

1 **Supplementary Materials: The Weakening of the Stratospheric Polar Vortex**  
2 **and the Subsequent Surface Impacts as Consequences to Arctic Sea-ice Loss**

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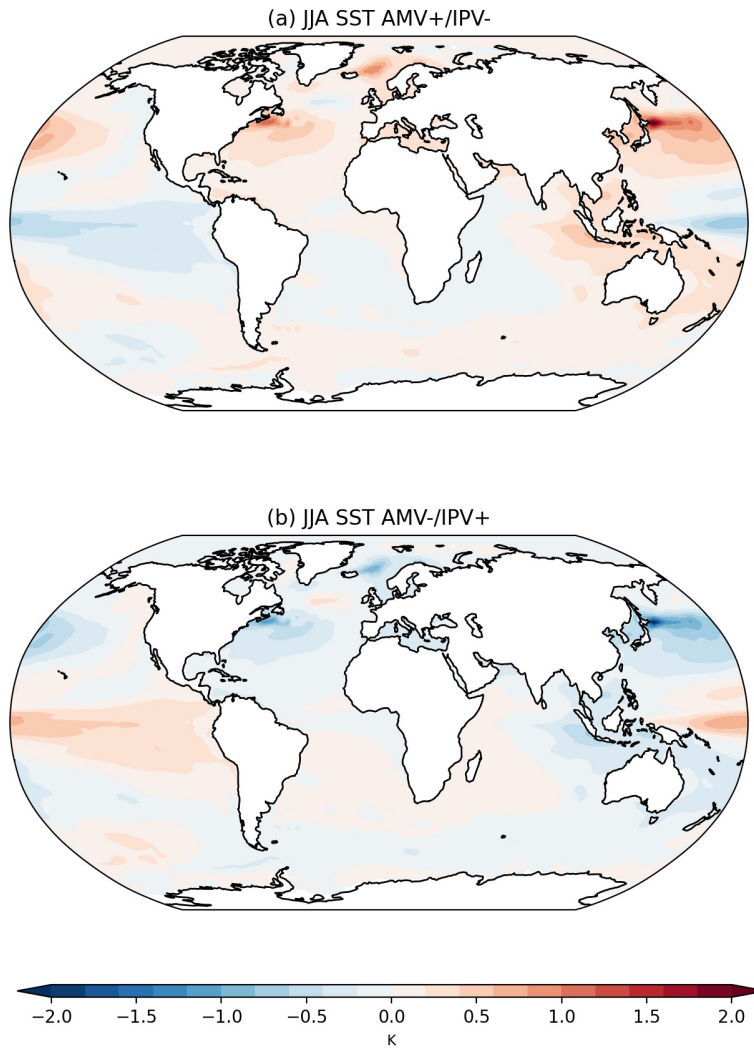
