



Norwegian
Meteorological
Institute

*WGCM_18 on CMIP6,
Grainau, Germany, Oct 10. 2014*

Norwegian Earth System Model NorESM → CMIP6

Trond Iversen, MET Norway / Univ of Oslo



A National Effort

with increasing Nordic contributions



Bergen Climate Model (BCM)
ARPEGE + MICOM
Contributed to CMIP3 and
IPCC AR4

**Aerosols, clouds and
atmospheric chemistry**
CAM-based research
Used in IPCC AR4



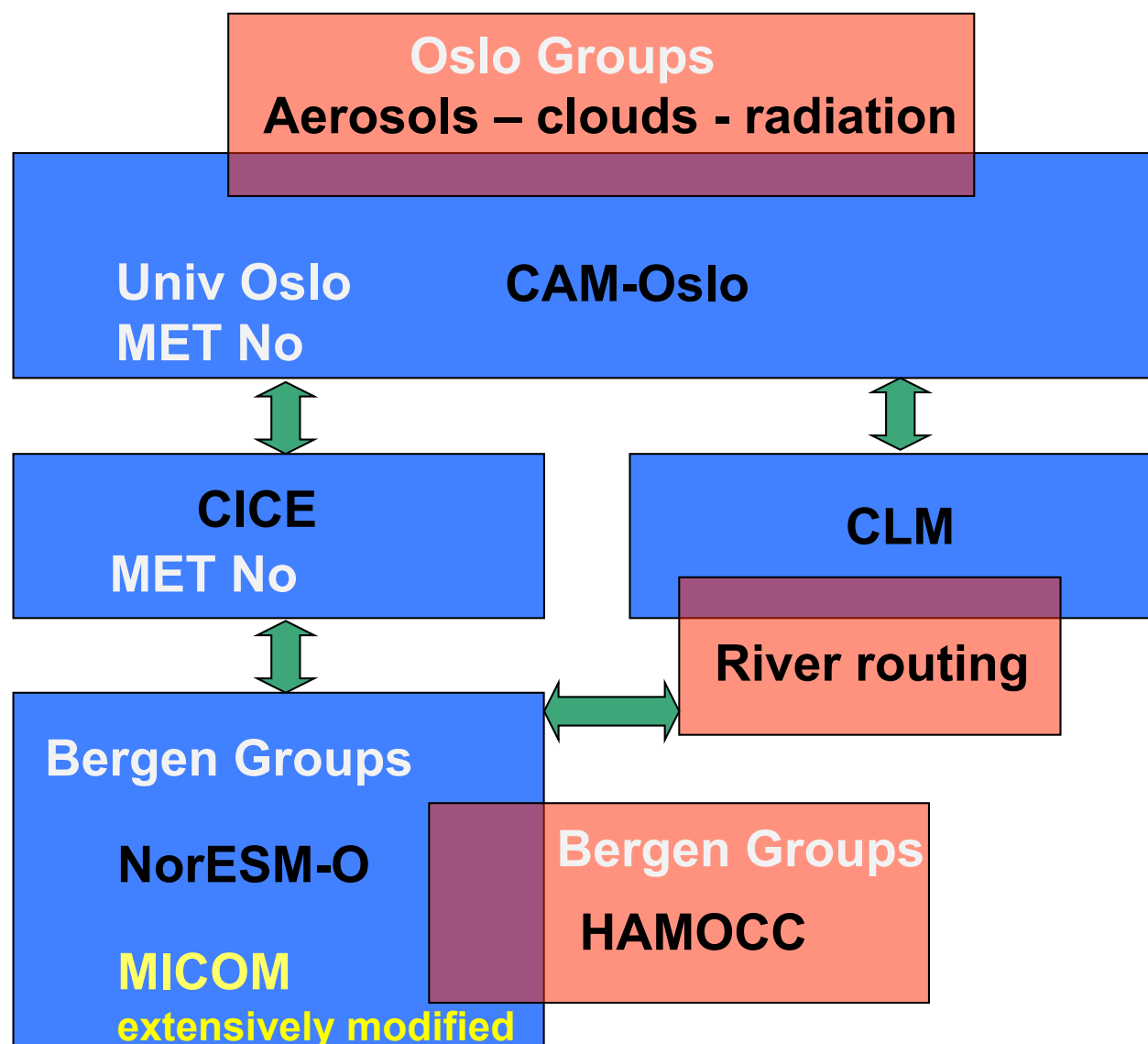
NorESM

CAM-Oslo + MICOM-Bergen + HAMOCC



NorESM1_M & NorESM1_ME
contributed to CMIP5 and IPCC AR5
M=medium resolution; E=emission driven

NorESM framework and model components



Belongs to the «NCAR family»

Components in **blue** communicate through the **coupler CPL7**.
Components in **red** are subroutines of blue components.

NorESM2 → CMIP6

CAM5.x (NCAR et al) → CAM5-Oslo (at present: CAM5_3_01 of cesm1_2_0)

New Cloud and Radiation param.;
Optional CAM5-aerosols and Mozart chem

NorESM2_ME (~2500 years)

- Main model version for CMIP6.
- Resolution 0.95° x 1.25° atm./land; 0.25° ocean/sea-ice.
- Full carbon cycle enabling emission-driven CO₂.
- Interactive aerosol-cloud-radiation.
- Also for concentration-driven CO₂. (**NorESM2_M: ~2500 years**)

NorESM2_LE (~5000 years)

- Reduced resolution version for CMIP6.
- Resolution 1.9° x 2.5° atm./land; 1° ocean/sea-ice.
- Intended for complementing main MIP-exp., for very long simulations, and decadal predictability (DCPP if possible).

