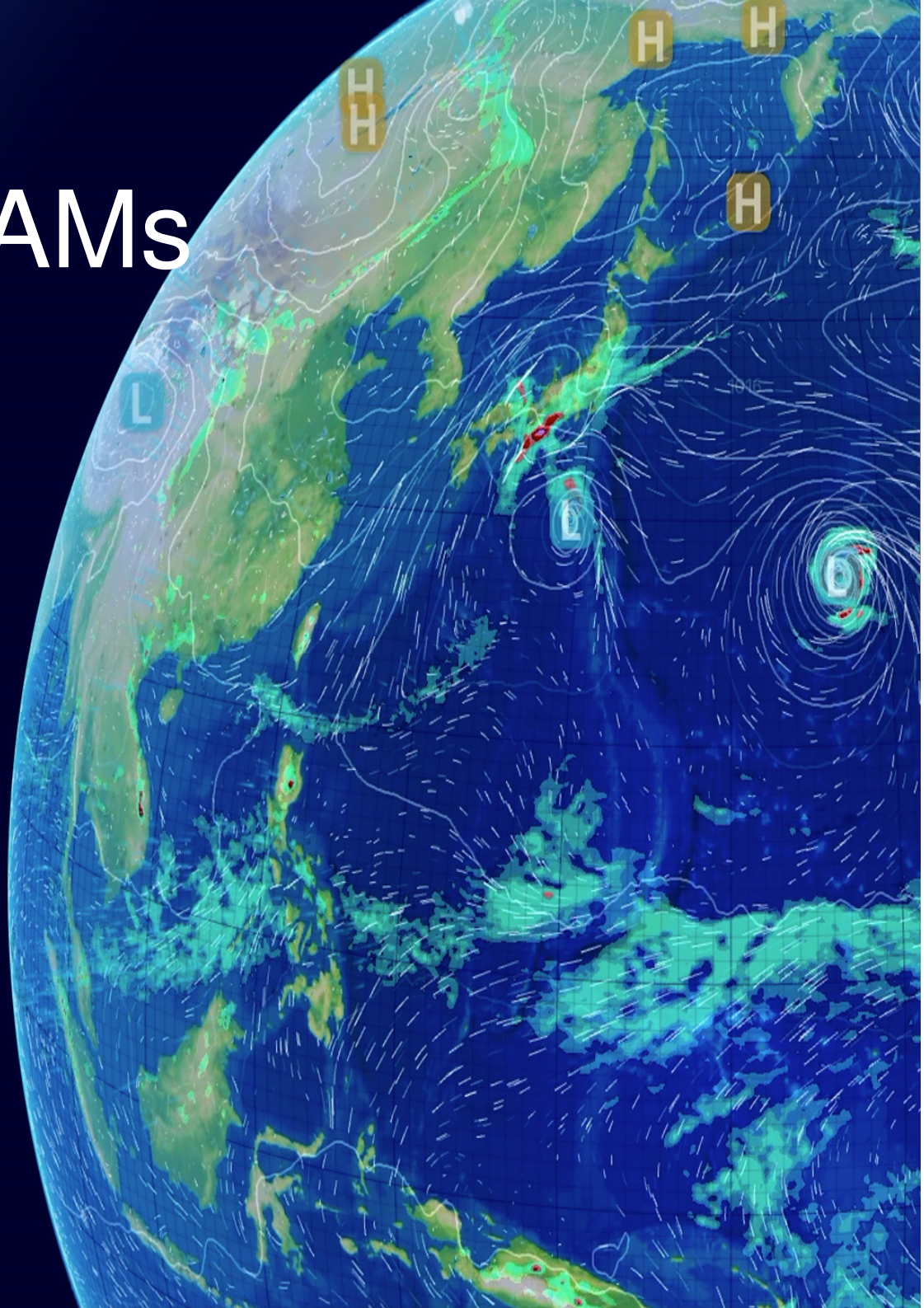
Downscaling in LAMs

Terry Davies



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