

Supporting Information for

**Statistical-Dynamical Seasonal Forecast of Western North Pacific
and East Asia Landfalling Tropical Cyclones using the
High-Resolution GFDL FLOR Coupled Model**

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Introduction

This supporting information provides figures for the spatial correlation maps between hindcasted and observed potential predictors initialized in February to July (Figures S1-S6). This document also provides the equations for the prediction of WNP TC frequency using hybrid models initialized from February to July (Table S1-S6)

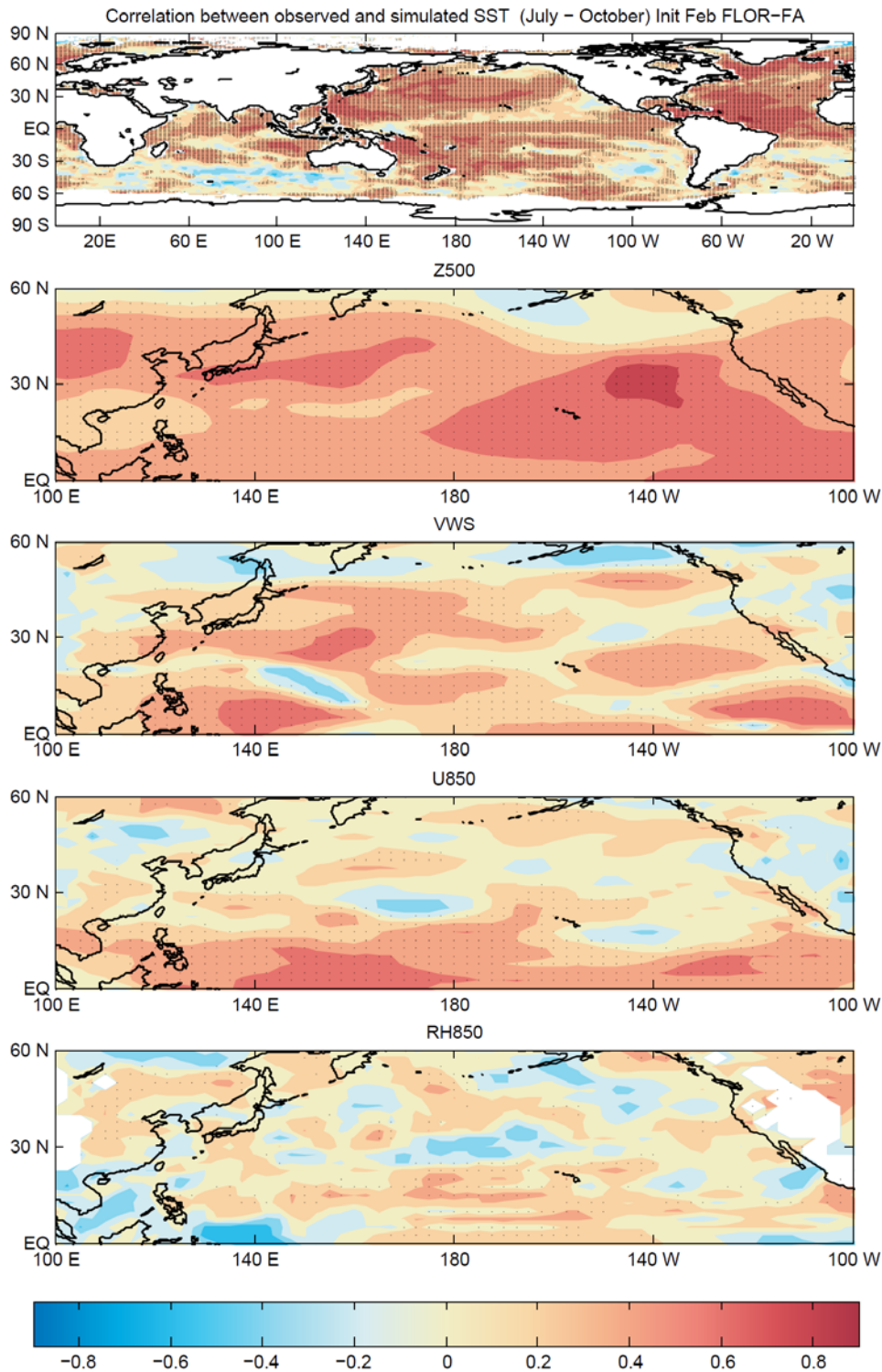


Figure S1. The correlation between hindcasted (initialized in February) and observed potential predictors (SST, Z500, VWS, U850 and RH850) during the peak season (JASO) to represent the predictive skill of the variables using FLOR-FA. Stippled black regions are those with 0.05 level of significance.