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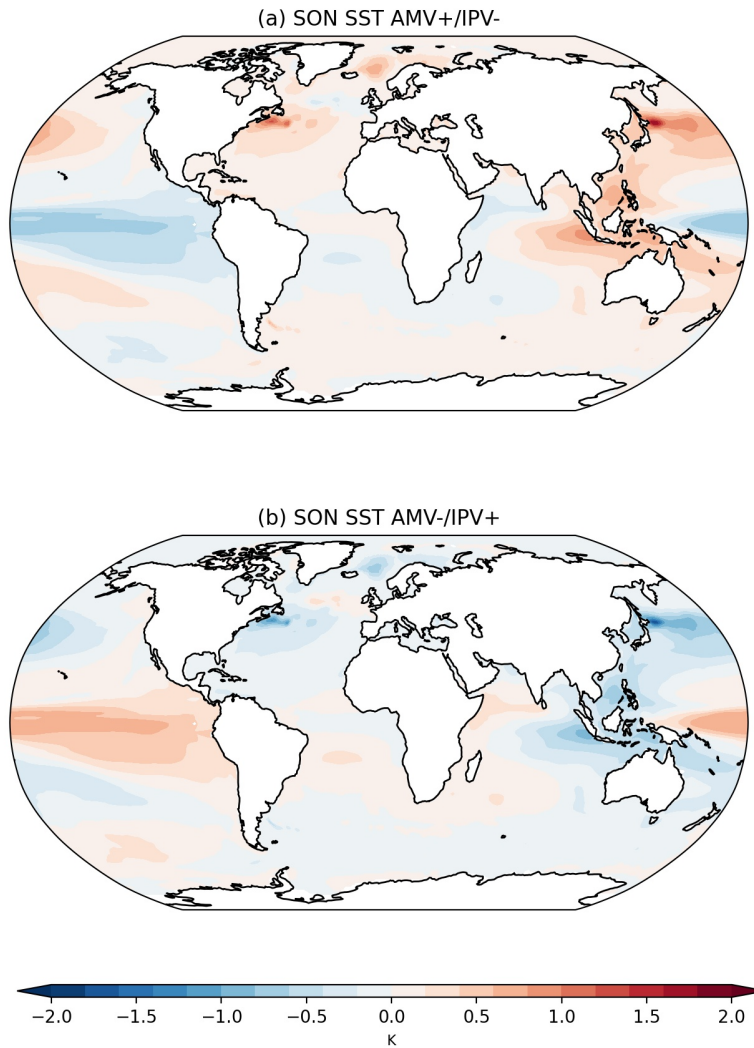
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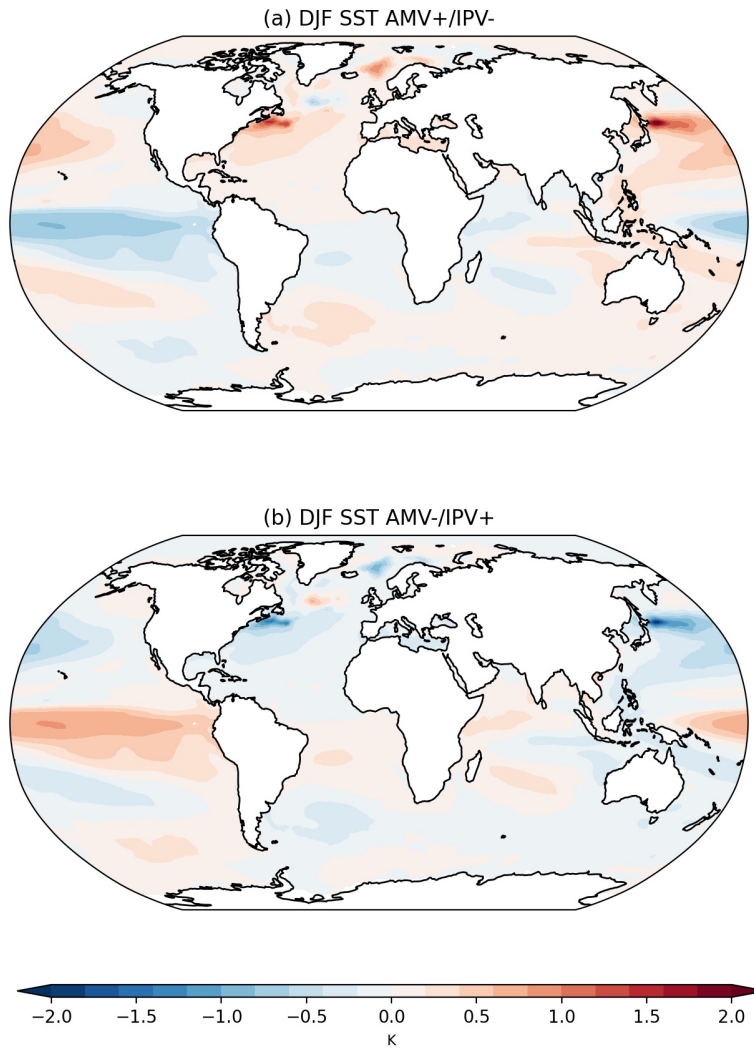
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**FIG. S1.** JJA present ensemble-mean SST for AMV+/IPV- state (a) and AMV-/IPV+ state (b).