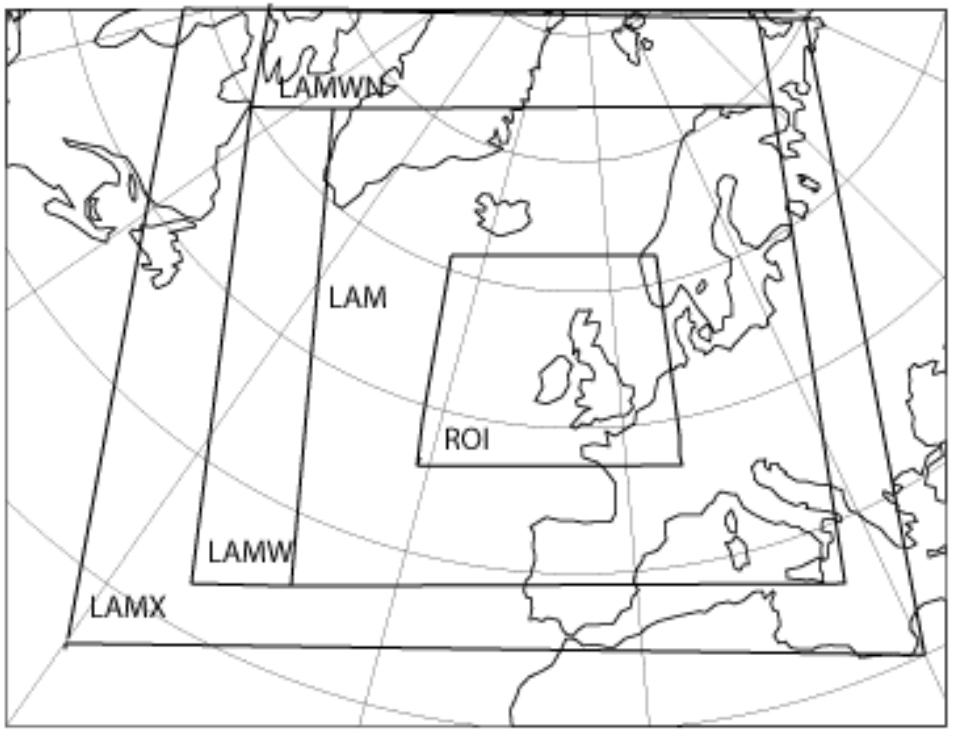
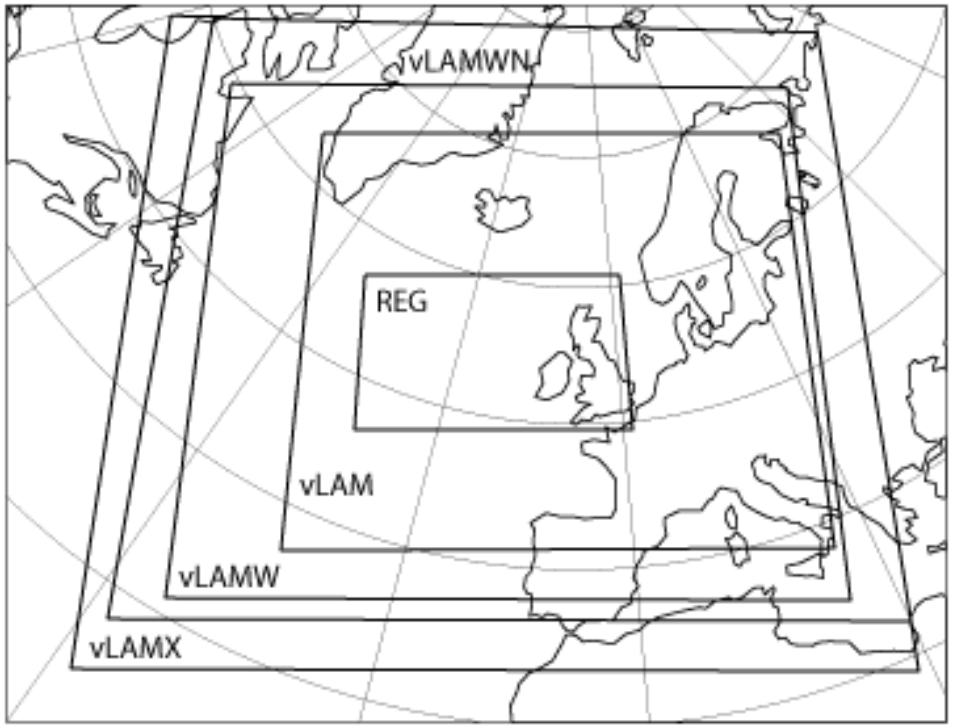
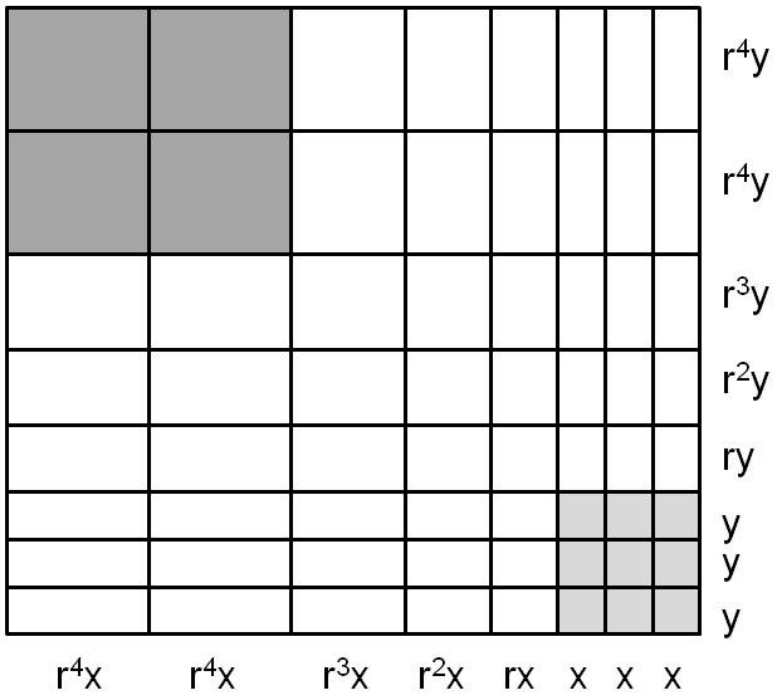


