WGNE activities and future directions

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Role of WGNE

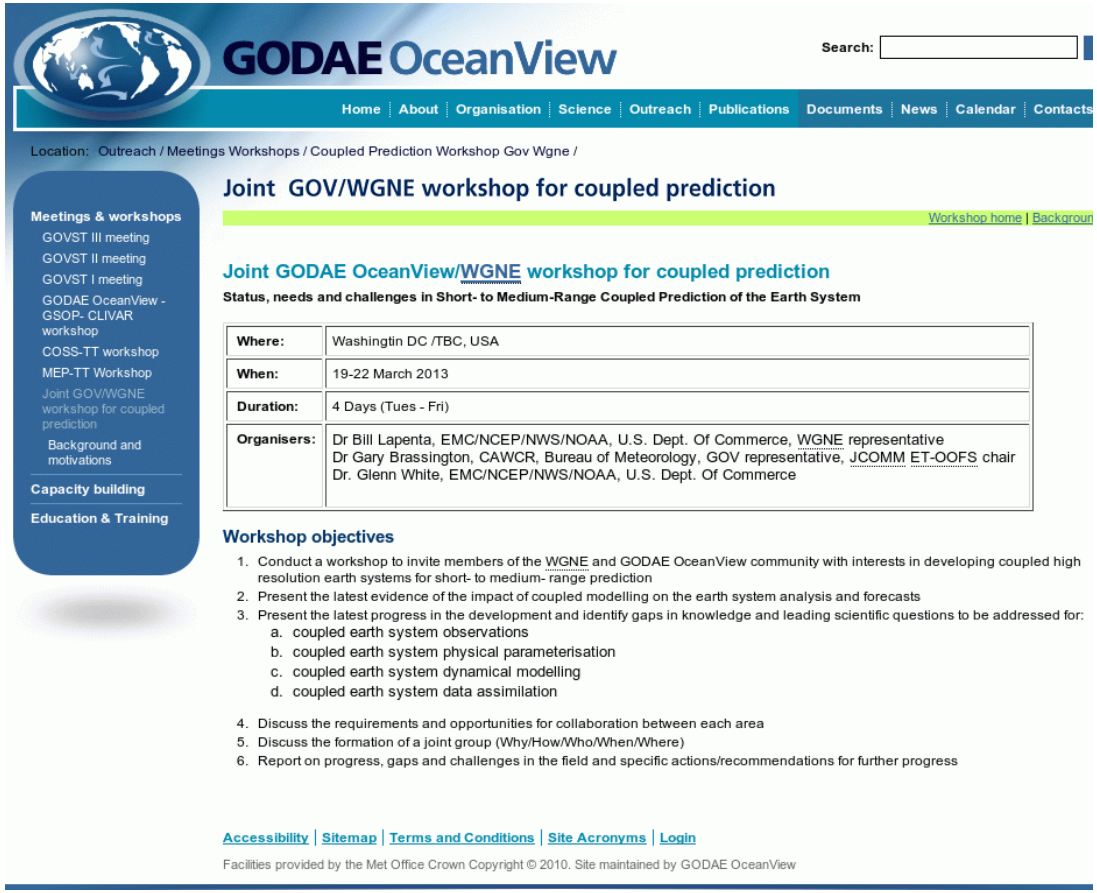
- Working Group on Numerical Experimentation
  - Jointly established by the WCRP and the WMO Commission for Atmospheric Sciences (CAS)
  - Responsibility of fostering the development of atmospheric circulation models for use in weather prediction and climate studies on all time scales and diagnosing and resolving shortcomings.
- A distillation of the Terms of Reference…..
  - Advice, liaison
  - Co-ordinated experiments
  - Workshops, publications, meetings

Co-ordinated experiments and projects

- Transpose-AMIP GOOD PROGRESS
- Cloudy-radiance DONE
- Grey-zone GOOD PROGRESS
- Verification
  - NWP performance (eg TCs, precipitation) ONGOING
  - Polar (CBS-style; ConcordIASI intercomparsion) DONE ➡ PPP
  - Climate metrics GOOD PROGRESS
  - Issues with verification against own analysis NEW
  - MJO / Boreal Summer Intraseasonal Oscillation intercomparisons (with MJO-TF) ONGOING / NEW
- Importance of aerosols for weather and climate DISCUSSION WGNE 2012. PROJECT TO BE SPUN UP
- Quality of monsoon simulations for weather and climate DISCUSSION WGNE 2012
- Comparison of model momentum budgets NEW