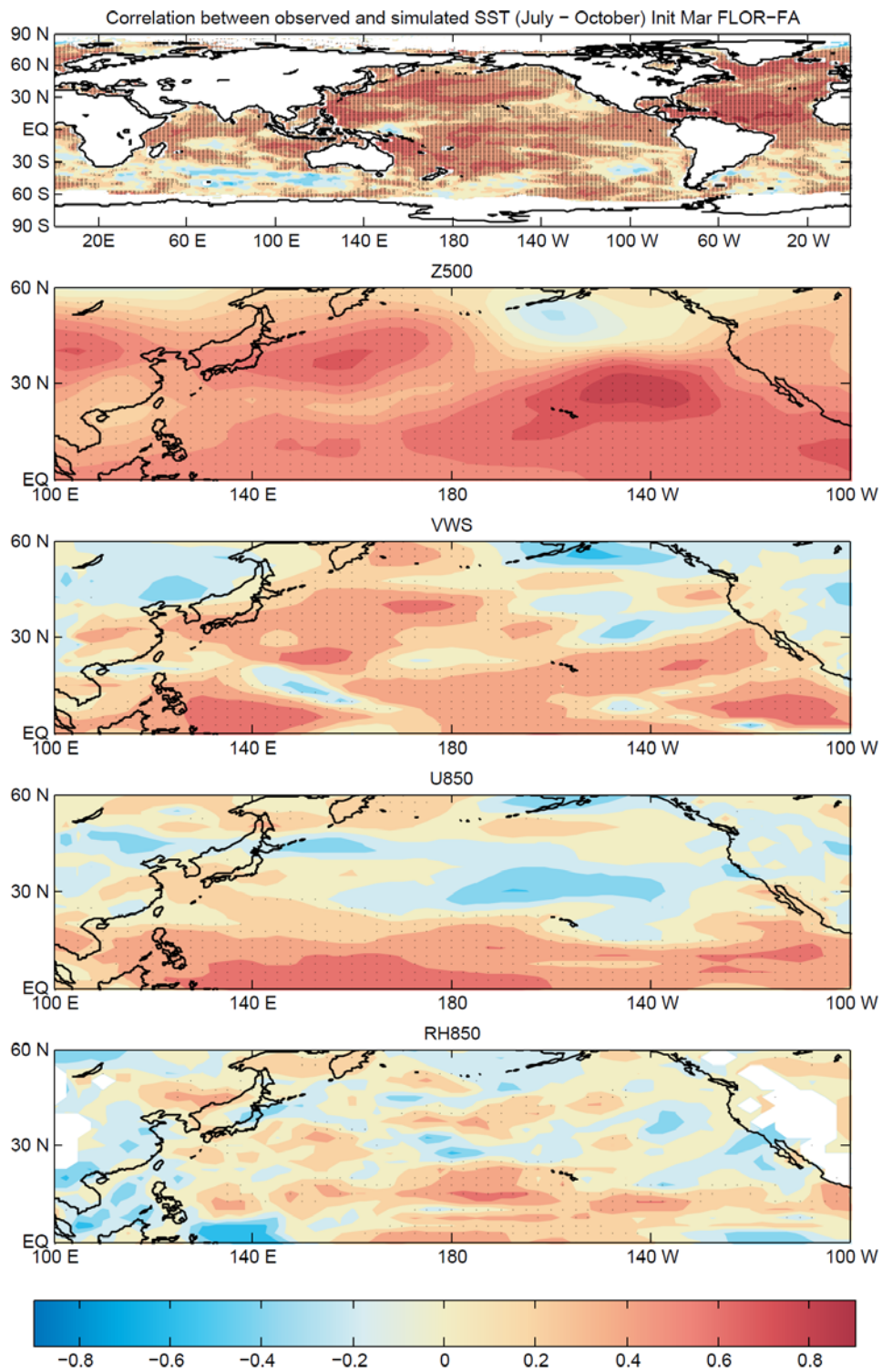


Figure S2. As for Figure S1 but initialized in March.

