Table S1. Unavailable data fields in ESM and scenarios. (× means unavailable).

Model		ocean temperature	AMOC intensity	Sea ice fraction	P-E	Upward heat flux	1000hPa wind	TOA net radiation
BNU-ESM	G1							
	G1oa							
	G4							
	G4cdnc							
CanESM2	G1					×		
	G1oa					×		
	G4					×		
	G4cdnc					×		
HadGEM2-ES	G1					×		
	G1oa					×		
	G4					×		
	G4cdnc					×		
ISPL-CM5A-LR	G1					×		
	G1oa			×		×		×
	G4	×	×	×	×	×	×	×
	G4cdnc			×		×		×
MIROC-ESM	G1							
	G1oa			×		×		
	G4							
	G4cdnc			×		×		
NorESM1-M	G1							
	G1oa							
	G4							
	G4cdnc							

Table S2. Differences in AMOC Flux (Sv) for each ESM having data available. Differences significant at the 95% are marked in bold according to the signed Wilcoxon rank test.

Experiments	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
4xCO2-piC	**-9.1**	**-6.1**	**-4.9**	**-3.5**	**-4.5**	**-7.6**	**-6.0**
RCP4.5-piC	**-4.8**	**-2.6**	0.6	**-1.0**	**-1.6**	**-3.2**	**-2.1**
G1-piC	**-1.8**	0.2	-0.5	-0.5	-0.5	**-0.8**	-0.7
G1oa-piC	**-2.8**	-0.2	**-2.6**	**-1.1**	-0.2	**-1.3**	**-1.4**
G4cdnc-piC	**-2.2**	**-1.1**	**2.0**	-0.5	-0.4	**-2.7**	-0.8
G4-piC	**-3.3**	**-1.8**	**1.3**		**-1.2**	**-2.3**	**-1.5**
G1oa-4xCO2	**6.4**	**5.9**	**2.3**	**2.4**	**4.2**	**6.2**	**4.6**
G1-4xCO2	**7.3**	**6.3**	**4.4**	**3.0**	**3.9**	**6.8**	**5.3**
G4cdnc-RCP4.5	**2.6**	**1.5**	**1.4**	0.5	**1.1**	0.5	**1.3**
G4-RCP4.5	**1.4**	**0.8**	**0.8**		0.4	**1.0**	**0.9**
G1oa-G1	**-0.9**	-0.4	**-2.1**	-0.6	0.3	-0.5	-0.7
G4cdnc-G4	**1.1**	**0.7**	0.6		**0.8**	-0.4	0.6
$\frac{G4 - RCP4.5}{G1 - 4XCO2}$	20%	12%	17%		9%	14%	14%
$\frac{G4cdnc - RCP4.5}{G1 - 4XCO2}$	35%	24%	32%	16%	29%	8%	24%
$\frac{G4 - RCP4.5}{G4cdnc - RCP4.5}$	56%	52%	54%		31%	186%	76%
$\frac{G4 - RCP4.5}{G1oa - 4XCO2}$	23%	13%	32%		8%	15%	18%
$\frac{G4cdnc - RCP4.5}{G1oa - 4XCO2}$	40%	25%	60%	20%	27%	8%	30%

Table S3. Differences in upward Heat Flux (Wm^{-2}) in the three deep convective regions at North Atlantic for each ESM having data available. Differences significant at the 95% are marked in bold according to the signed Wilcoxon rank test.

