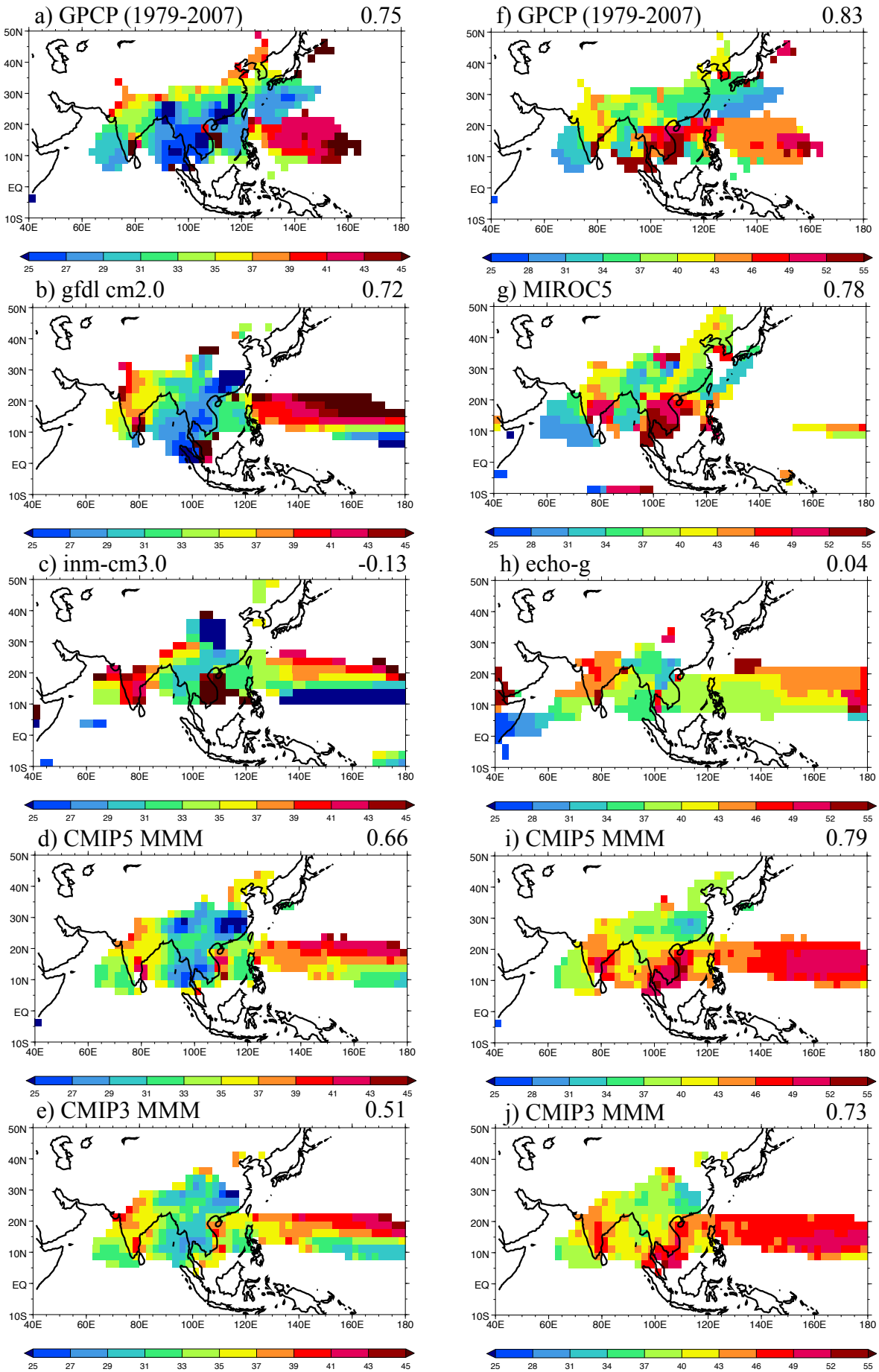



**Fig. 6** Monsoon onset pentad **a** GPCP, **b** gfdl cm2.0, **c** inm-cm 3.0, **d** CMIP5 MMM, and **e** CMIP3 MMM. Monsoon peak pentad **f** GPCP, **g** MIROC5, **h** echo-g, **i** CMIP5 MMM, and **j** CMIP3 MMM. Also given in **a** and **f** is the pattern correlation of GPCP with CMAP, and in **b-e** and **g-j** are the model pattern correlations with GPCP over the region 50°E-180°E, 0°-50°N. The units are pentad (Pentad 1 = January 1-5). Note the difference in scale for the onset vs. peak phases. GPCP and CMAP data are from 1979-2007 and the model data is from 1961-1999

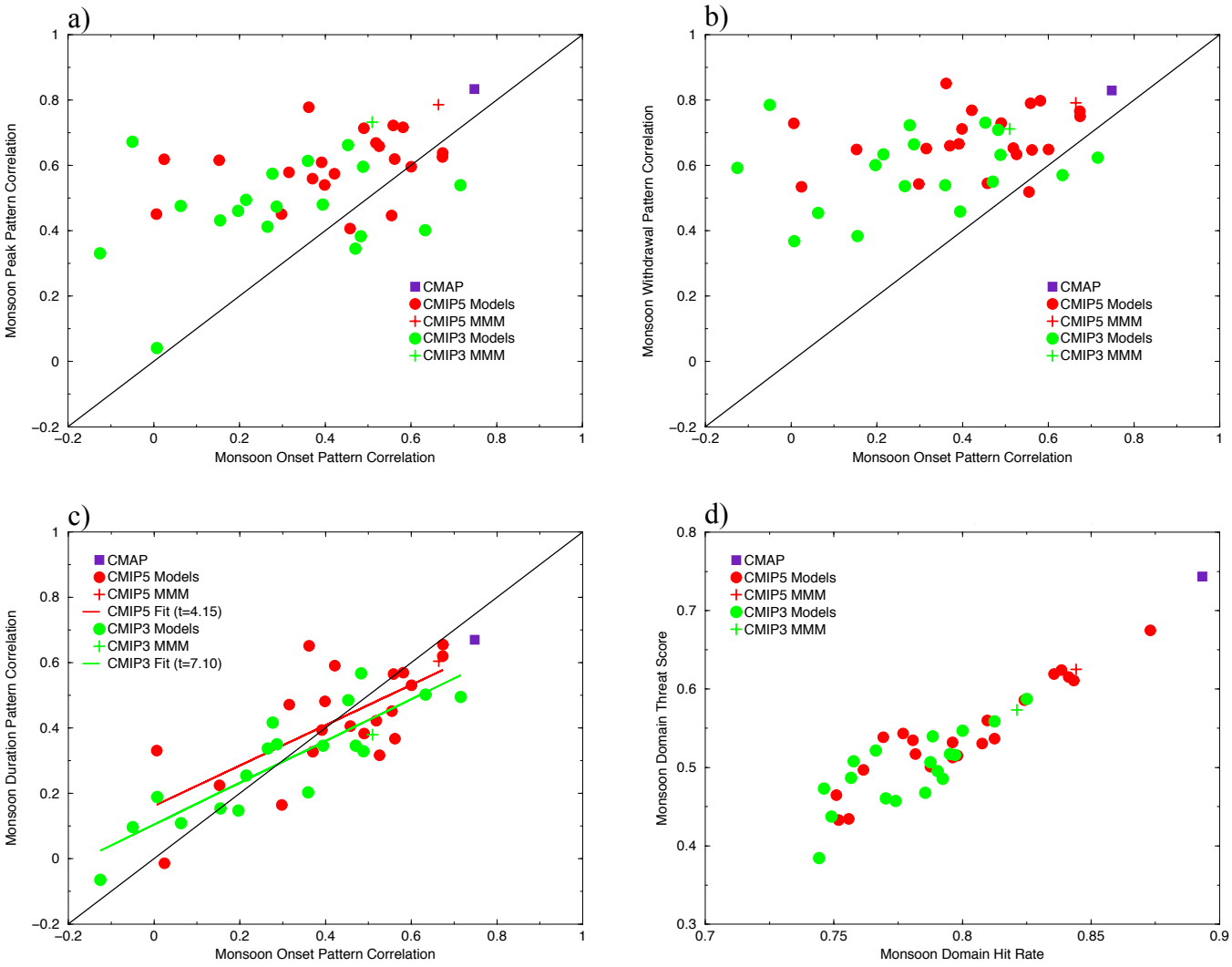
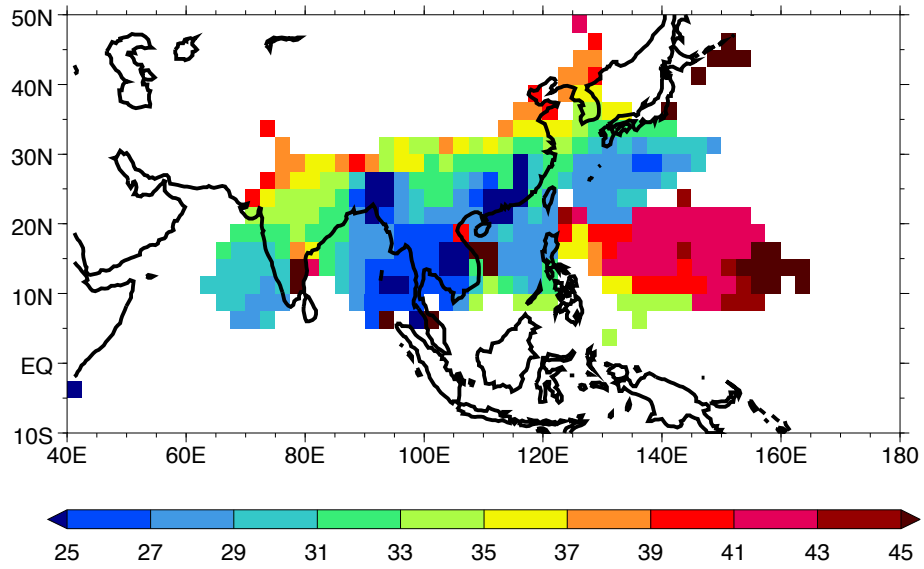
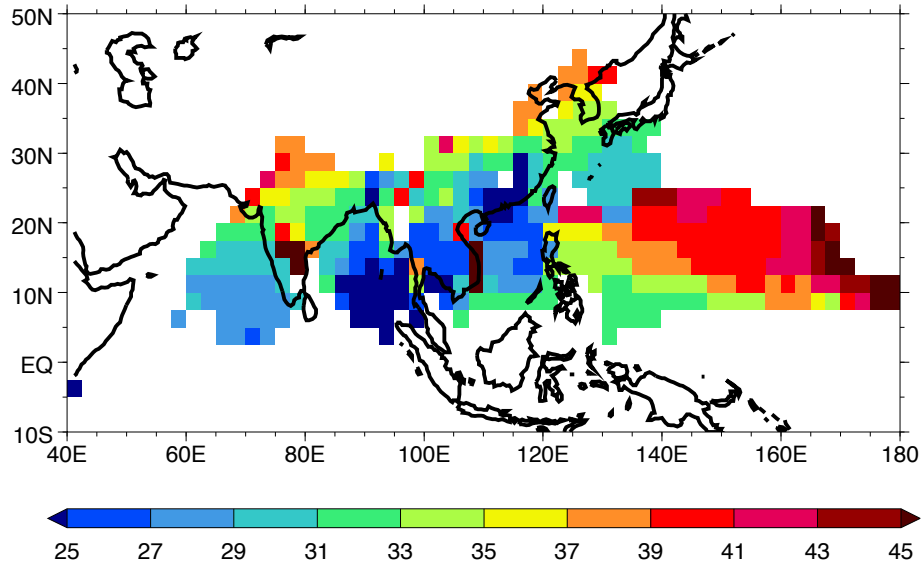


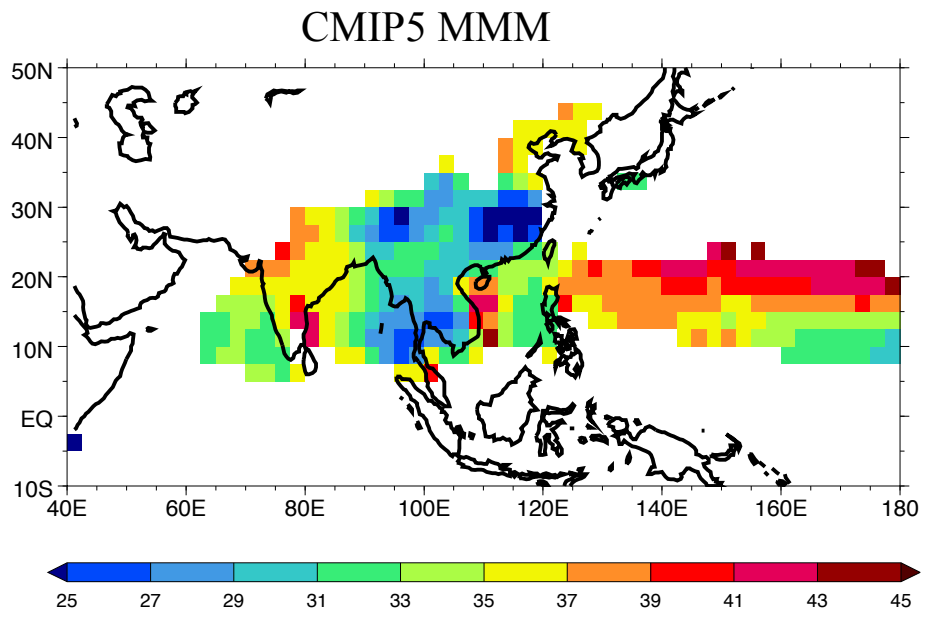

