

WGNE activities and future directions

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WGNE: TERMS OF REFERENCE

- Advise the JSC and CAS on progress in atmospheric modelling.
- **Review the development of atmospheric models** for use in **weather** prediction and **climate** studies on all scales, including the diagnosis of shortcomings.
- Propose numerical experiments aiming to refine **numerical techniques** and the formulation of **atmospheric physics processes**, boundary layer processes and land surface processes in models.
- Design and promote **coordinated experiments** for:
 - **validating model results** against observed atmospheric properties and variations;
 - exploring the **intrinsic and forced variability and predictability of the general circulation of the atmosphere on short to extended ranges**;
 - assessing the intrinsic and forced variability of the atmosphere **on climate time-scales**.
- **Promote the development of data assimilation methods** for application to numerical weather and climate predictions, and for the estimation of derived climatological quantities.
- Promote the **development of new methods** for numerical weather prediction and climate simulation.
- Maintain **scientific liaison** with other WCRP and CAS groups as appropriate.
- Promote the timely exchange of information, data and new knowledge on atmospheric modelling through **publications, workshops and 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 intercomparison) **DONE (➡ PPP)**
 - Climate metrics **GOOD PROGRESS**
 - Issues with verification against own analysis **(still) NEW**
 - MJO / Boreal Summer Monsoon Intraseasonal Oscillation intercomparisons (with MJO-TF)
ONGOING / NEW (➡ S2S)
- Importance of aerosols for weather and climate **DISCUSSION WGNE 2012. PROJECT BEING SPAN UP**
- Quality of monsoon simulations for weather and climate **DISCUSSION WGNE 2012 (➡ S2S)**
- Comparison of model momentum budgets **NEW**

Evaluating aerosols impacts on Numerical Weather Prediction (NWP)

Saulo Freitas with contribution from
Angela Benedetti et al (ECMWF)

Select strong or persistent events of aerosol pollution worldwide that could be fairly represented in the current NWP model allowing the evaluation of aerosol impacts on weather prediction.

Perform model runs both including and not the feedback from the aerosol interaction with radiation and clouds.

Evaluate model performance in terms of AOD simulation compared to observations (e.g. AERONET/MODIS data) or any other related aerosol observation available.

Evaluate aerosol impacts on the model results regarding 2-metter temperature, wind, rainfall, surface energy budget, ...

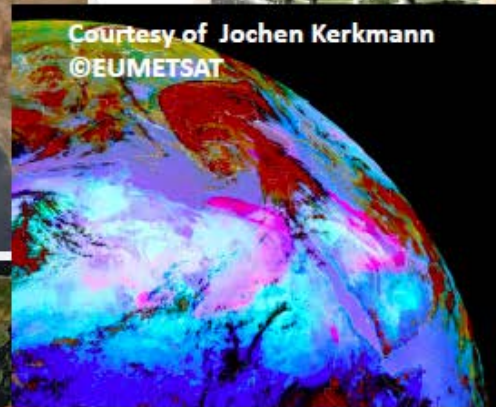
3 cases:

- **Egyptian dust storm – 18 April 2012**
- **Air pollution event, Beijing – 14 January 2013**
- **Biomass burning over South America**

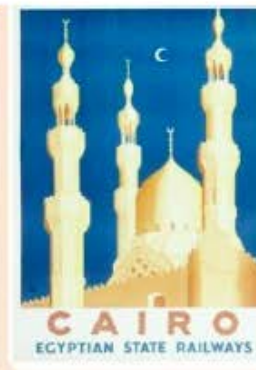
Dust Storm on April 18 2012



Dust over the Nile delta from satellite imagery.
Image courtesy of Chelys.



Courtesy of Jochen Kerkmann
©EUMETSAT



Wednesday, April 18, 2012

#Sandstorm in #Cairo

We are having the worst sandstorm in Cairo today. It is the **khamsin** in its official time after Easter. The storm started at 8:30 AM this morning. Suddenly we got this yellow color in the air.
Here is Tahrir square from short awhile ago :