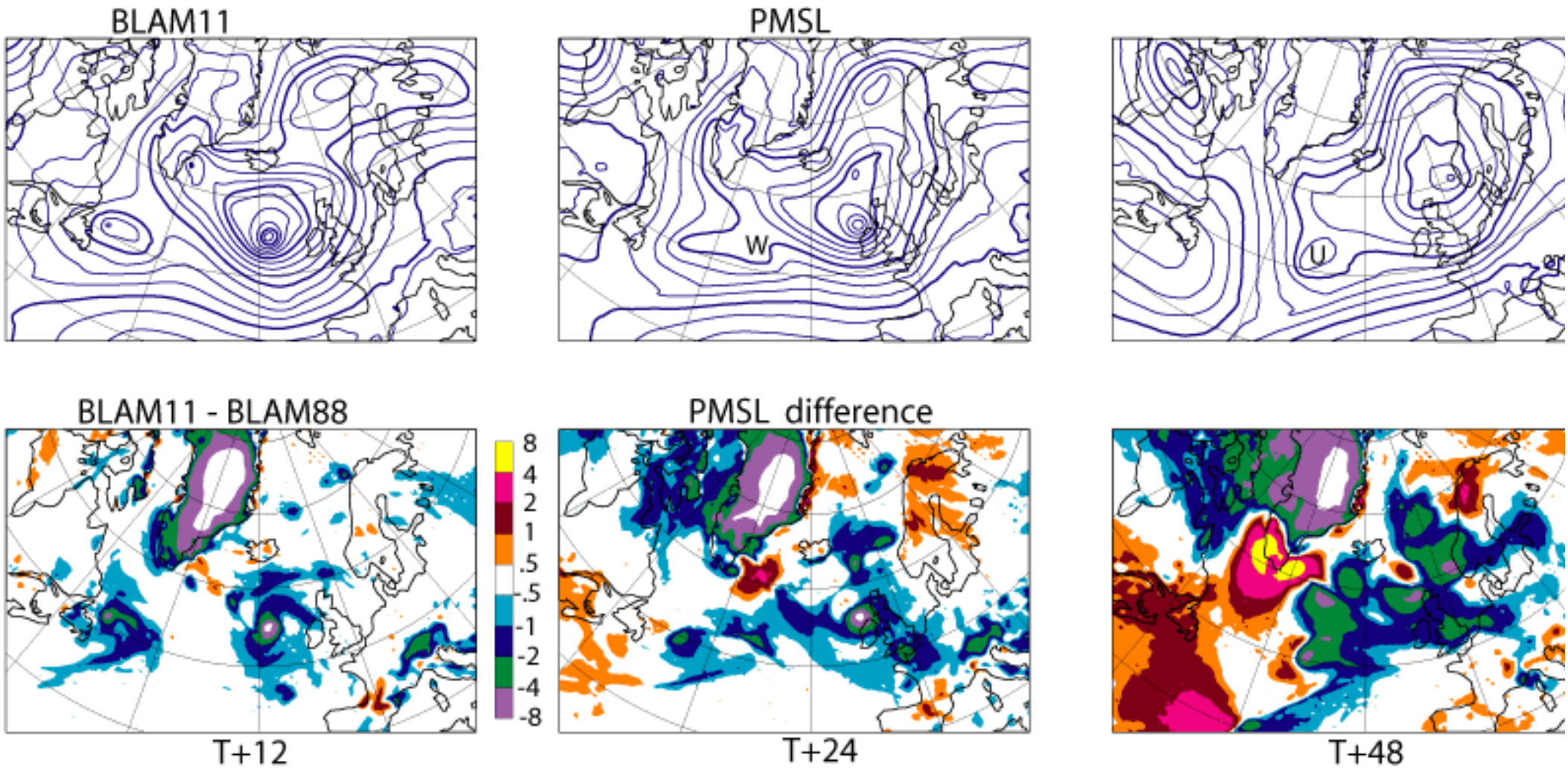
Regular LAM domains

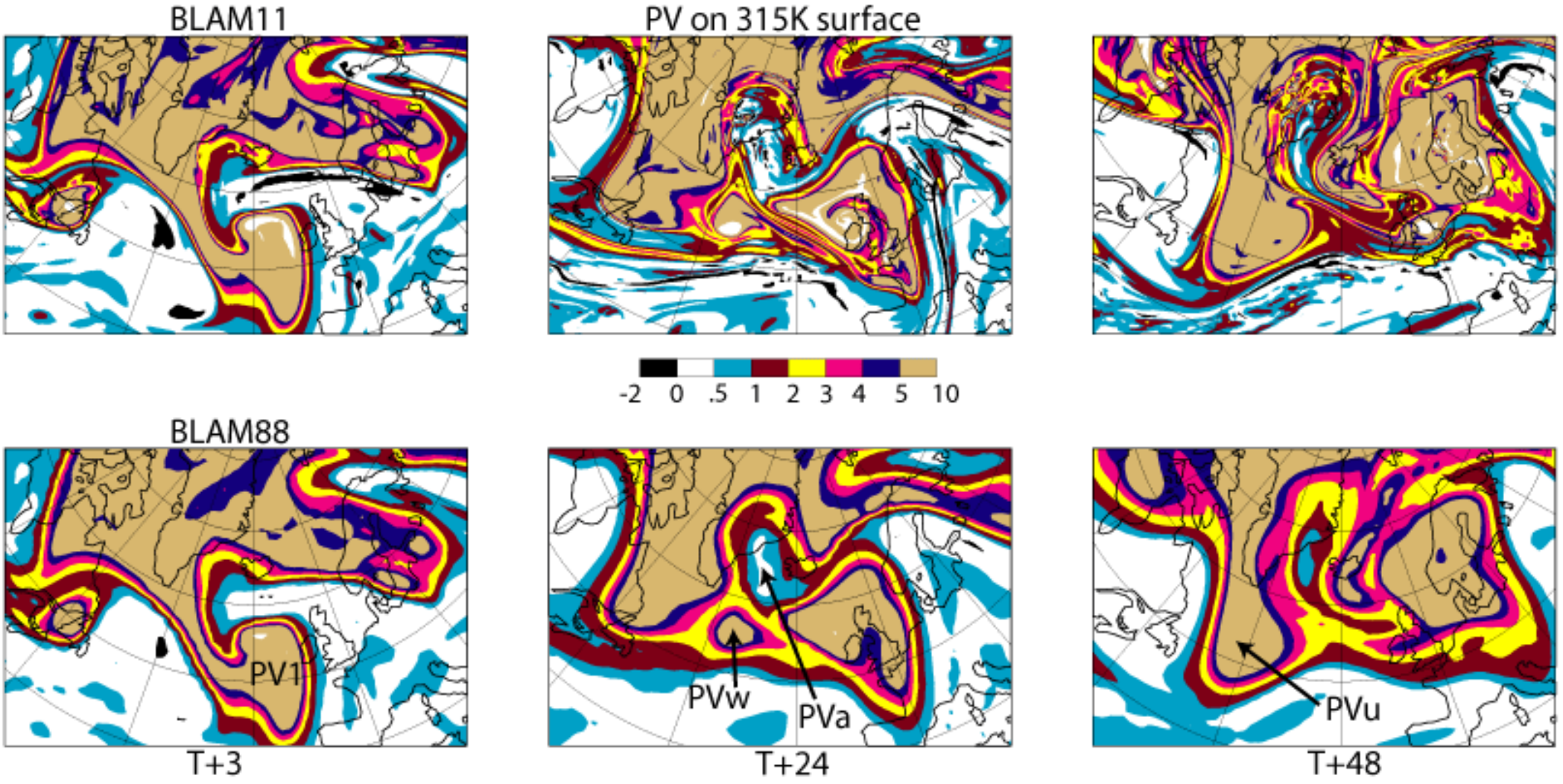


Variable LAM domains