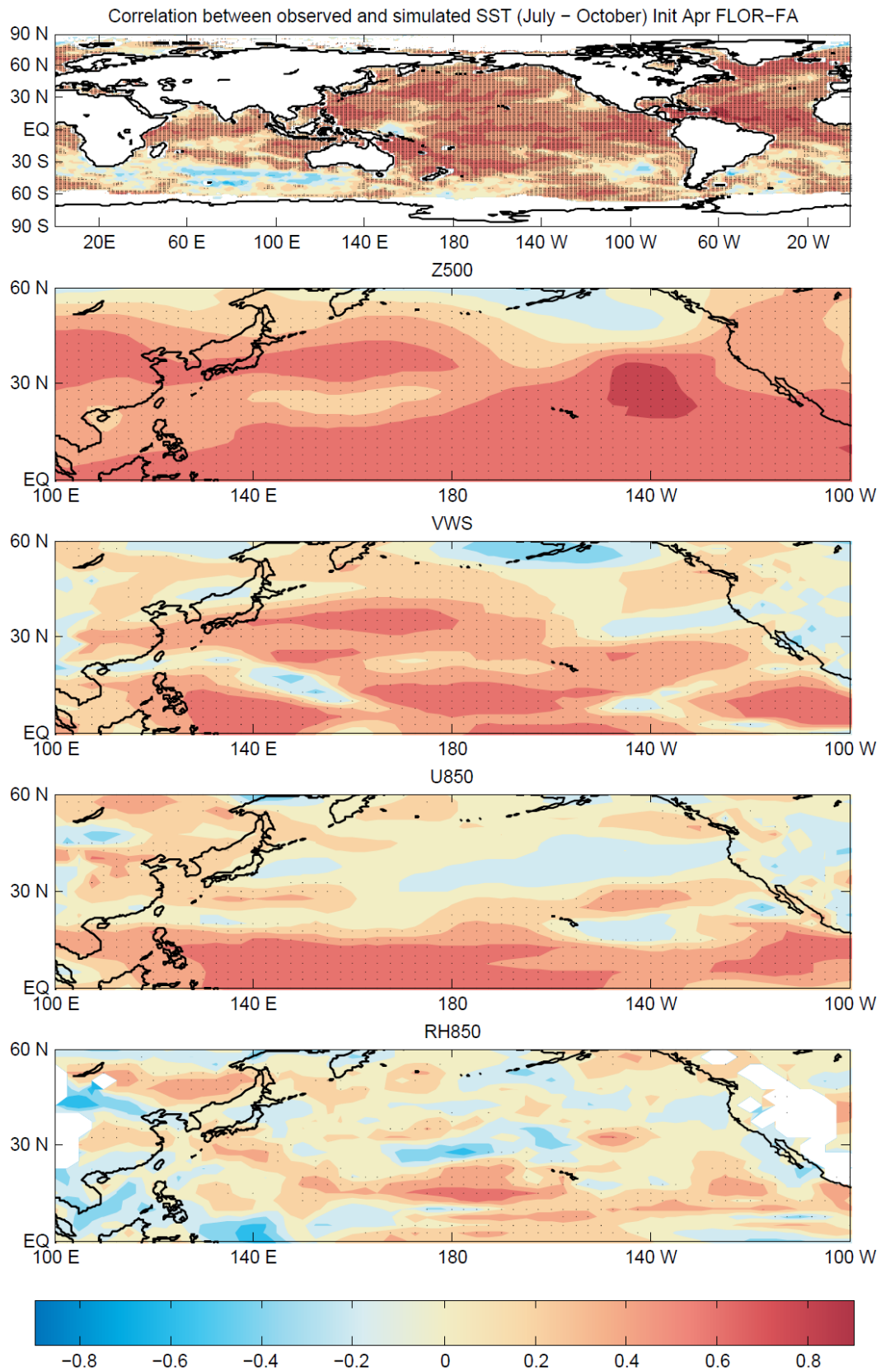


Figure S3. As for Figure S1 but initialized in April.