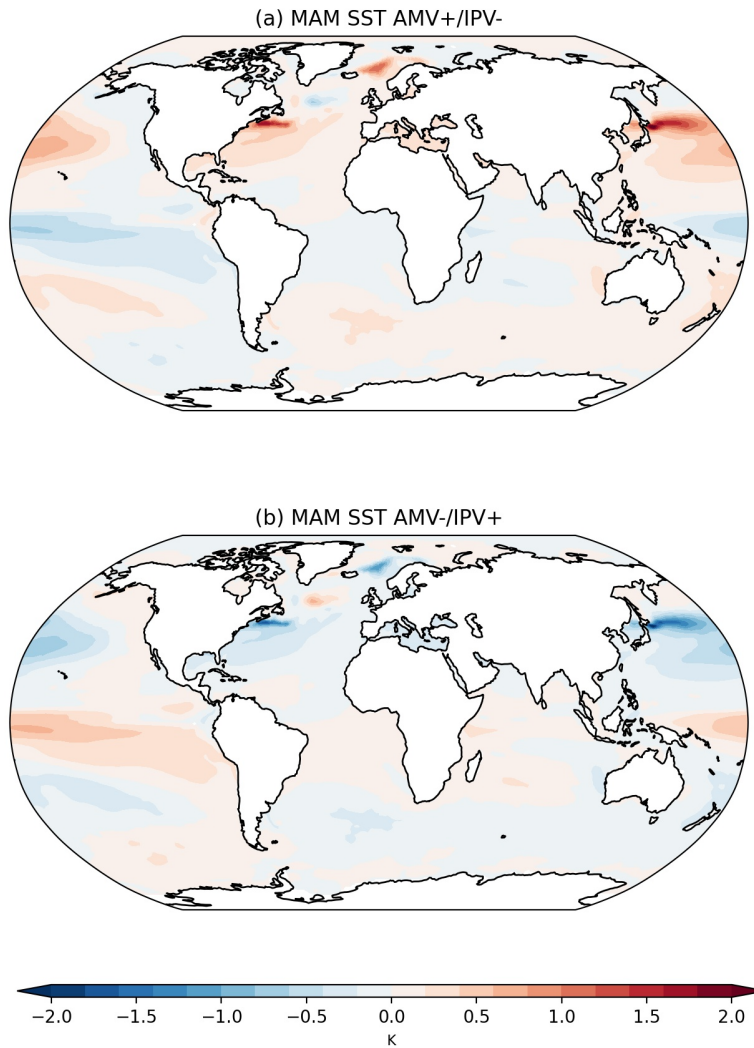
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42 **FIG. S2.** As in Figure S1 but for SON.