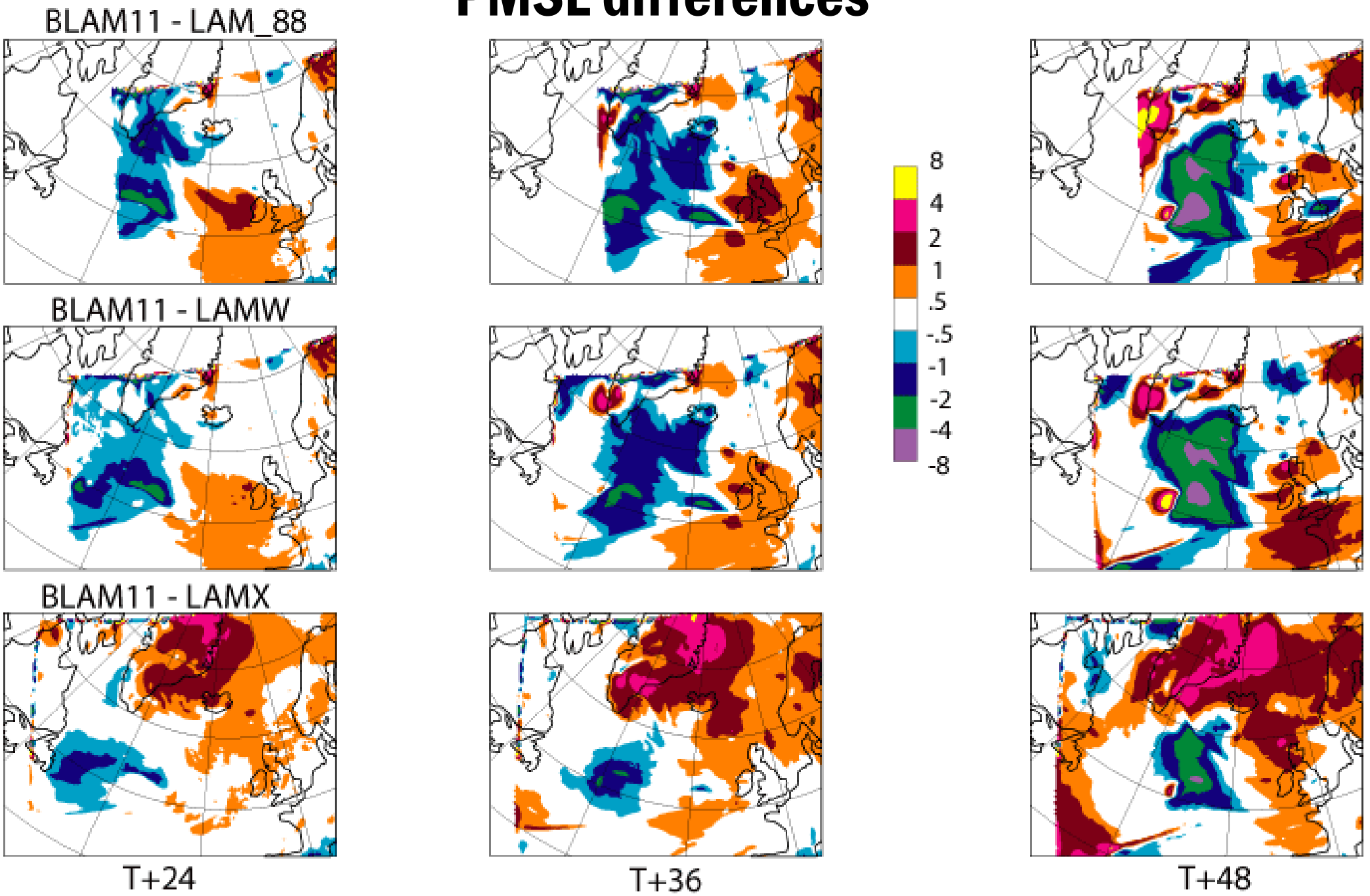
Big brother experiments
High resolution B(ig)LAM11
CONTROL and lower resolution
BLAM88 supplying LBCS