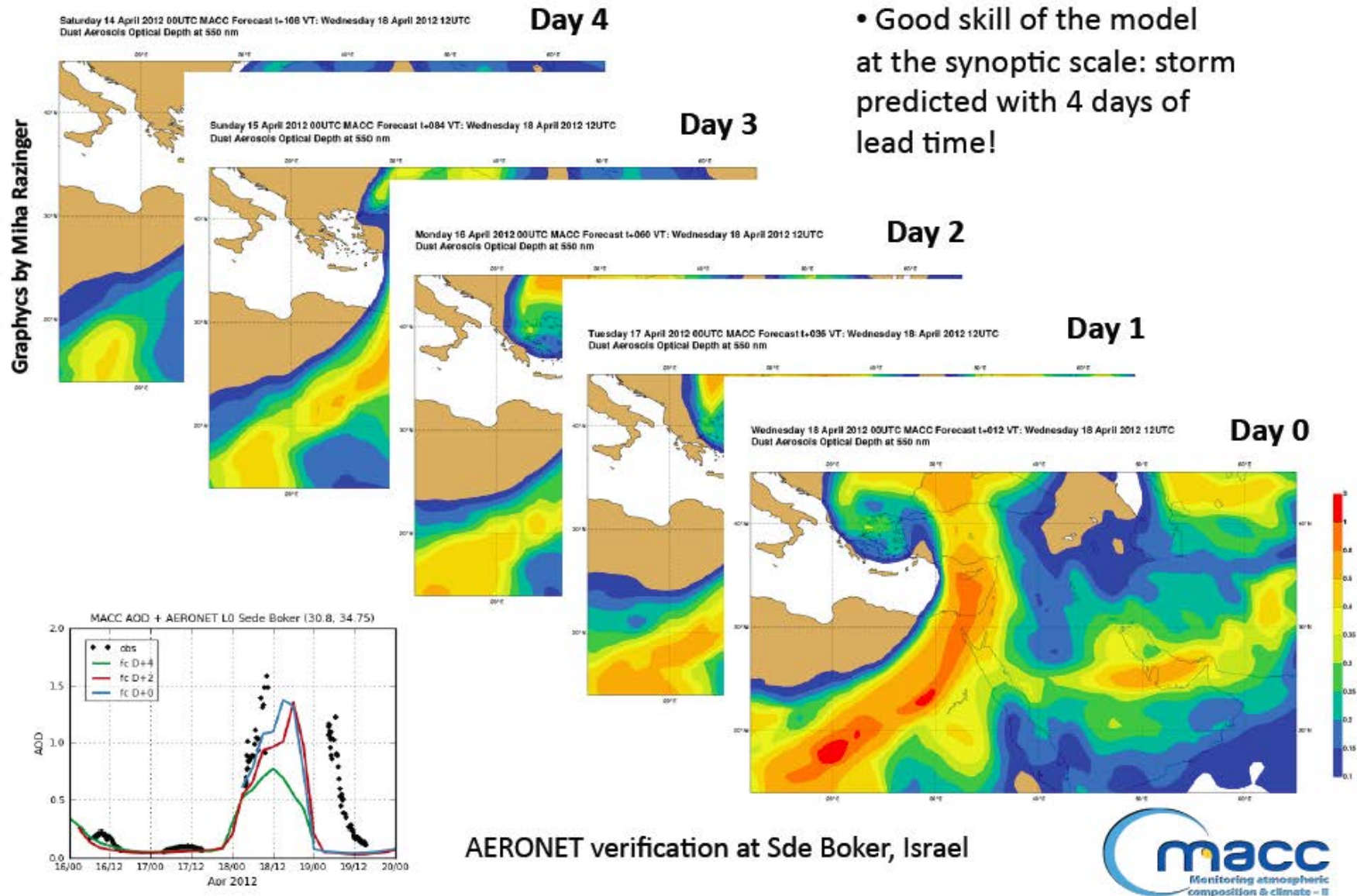


Khamisn in Tahrir square *Kolena Khaled Said*



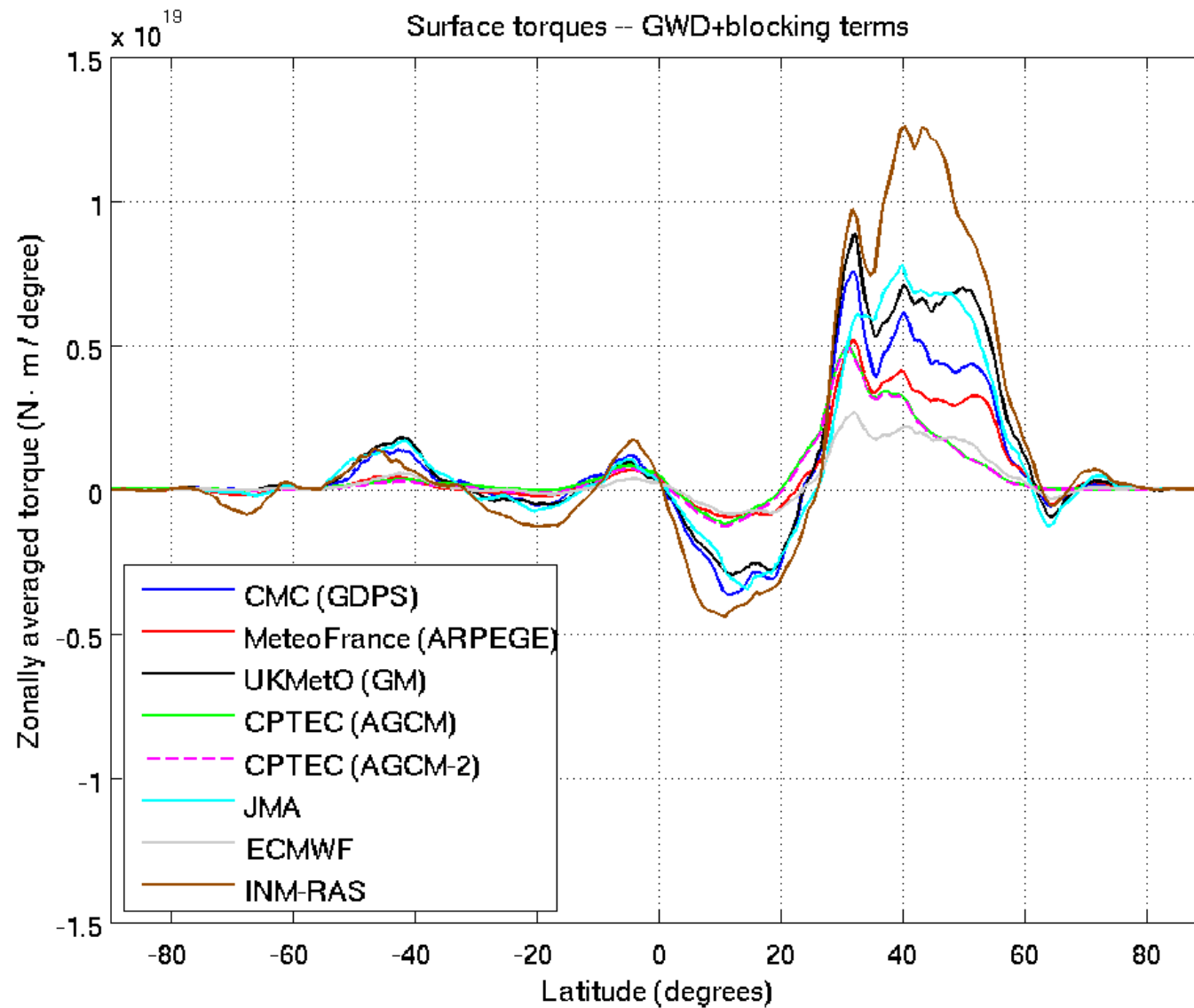
Palestinian men cross a main road as a sand storm envelops the town of Rafah along the border with