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2 **The influence of subsurface conditions on the spatial and temporal**
3 **variability of tropical SST and rainfall in CFSv2 reforecasts**

4
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38 **Figures Caption:**

39 **Figure S1:** (a) The difference of interannual variability of January (Jan) SST between January
40 initialized reforecasts (JIR) for the period 1994-2014 (hereafter; P58-78) and period 1994-2014
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43 **Figure S2:** Spatial distribution of climatological monthly SST in JIR during the period 1994-2014 in
44 (a) January, (b), mean of June to July (JJ) and (c) mean of August to September (AS). (d)-(f) as in
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46 **Figure S3:** Spatial distribution of climatological monthly Extended Reconstructed SST, version 5
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60 **Figure S6:** (a) Spatial distribution of the climatological difference of January SST between
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68 **Figure S8:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of
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70 COMBINE-NV. The black line indicates 20°C isotherm (Z20) in January. The scale for the
71 magnitude of PT in “°C” is shown at right of these panels (upper one). (f)-(j) as in (a)-(e) but for
72 Salinity. The scale for the magnitude of salinity in “psu” is shown below these panels. (k)-(n) as in
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78 magnitude of PT in “°C” is shown at right of these panels (upper one). (f)-(j) as in (a)-(e) but for
79 Salinity. The scale for the magnitude of salinity in “psu” is shown below these panels. (k)-(n) as in
80 (b)-(e) for zonal current in (k) CFSR, (l) GODAS, (m) ORA-S3 and (n) COMBINE-NV. The scale
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100 The green line (black line) indicates 20°C isotherm (Z20) in the period P58-78 (P94-14) in both JIR
101 and AprIR. (i) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological
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104 **Figure S14:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of
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109 in JIR during mean of P94-14 for Jan, Mar and April. (g)-(i) as in (d)-(f) but for MC in JIR during
110 mean of P58-78.

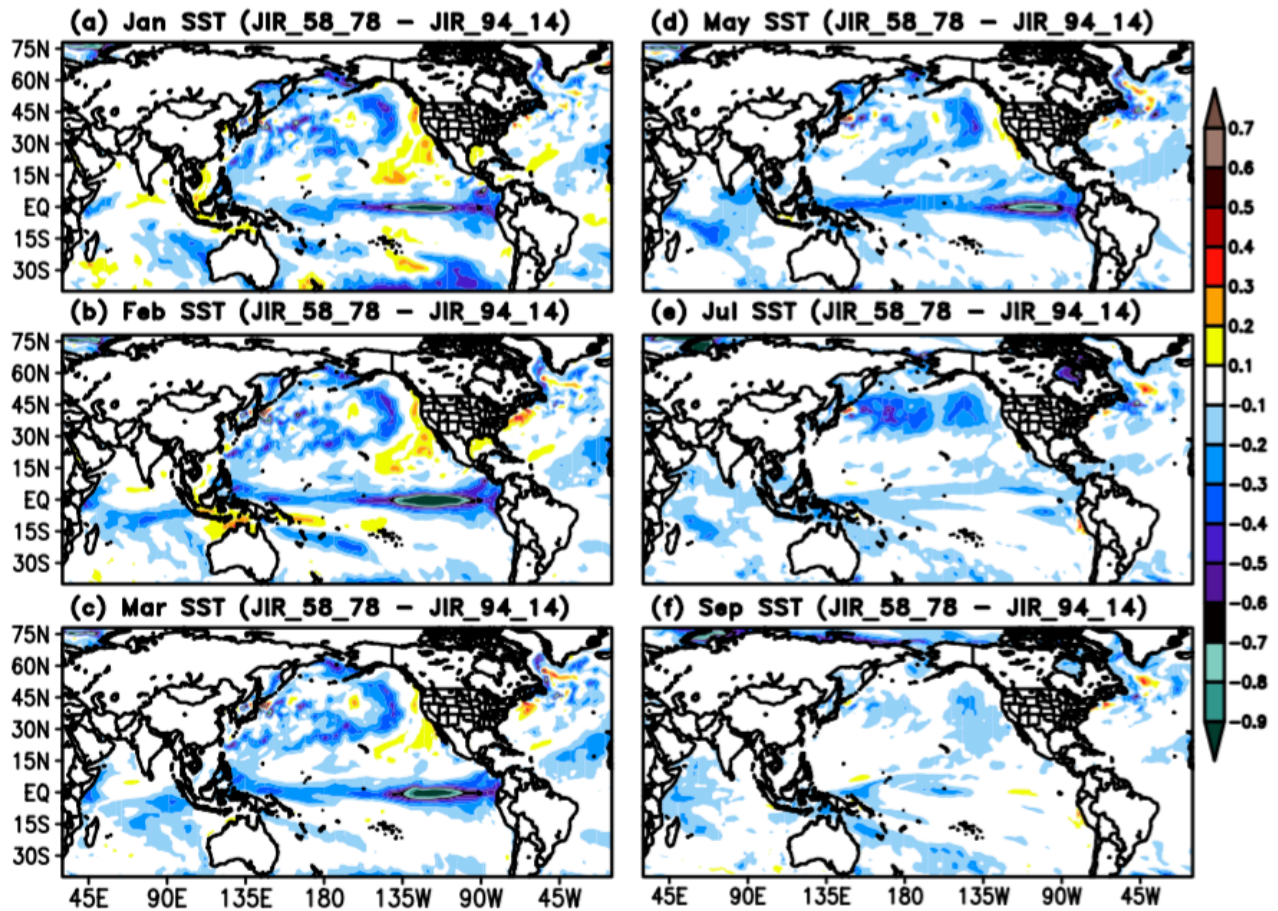
111 **Figure S16:** (a) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological
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113 as in (a) but for Feb (b), Mar (c), Apr (d), May (e), Jun (f), Jul (g) and Aug (h) MC in JIR. The
114 green line (black line) indicates 20°C isotherm (Z20) in the period P58-78 (P94-14) in both JIR and
115 AprIR. (i) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological difference
116 of Apr VC between AprIR during mean of P58-78 and P94-14. (j)-(l) as in (i) but for May (j), Jun
117 (k) and Jul (l) MC in AprIR.