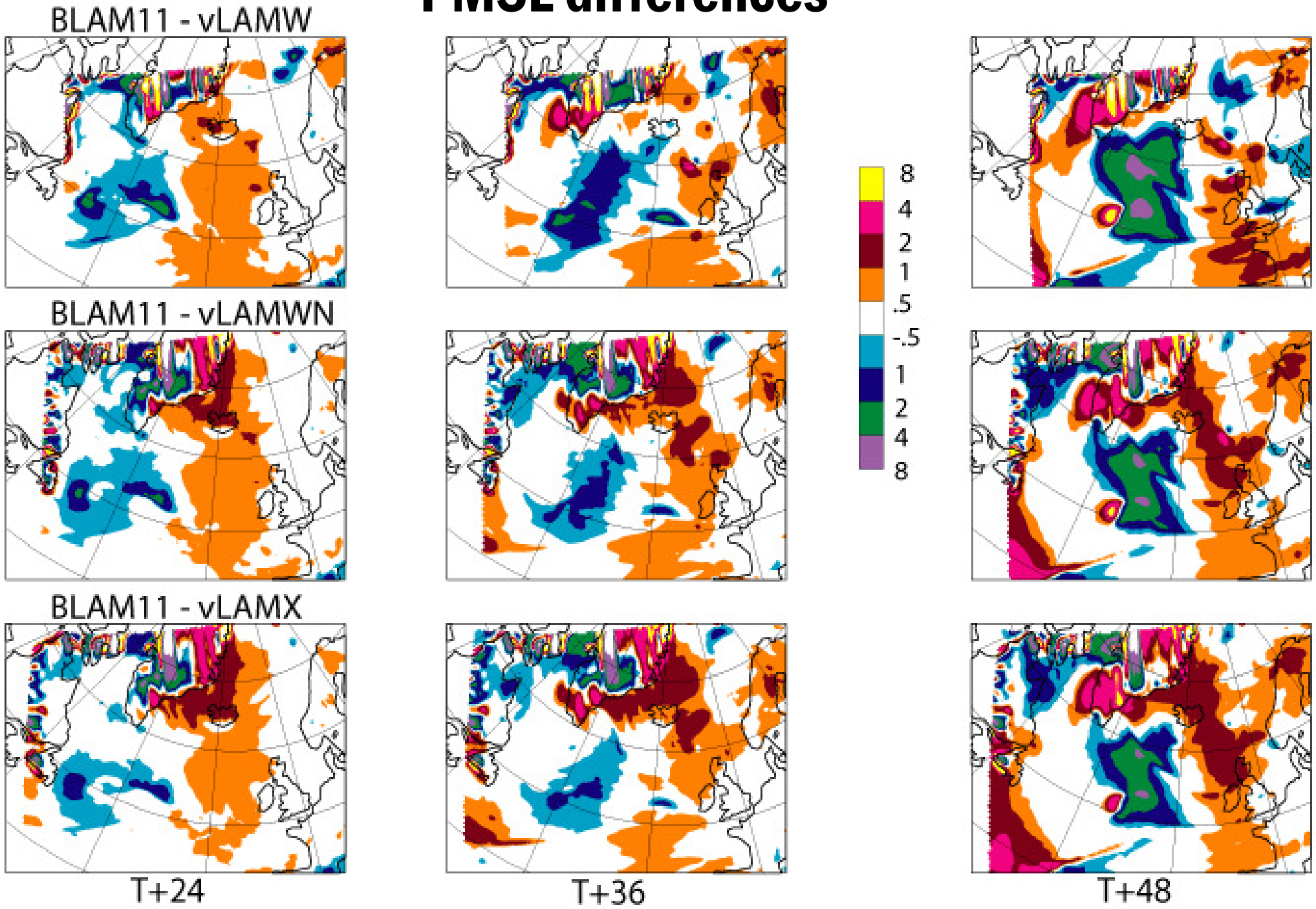




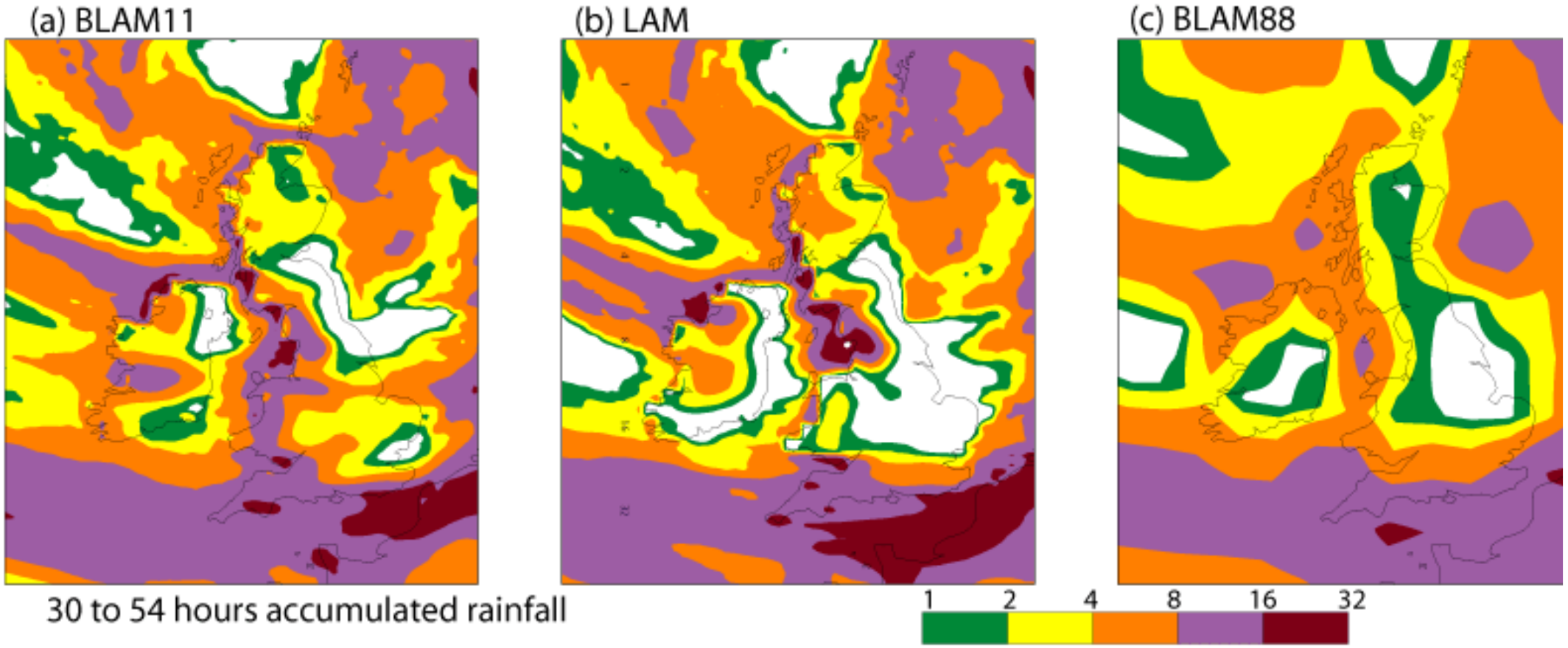
PMSL differences



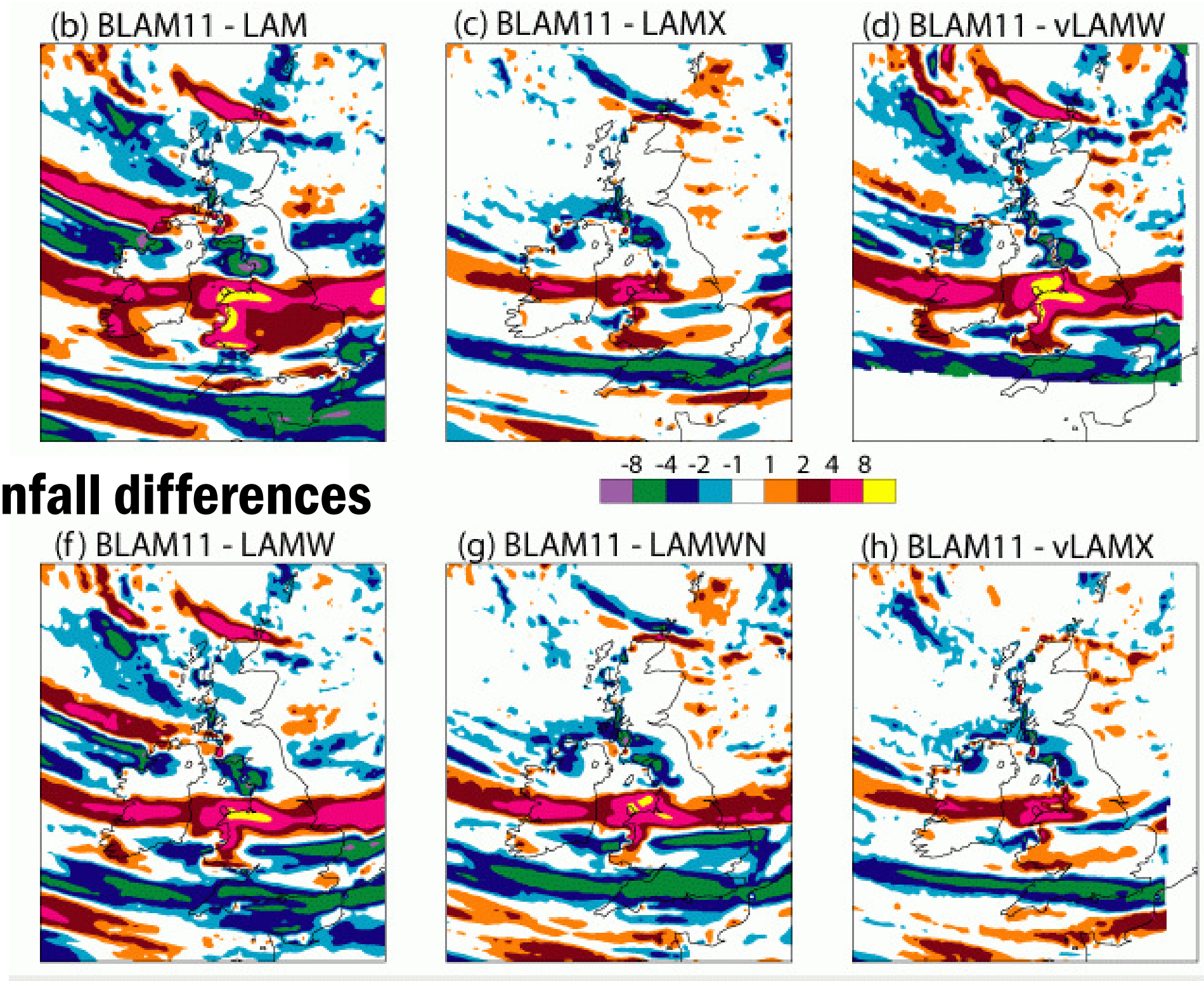