Egypt in southern Gaza Strip, on April 18, 2012. (SAID KHATIB/AFP/Getty Images)

MACC-II/ECMWF forecasts for April 18 2012



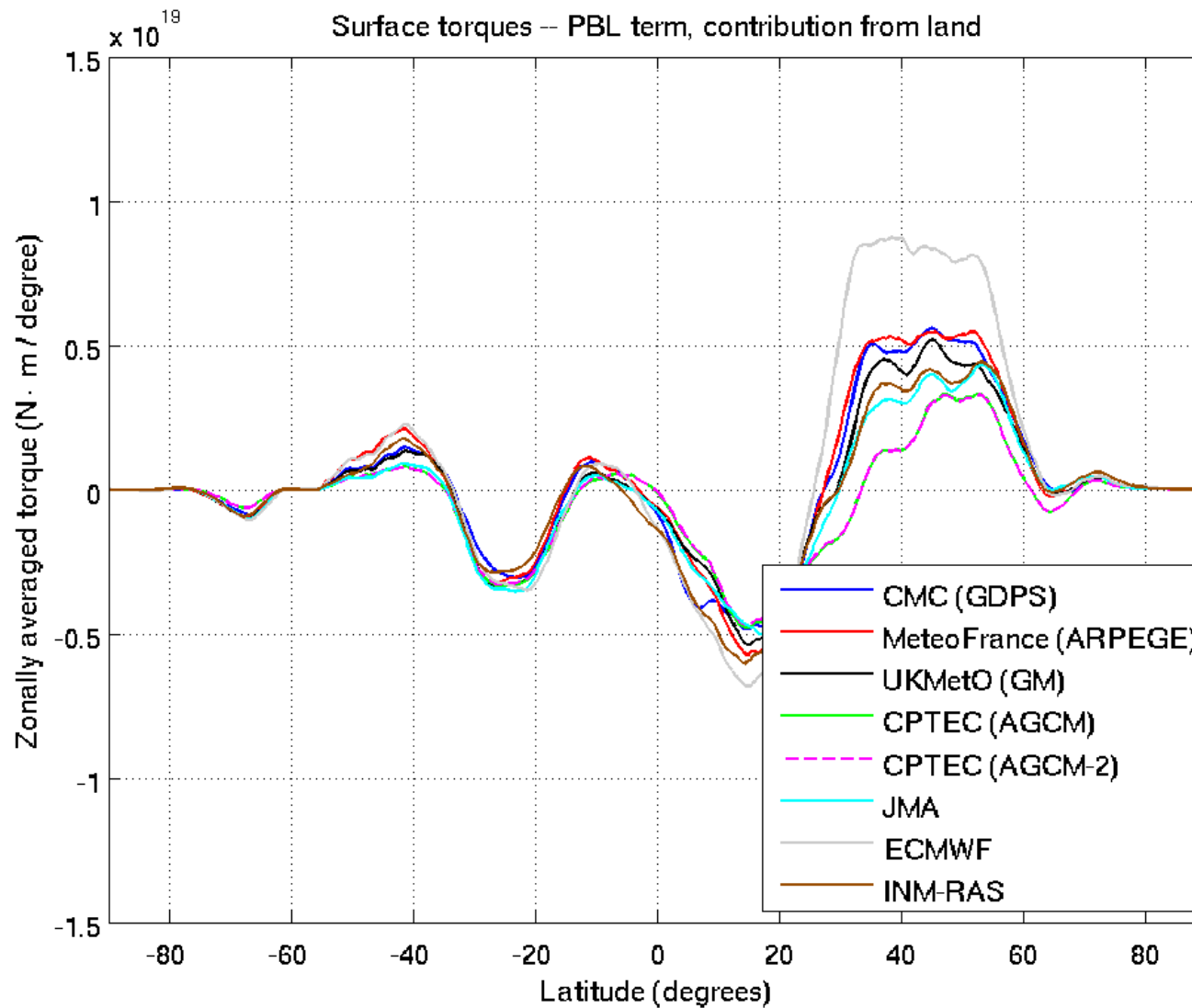
WGNE DRAG-project, torque inter-comparison Step0-24 January 2012