**Fig. 8** Scatterplot of the pattern correlation with observations of the simulated pentad of monsoon onset vs. **a** the pattern correlation with observations of the simulated pentad of monsoon peak, **b** the pattern correlation with observations of the simulated pentad of monsoon withdrawal, and **c** the pattern correlation with observations of the simulated number of pentads of monsoon duration. **d** Scatterplot of the Monsoon Domain Hit Rate vs. the Monsoon Domain Threat Score. In **a-d** the skill is with respect to GPCP for the region 50°E-180°E, 0°-50°N

GPCP (1979-2007)




CMAP (1979-2007)

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40N
30N
20N
10N
EQ
10S
40E
60E
80E
100E
120E
140E
160E
180
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27
29
31
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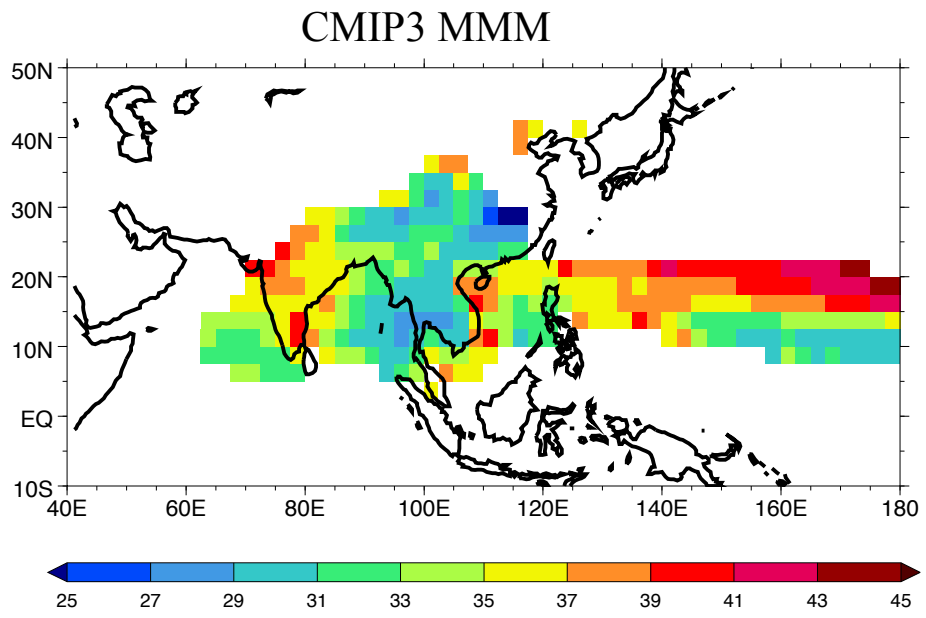
35
37
39
41
43
45


CMIP3 MMM
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30N
20N
10N
EQ
10S
40E
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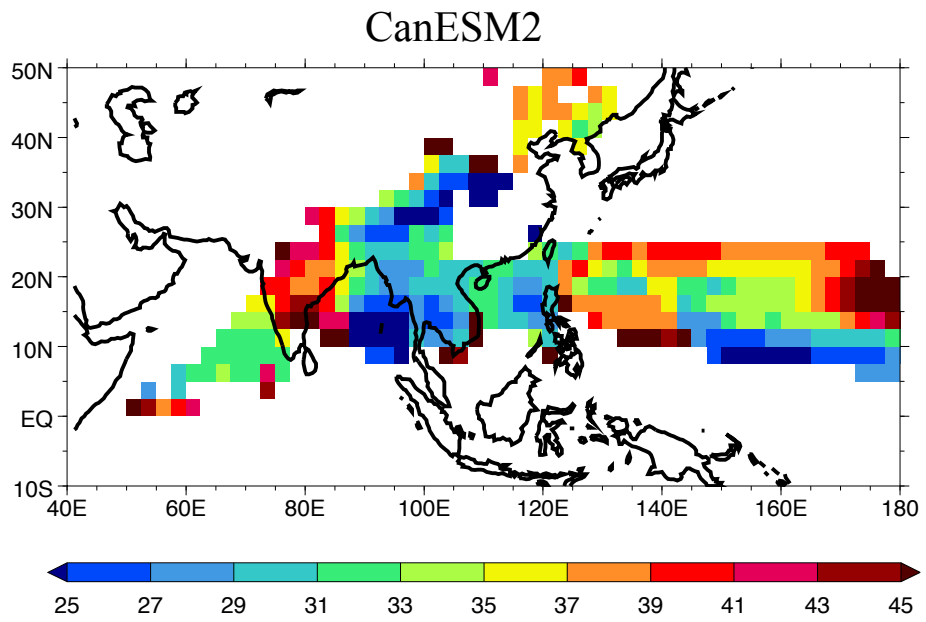
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20N
10N
EQ
10S
40E
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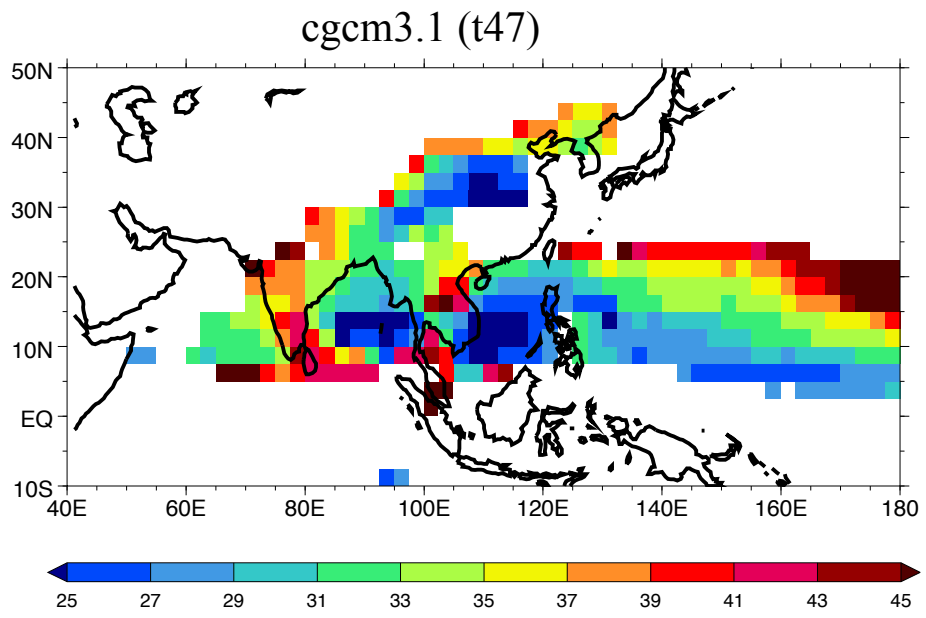
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10S
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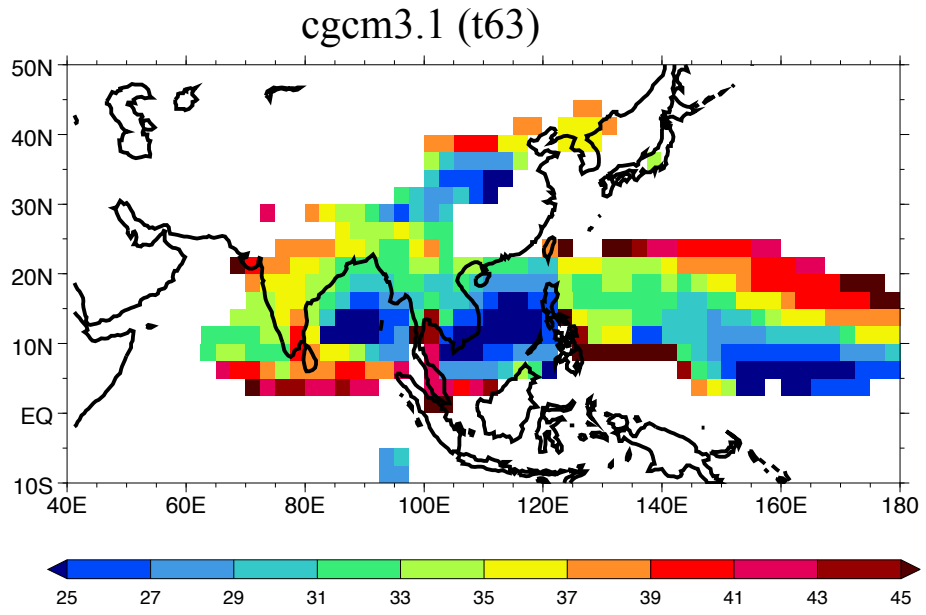
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EQ
10S
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120E
140E
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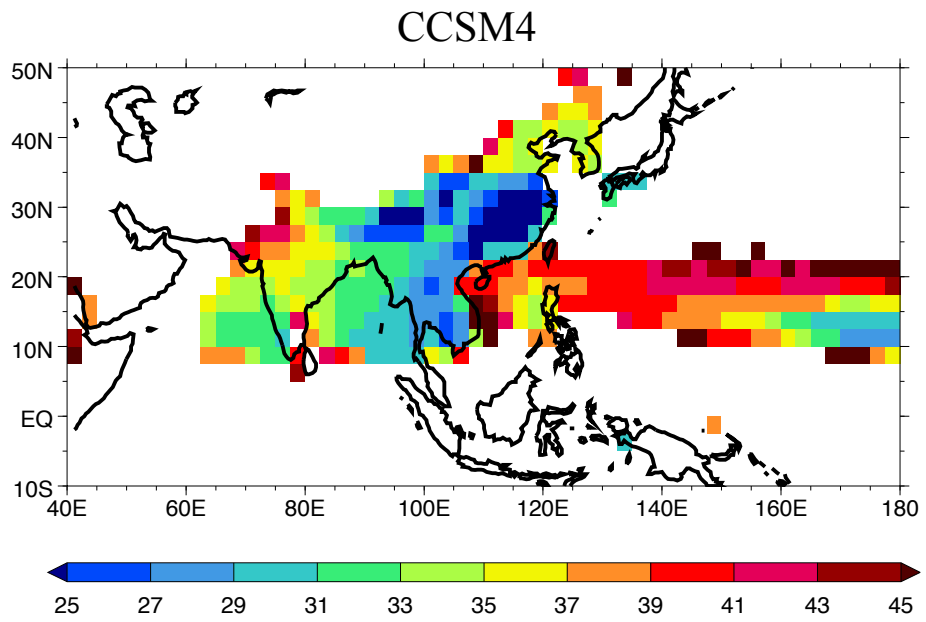