Workshops and meetings

GOV/WGNE Ocean coupling workshop



- **Washington, USA. 19th-22nd March 2013**
- Follow on to ECMWF (2008) and Met Office (2009) workshops
- Focus on coupled modelling for short and medium range
- Use of short-range coupled to understand issues for longer range (e.g. subseasonal-seasonal)

https://www.godae-oceanview.org/outreach/meetings-workshops/task-team-meetings/coupled-prediction-workshop-gov-wgne-2013/

4th WGNE Workshop on Systematic Errors in Weather and Climate Models

- **Met Office, Exeter, UK. 15th-19th April 2013**
- Weather and climate
- Nature and causes of errors
- Use of diagnostic techniques, observations, process models and simplified experiments to understand errors

http://www.metoffice.gov.uk/conference/wgne2013

WGNE systematic errors meeting Key recommendations

- The workshop recommends putting more emphasis on seamless approaches to model evaluation and improvement across the existing programmes of WMO. A close collaboration of the WCRP and WWRP in this area is strongly recommended. The WGNE should play a major role in facilitating this approach for the atmospheric modelling community and similar efforts for other model components are desirable.
- The lack of and/or inaccessibility to some key observations remains a major challenge. These include surface fluxes (especially over the oceans), and observations in polar and tropical regions. Additional efforts in these areas are required.

WGNE systematic errors meeting Key recommendations

- The workshop encourages a wider range of diagnostic techniques to be applied to model errors. In particular, these should be applied on the timescale on which errors develop. This needs to be supported by well organised data (model and observational) available in common formats across timescales. The workshop notes the vital role played by those hosting data for these activities.
- The links across the communities currently divided by timescales (e.g., climate – seasonal - weather) need further strengthening. It is recommended that workshops targeted at addressing these connections specifically should be organized in the near and medium term.

WGNE systematic errors meeting Key recommendations

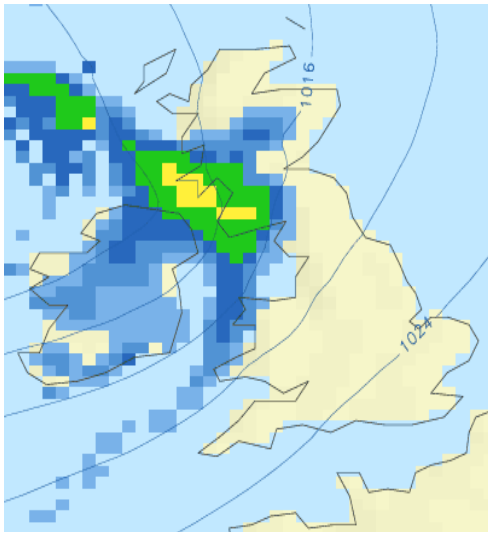
- The workshop encourages the development of diagnostic methods that are specifically aimed at linking dynamical and physical processes in models. A special workshop in this area might be helpful to organize the community.
- Most operational centres tend to have a mid-latitude focus to their work. As a consequence, the quality of their tropical and polar analyses has been found to be lower than that in the mid-latitudes. This also applies to re-analyses. The workshop recommends additional efforts in the development of data assimilation systems in those regions. The WGNE should lead an effort to assess the quality of the systems and propose future activities.

WGNE systematic errors meeting
Key recommendations

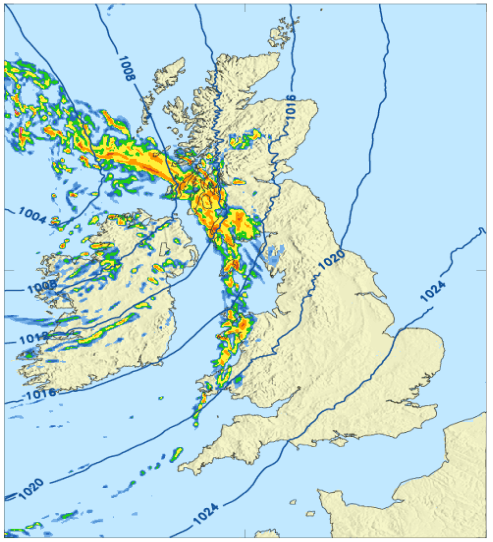
- The workshop recommends for the WCRP and WWRP to develop a joint initiative for a repository for diagnostic packages. This could be an area for development under the auspices of the WGNE/WGCM Metrics Panel.
- An impediment to progress that the workshop has identified is that different model configurations are often submitted to different model intercomparison projects (MIPs) and process studies. This makes community efforts to diagnose common model errors and their sources difficult. All modelling projects in WCRP and WWRP should be asked to develop a strategy around this issue. -> WMAC???