subgrid orography



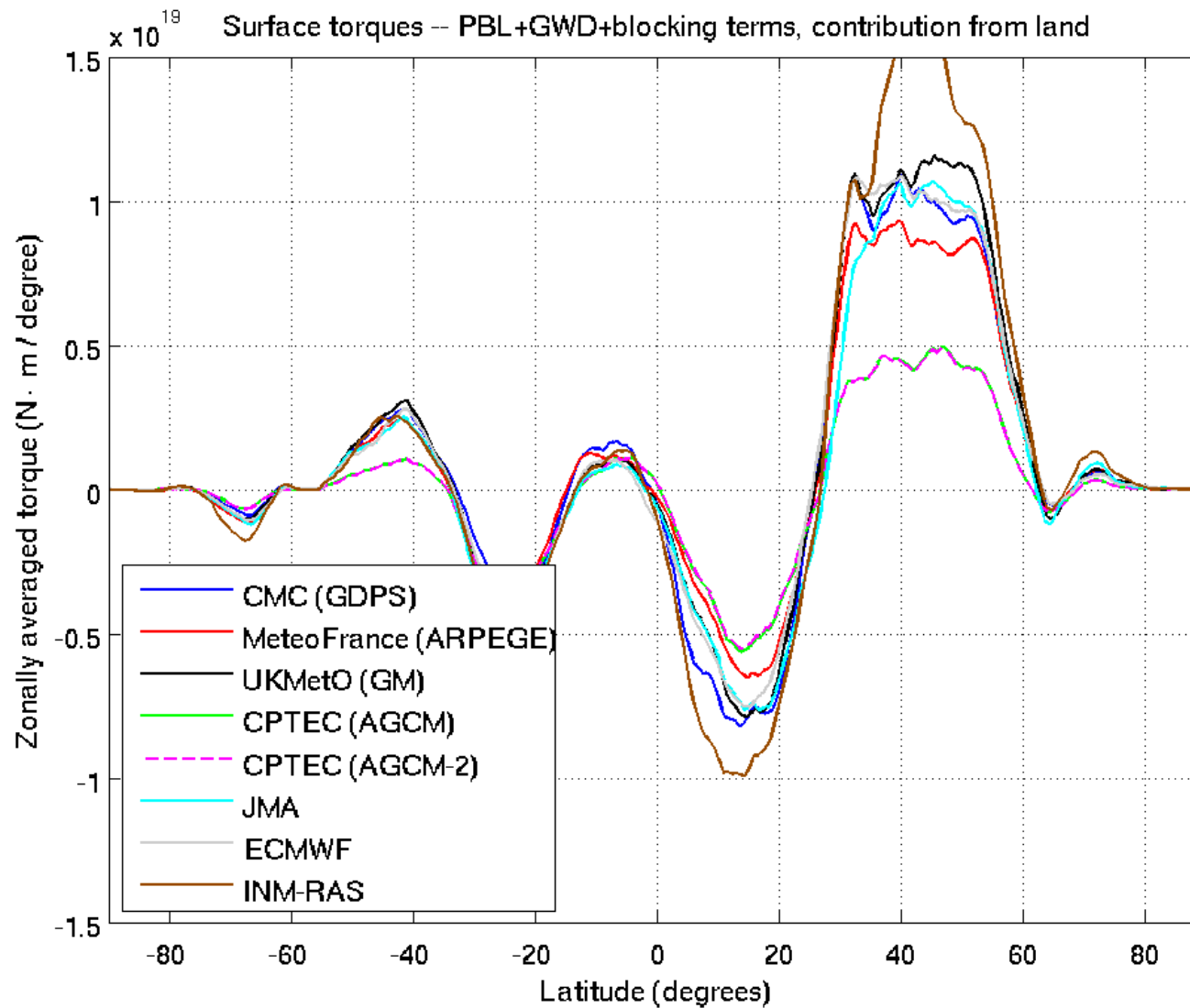
WGNE DRAG-project, torque inter-comparison Step0-24 January 2012

