



Supplement of

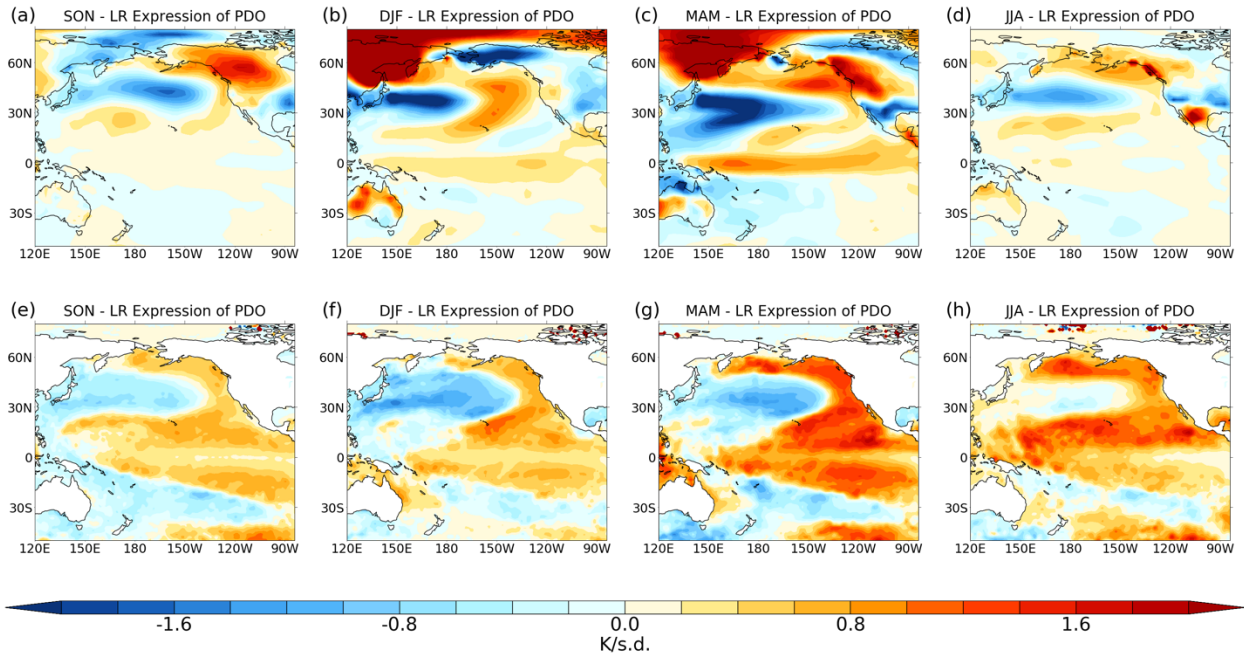
Sustained intensification of the Aleutian Low induces weak tropical Pacific sea surface warming

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4 **Figure S1:** (a-d) Seasonal mean skin temperature anomalies linearly regressed (LR) onto
5 the PDO index in CONTROL scaled by 5x for comparison with HadSST4 data (panels e-
6 h). Units: K per standard deviation.