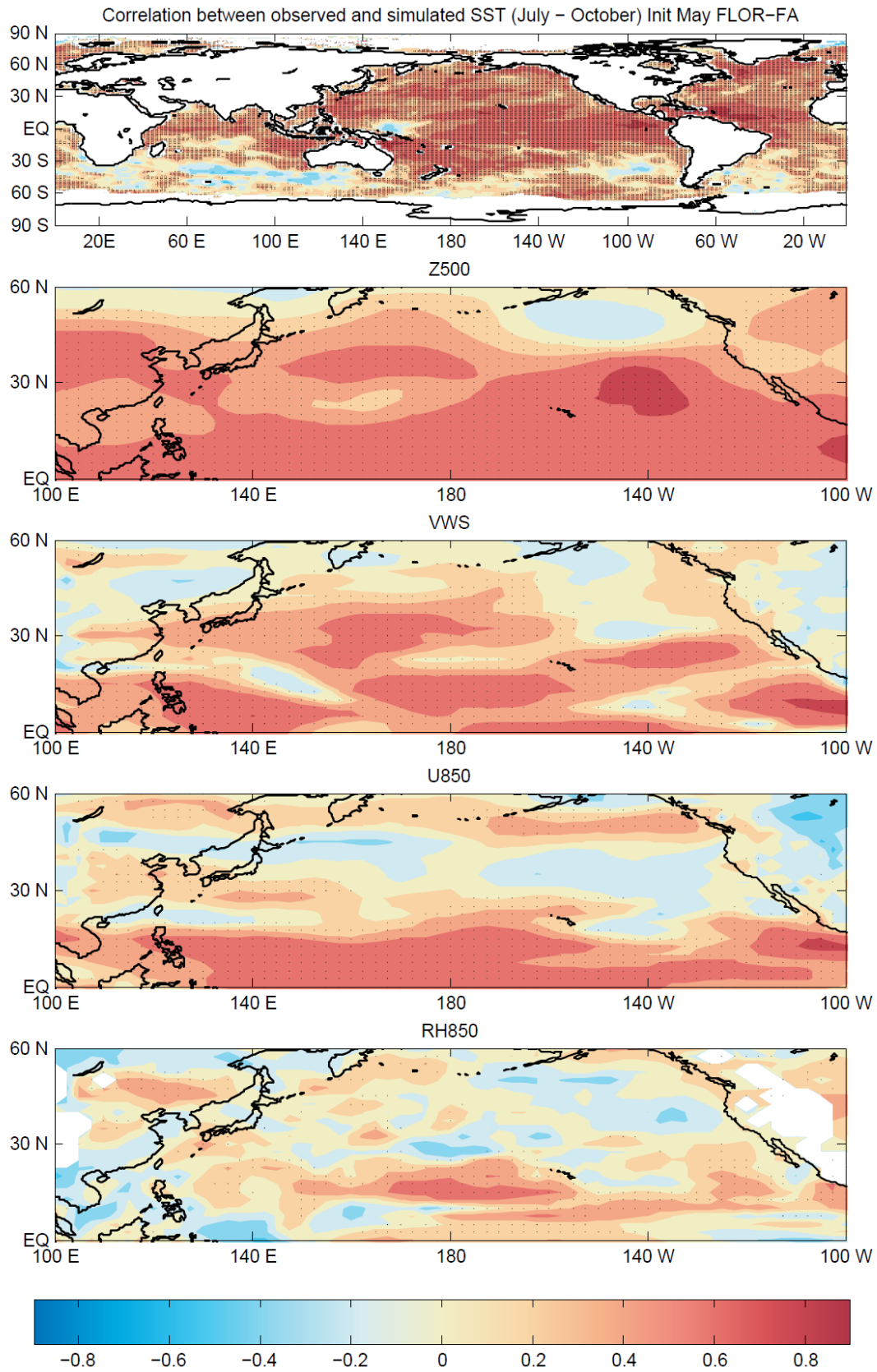


Figure S4. As for Figure S1 but initialized in May.