Experiments	*BNU-ESM*	*CanESM2*	*HadGEM2-ES*	*IPSL-CM5A-LR*	*MIROC-ESM*	*NorESM1-M*	*Ensemble*
4xCO2-piC	**-48.9**				**-27.8**	**-34.9**	**-37.2**
RCP4.5-piC	**-26.7**				**-16.7**	**-15.2**	**-19.5**
G1-piC	**-15.6**				-3.0	**-6.3**	-8.3
G1oa-piC	**-27.4**					**-7.9**	**-17.7**
G4cdnc-piC	**-19.1**					**-11.9**	**-15.5**
G4-piC	**-22.4**				**-14.2**	**-13.7**	**-16.8**
G1oa-4xCO2	**21.5**					**27.0**	**24.2**
G1-4xCO2	**33.3**				**24.9**	**28.5**	**28.9**
G4cdnc-RCP4.5	**7.6**					3.2	5.4
G4-RCP4.5	4.3				2.5	1.4	2.7
G1oa-G1	**-11.8**					-1.5	-6.7
G4cdnc-G4	3.3					1.8	2.5
$\frac{G4 - RCP4.5}{G1 - 4XCO2}$	13%				10%	5%	9%
$\frac{G4cdnc - RCP4.5}{G1 - 4XCO2}$	23%					11%	17%
$\frac{G4 - RCP4.5}{G4cdnc - RCP4.5}$	56%					44%	50%
$\frac{G4 - RCP4.5}{G1oa - 4XCO2}$	20%					5%	13%
$\frac{G4cdnc - RCP4.5}{G1oa - 4XCO2}$	35%					12%	24%

Table S4. Differences in Arctic September Sea Ice (10^6 km^2) for each ESM having data available. Differences significant at the 95% are marked in bold according to the signed Wilcoxon rank test.

Experiments	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
4xCO2-piC	**-8.6**	**-3.4**	**-4.5**	**-6.8**	**-6.1**	**-6.1**	**-5.9**
RCP4.5-piC	**-1.6**	**-3.0**	**-2.9**	**-4.3**	**-6.0**	**-2.5**	**-3.4**
G1-piC	0.1	-0.3	**-1.0**	-0.3	**-0.7**	0.1	-0.3
G1oa-piC	**-1.3**	**-1.2**	**-2.5**	**-1.4**		**-1.4**	**-1.6**
G4cdnc-piC	0.4	**-2.4**	**-2.7**	-0.8		**-2.0**	-1.5
G4-piC	**-1.3**	**-2.3**	-0.6		**-5.1**	**-1.9**	**-2.2**
G1oa-4xCO2	**7.3**	**2.2**	**2.0**	**5.3**		**4.8**	**4.3**
G1-4xCO2	**8.7**	**3.1**	**3.5**	**6.5**	**5.4**	**6.3**	**5.6**
G4cdnc-RCP4.5	**1.9**	0.6	0.3	**3.5**		0.5	1.4
G4-RCP4.5	0.3	**0.7**	**2.4**		**0.9**	0.5	1.0
G1oa-G1	**-1.4**	**-0.8**	**-1.5**	**-1.2**		**-1.5**	**-1.3**
G4cdnc-G4	**1.6**	-0.1	**-2.1**			-0.02	-0.2
$\frac{G4-RCP4.5}{G1-4XCO2}$	3%	23%	67%		17%	8%	24%
$\frac{G4cdnc-RCP4.5}{G1-4XCO2}$	22%	19%	7%	54%		8%	22%
$\frac{G4-RCP4.5}{G4cdnc-RCP4.5}$	15%	120%	944%			105%	296%
$\frac{G4-RCP4.5}{G1oa-4XCO2}$	4%	31%	119%			11%	41%
$\frac{G4cdnc-RCP4.5}{G1oa-4XCO2}$	26%	26%	13%	66%		11%	28%

Table S5. TOA Net radiation flux global mean (W/m^2) for each ESM having data available. Differences significant at the 95% are marked in bold according to the signed Wilcoxon rank test.