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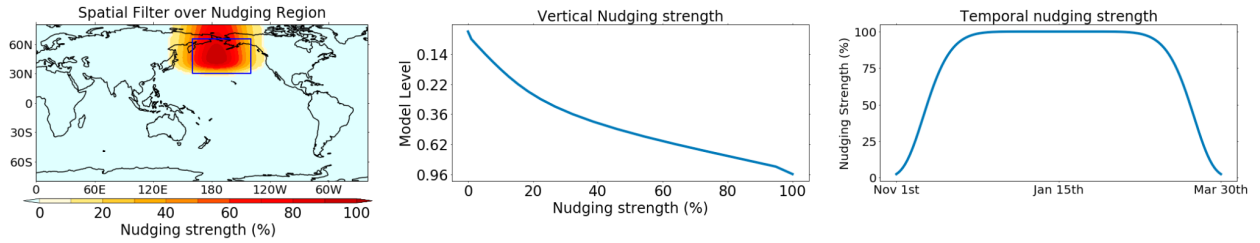
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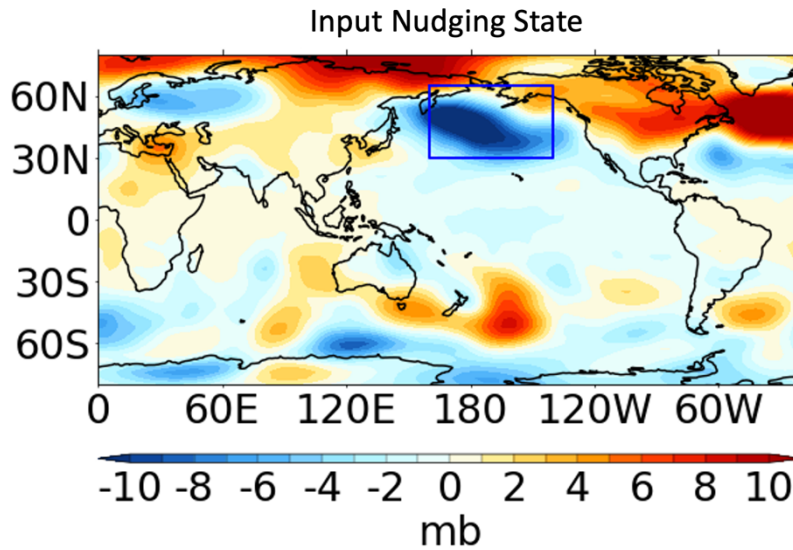
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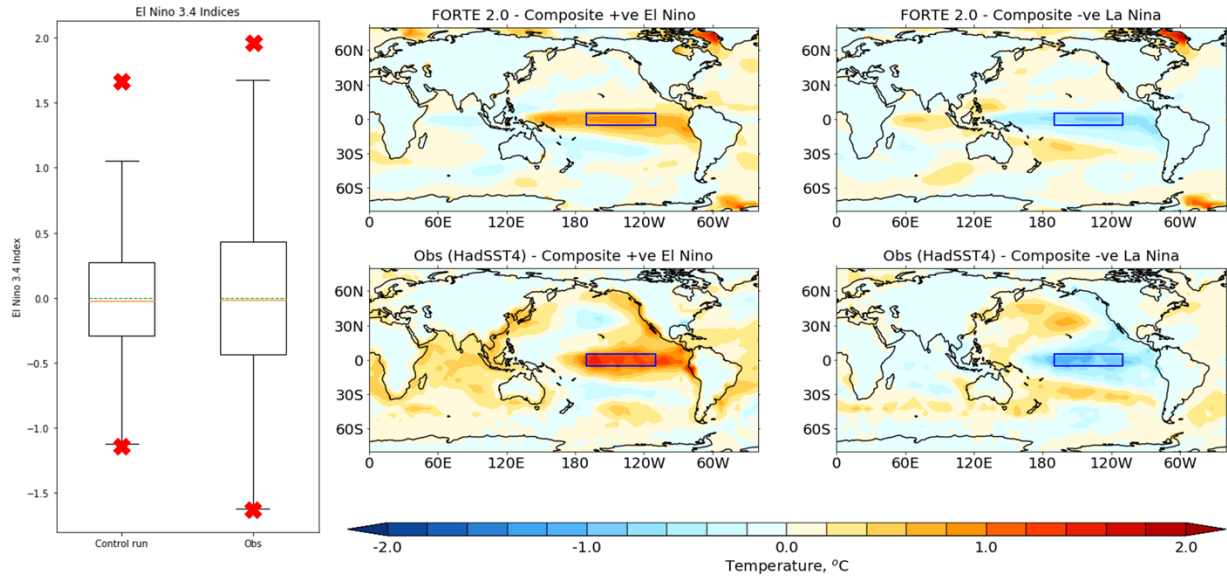
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Figure S2: Details of the nudging kernel used for the NUDGED experiment. (a) Horizontal variation, (b) vertical variation and (c) temporal variation.



