Met Office developments and plans

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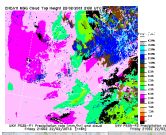
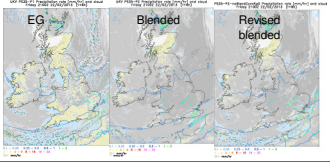
Current activities

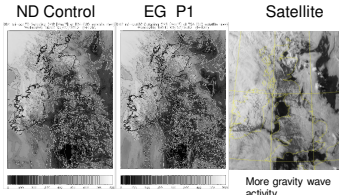
ENDGame –Parallel suite 35 (Nov)

Geocloud assimilation
Blended (scale aware) boundary layer
Warm rain (scale aware) microphysics
New Murk aerosol sources

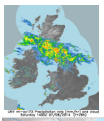


Winter case
Low cloud less broken

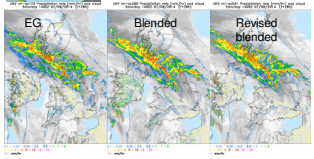




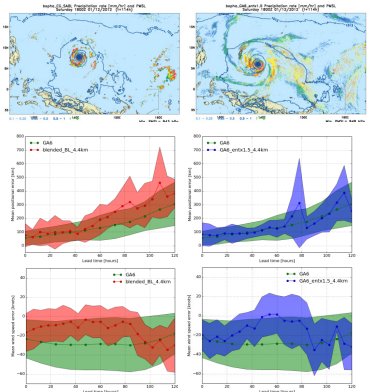
More gravity wave activity



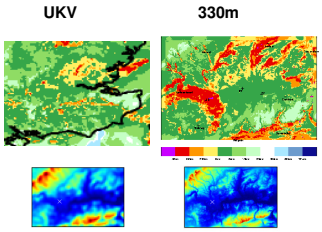
Summer VAR trial
Fewer spurious showers/small scale rain over Ireland with revised blended



Tropical cyclones 4km relocatable downscaler



London Model -330m Fog, Urban modelling



Parallel suite 36 (Summer 2015)

Porting to new HPC (1a)

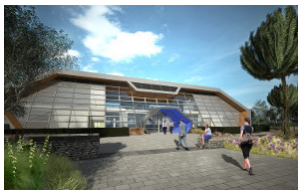
The ENDGame dynamical core became operational in July 2014 in the Global model with improved model resolution from N512 to N768 and an update to the model physics .. ENDGame is an evolution of the New Dynamics and aims to be more robust and accurate whilst maintaining or improving conservation and efficiency. ENDGame is less diffusive than New Dynamics resulting in increased Eddy Kinetic Energy. This leads to more intense development of storms and improved wind biases. Limited area configurations will be implemented operationally in early 2015.

ENDGame was formulated by the Dynamics Research team: Nigel Wood, Thomas Allen, Terry Davies, Markus Gross, Thomas Melvin, Chris Smith, Andrew Staniforth, John Thuburn* and Mohamed Zerroukat (*University of Exeter). Subsequently, many people in the Met Office have worked on its development and implementation, particularly the physics (APP), the global (GMED) and the regional (RMED) teams.

New HPC

Contract sign expected end September 2014
Significant increase in HPC over next 2+ years

3 phases
1a – April-May 2015
1b – October 2015-Feb 2016
1c – Feb 2017 -new IT Hall facility -Offsite



Expected Performance/System Size

System	Capacity (Volume –V)	Nodes
IBM P7 *(2011 twin clusters)*	0.82	864
IBM P7 *(2014 twin clusters)* - Baseline for Performance Measurement	1	1056
IBM P7 *(All 3 clusters)*	1.15	1216
Phase 1a	1	1088
Development /MONSooN	0.11	120
Phase 1b	5.21	4992
Phase 1c	9.63	6060

Model	Weight in Evaluation	No. of copies on IBM P7	Nodes per copy on IBM P7
UM-N1024 –Global Forecast	30%	5.5	192
UM-N144 + Chemistry - Climate	30%	33	32
Ocean- NEMO 0.25 + CICE & Tracers	20%	33	32
4DVAR - N320	20%	22	48

The Benchmark Challenge :

1. *At least match IBM runtimes*
2. *Define Capacity (number of nodes) to match IBM capacity as a weighted average of the 4 benchmarks, running sufficient copies to fill both clusters.*
3. *Scale up that capacity within the Affordability (and for current IT Halls the Power) Constraints*

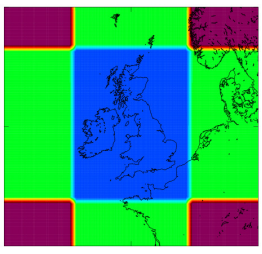
Projected Capacity by Benchmark

	V-Total	V-N1024	V-N144	V-NEMO	V-4DVAR
1ab	6.2	6.4	7.5	6.5	4.6
1c	9.6	10.1	11.3	9.6	7.5
Total	15.8	16.5	18.8	16.1	12.1

Future plans

Extension of UKV domain

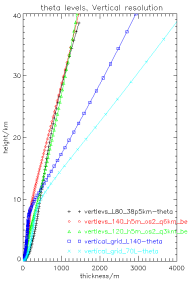
Move boundaries – allow spin-up of showers/fine-scale
Better match wave/shelf models



1.5 x 1.5km 4 x 1.5km ,1.5x 4km 4x 4km

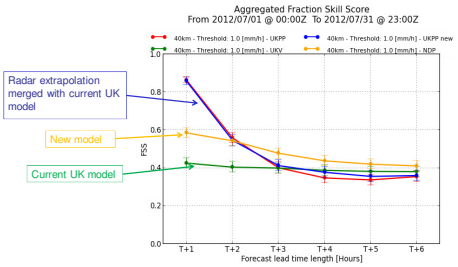
Improved vertical resolution

Better lower and upper troposphere & stratosphere
140L –new
120L-new
SingV 80L set



Hourly UK-wide 4DVAR

Current UKV - 3DVAR,3hour cycle
NDP Project showed higher ppn skill in latest forecast from hourly analyses, relative to older UKV run
4DVAR makes better use of time sequence of obs
4DVAR makes possible more advanced use of eg radar data
Improve UK Post-Processing products in 0-6 hour period
Improve severe weather guidance in 0-12 hour time period



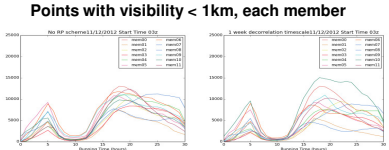
Nowcasting demonstration project -- Olympics

MOGREPS-UK

Use UKV analysis combined with perturbations from MOGREPS-G to make use of more recent & more detailed data for the initial

First phase of stochastic physics
– version of "random parameters" (RP) scheme suited for MOGREPS-UK
-Increased variability of fog - wider range of low-visibility points, compared with no RP scheme.

Points with visibility < 1km, each member



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