Experiments	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
4xCO2-piC	**0.9**	**2.6**	**2.5**	**2.8**	**3.6**	**4.5**	**2.8**
RCP4.5-piC	**1.3**	**1.2**	**1.2**	**1.4**	**1.4**	**3.3**	**1.6**
G1-piC	0.1	0.0	0.2	0.1	0.2	**2.1**	0.4
G1oa-piC	**-1.4**	-0.2	-0.1		0.0	**2.0**	0.0
G4cdnc-piC	0.3	0.6	0.5		0.6	**3.0**	1.0
G4-piC	0.7	**0.9**	0.6		**1.2**	**3.1**	**1.3**
G1oa-4xCO2	**-2.3**	**-2.8**	**-2.6**		**-3.6**	**-2.5**	**-2.8**
G1-4xCO2	-0.8	**-2.6**	**-2.3**	**-2.7**	**-3.4**	**-2.4**	**-2.4**
G4cdnc-RCP4.5	**-1.0**	-0.6	-0.6		**-0.8**	-0.3	-0.7
G4-RCP4.5	-0.5	-0.3	-0.5		-0.2	-0.2	-0.4
G1oa-G1	**-1.5**	-0.2	-0.3		-0.2	-0.1	-0.5
G4cdnc-G4	-0.5	-0.3	-0.1		-0.6	-0.1	-0.3
$\frac{G4-RCP4.5}{G1-4XCO2}$	64%	10%	23%		6%	10%	23%
$\frac{G4cdnc-RCP4.5}{G1-4XCO2}$	121%	22%	27%		24%	14%	42%
$\frac{G4-RCP4.5}{G4cdnc-RCP4.5}$	53%	45%	85%		27%	70%	56%
$\frac{G4-RCP4.5}{G1oa-4XCO2}$	22%	9%	21%		6%	10%	14%
$\frac{G4cdnc-RCP4.5}{G1oa-4XCO2}$	42%	21%	24%		22%	14%	25%

Table S6. Ratios of SRMs for AMOC/TOA. Where individual ESM have no data, the ensemble mean was used.

Type	Ratios	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
SAI/G1 Solar	$\frac{G4-RCP4.5}{G1-4XCO2}$	0.3	1.2	0.7	0.6	1.4	1.4	0.6
MCB/G1 Solar	$\frac{G4cdnc-RCP4.5}{G1-4XCO2}$	0.3	1.1	1.2	0.4	1.2	0.5	0.6
SAI/MCB	$\frac{G4-RCP4.5}{G4cdnc-RCP4.5}$	1.1	1.2	0.6	1.3	1.1	2.6	1.3
	$\frac{G4-RCP4.5}{G1oa-4XCO2}$	1.0	1.4	1.6	1.3	1.4	1.6	1.3
	$\frac{G4cdnc-RCP4.5}{G1oa-4XCO2}$	1.0	1.2	2.5	0.8	1.2	0.6	1.2

Table S7. Ratios of SRMs for Upward Heat Flux/TOA. Where individual ESM have no data, the ensemble mean was used.

Type	Ratios	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
SAI/G1 Solar	$\frac{G4-RCP4.5}{G1-4XCO2}$	0.2	0.9	0.4	0.4	1.6	0.5	0.4
MCB/G1 Solar	$\frac{G4cdnc-RCP4.5}{G1-4XCO2}$	0.2	0.8	0.6	0.4	0.7	0.8	0.4
SAI/MCB	$\frac{G4-RCP4.5}{G4cdnc-RCP4.5}$	1.1	1.1	0.6	0.9	1.9	0.6	0.9
	$\frac{G4-RCP4.5}{G1oa-4XCO2}$	0.9	1.3	0.6	0.9	2.1	0.6	0.9
	$\frac{G4cdnc-RCP4.5}{G1oa-4XCO2}$	0.8	1.1	1.0	1.0	1.1	0.9	1.0

Table S8. Ratios of SRMs for Arctic September Sea Ice/TOA. Where individual ESM have no data, the ensemble mean was used.

Type	Ratios	BNU-ESM	CanESM2	HadGEM2-ES	IPSL-CM5A-LR	MIROC-ESM	NorESM1-M	Ensemble
SAI/G1 Solar	$\frac{G4-RCP4.5}{G1-4XCO2}$	0.1	2.3	2.9	1.1	2.6	0.9	1.0
MCB/G1 Solar	$\frac{G4cdnc-RCP4.5}{G1-4XCO2}$	0.2	0.8	0.3	1.3	0.9	0.6	0.5
SAI/MCB	$\frac{G4-RCP4.5}{G4cdnc-RCP4.5}$	0.3	2.7	11.1	5.3	11.0	1.5	5.3
	$\frac{G4-RCP4.5}{G1oa-4XCO2}$	0.2	3.3	5.7	3.0	6.8	1.2	3.1
	$\frac{G4cdnc-RCP4.5}{G1oa-4XCO2}$	0.6	1.2	0.5	2.7	1.3	0.8	1.2