

**Supplemental Table. 1**  $N_{\text{spatial}}$  values for all models as shown in Fig. 4.

Model Name	North Pacific		Tropical Indo-Pacific		North Atlantic		Tropical Atlantic		Southern Ocean	
	High-pass	Low-pass	High-pass	Low-pass	High-pass	Low-pass	High-pass	Low-pass	High-pass	Low-pass
<b>CMIP3</b>										
BCCR-BCM2.0	19.9	4.1	15.8	5.5	13.4	5.1	15.2	4.1	27.0	5.0
CGCM3.1 (T47)	15.7	3.0	26.4	3.2	13.9	4.2	14.9	2.5	24.0	6.3
CGCM3.1 (T63)	18.2	3.7	28.4	3.9	12.6	3.6	15.1	3.1	30.1	5.9
CNRM-CM3	16.1	4.2	3.6	4.4	14.3	5.1	8.8	3.4	29.6	6.4
CSIRO-Mk3.0	18.6	5.7	9.7	5.8	29.8	2.6	13.8	3.9	29.7	6.8
CSIRO-Mk3.5	15.4	5.0	7.5	4.6	18.6	4.5	11.6	4.0	20.8	8.7
GFDL-CM2.0	22.7	3.2	8.6	4.6	23.6	4.1	12.3	5.6	22.6	5.1
GFDL-CM2.1	15.7	5.5	5.1	5.0	16.4	4.7	9.8	4.1	16.3	8.3
GISS-AOM	14.5	6.0	35.1	6.7	12.2	4.6	11.8	4.2	33.5	10.0
GISS-EH	22.5	5.4	38.1	5.0	18.8	5.9	16.9	4.0	29.9	8.8
GISS-ER	18.3	4.6	39.8	7.5	15.6	4.6	14.1	3.9	19.6	6.6
FGOALS-g1.0	7.0	3.5	1.9	3.0	11.4	2.0	6.6	3.7	10.9	8.3
INGV-SXG	13.6	4.0	9.9	4.3	14.1	6.5	16.7	4.8	27.4	6.2
INM-CM3.0	15.2	3.0	13.0	3.5	17.9	6.3	12.3	4.5	41.2	5.0
IPSL-CM4	12.3	3.2	6.0	3.9	13.7	5.0	9.8	4.5	19.2	7.2
MIROC3.2 (hires)	28.7	7.7	43.3	5.2	19.0	5.9	15.0	3.9	35.9	11.6
MIROC3.2 (medres)	17.3	4.3	21.8	4.6	16.4	5.1	12.1	4.2	12.8	7.4
ECHAM5/MPI-OM	19.0	3.8	4.9	3.7	27.8	9.8	11.0	5.0	43.5	11.6
MRI-CGCM2.3.2	11.3	2.9	10.1	3.9	9.3	3.3	9.7	4.3	26.0	8.6
CCSM3	13.2	4.1	7.7	7.4	19.4	2.9	16.1	5.7	22.6	7.3
PCM	13.5	5.2	25.6	6.9	24.0	5.2	22.2	7.2	34.9	9.6
UKMO-HadCM3	25.6	5.3	10.3	4.4	31.2	7.5	19.8	4.1	38.5	10.6
UKMO-HadGEM1	27.8	7.6	38.7	5.8	19.8	5.8	21.1	3.9	25.5	10.0
<b>CMIP5</b>										
ACCESS1.0	18.2	6.1	13.3	6.8	18.0	4.3	17.1	4.3	22.1	11.2
BCC-CSM1.1	19.8	4.7	19.9	6.7	22.7	5.9	14.8	4.5	18.1	4.8
CCSM4	12.1	4.5	5.4	4.9	12.5	4.2	9.9	3.7	18.7	5.3
CNRM-CM5	18.1	5.3	9.8	5.9	15.2	4.4	14.2	4.7	22.8	6.7
CanESM2	15.9	3.6	5.7	4.0	18.8	4.5	12.5	3.9	21.3	6.8
GFDL-CM3	14.5	5.2	7.3	4.5	16.4	4.5	11.5	3.4	16.6	4.4
GFDL-ESM2G	23.9	4.2	19.2	5.1	17.7	2.4	16.1	4.6	23.6	9.4
GFDL-ESM2M	17.2	4.3	6.3	4.6	16.9	4.7	11.1	5.0	18.4	6.9
GISS-E2-H	13.5	5.5	14.1	8.9	12.2	5.9	13.5	3.0	22.5	10.9
GISS-E2-R	17.0	5.7	13.3	6.0	12.7	6.2	13.4	4.7	19.2	7.1
HadCM3	29.4	4.6	14.4	4.2	32.0	5.6	20.2	5.7	36.5	5.7
HadGEM2-CC	24.4	5.0	18.8	4.6	18.5	4.3	21.1	4.4	24.7	8.3
HadGEM2-ES	24.2	6.5	27.9	4.3	19.2	4.4	22.4	5.2	26.5	9.4
INM-CM4	22.6	4.8	22.7	4.9	32.0	7.1	26.6	6.2	52.1	9.4
IPSL-CM5A-LR	16.3	4.2	20.7	3.9	13.6	3.9	11.7	3.3	18.5	4.2
IPSL-CM5A-MR	16.6	2.9	15.5	3.8	13.2	5.8	12.8	4.5	17.2	8.0
IPSL-CM5B-LR	16.4	4.1	17.7	5.7	13.4	4.5	13.3	3.4	26.6	9.4
MIROC5	12.3	5.4	7.4	3.5	14.9	4.8	10.4	4.7	23.2	7.7
MPI-ESM-LR	26.1	6.2	21.5	3.1	30.7	8.8	20.0	5.0	53.2	14.8
MPI-ESM-P	24.5	4.9	17.4	4.6	28.9	7.3	18.8	5.2	51.2	11.2
MRI-CGCM3	17.2	6.6	22.4	5.9	22.2	6.3	18.5	5.4	22.0	9.7
NorESM1-M	12.3	4.2	6.7	4.1	14.1	4.7	15.0	3.7	22.9	8.4
NorESM1-ME	13.2	4.3	7.7	5.4	14.6	4.9	12.5	4.3	22.6	6.3