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EQ
10S
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120E
140E
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180
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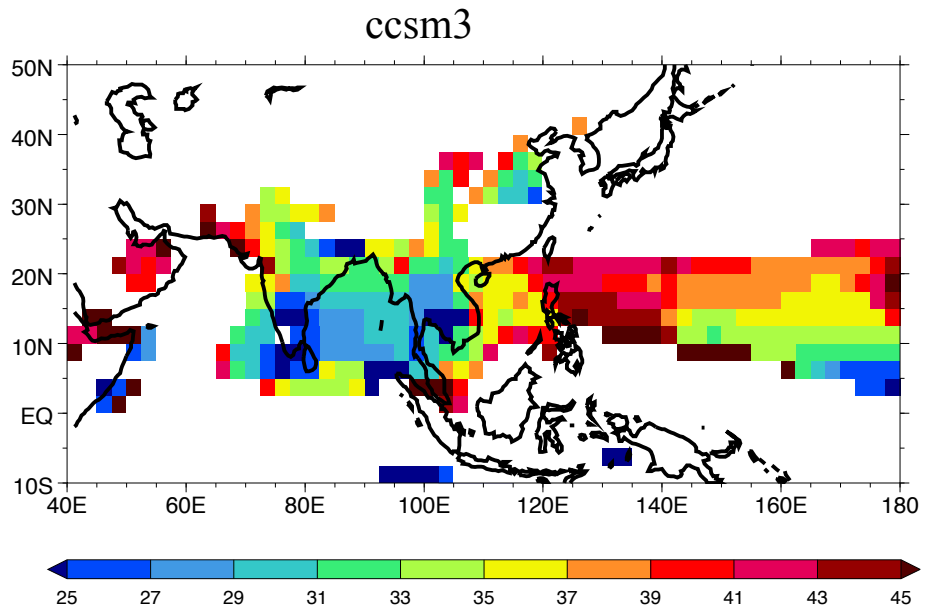
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10N
EQ
10S
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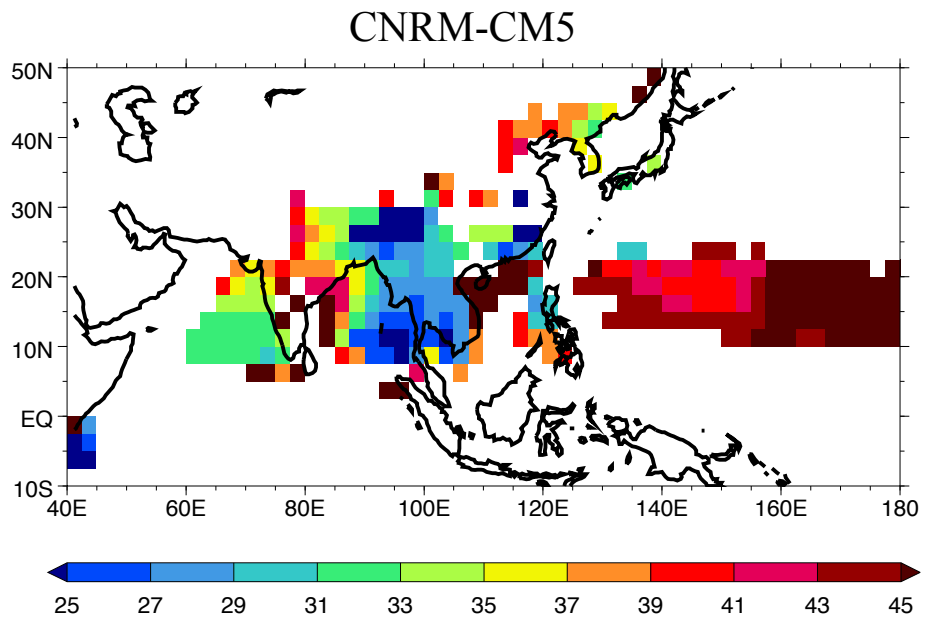
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10N
EQ
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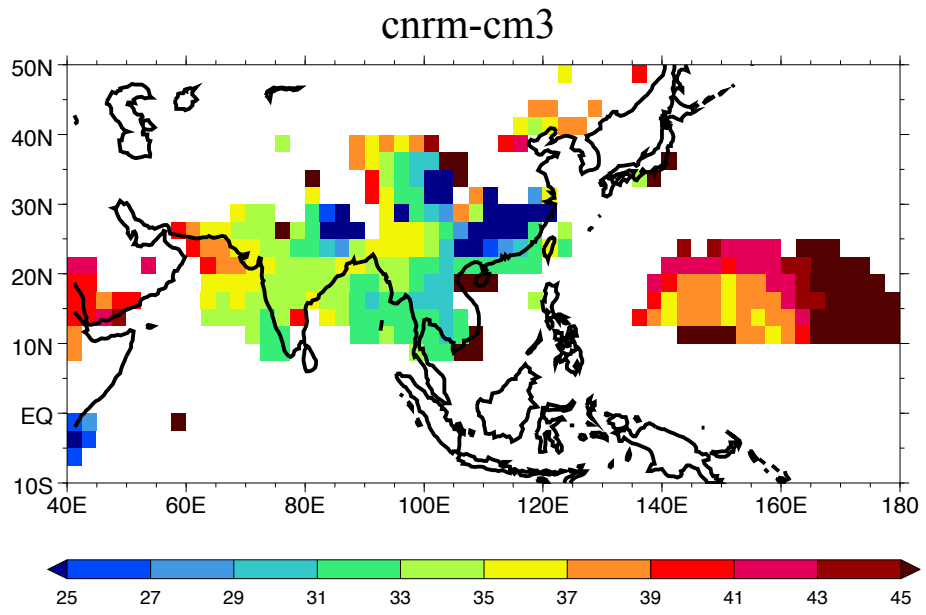
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EQ
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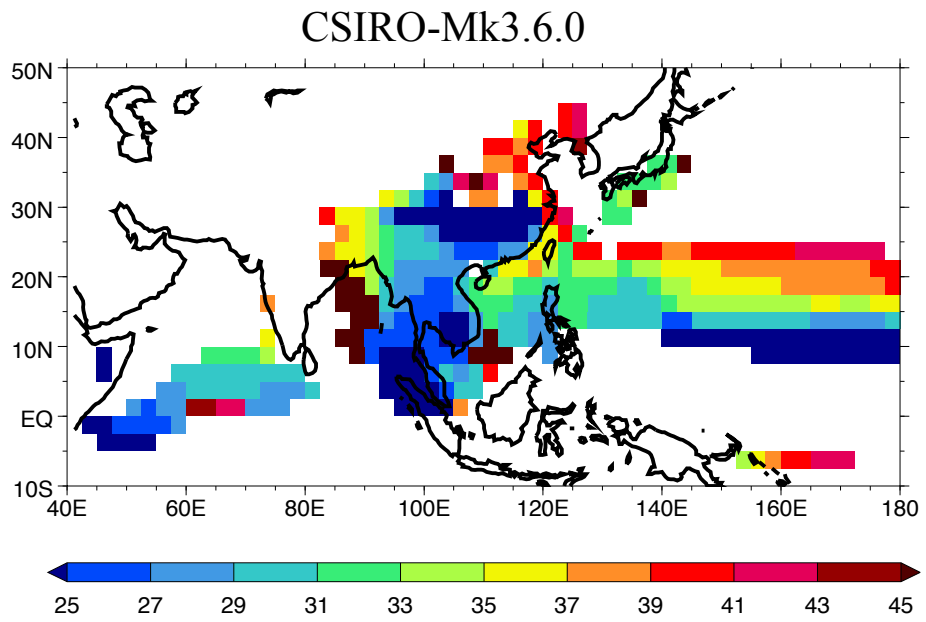
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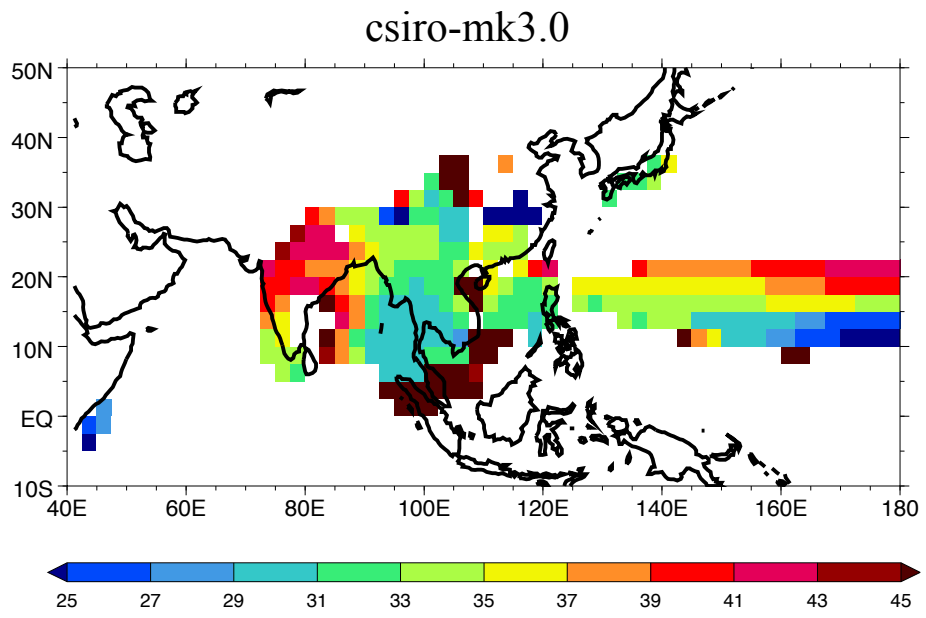
