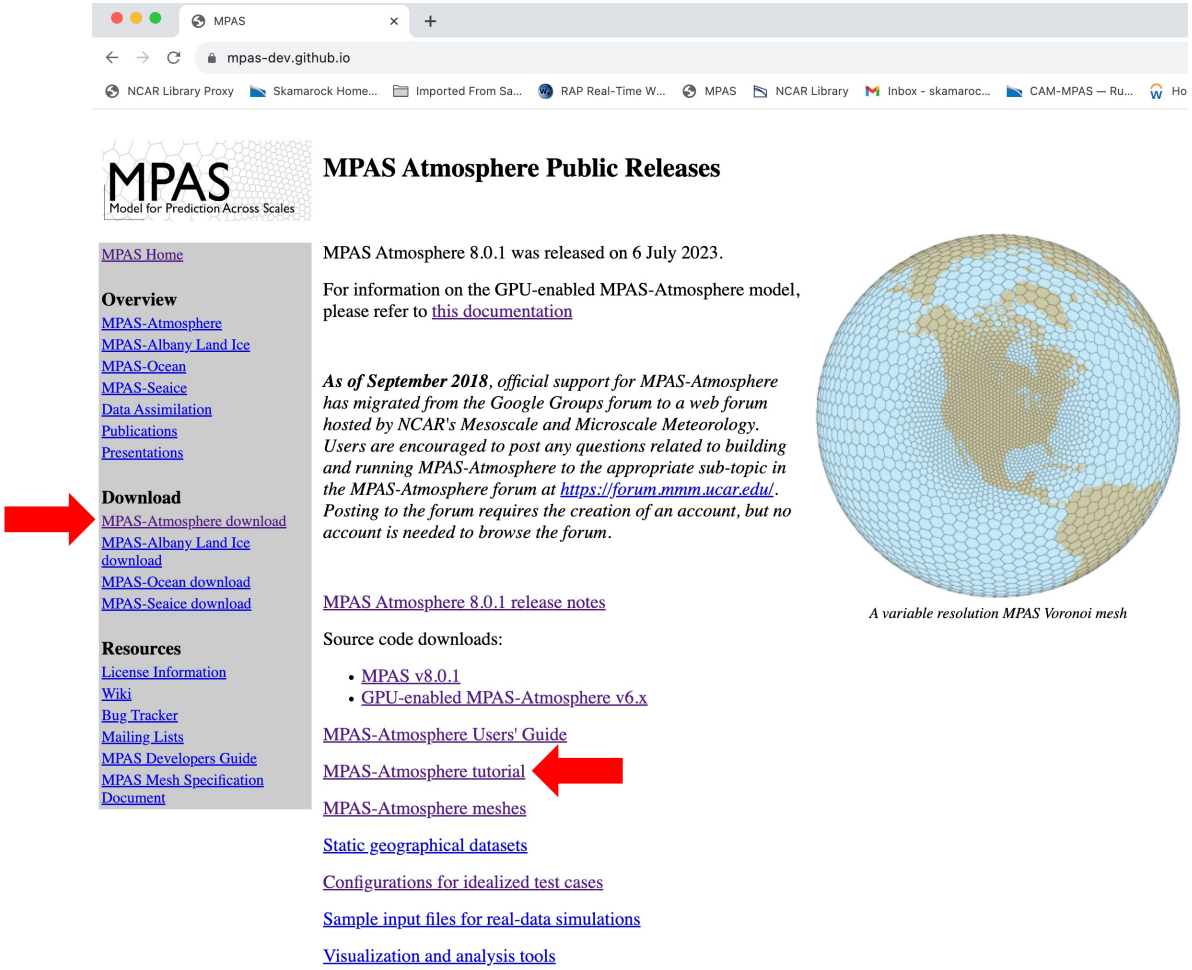
MPAS-Atmosphere Resources

MPAS-Atmosphere tutorial: On the MPAS-Atmosphere download page



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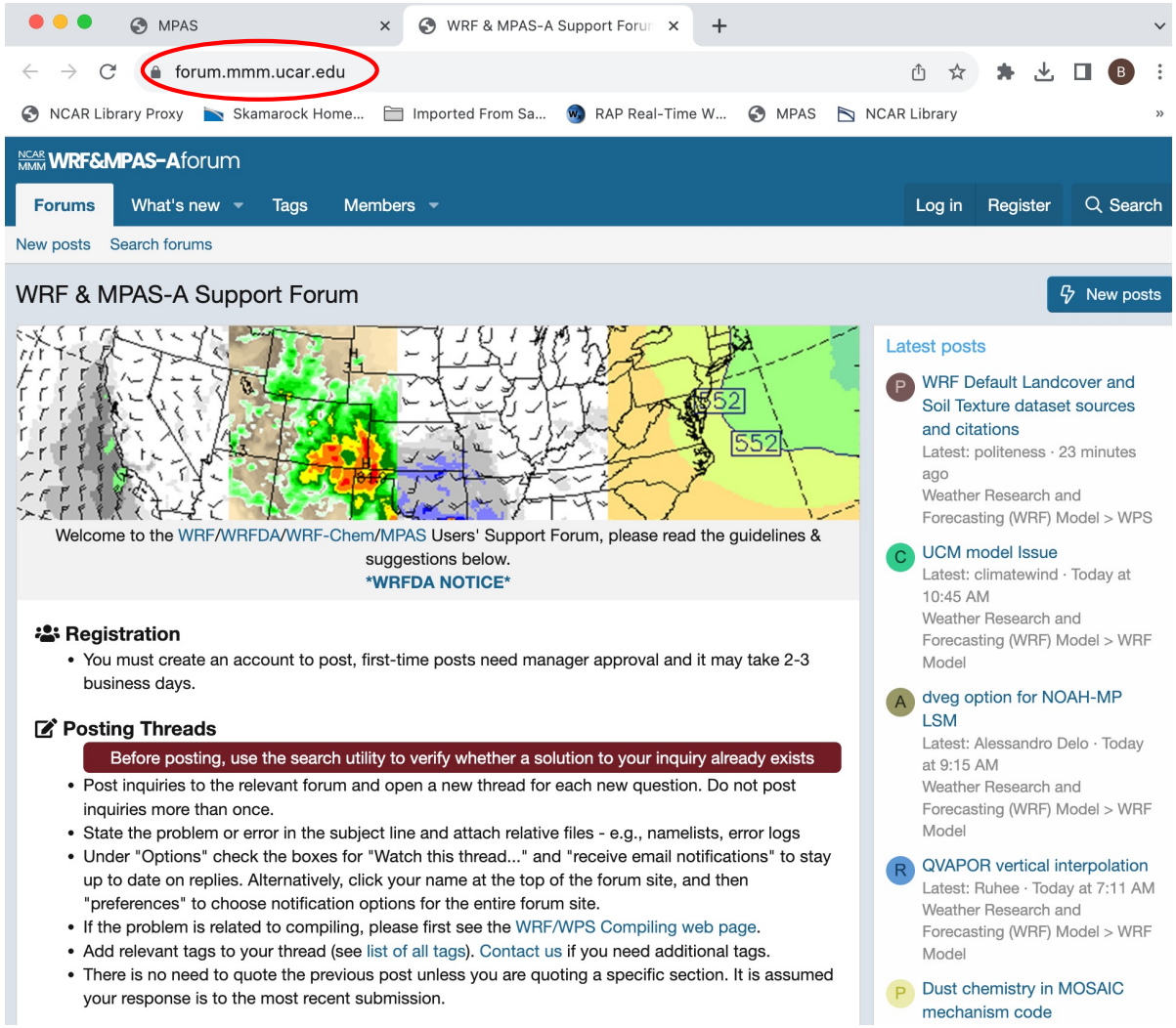
MPAS-Atmosphere Resources

WRF&MPAS-A Support Forum

You need to create an account to post to it.

Searchable



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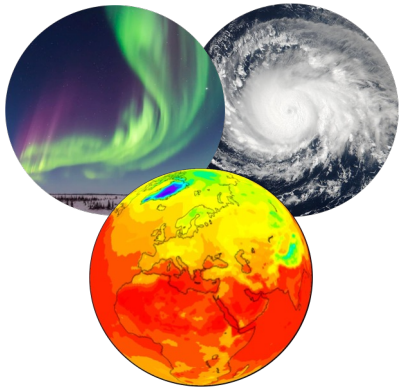
The Model for Prediction Across Scales Atmosphere