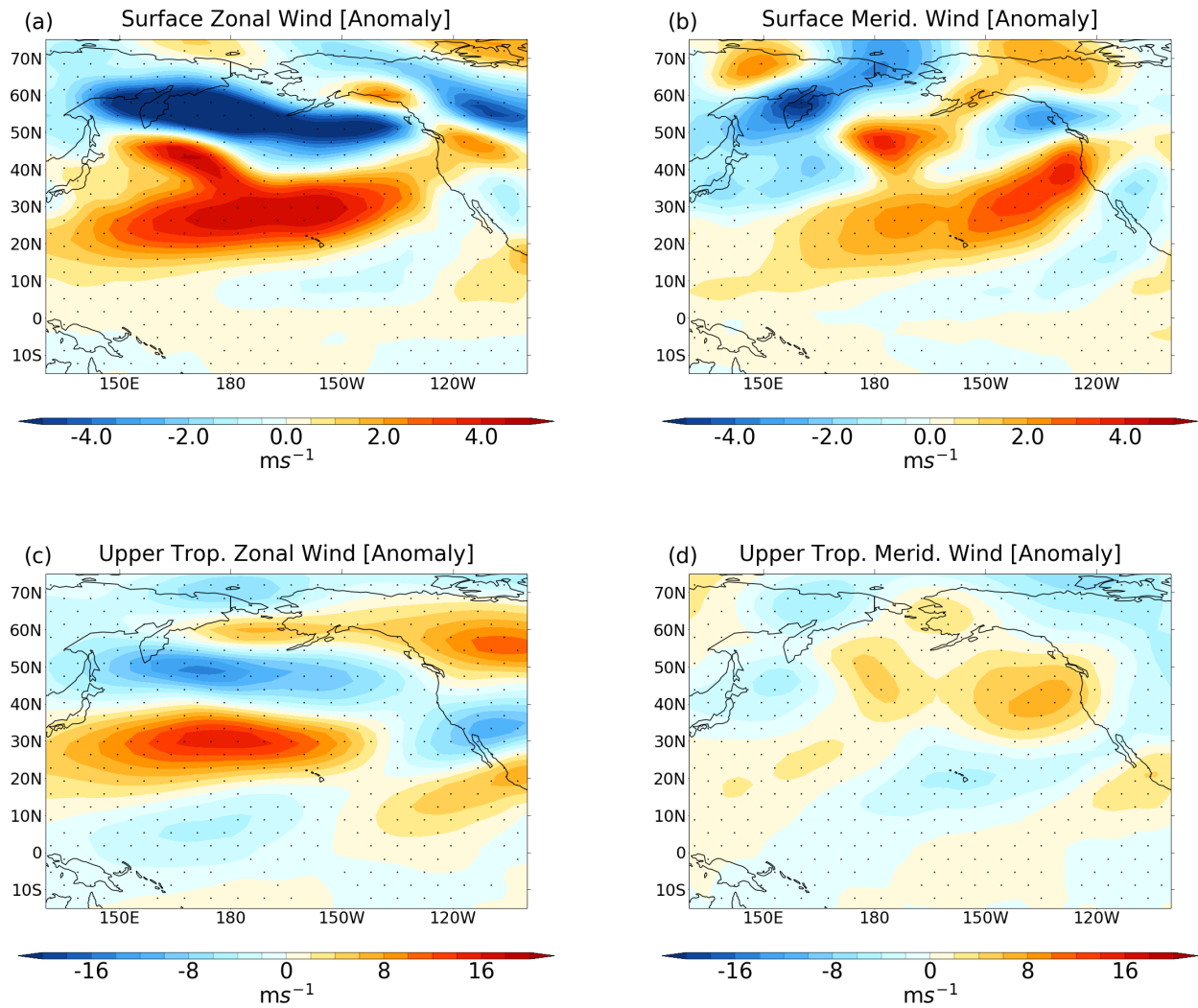
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Figure S3: Global sea level pressure anomaly field [hPa] for January of CONTROL year 163 used as the input anomaly for the NUDGED experiment. Blue box shows the domain used to calculate the North Pacific Index [30°N-65°N, 160°E-140°W].



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 32 **Figure S4:** Comparison between the expression of ENSO 3.4 in observations (HadSST4 - last
 33 100 years) and FORTE 2.0 CONTROL run. Left panel – box and whisker plot showing statistical
 34 distribution. The box limits represent 10%, 25%, 75% and 90% of the distribution. The maximum
 35 and minimum values of Nino 3.4 in the HadSST4 and Control run are indicated by a red “x”.
 36 Right panels show composite maps of El Nino and La Nina SST anomalies in (upper)
 37 observations and (lower) FORTE2.0.

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44 **Figure S5:** Years 1-30 DJF NUDGED near-surface and upper troposphere wind anomalies for
 45 (a,c) zonal and (b,d) meridional wind. Recall that the nudging strength in the upper troposphere
 46 is several times weaker than at the surface (Fig. S2), so the upper-level circulation anomalies
 47 likely represent a response to the lower tropospheric forcing. Stippling denotes anomalies that
 48 are significant at the 95% level.

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