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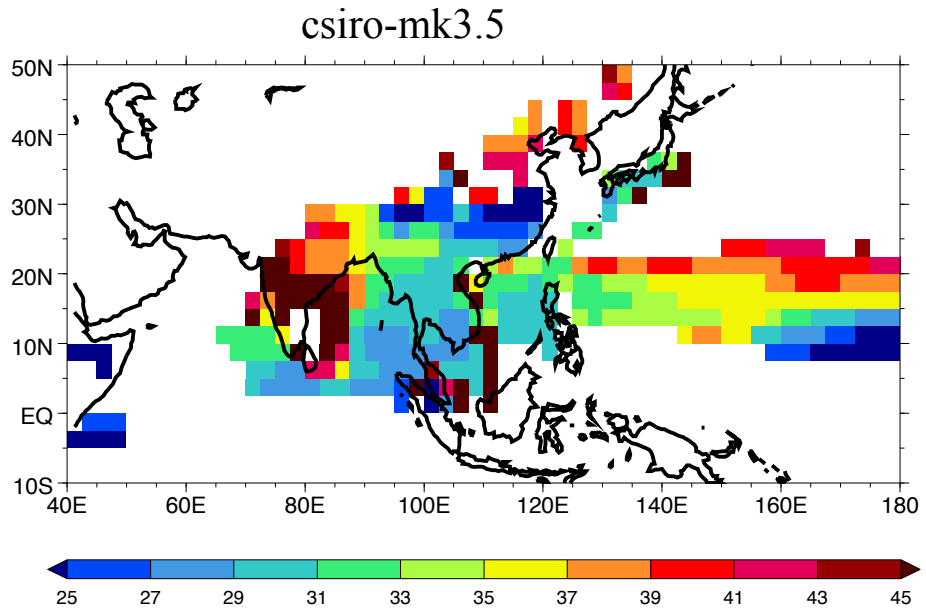
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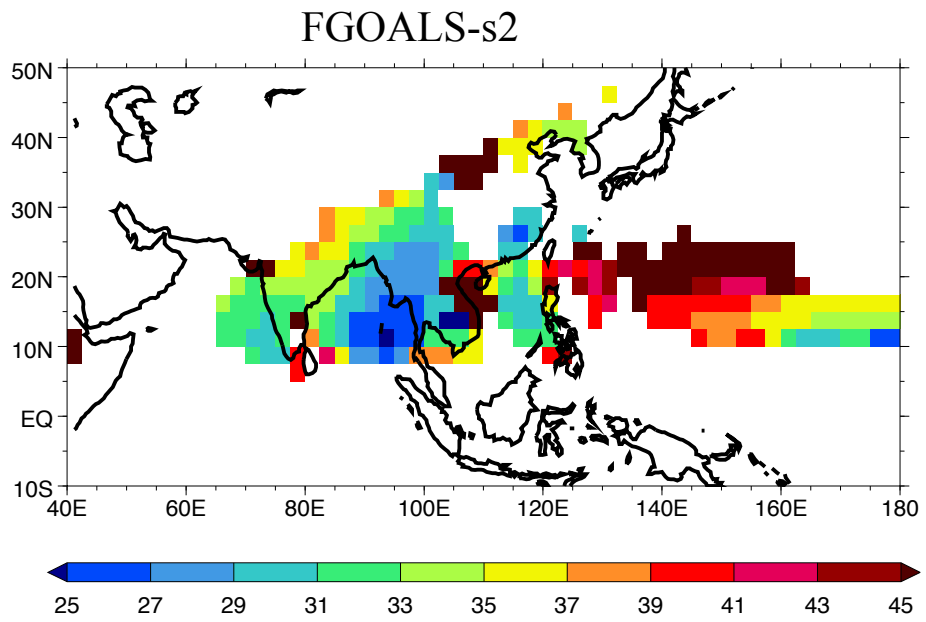
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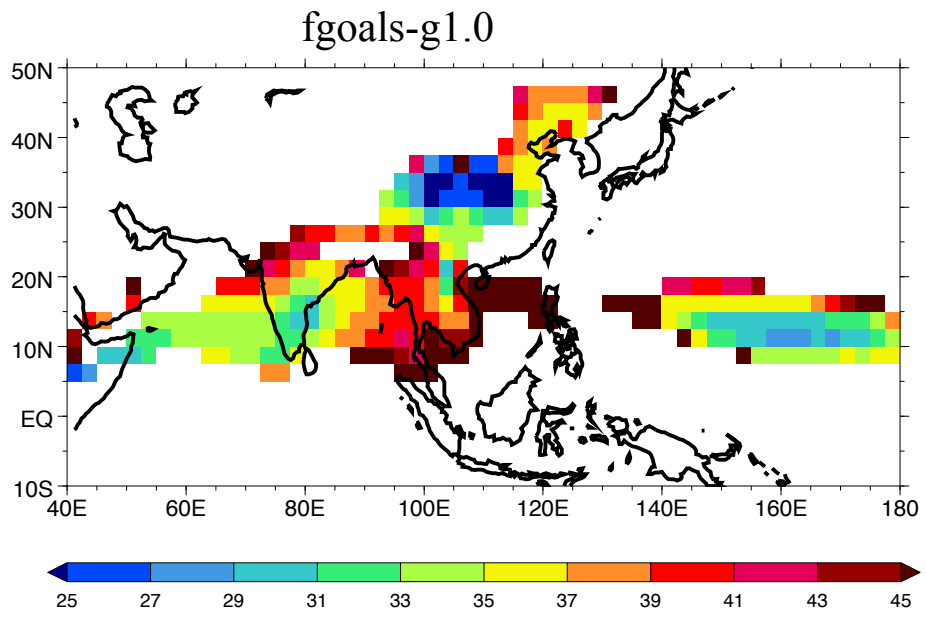
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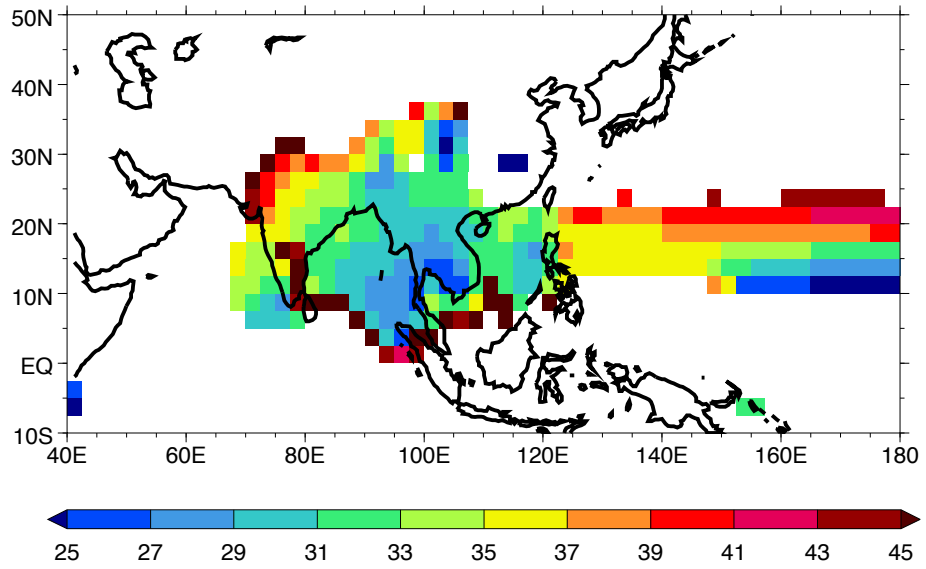
GFDL-CM3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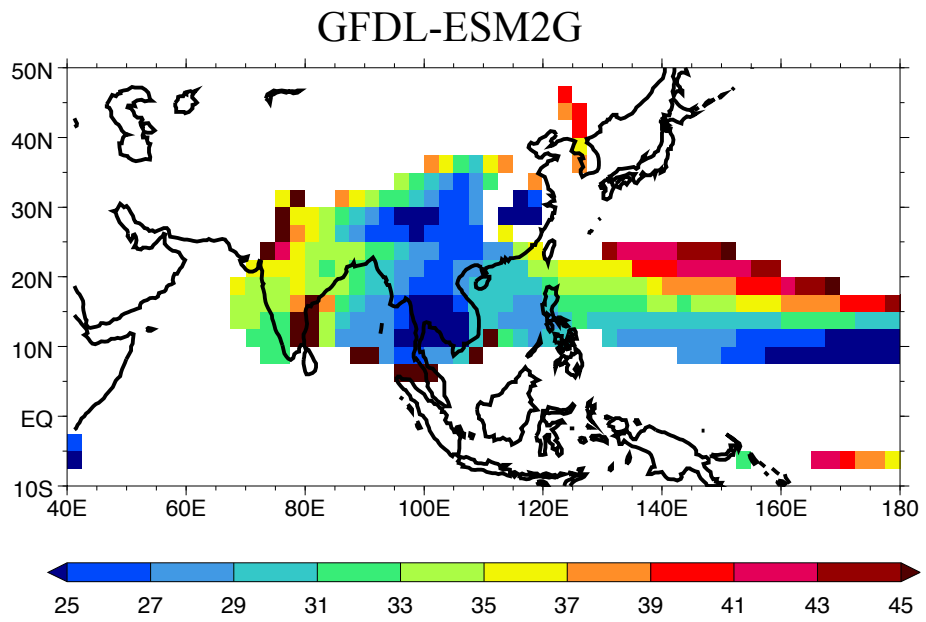
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EQ
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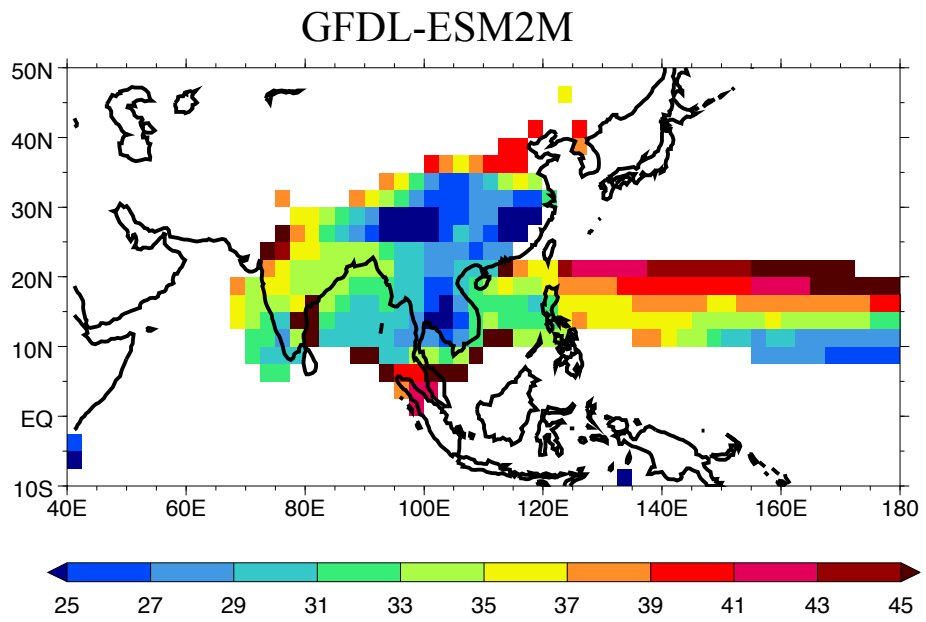
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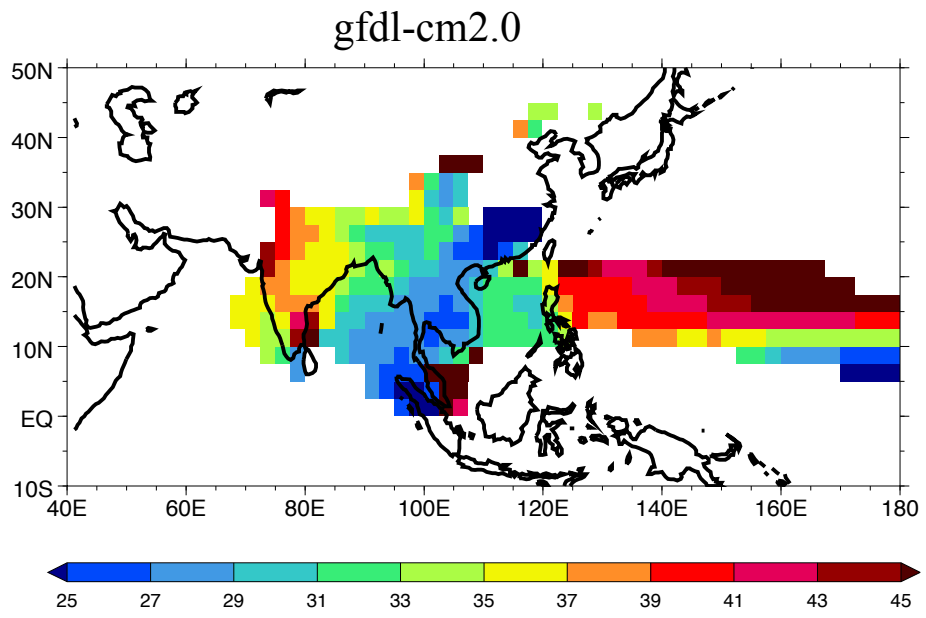
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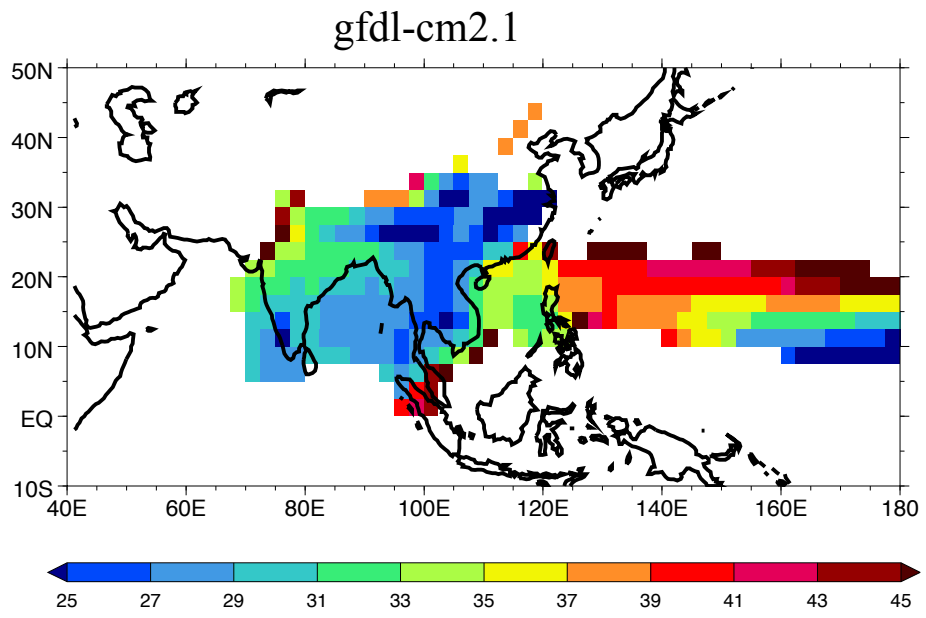