MPAS-Atmosphere and the future

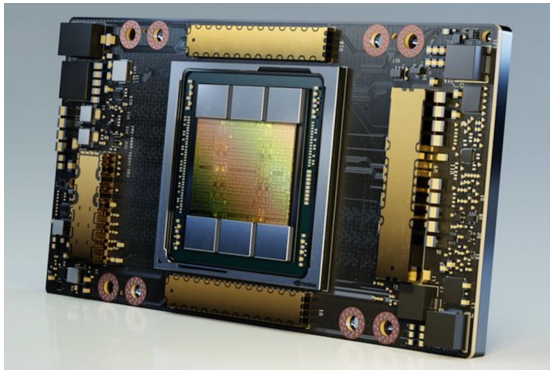
MPAS-A in an Earth System Model



SIMA

EarthWorks

MPAS-A and GPUs



NVIDIA Ampere A100 GPU

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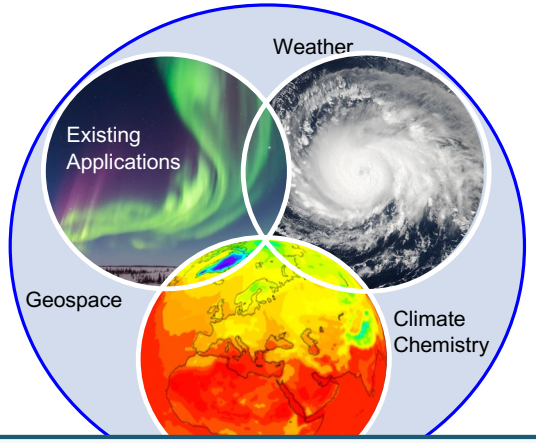
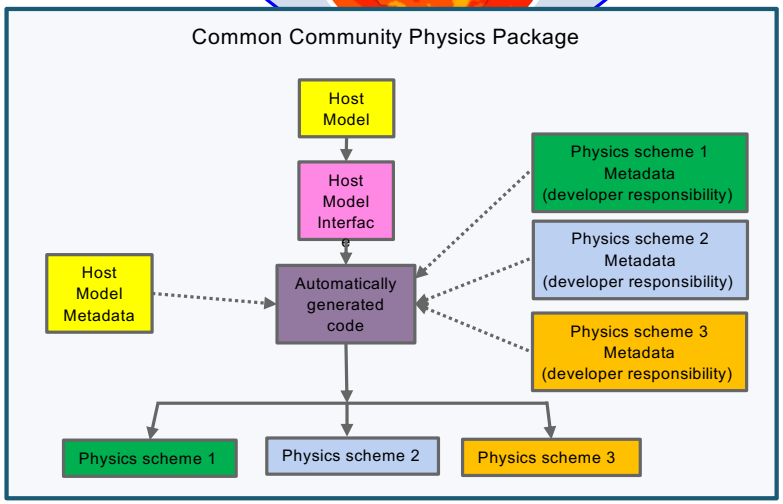
System for Integrated Modeling of the Atmosphere (SIMA)



(1) MPAS-Atmosphere in an Earth System Model (ESM), using CESM components. Other ESM components: ocean, land, land and sea ice, chemistry

(2) WRF/MPAS physics in an ESM using the Common Community Physics Package (CCPP) interface.



Status:

- *MPAS-A in CESM is being tested.*
- *Only CESM/CAM physics will be available in this first release.*
- *CCPP implementation in MPAS and CESM is not yet complete.*
- *Initial release (experimental) TBD.*

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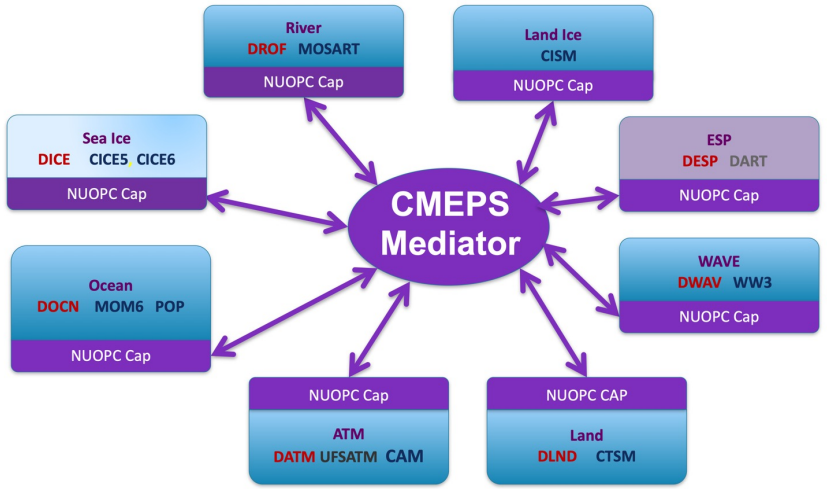
EarthWorks

EarthWorks is a five-year university-based project (CSU), supported by NSF/CISE, to develop a *global convection-permitting coupled model* based on the CESM with GPU capability for all components.