PMSL differences

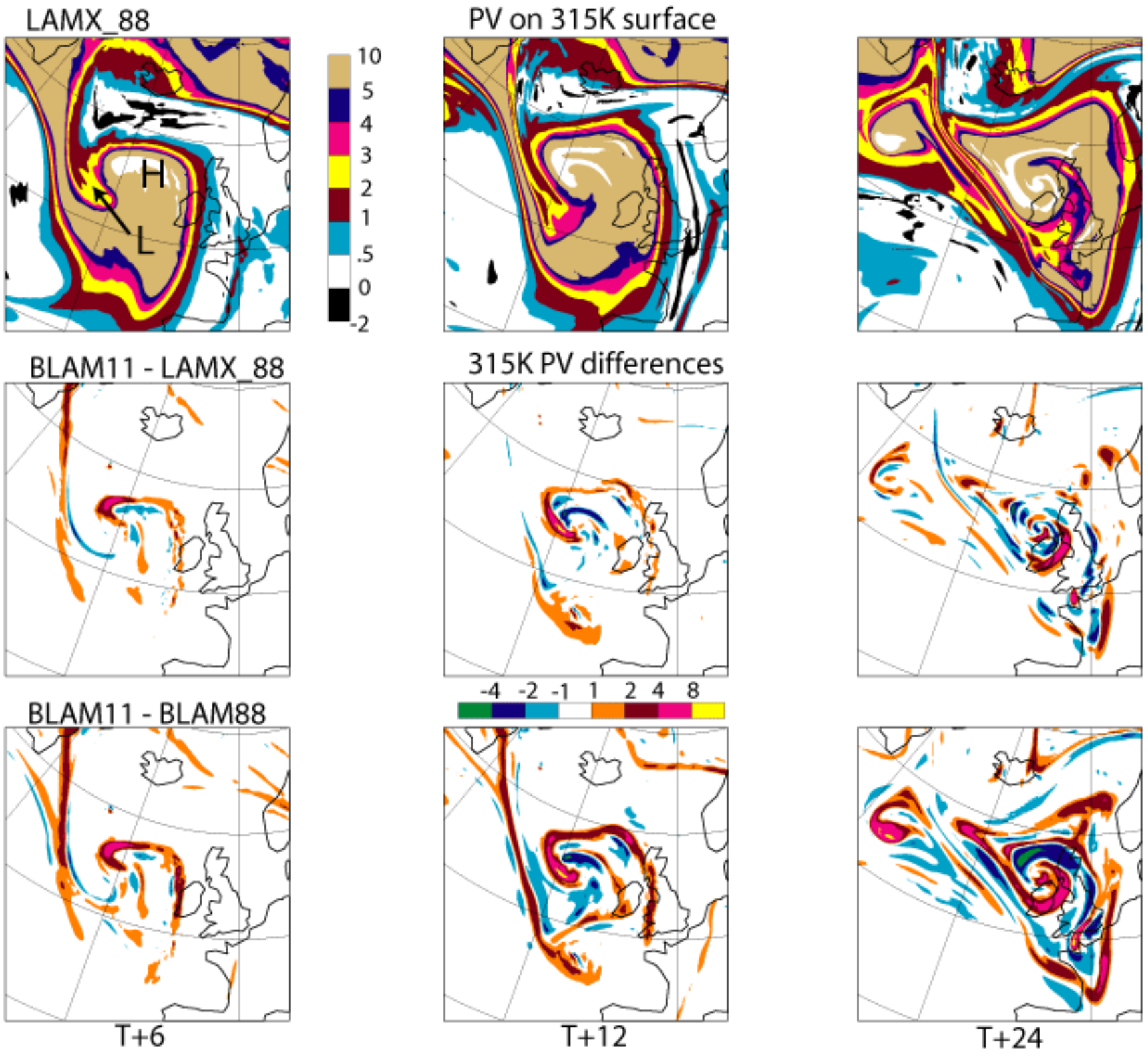


Accumulated Rainfall



Rainfall differences

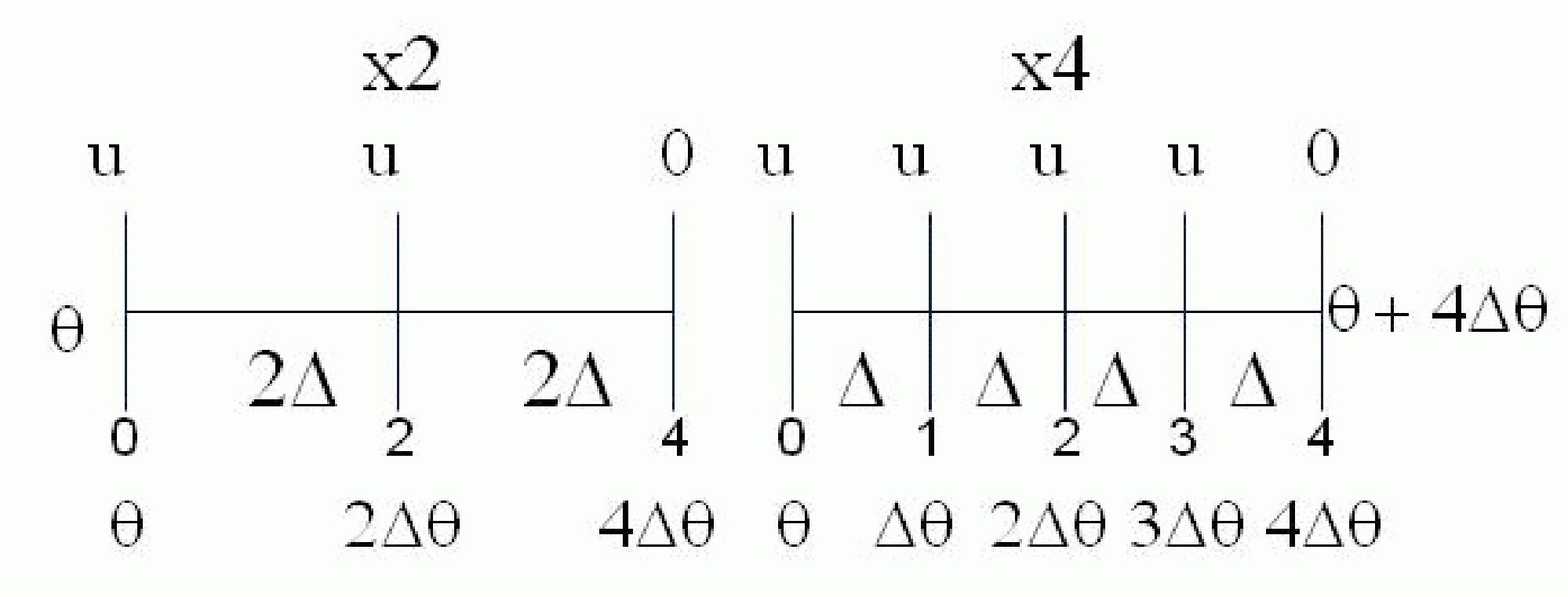



LAMX_88
PV on 315K surface
H
L
10
5
4
3
2
1
.5
0
-2
BLAM11 - LAMX_88
315K PV differences
-4 -2 -1 1 2 4 8
BLAM11 - BLAM88
T+6
T+12
T+24