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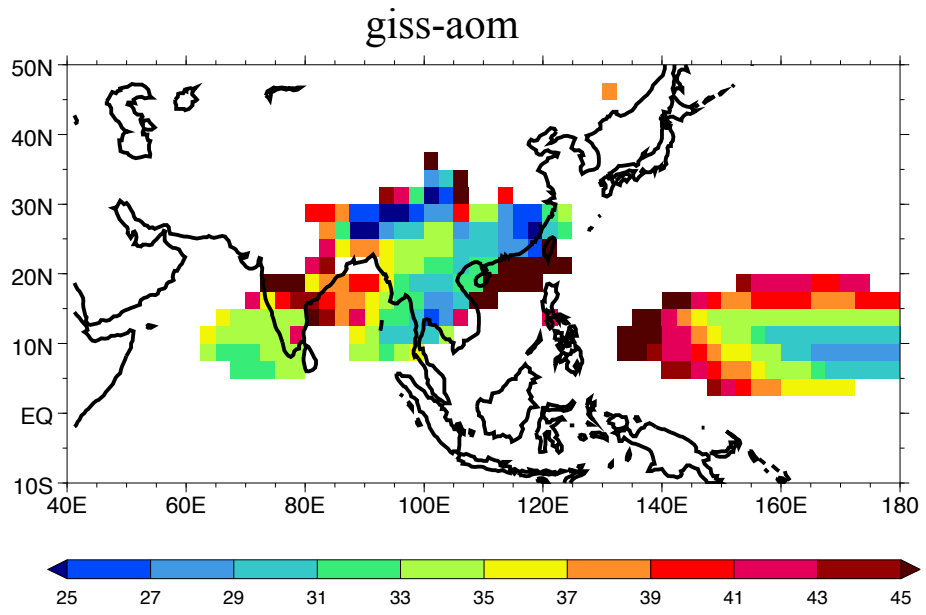
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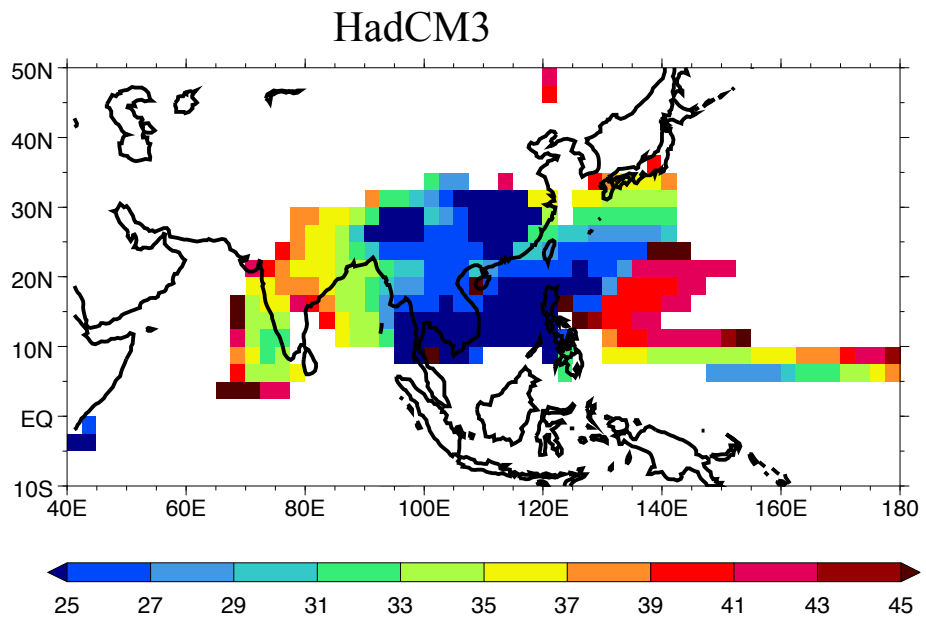
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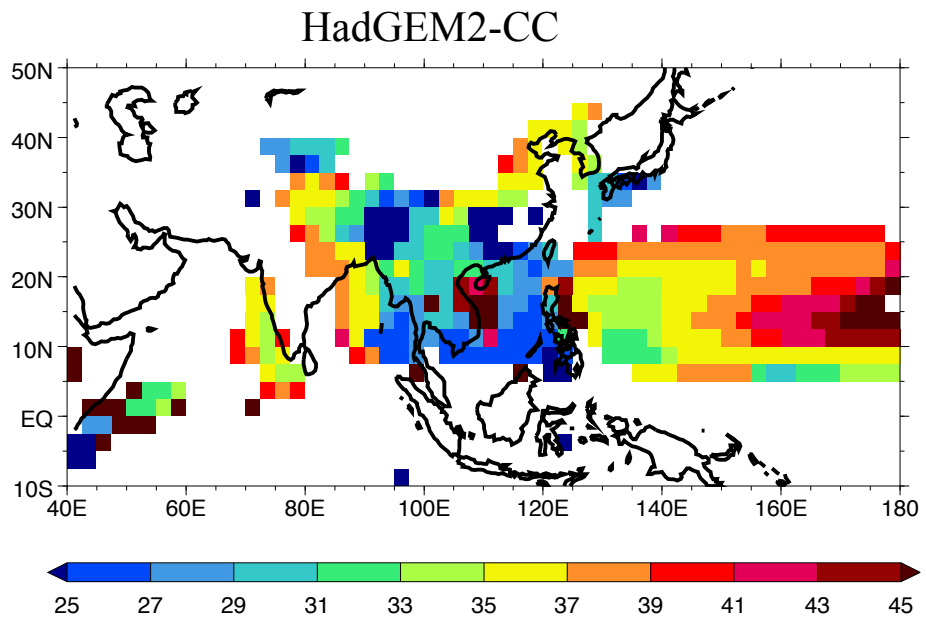
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EQ
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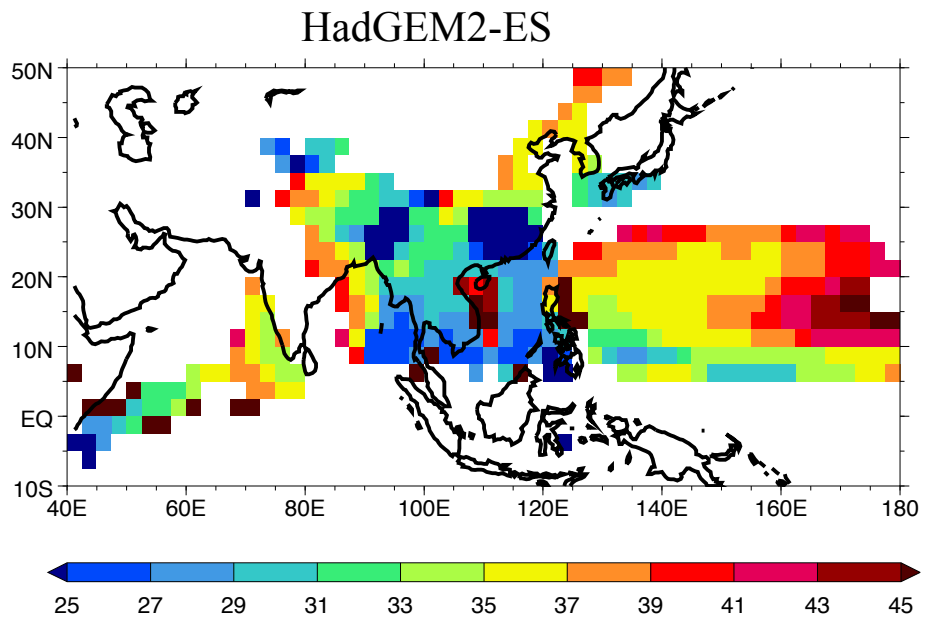
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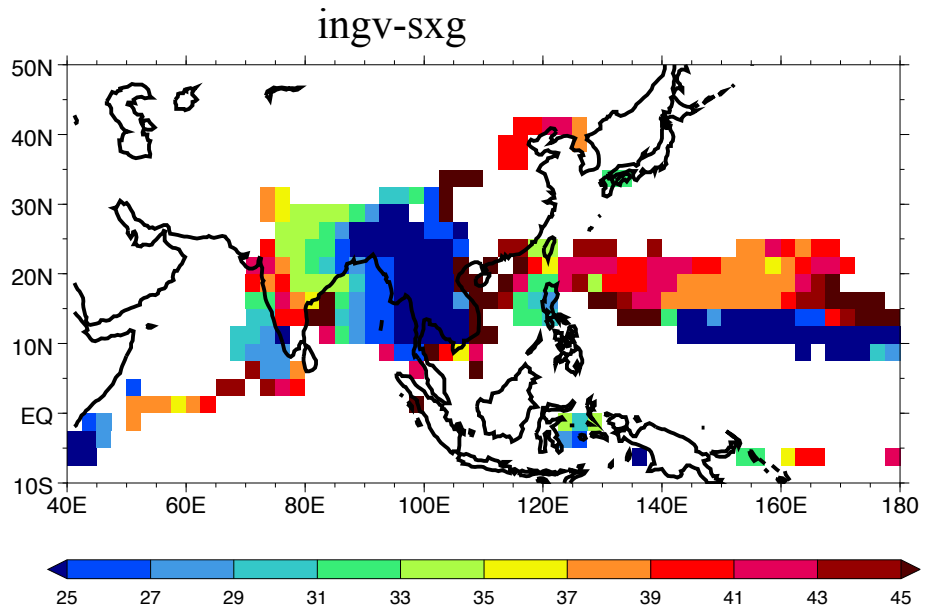
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EQ
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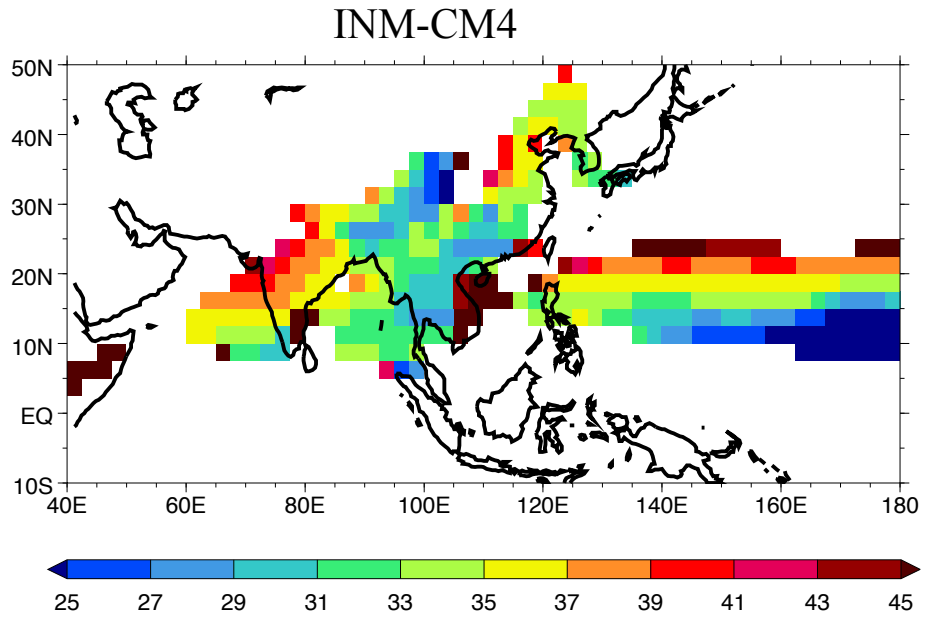
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EQ
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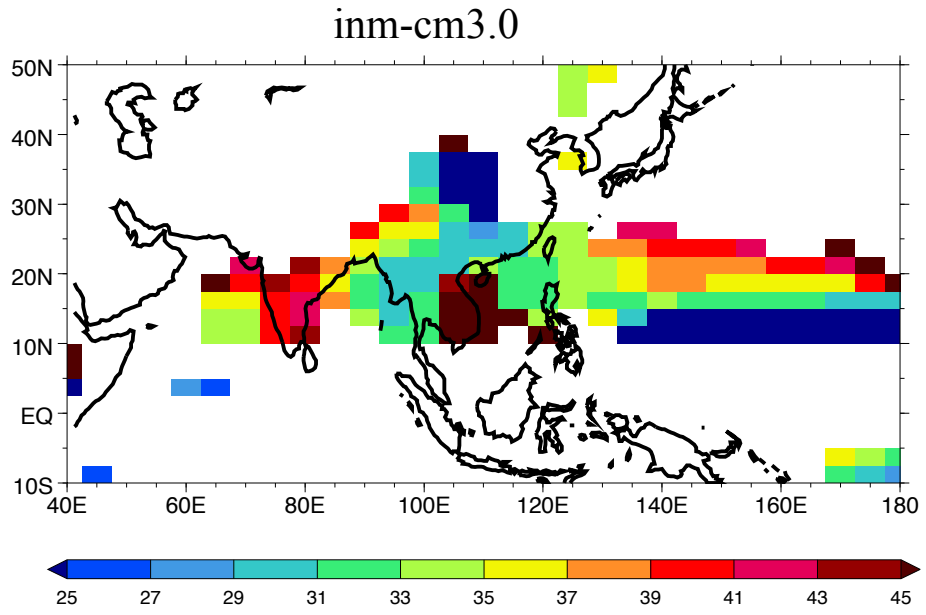