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119 ORAS4) between mean of P58-78 and P94-14 at (a) 5.02m, (b) 25.16m, (c) 45.45m, (d) 66.04m, (e)
120 87.27m, (f) 98.31m, (g) 109.81m, (h) 135.03m and (i) 165.73m. The scale for the magnitude of PT
121 in “°C” is shown at right of these panels (upper one). (j)-(r) as in (a)-(i) but January ZC in OICs
122 (ECMWF ORAS4). The scale for the magnitude of ZC in “cm/s” is shown at right of these panels
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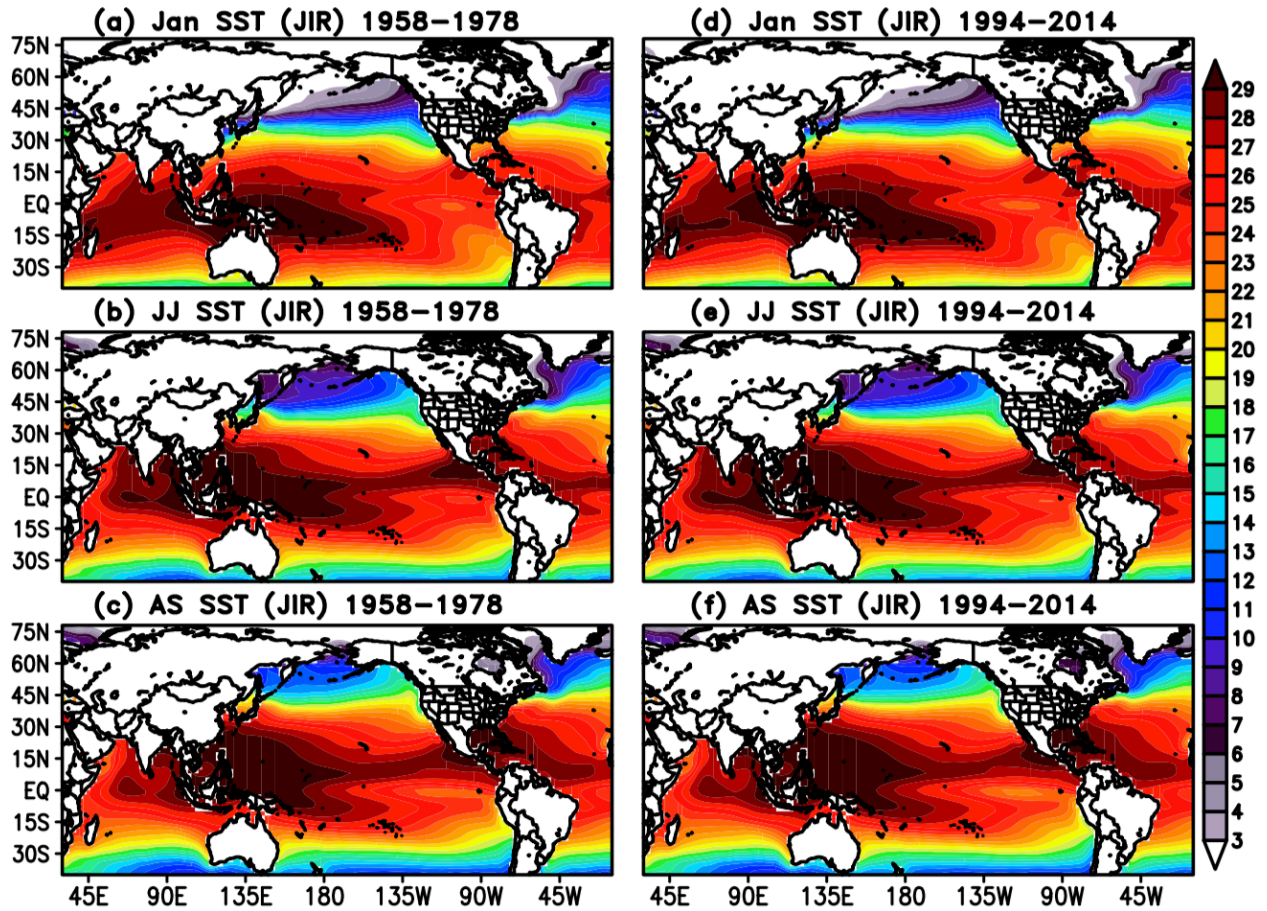