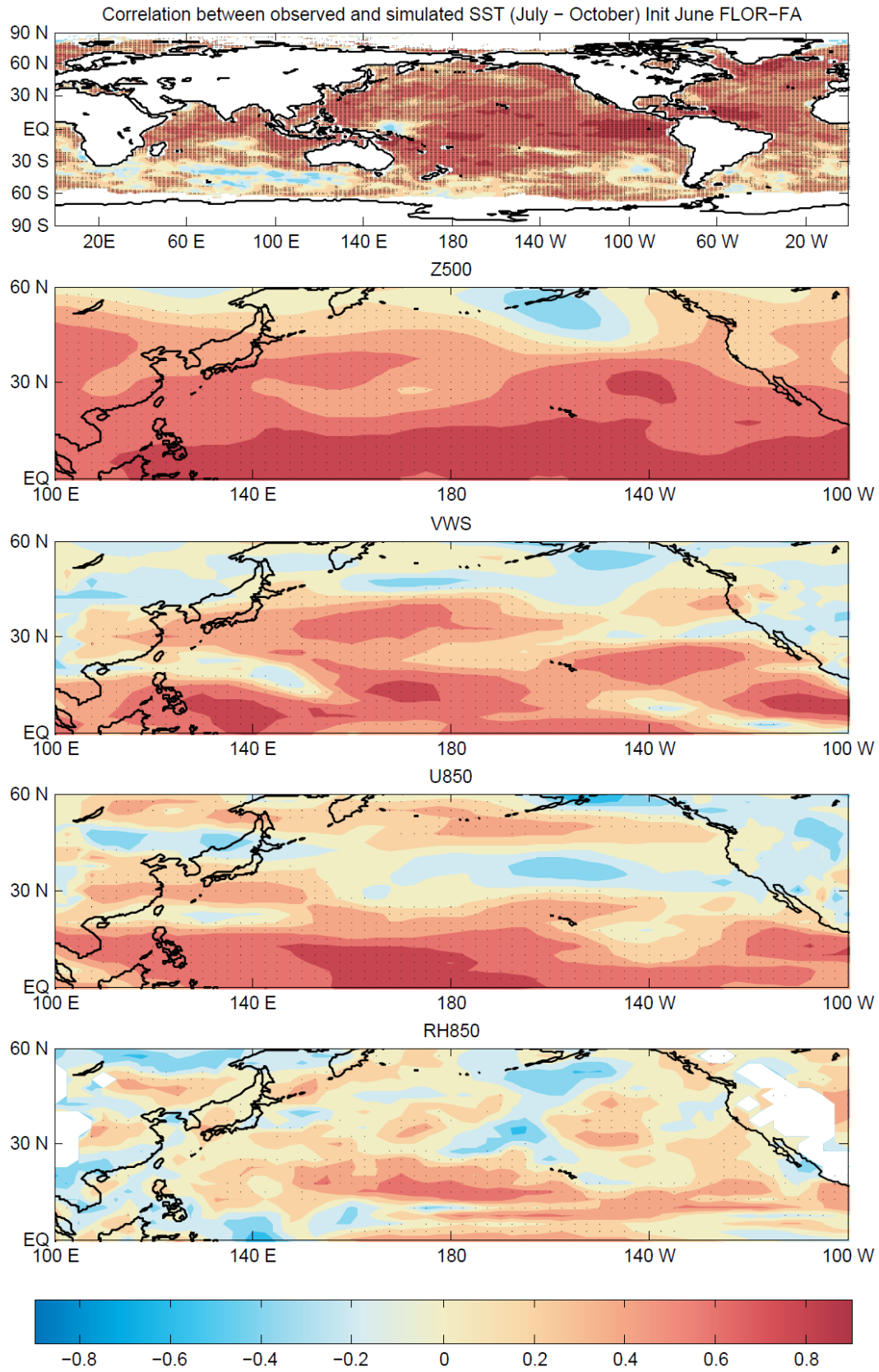


Figure S5. As for Figure S1 but initialized in June.