Boundary layer



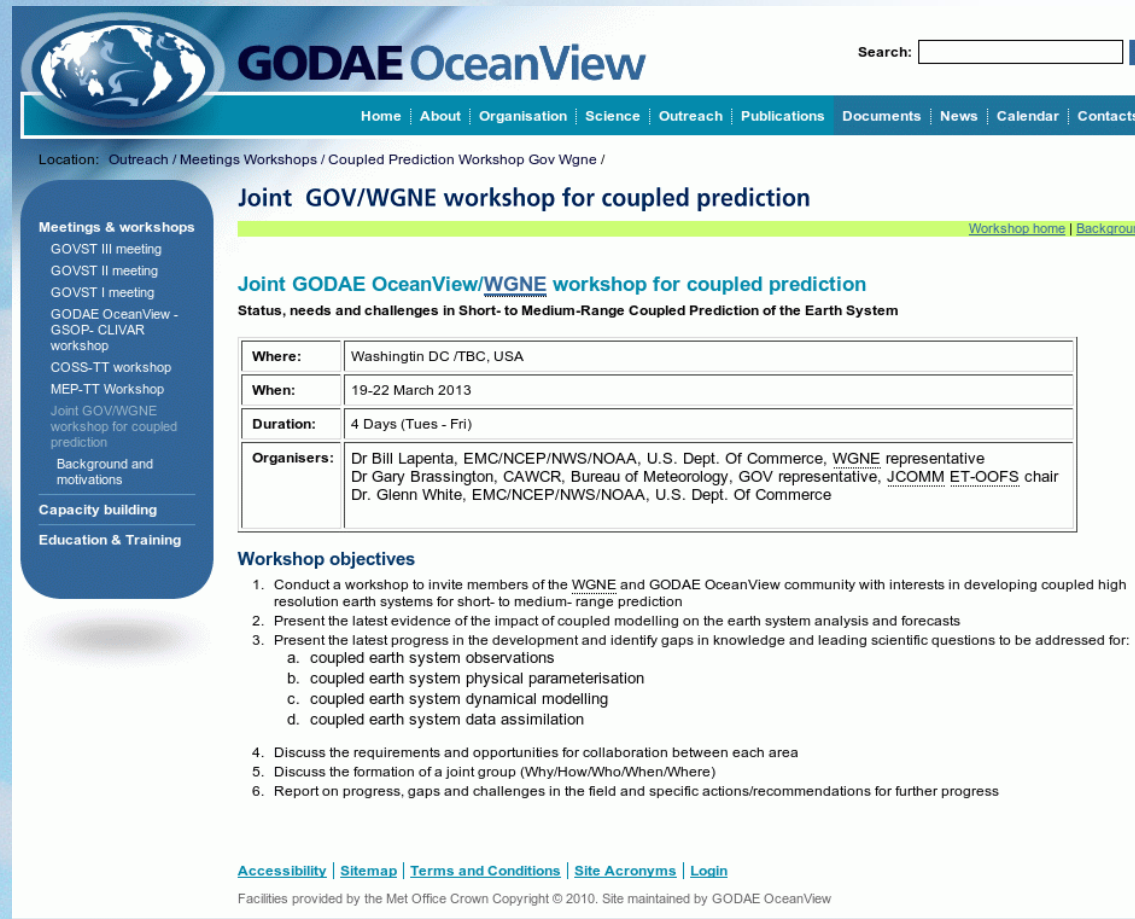
WGNE DRAG-project, torque inter-comparison Step0-24 January 2012

Boundary layer + subgrid orography



Workshops and meetings

GOV/WGNE Ocean coupling workshop



The screenshot shows the GODAE OceanView website. The header includes the GODAE OceanView logo, a search bar, and navigation links: Home, About, Organisation, Science, Outreach, Publications, Documents, News, Calendar, and Contacts. The location is specified as Outreach / Meetings Workshops / Coupled Prediction Workshop Gov Wgne /.