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131 **Figure S1:** (a) The difference of interannual variability of January (Jan) SST between January
132 initialized reforecasts (JIR) for the period 1994-2014 (hereafter; P58-78) and period 1994-2014
133 (hereafter; P94-14). (b)-(h) as in (a) but for February (Feb) (b), March (Mar) (c), May (d), July (Jul)
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146 (a) January, (b), mean of June to July (JJ) and (c) mean of August to September. (d)-(f) as in (a)-(c)
147 but for JIR during the period 1994-2014.

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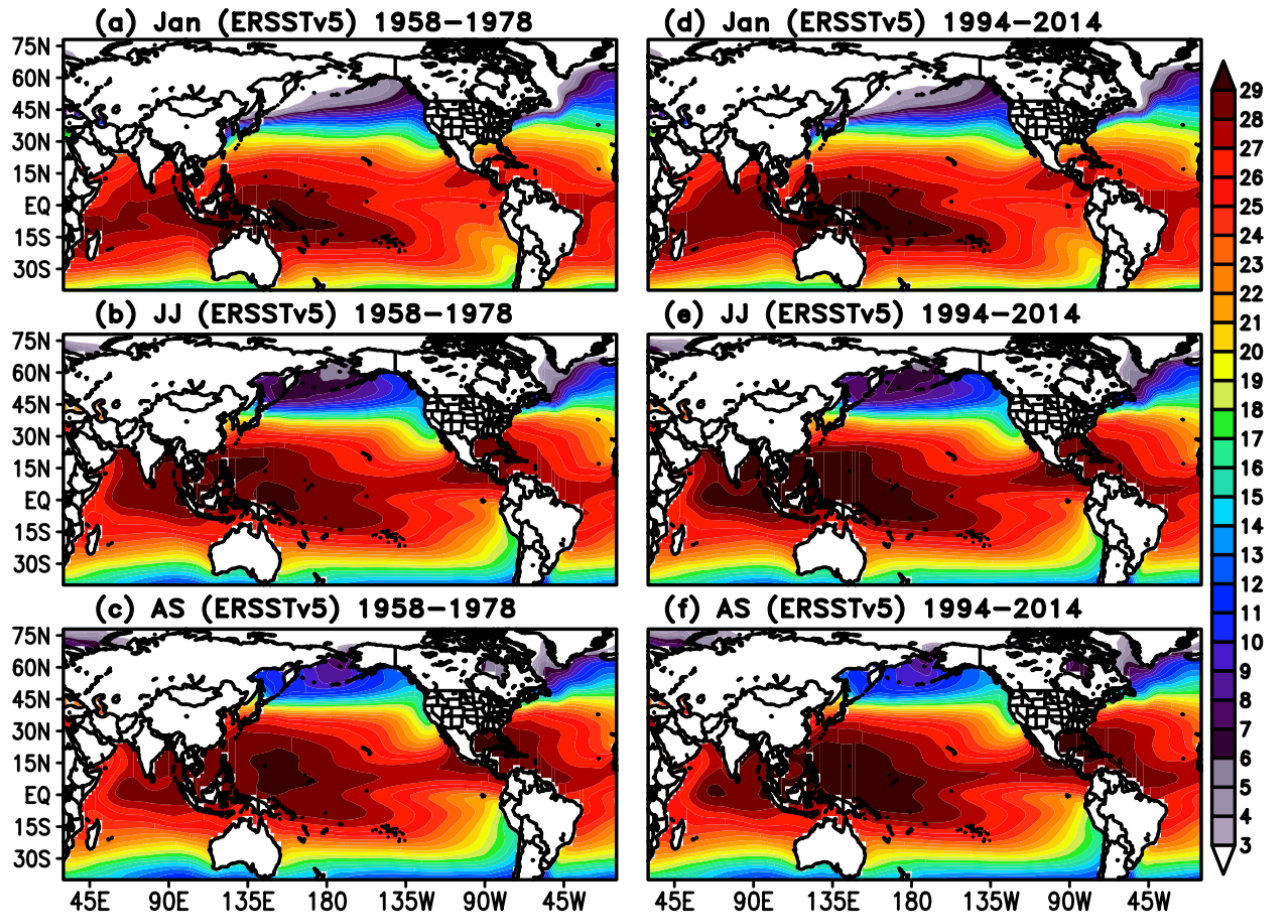
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158 (ERSSTv5) during the period 1994-2014 in (a) January, (b) JJ and (c) AS. (d)-(f) as in (a)-(c) but for
159 ERSSTv5 during the period 1994-2014.