Earthworks consists of:

- The MPAS non-hydrostatic dynamical core, with a resolved stratosphere and CAM-ish physics
- The MPAS ocean model, developed at Los Alamos
- The MPAS sea ice model, based on CICE
- The Community Land Model (CLM)
- The Community Mediator for Earth Prediction Systems (CMEPS)



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EarthWorks

EarthWorks is available now in a first “functional” release:
git clone https://github.com/EarthWorksOrg/EarthWorks.git

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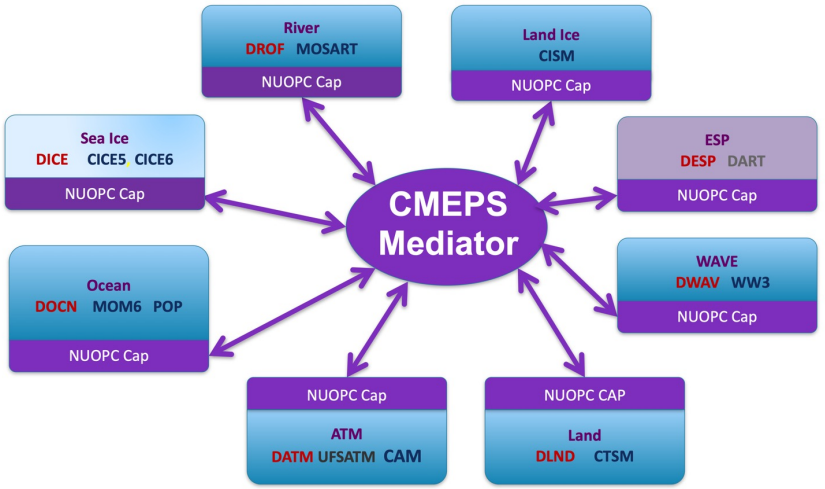

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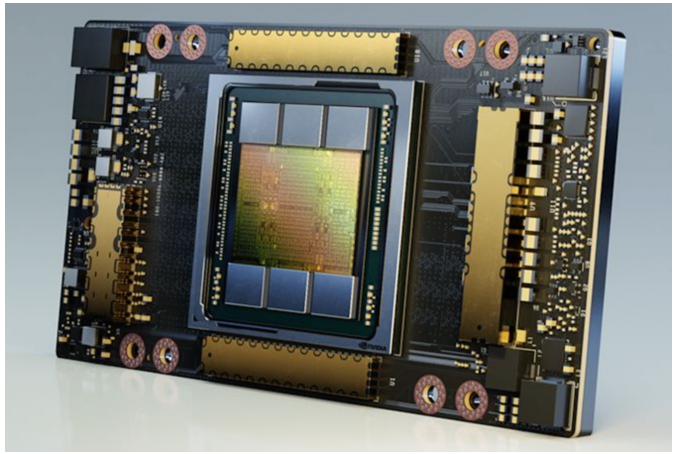
MPAS and GPUs

We released the GPU-enabled MPAS-Atmosphere in October 2020 as a branch from MPAS Version 6.1. We have a Version 7 update but it has not been released.



NVIDIA Ampere A100 GPU

What is in current (2020) release:

- GPU-enabled MPAS dynamical core using OpenACC directives.
- Some GPU-enabled physics (e.g. YSU, WSM6, M-O, scale-aware nTiedtke)
- Asynchronous execution capability on heterogenous architectures - currently radiation (lagged) and NOAH land model on CPUs, all else on GPUs
- Configurations tested and validated on IBM POWER9 architectures and on AMD architectures employing NVIDIA V100 and A100 GPUs.

