

38 years of WGNE in WCRP & CAS !! Earlier structure since 1967 ...

Working Group on Numerical Experimentation (WGNE)

WGNE co-chairs: Nils Wedi (ECMWF), Ariane Frassoni (INPE) WCRP Secretariat: Nico Caltabiano

Members

- Tim Graham-Met Office (UK)
- Romain Roehrig-CNRM/MeteoFrance (France)
- Gunther Zaengl-DWD (Germany)
- Peter Lauritzen-NCAR (USA)

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• Fanglin Yang-NOAA/NCEP/EMC (USA)

- Masashi Ujiie-JMA (Japan),
- Ron McTaggart-Cowan-ECCC (Canada),
- Oscar Alves-BOM (Australia),
- Jian Sun-CMA (China),
- Elena Astakhova-Rushydromet (Russia) still supporting wgne.net

At least 3 open memberships to be filled: Francois, Carolyn, Elena

WGNE - 2022/2023

- 6th WGNE workshop on systematic errors in weather and climate models at ECMWF (<u>https://events.ecmwf.int/event/241</u>)
 - summary paper to BAMS May 23
- WGNE "Blue Book": providing concise yearly updates on model system development (<u>https://wgne.net/publications/wgne-blue-book/</u>)
- Continuous updates, references and sharing of modelling progress and process-oriented verification and prediction skill from major modelling centres worldwide (*wgne.net*)
- Topical discussions: Numerical model development; AI/ML + bias correction; Earth system coupling; HPC adaptation & emerging technologies; digital twinning (linking to impact sector applications); linking to GASS and GLASS activities
- Sharing diagnostic tools and techniques (Joint with the JWGFVR)
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Specific topical projects

- MJO-TF surfaces fluxes and SST sensitivity
- MUMIP model uncertainty intercomparison
- Survey on global model budgets (& physics-dynamics coupling)
- Process-oriented verification (via Joint working group JWGFVR)
- Aerosol interactions (with S2S follow-up project)
- Contributed to RB concept notes and WIPPS EW4All campaign

Governance in light of WMO changes

Following the 2020 WMO Constituent Body Reform, WMO has established a Research Board. In addition, WCRP has established a new core project ESMO that coordinates, advances, and facilitates all [Earth system] modelling, data assimilation and observational activities within WCRP. As a result, WGNE is now jointly governed and reports to ESMO and the Research Board. The core of WGNE membership consists predominantly of **global** (research) experts who are vested in enhancing the emerging capacities of operational meteorological centers. WGNE cochairs are members of the Research Board and together with other WCRP working groups (e.g. WGCM) extend the ESMO SSG in annual meetings.

!! Need to consolidate Terms of Reference & Membership criteria !!



New terms of reference (TBD)

- *Foster the worldwide, long-term development of complex coupled Earth system models (ESMs) to simulate weather-climate-water-biogeochemical processes for the application in operational services.*
- Identify, prioritise, link and understand common systematic errors and their solutions across different time-scales in coupled ESMs, sharing this information across the model development community.
- Assess the use of innovative approaches, in particular machine learning for Earth system modelling
- Provide guidance to utilise exascale computing for Earth system modelling, e.g. to overcome scalability issues and capture trends.
- Identify technological and scientific trends in Earth system modelling and share information on trends in global data-processing and forecasting systems across major modelling centers.
- Share information and provide advice on the right level of complexity required in increasingly coupled ESMs for a particular application.
- Encourage quality assurance through facilitation of intercomparison and exchange of internationally accepted model evaluation information relevant to their efficient and accurate use in operational weather & climate services.
- Share knowledge on the development & trends in R2O processes, operational NWP and climate services with ESMO and the Research Board.

Membership criteria (TBD)

- WGNE specifically does not recruit based on WMO regional association (even if a balance is desired), but
 on specific expertise and/or representation of a major modelling centre to capture trends in
 development.
- WGNE desires to achieve a better gender balance
- WGNE seeks/extends expertise to better collaborate across ESMO modelling activities (e.g. link to WGCM and observations/DA), and groups outside ESMO (e.g. OMDP, OceanPredict, Gewex)
- Existing membership is strong on atmospheric dynamical core development, transport algorithms, some ocean expertise, HPC adaptation, physical parametrisation development, representation of several large modelling centres.
- Identified gaps:
 - ML/AI replacing traditional physical modelling
 - Model uncertainty representation
 - Addressing specific systematic errors in projects (co-)lead by members and linking to activitities in GEWEX/GAW

Old terms of reference (wgne.net)

- Foster and coordinate the worldwide, long-term development of complex coupled Earth system models (ESMs) to simulate fast weather-climate-water-biogeochemical processes for application in research and operations.
- Identify, prioritise, link and understand common systematic errors and their solutions across different time-scales in coupled ESMs, sharing this information across the model development community.
- Promote the use of innovative approaches such as machine learning and provide guidance to utilise exascale computing for Earth system modelling, e.g. to overcome scalability issues.
- Provide advice on the right level of complexity required in coupled ESMs for a particular application.
- Maintain close links to specialized modelling, user, working or focus groups.
- Identify technological and scientific trends in Earth system modelling and advise seamless global data-processing and forecasting systems (WIPPS) (via the Research Board), and research groups within the programmes, of these emerging themes.
- Encourage quality assurance through facilitation of intercomparison and exchange of internationally accepted model evaluation information relevant to their efficient and accurate use in operational weather & climate services.
- Advise the Research Board, and hence the other WMO research programmes, on the development of ESMs.