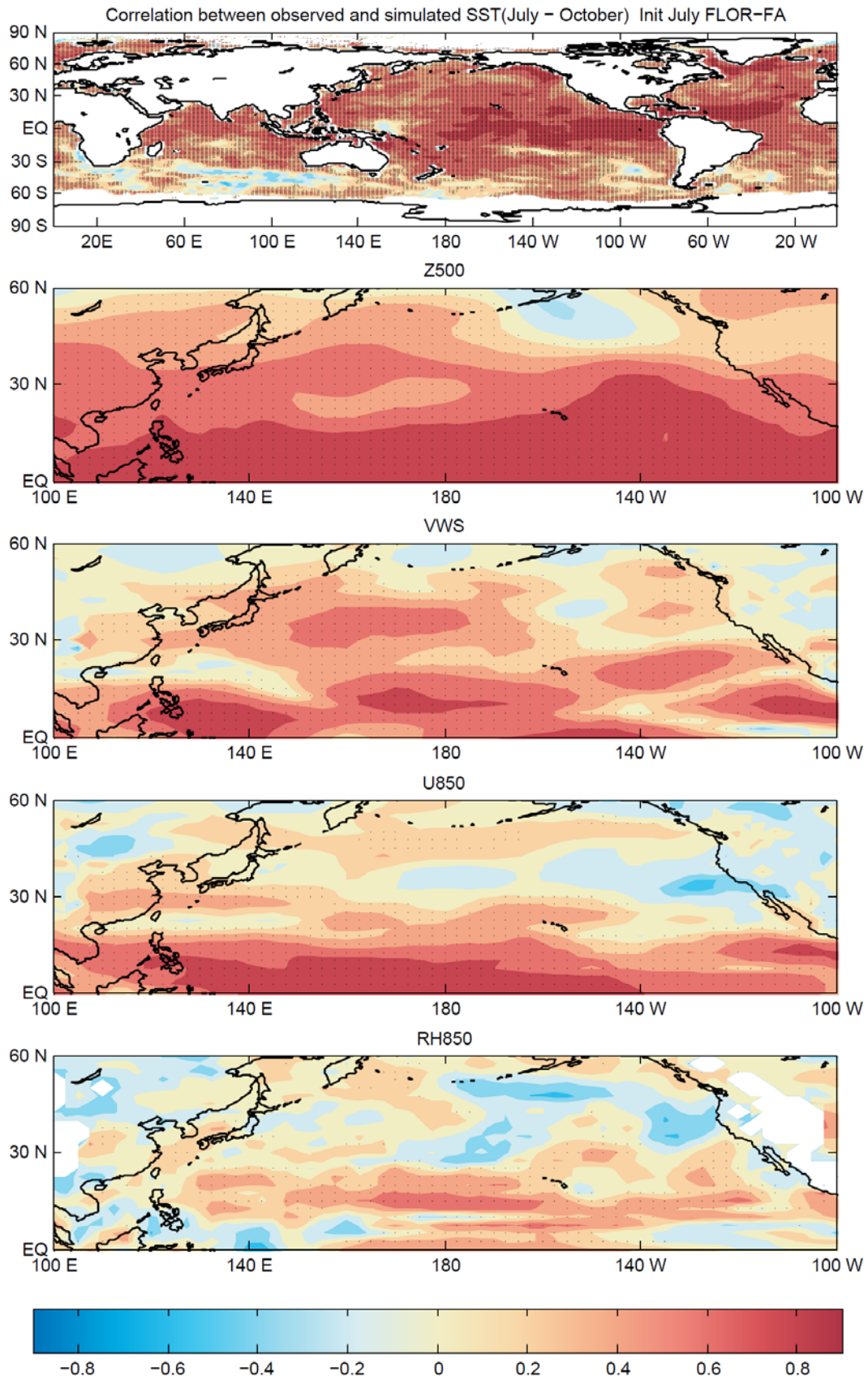


Figure S6. As for Figure S1 but initialized in July.