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**FIG. S3.** As in Figure S1 but for DJF.



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60 **FIG. S4.** As in Figure S1 but for SON.

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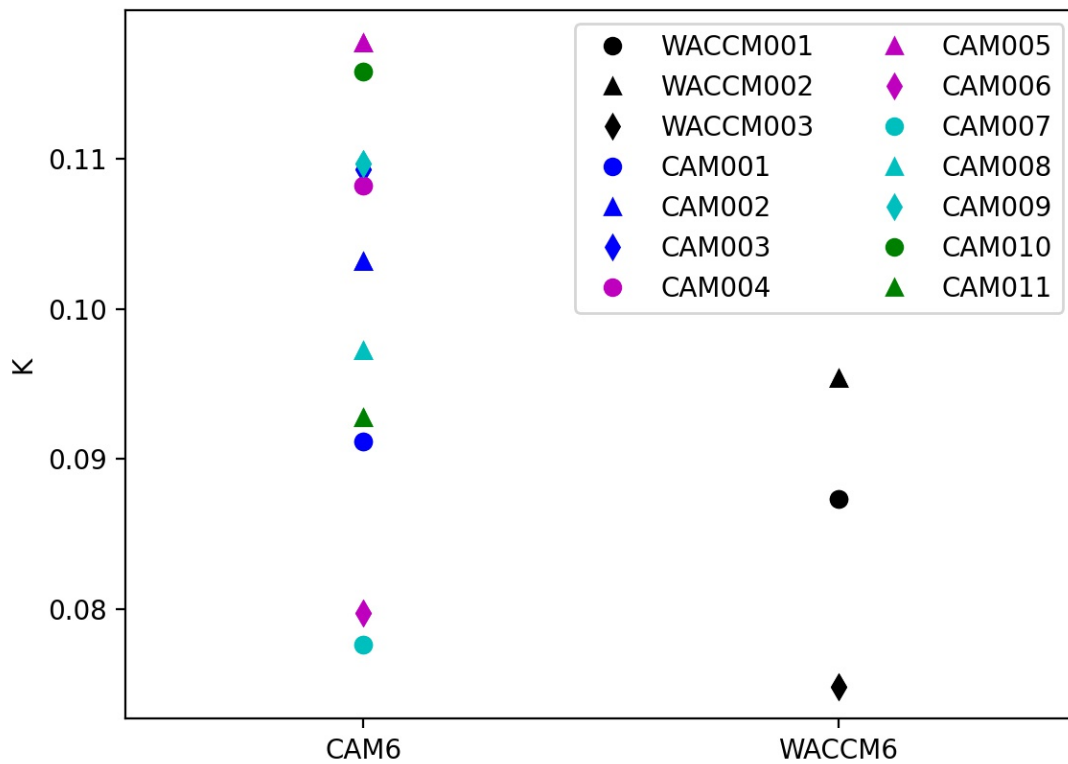
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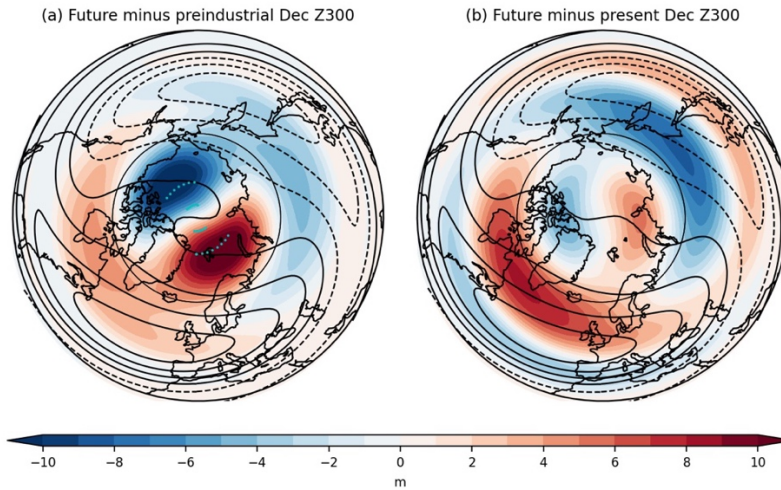
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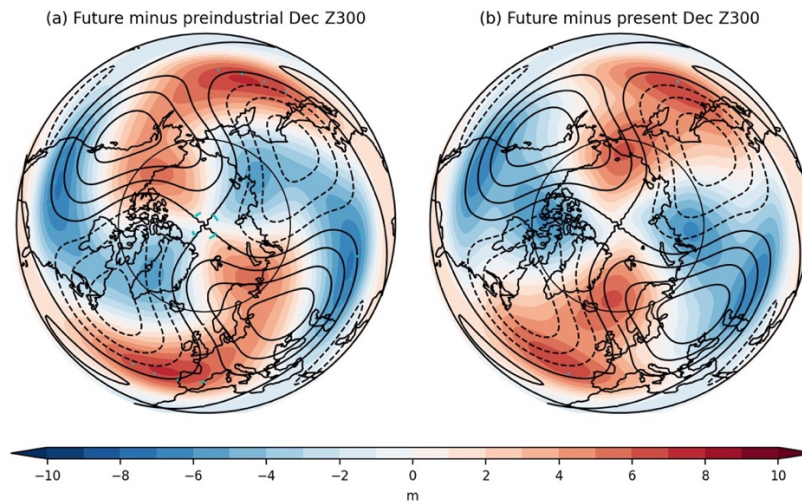
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 69 **FIG. R7.** The standard deviation of the global-mean SST time series during 1985-2014 period  
 70 from CESM2-CAM6 and CESM2-WACCM6 historical simulations.

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 89 **FIG. S6.** December wavenumber1 Z300 response to (a) strong SIC forcing and (b) weak SIC  
 90 forcing (color shadings). The contour lines represent the climatological wavenumber1 Z300 in  
 91 December.