Meetings & workshops

- GOVST III meeting
- GOVST II meeting
- GOVST I meeting
- GODAE OceanView - GSOP- CLIVAR workshop
- COSS-TT workshop
- MEP-TT Workshop
- Joint GOV/WGNE workshop for coupled prediction
- Background and motivations

Capacity building

Education & Training

Joint GOV/WGNE workshop for coupled prediction

[Workshop home](#) | [Background](#)

Joint GODAE OceanView/WGNE workshop for coupled prediction

Status, needs and challenges in Short- to Medium-Range Coupled Prediction of the Earth System

Where:	Washington DC /TBC, USA
When:	19-22 March 2013
Duration:	4 Days (Tues - Fri)
Organisers:	Dr Bill Lapenta, EMC/NCEP/NWS/NOAA, U.S. Dept. Of Commerce, WGNE representative Dr Gary Brassington, CAWCR, Bureau of Meteorology, GOV representative, JCOMM ET-OOFS chair Dr. Glenn White, EMC/NCEP/NWS/NOAA, U.S. Dept. Of Commerce

Workshop objectives

1. Conduct a workshop to invite members of the WGNE and GODAE OceanView community with interests in developing coupled high resolution earth systems for short- to medium- range prediction
2. Present the latest evidence of the impact of coupled modelling on the earth system analysis and forecasts
3. Present the latest progress in the development and identify gaps in knowledge and leading scientific questions to be addressed for:
 - a. coupled earth system observations
 - b. coupled earth system physical parameterisation
 - c. coupled earth system dynamical modelling
 - d. coupled earth system data assimilation
4. Discuss the requirements and opportunities for collaboration between each area
5. Discuss the formation of a joint group (Why/How/Who/When/Where)
6. Report on progress, gaps and challenges in the field and specific actions/recommendations for further progress

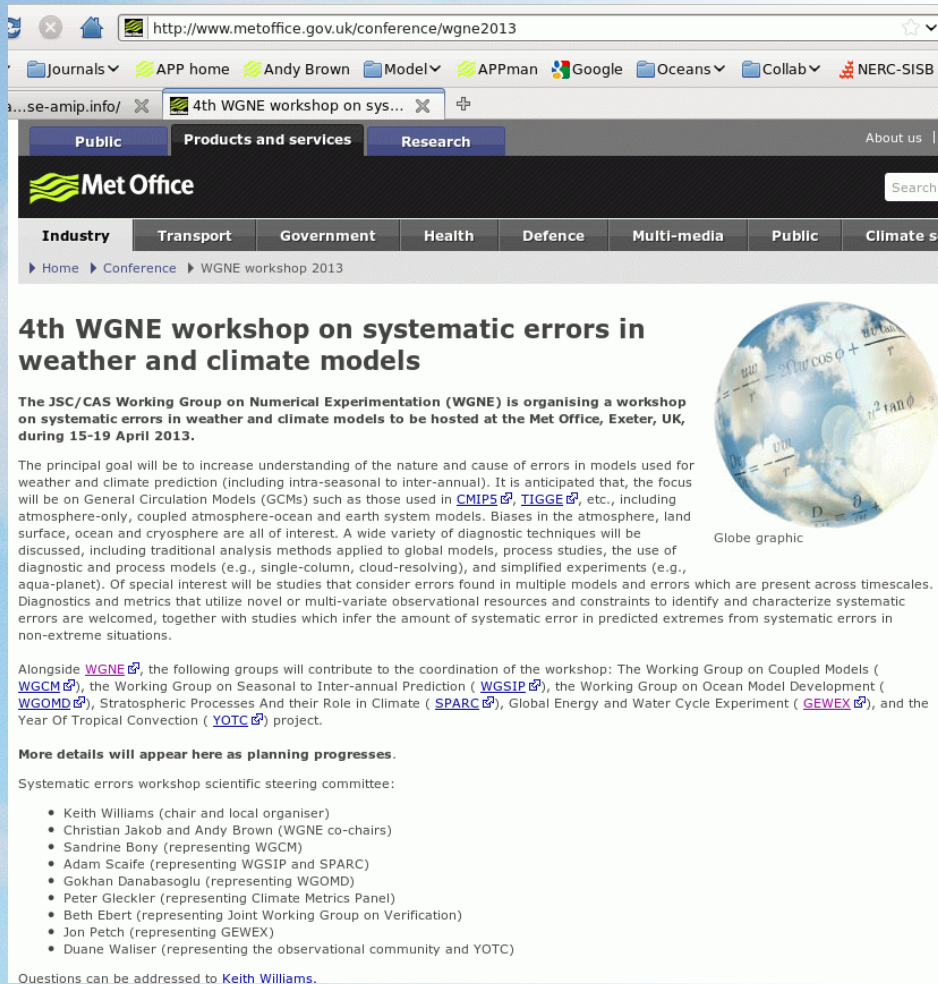
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- **Washington, USA. 19th-22nd March 2013**
- Follow on to ECMWF (2008) and Met Office (2009) workshops
- Focus on coupled modelling for short and medium range
- Use of short-range coupled to understand issues for longer range (e.g. subseasonal-seasonal)