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EQ
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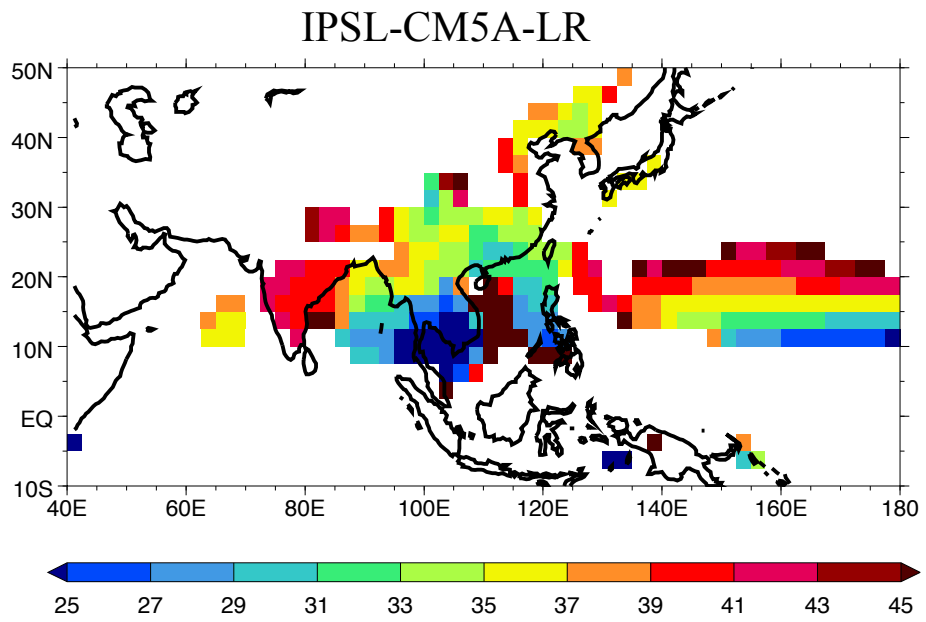
IPSL-CM5A-LR
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EQ
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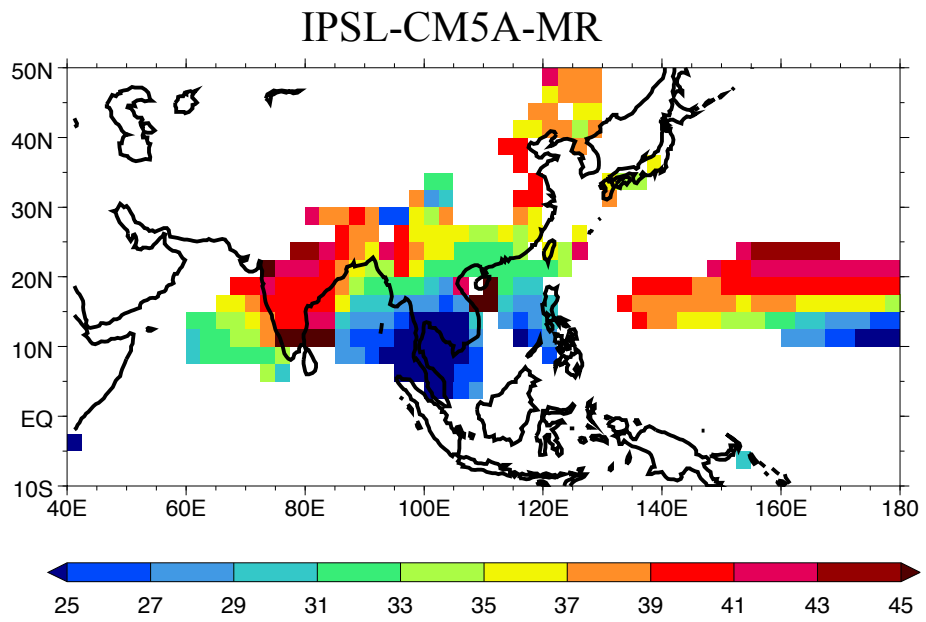
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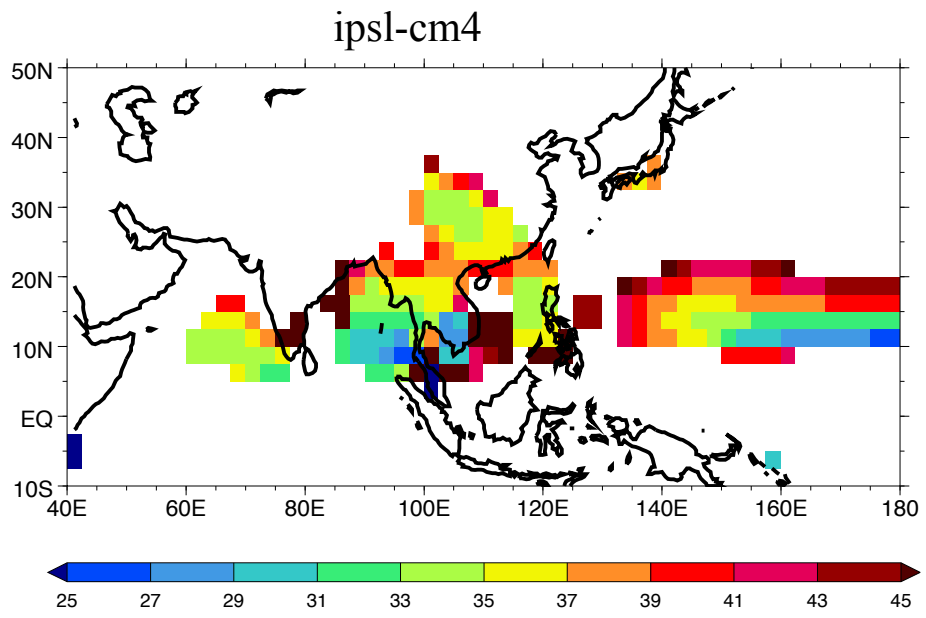
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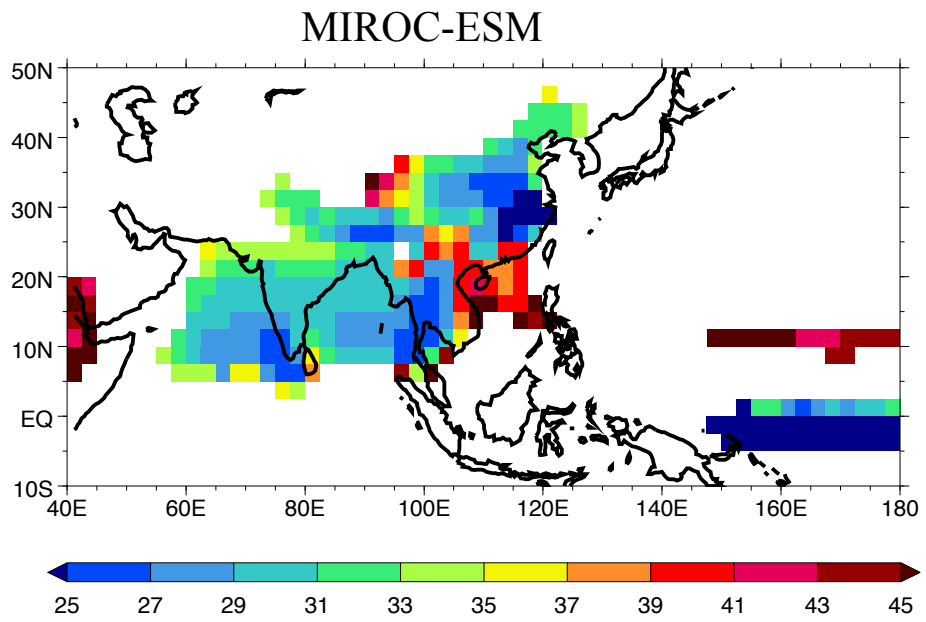
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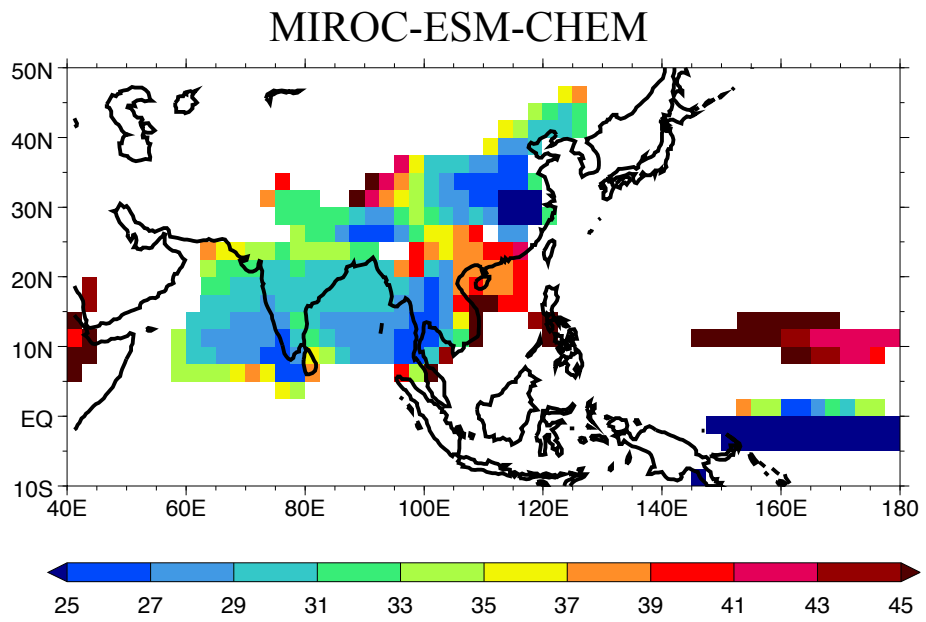
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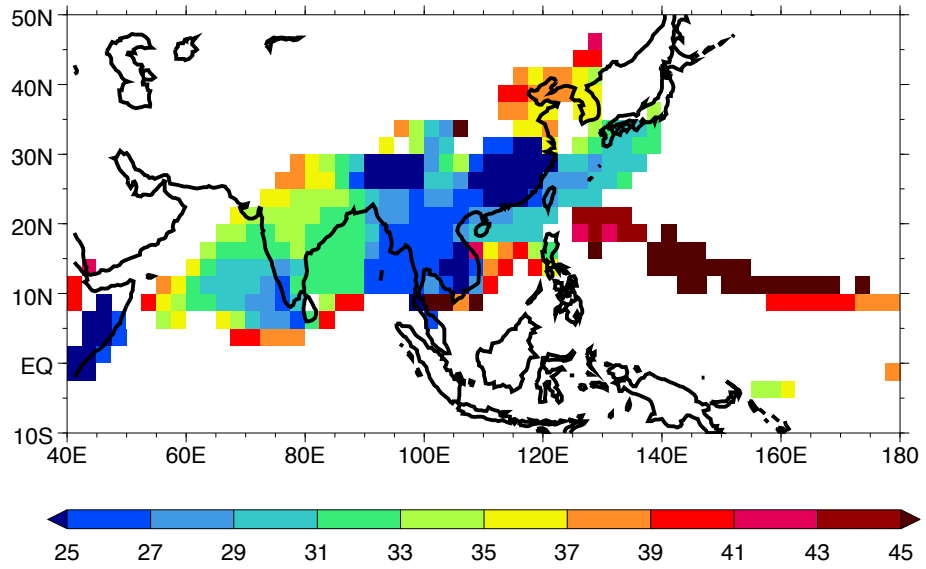
MIROC4h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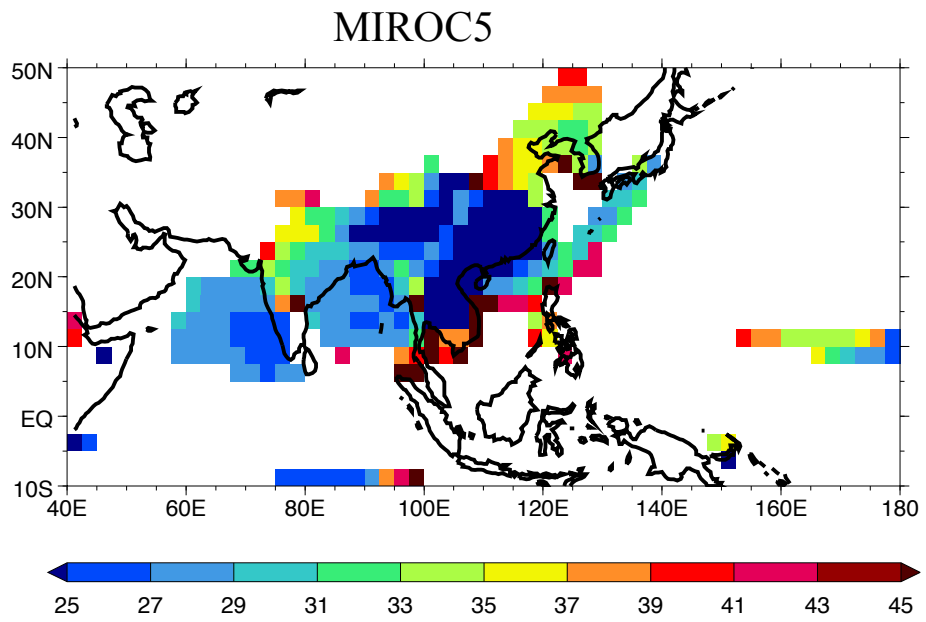