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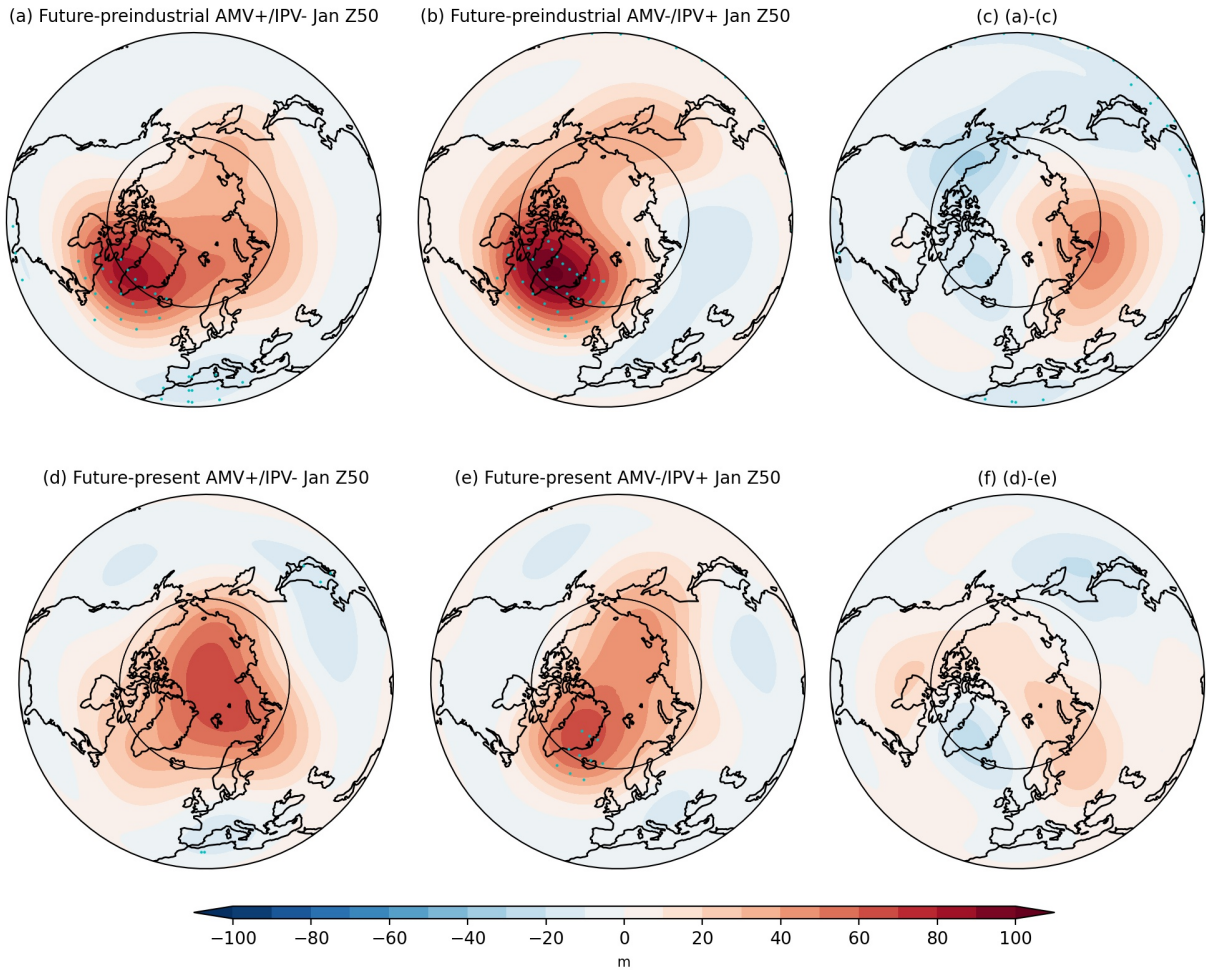


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 95 **FIG. S7.** December wavenumber2 Z300 response to (a) strong SIC forcing and (b) weak SIC  
 96 forcing (color shadings). The contour lines represent the climatological wavenumber2 Z300 in  
 97 December.