<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



The screenshot shows a web browser window with the URL <http://www.metoffice.gov.uk/conference/wgne2013>. The page features the Met Office logo and navigation tabs for Public, Products and services, and Research. A search bar is also present. The main heading is "4th WGNE workshop on systematic errors in weather and climate models". Below this, a paragraph states: "The JSC/CAS Working Group on Numerical Experimentation (WGNE) is organising a workshop on systematic errors in weather and climate models to be hosted at the Met Office, Exeter, UK, during 15-19 April 2013." A globe graphic is shown to the right of the text. The text continues: "The principal goal will be to increase understanding of the nature and cause of errors in models used for weather and climate prediction (including intra-seasonal to inter-annual). It is anticipated that, the focus will be on General Circulation Models (GCMs) such as those used in CMIP5, TIGGE, etc., including atmosphere-only, coupled atmosphere-ocean and earth system models. Biases in the atmosphere, land surface, ocean and cryosphere are all of interest. A wide variety of diagnostic techniques will be discussed, including traditional analysis methods applied to global models, process studies, the use of diagnostic and process models (e.g., single-column, cloud-resolving), and simplified experiments (e.g., aqua-planet). Of special interest will be studies that consider errors found in multiple models and errors which are present across timescales. Diagnostics and metrics that utilize novel or multi-variate observational resources and constraints to identify and characterize systematic errors are welcomed, together with studies which infer the amount of systematic error in predicted extremes from systematic errors in non-extreme situations." Further down, it lists the groups contributing to the coordination of the workshop: The Working Group on Coupled Models (WGCM), the Working Group on Seasonal to Inter-annual Prediction (WGSIP), the Working Group on Ocean Model Development (WGOMD), Stratospheric Processes And their Role in Climate (SPARC), Global Energy and Water Cycle Experiment (GEWEX), and the Year Of Tropical Convection (YOTC) project. A section titled "More details will appear here as planning progresses." follows, leading to a list of the systematic errors workshop scientific steering committee members: Keith Williams (chair and local organiser), Christian Jakob and Andy Brown (WGNE co-chairs), Sandrine Bony (representing WGCM), Adam Scaife (representing WGSIP and SPARC), Gokhan Danabasoglu (representing WGOMD), Peter Gleckler (representing Climate Metrics Panel), Beth Ebert (representing Joint Working Group on Verification), Jon Petch (representing GEWEX), and Duane Waliser (representing the observational community and YOTC). A note at the bottom states: "Questions can be addressed to Keith Williams."

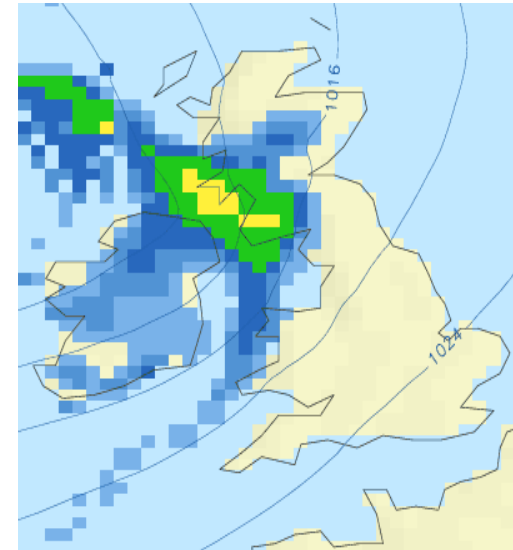
- Met Office, Exeter, UK.
15th-19th April 2013
- Weather and climate
- Nature and causes of errors
- Use of diagnostic techniques, observations, process models and simplified experiments to understand errors