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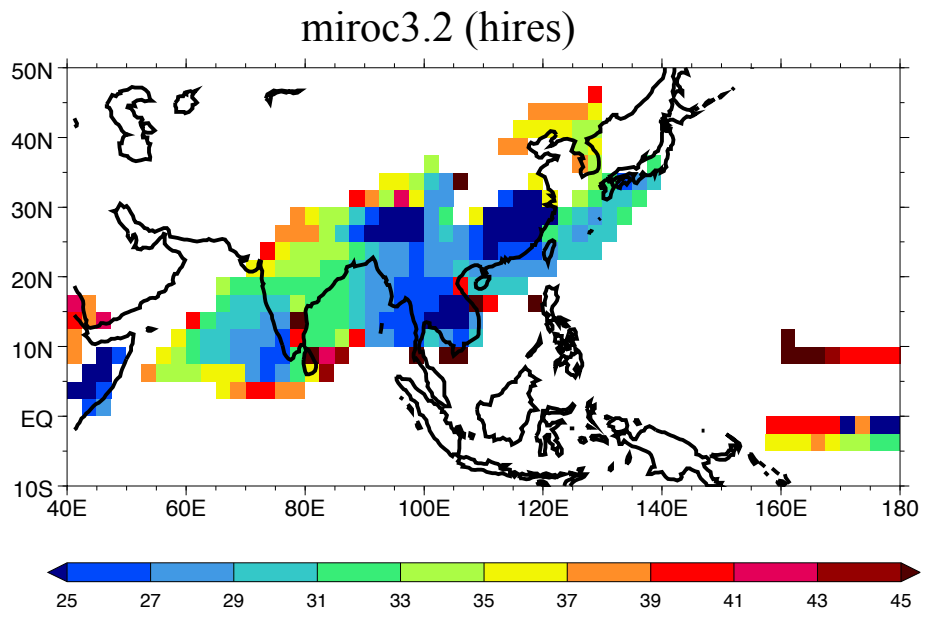
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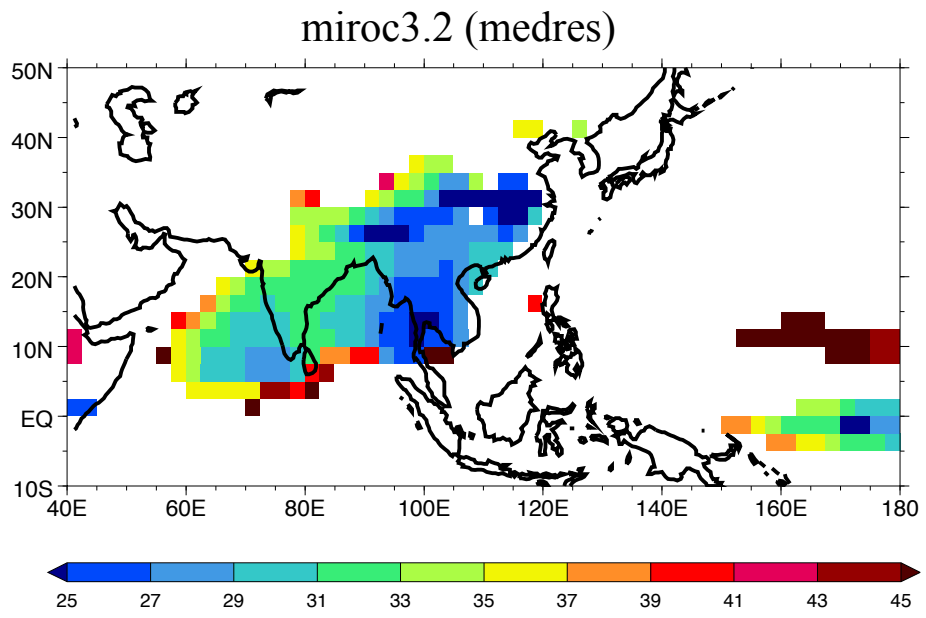
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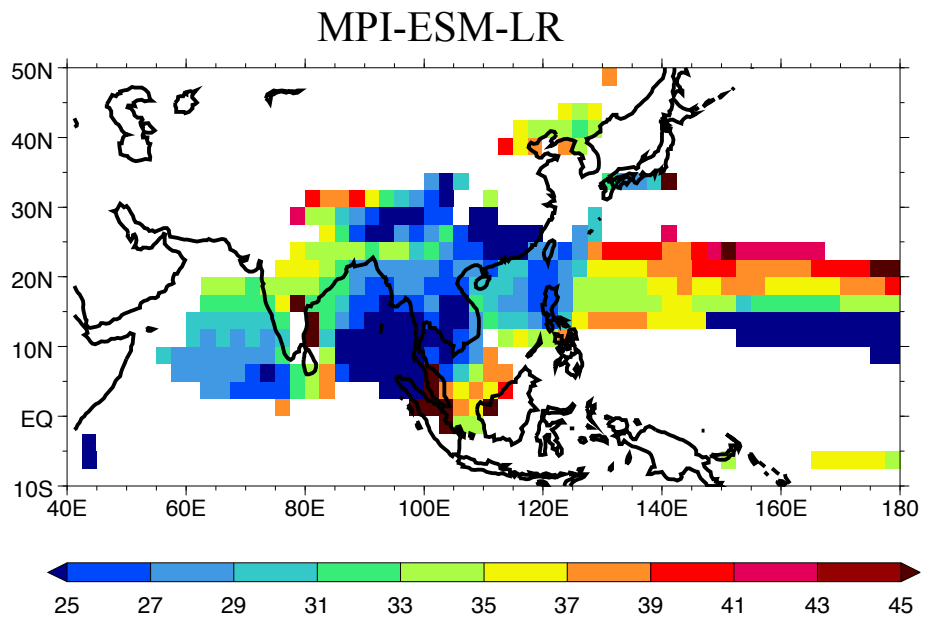
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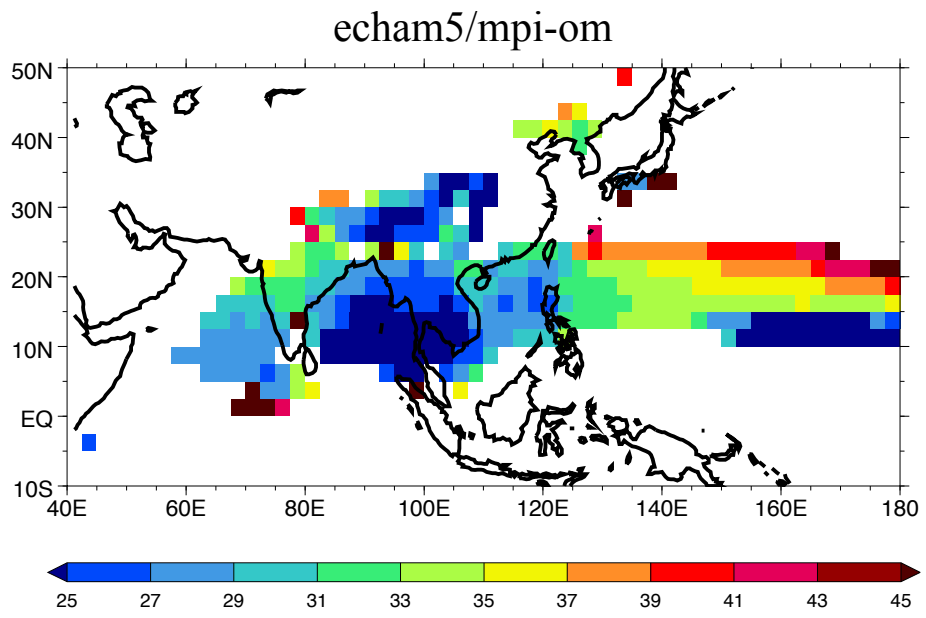
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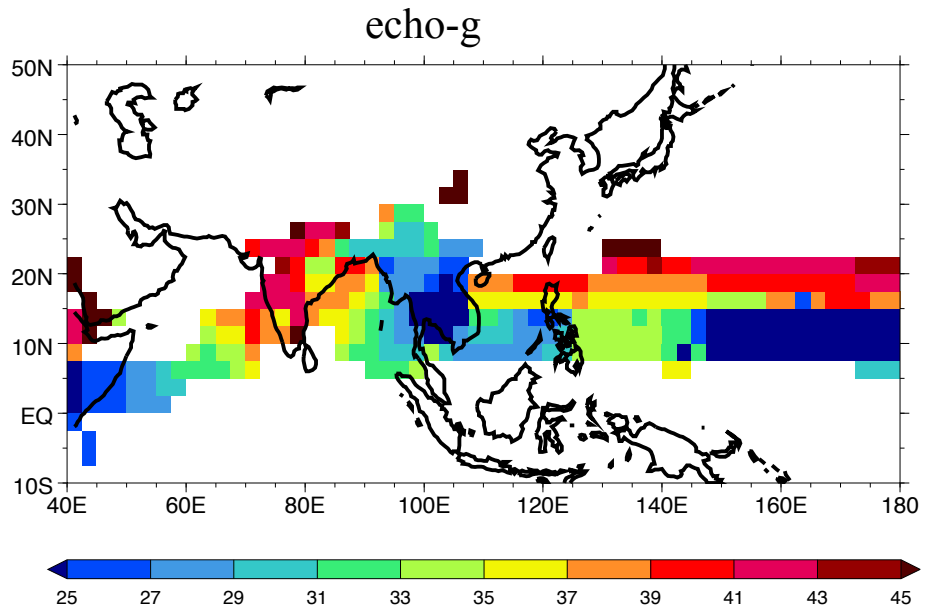
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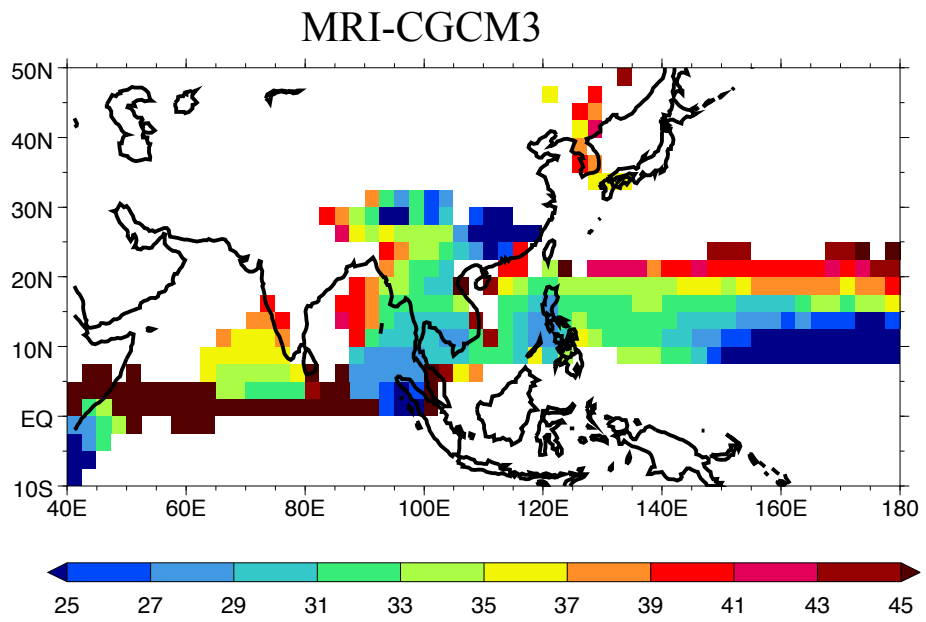
MRI-CGCM3
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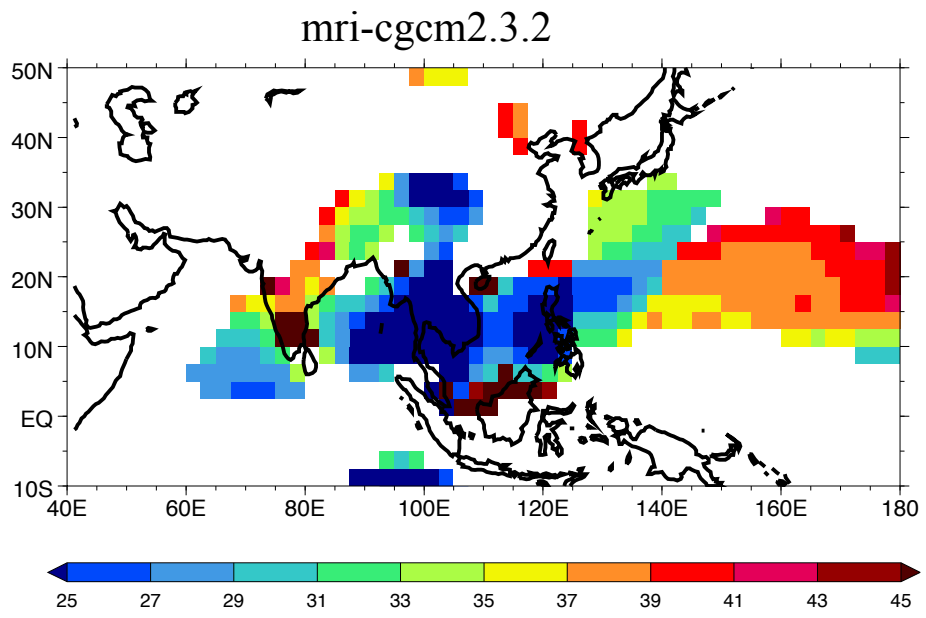
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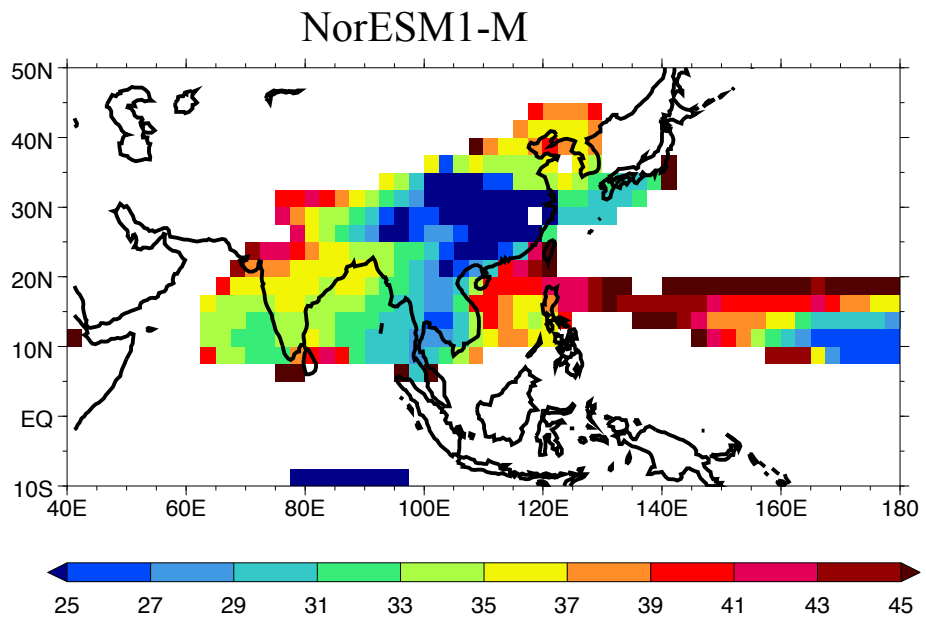
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