Relative cost (%) of variable vLAM against regular LAM

	LAM	LAMW	LAMWN	LAMX
vLAM	24			
vLAMW	55*	44		
vLAMWN	55*	44*	34	
vLAMX	71*	57*	44*	36

Gradient tightening due to large scale convergence



Conclusions 1

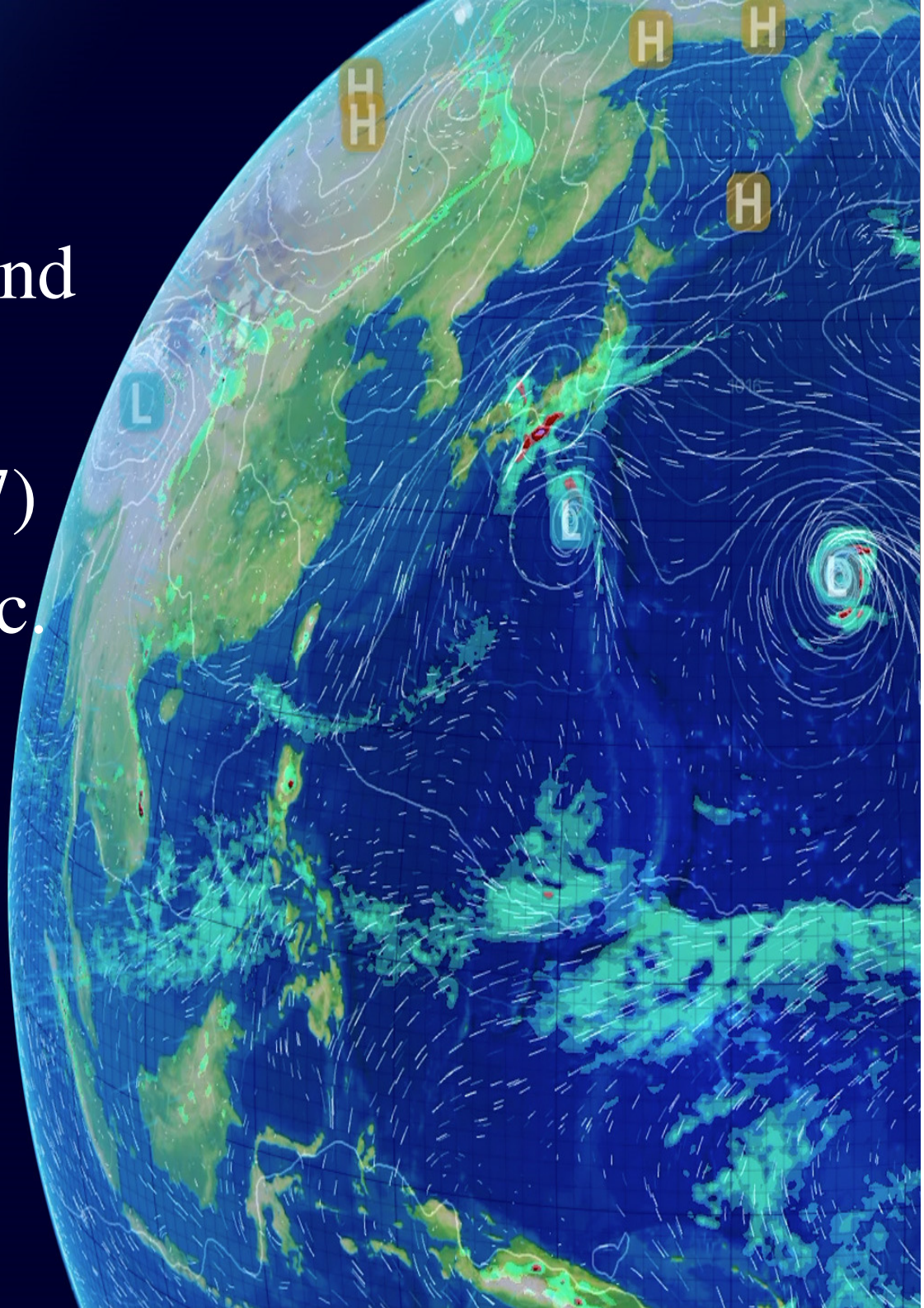
- The bigger the domain, the longer it takes for LBCs to affect the region of interest (ROI).
- Variable resolution LAMs over the same domain give similar results as regular LAMs but at significantly lower cost.
- Variable resolution LAMs can have much bigger domains than regular LAMs for the same cost.

Conclusions 2

- There is limited evidence of downscaling of LBC information apart from that induced by interaction with the surface.
- NWP – do not let LBCs affect ROI – make boundaries as remote as possible and do not downscale medium range forecasts.
- RCMs – Make boundaries as remote as possible e.g. climate UKV needs to include whole of Iberia.

The End

Dynamical downscaling and variable resolution in limited-area models (2017) Quart. Jour. Roy. Met. Soc.



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