WGNE systematic errors meeting: Key outcomes

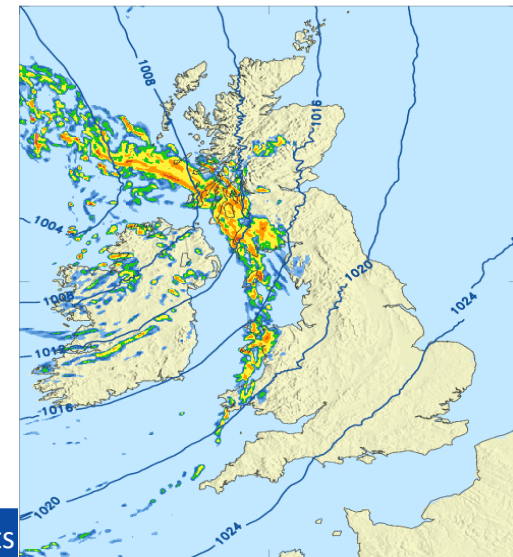
- Challenged by lack and/or inaccessibility of observations (& uncertainties)
 - Surface fluxes (e.g. Argo floats)
 - Polar data (clouds, sea-ice volume, etc.)
- Wide range of diagnostic techniques to identify the timescale on which errors develop (**Transpose-CMIP**), supported by well organised data availability in common formats.
- This needs to have good links across the communities (e.g. Climate, seasonal, NWP)
- Develop link between dynamics & physics in diagnostic methods (e.g. PDP work; clouds grand challenge)
- Quality of (re-)analyses (esp. Tropics & Poles).
- Diagnostic packages for centres to run themselves (repository?).
- **Common model configurations to different MIPs. Linked to this, model configurations being analysed need to be more relevant to modelling centres (implication for CMIP6; Uni/Op centre links).**

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 JWGVF) [and routine use of them](#)
 - [Link to climate downscaling?](#)



25km

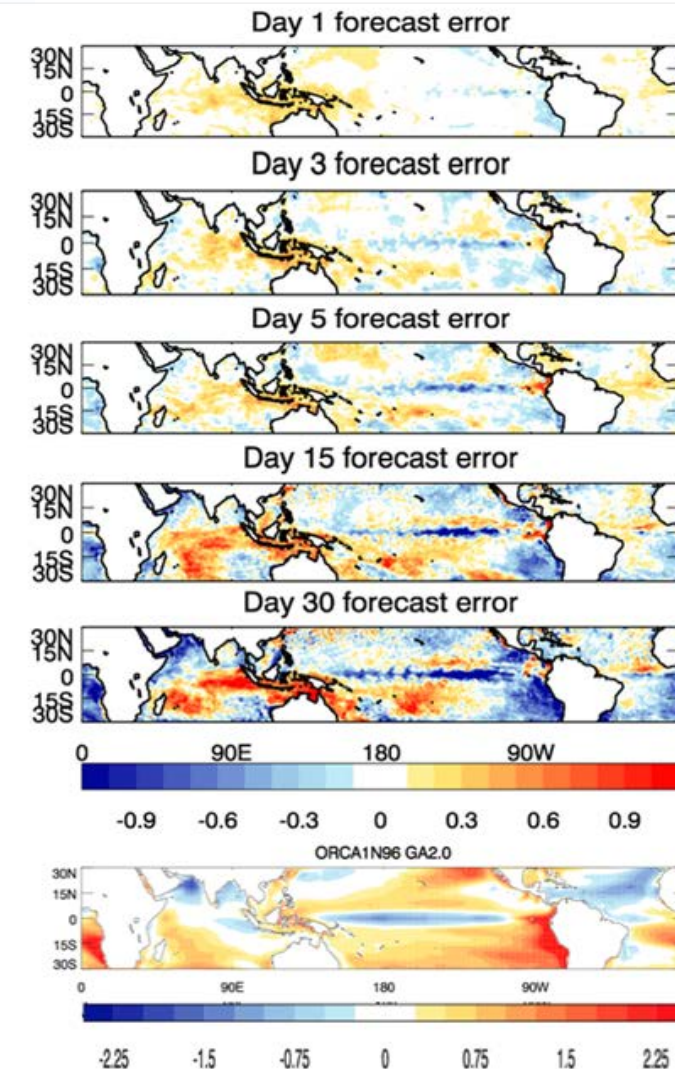


1.5km

Future directions

- Earth system prediction
 - (Ensemble) atmospheric weather prediction 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
 - **TRANPOSE-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?](#))
 - [Scalability?](#)
 - [Stratosphere \(resolution, QBO\)?](#)
 - [Stochastic Physics? \(incorporated at the heart of model parameterization developments\)](#)

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
 - Including stochastics, dynamical cores, scalability, etc..
- Maintain strong links to many other groups and projects e.g. WWRP, DAOS, GASS, PPP, S2S, WGCM, SPARC, WMAC, WDAC, GODAE, WCRP Grand Challenges.....
- Importance of Maintaining active portfolio of projects and workshops/conferences



Thank You