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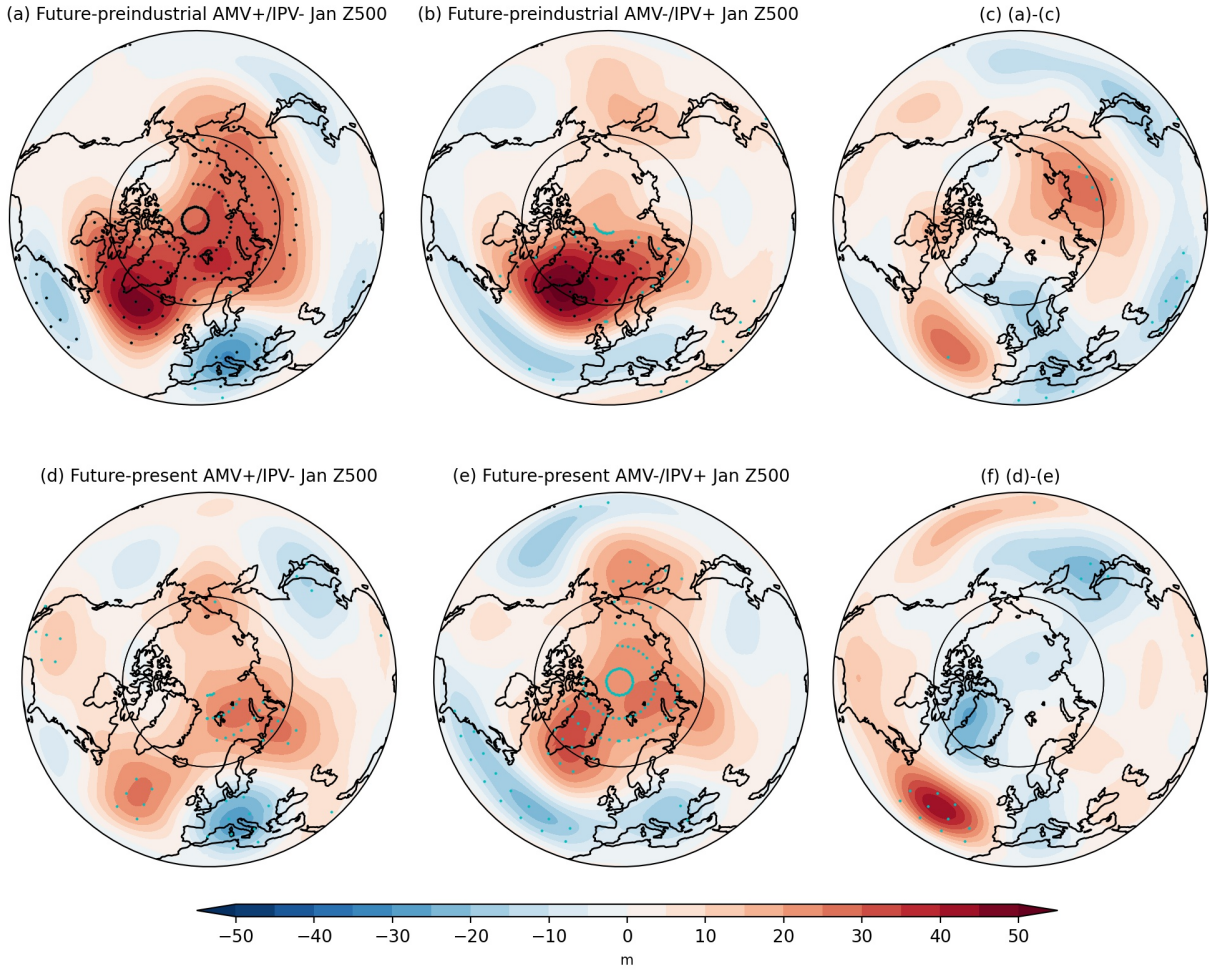




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 105 **FIG. S8.** January Z50 (a)-(b), responses to strong sea-ice forcing during AMV+/IPV- and AMV-  
 106 /IPV+ states, respectively. (c) (a) minus (b). (d)-(f) as in (a)-(c) but to weak sea-ice forcing. The  
 107 black dots denote the field significance, while the cyan dots the 5% local significance.