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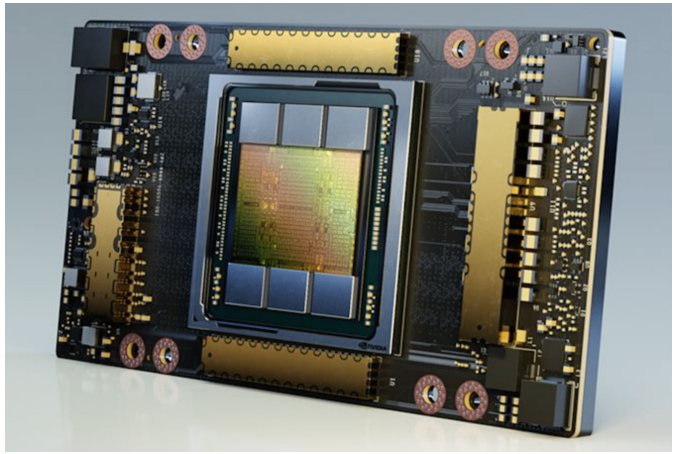

NVIDIA Ampere A100 GPU

What is *NOT* in this release:

- Regional capability
- Most of the physics options

We are currently evaluating the viability of this GPU implementation of MPAS-Atmosphere.

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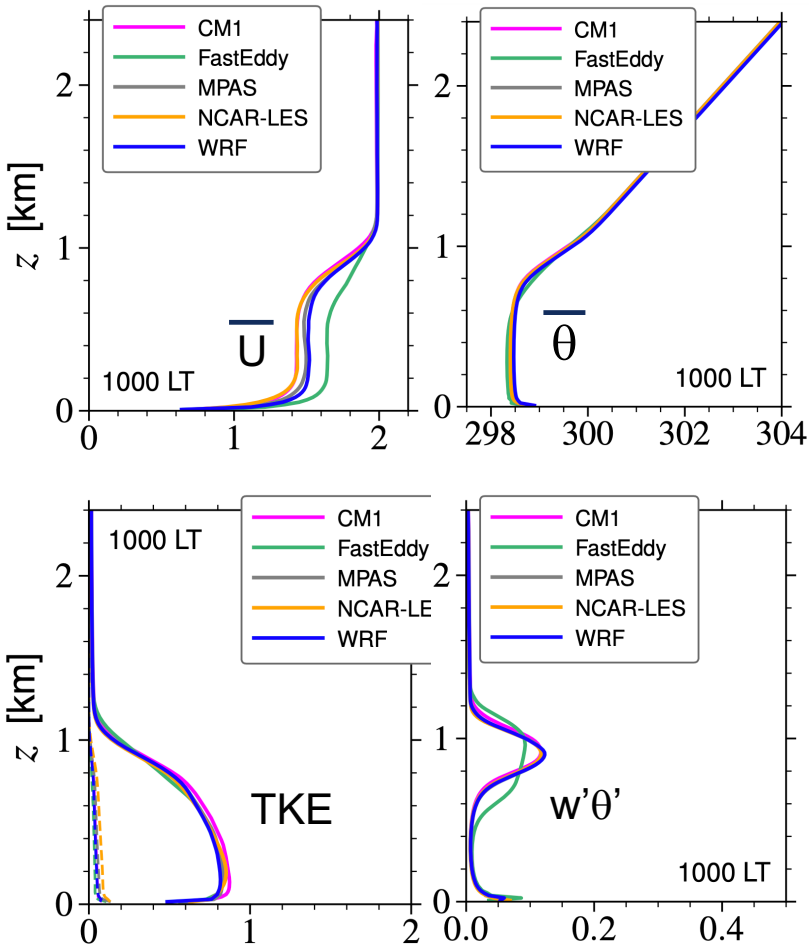
LES capabilities in MPAS

We implemented 2 LES SGS turbulence models in MPAS: 3D Smagorinsky scheme (diagnostic) and a 1.5 order TKE scheme (prognostic).

MPAS LES results look at lot like WRF and CM1 results.

Extensions for terrain need implementing.

Release timetable TBD.



SAS LES test case, NCAR PBL reinvestment project

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Also under development…

- LES capabilities – we have an LES branch that incorporates a 3D Smagorinsky (diagnostic) scheme and a 1.5 order prognostic TKE scheme.
- Scalar transport in physics parameterizations (convection, boundary layer) in preparation for chemistry.
- Prognostic ozone
- NOAH-MP, Unified (MPAS, WRF, CM1) physics
- Mesh generation, global and regional

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Coming Events

Version 8.? Releases: (1) NOAH-MP; (2) MPAS-JEDI
MPAS virtual tutorial, Spring 2024, dates TBD

WRF-MPAS workshop
June 2024 (in person), specific week TBD

We've begun work on an MPAS NCAR Technical Note. Available sometime 2024?