Future directions

- Short-range weather prediction
  - Changing focus – cloud, rain, surface temperature (not Z500!)
  - Increased emphasis on high resolution – especially convection permitting
    - Grey-zone project
    - Appropriate metrics for high resolution models (with JWGVR) and routine use of them
    - Link to climate downscaling?



25km

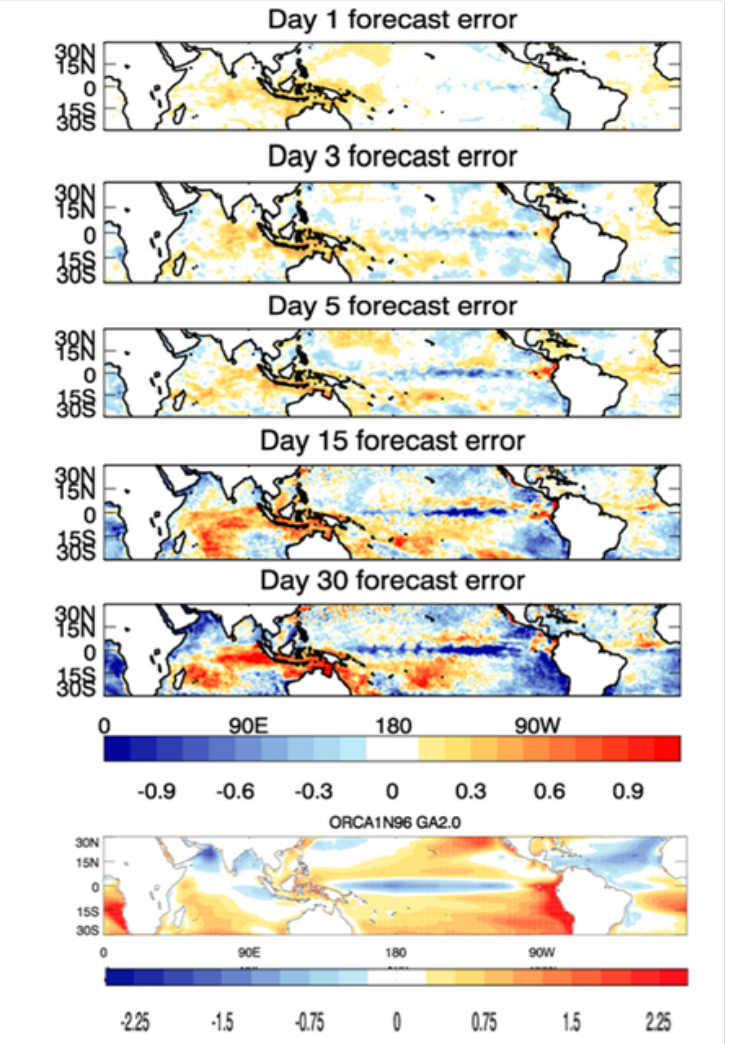


1.5km

Future directions

- Earth system prediction
  - Weather models coupled to ocean, composition, air quality, hydrology, ice.....
    - Bringing together communities (GODAE coupling workshop; systematic errors meeting)
    - Importance of aerosol for NWP: review and test cases
    - TRANSPOSE-CMIP?

Time evolution of coupled model SST errors



Future directions

- "Traditional model evaluation development"
  - Still important – and importance under-recognized
  - Champion (with partners) e.g. Conferences
  - Specific projects to engage community and tackle key issues
    - Boreal ISV
    - Grey zone
    - Drag
    - Dynamical cores (Workshops, Review of Centre Plans, Next steps?)
    - Stratosphere (resolution, QBO)?
    - Stochastic Physics?

Future directions

- Continue to look cross-timescale – weather and climate (and air quality/chemistry) communities together
- Need to keep championing the importance of model development
- Maintain strong links to many other groups and projects e.g. WWRP, DAOS, GASS, polar, subseasonal-seasonal, WGCM, SPARC, WMAC, GODAE, WCRP Grand Challenges.....

- Open questions and challenges
  - Involvement in data assimilation; relation to mesosale working group
  - Maintaining active portfolio of projects and workshops/ conferences

Questions?

Project sessions this week…

Project sessions this week
Stable boundary layers
The diagnosis of cloud and radiation processes in models
Weak temperature gradient
Grey-zone project
Microphysics modelling (KiD)
LoCo/SGP Testbed (GLASS project)
Marine Boundary Layer Cloud Feedbacks (CGILS)
Land-Atmosphere Interactions (GLASS/GABLS joint project)
Radiative Processes in Observations and Models
Cirrus
Tropical Convection observed during CINDY/DYNAMO
Polar Clouds (ISDAC)
Stratocumulus-to-trade cumulus transition
Vertical structure and diabatic heating of the MJO