Table S1 The equations for the hybrid model of clusters initialized in February.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in February
Cluster 1	$\mu_{i1} = \exp(-0.6017 + 4.4026 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.5430 + 0.5399 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.4131 + 0.8719 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1796 + 1.4840 \cdot \text{SST}_i - 0.0014 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3618 + 5.8625 \cdot \text{SST}_i - 0.0293 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.5363 + 1.7801 \cdot \text{SST}_i - 0.0073 \cdot \text{Z500}_i - 0.165 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.1312 + 3.0665 \cdot \text{SST}_i)$

Table S2 The equations for the hybrid model of clusters initialized in March.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in March
Cluster 1	$\mu_{i1} = \exp(-0.6706 + 5.2958 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.5230 + 1.0152 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.4106 + 0.9154 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1735 + 1.6668 \cdot \text{SST}_i - 0.0022 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3392 + 7.6535 \cdot \text{SST}_i - 0.0451 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.5121 + 2.6973 \cdot \text{SST}_i - 0.0009 \cdot \text{Z500}_i - 0.5589 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.2698 + 5.062 \cdot \text{SST}_i)$

Table S3 The equations for the hybrid model of clusters initialized in April.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in April
Cluster 1	$\mu_{i1} = \exp(-0.6519 + 5.0937 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.5131 + 1.1662 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.4090 + 1.0181 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1785 + 1.4390 \cdot \text{SST}_i - 0.0019 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3234 + 6.8985 \cdot \text{SST}_i - 0.0308 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.4931 + 2.0274 \cdot \text{SST}_i - 0.0055 \cdot \text{Z500}_i - 0.2389 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.2331 + 4.5364 \cdot \text{SST}_i)$

Table S4 The equations for the hybrid model of clusters initialized in May.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in May
Cluster 1	$\mu_{i1} = \exp(-0.8002 + 6.6868 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.5114 + 1.1148 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.4122 + 0.9320 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1694 + 1.8127 \cdot \text{SST}_i - 0.0006 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3494 + 6.5543 \cdot \text{SST}_i - 0.0285 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.4888 + 2.1675 \cdot \text{SST}_i - 0.0033 \cdot \text{Z500}_i - 0.0194 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.1720 + 3.6927 \cdot \text{SST}_i)$

Table S5 The equations for the hybrid model of clusters initialized in June.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in June
Cluster 1	$\mu_{i1} = \exp(-0.8043 + 6.8743 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.4873 + 1.1698 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.4043 + 1.1155 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1603 + 2.1835 \cdot \text{SST}_i - 0.0008 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3825 + 3.4187 \cdot \text{SST}_i - 0.0103 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.4704 + 2.2588 \cdot \text{SST}_i - 0.0003 \cdot \text{Z500}_i - 0.1102 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.2008 + 4.5837 \cdot \text{SST}_i)$

Table S6 The equations for the hybrid model of clusters initialized in July.
 μ_{i1} represents the estimated TC frequency in Cluster 1 in the i^{th} year.

Equations	Initialized in July
Cluster 1	$\mu_{i1} = \exp(-0.7267 + 5.9805 \cdot \text{SST}_i)$
Cluster 2	$\mu_{i2} = \exp(1.4873 + 1.1518 \cdot \text{SST}_i)$
Cluster 3	$\mu_{i3} = \exp(1.3798 + 1.3595 \cdot \text{SST}_i)$
Cluster 4	$\mu_{i4} = \exp(1.1398 + 1.7423 \cdot \text{SST}_i - 0.0069 \cdot \text{Z500}_i)$
Cluster 5	$\mu_{i5} = \exp(0.3687 + 5.9426 \cdot \text{SST}_i - 0.0221 \cdot \text{Z500}_i)$
Cluster 6	$\mu_{i6} = \exp(0.4459 + 3.082 \cdot \text{SST}_i - 0.0080 \cdot \text{Z500}_i - 0.1839 \cdot \text{VWS}_i)$
Cluster 7	$\mu_{i7} = \exp(-0.2095 + 4.3909 \cdot \text{SST}_i)$