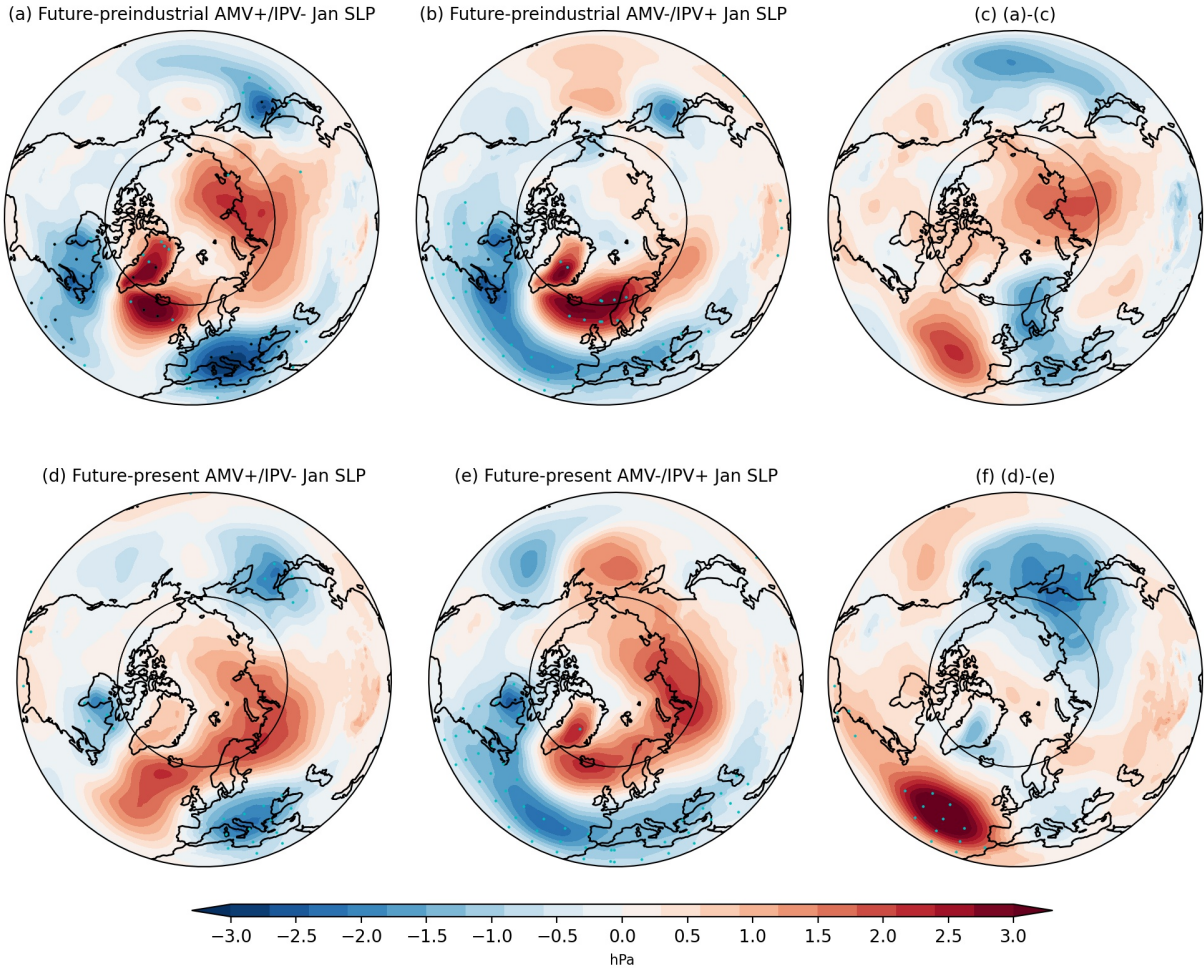
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 117 **FIG. S9.** January Z500 (a)-(b), responses to strong sea-ice forcing during AMV+/IPV- and AMV-  
 118 /IPV+ states, respectively. (c) (a) minus (b). (d)-(f) as in (a)-(c) but to weak sea-ice forcing. The  
 119 black dots denote the field significance, while the cyan dots the 5% local significance.

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 129 **FIG. S10.** January SLP (a)-(b), responses to strong sea-ice forcing during AMV+/IPV- and AMV-  
 130 /IPV+ states, respectively. (c) (a) minus (b). (d)-(f) as in (a)-(c) but to weak sea-ice forcing. The  
 131 black dots denote the field significance, while the cyan dots the 5% local significance.  
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