Main targeted MIPs

- **Tier 1 of:**

 *AerChemMIP,*

 *DAMIP*

 *RFMIP*

 *C4MIP*

 *OCMIP6*

 *SensMIP*

 *Possibly both Tier 1 and Tier 2 of ScenarioMIP*

Some views

- **General:**
 - CMIP DECK with a small set of experiments is a good idea
 - Miss experiment a la 4xCO2 for aerosols and absorbing aerosols
 - Nucleus6: Historical 1850-2015 should be 3 members (→reduce DAMIP)
 - ScenarioMIP and projection experiments in C4MIP should be highlighted
 - The no. Of model years in tier 1 MIP-experiments are over-ambitious
- **AerChemMIP Tier 1 needs to be reduced**
 - Shorter historical scenario: 1910-2015
 - Harmonize AerChemMIP, DAMIP and RFMIP
 - Only one 3-member ensemble run
 - The AMIP run for ERF-development needs reconsideration
- **C4MIP – ScenarioMIP harmonization**
 - At least one pair of concentration-driven and emission-driven SSP-RCP should be designed for quantifying feedbacks

NorESM2 → Experiment AMIP-versions; no CMIP DECK
Should be possible to include in pure science-targeted MIPs

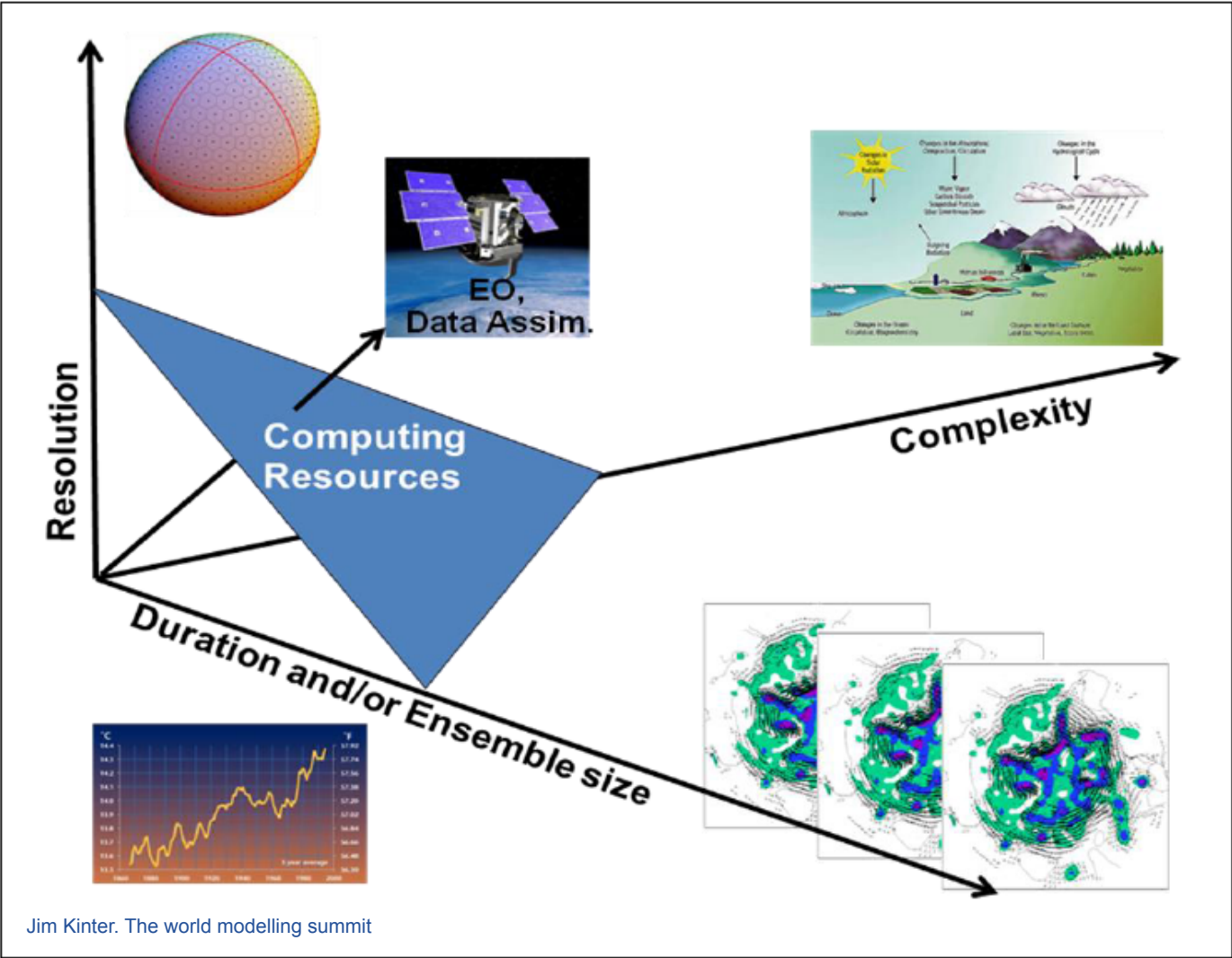
NorESM2_LEx /_Lx

- Increased complexity:
 - Full on-line oxidant chemistry
 - Sectional aerosols

NorESM2_Hx

- High-resolution; Reduced complexity: **Could be part of HighResMIP if only AMIP-runs are permitted**
 - 0.25 degree atmosphere
 - Prescribed aerosols and GHG conc.? Or as NorESM2_M

Prioritizing computer resources for climate modeling depend on Resolution / Complexity / Duration & Ensembles





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