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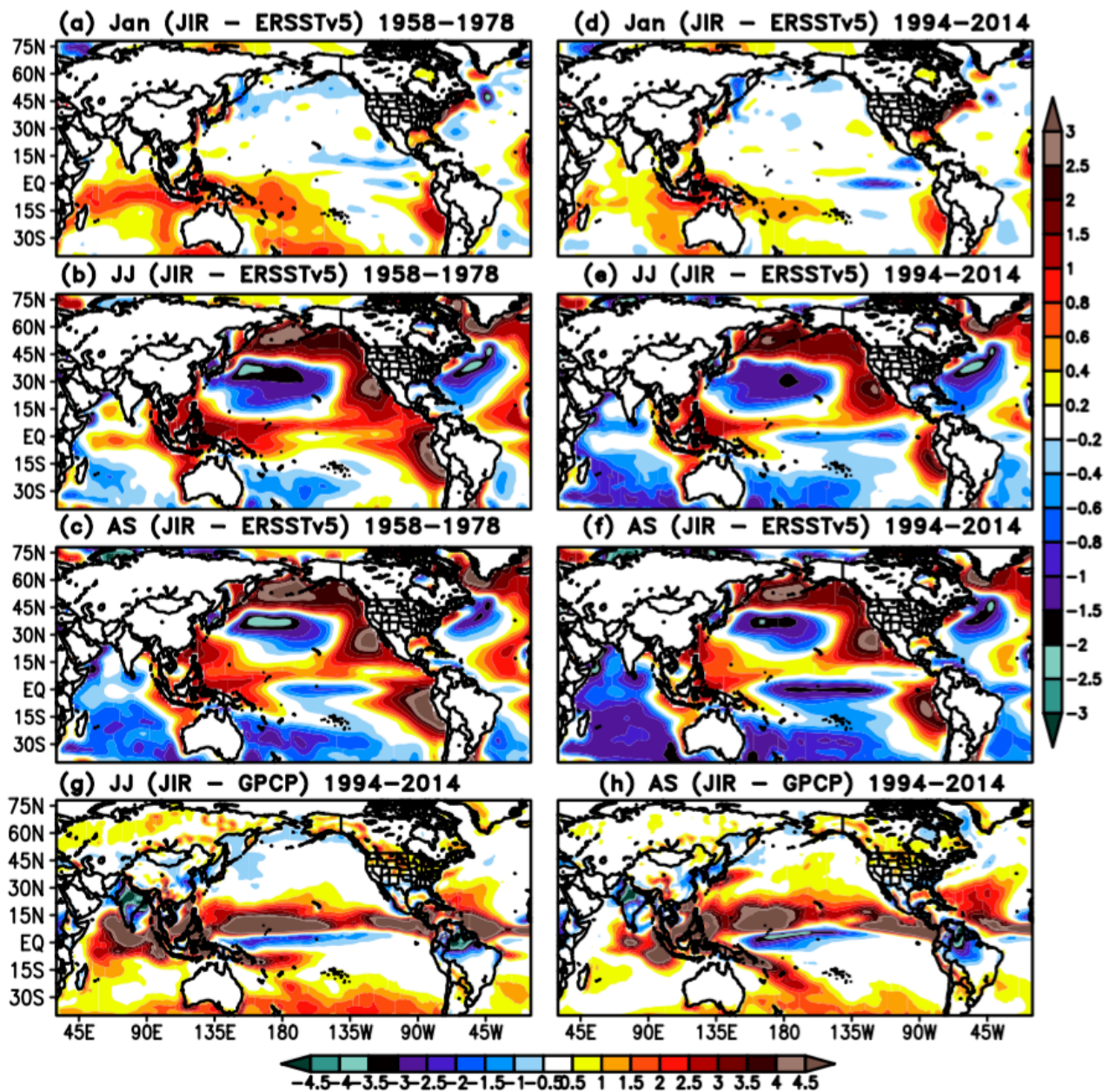
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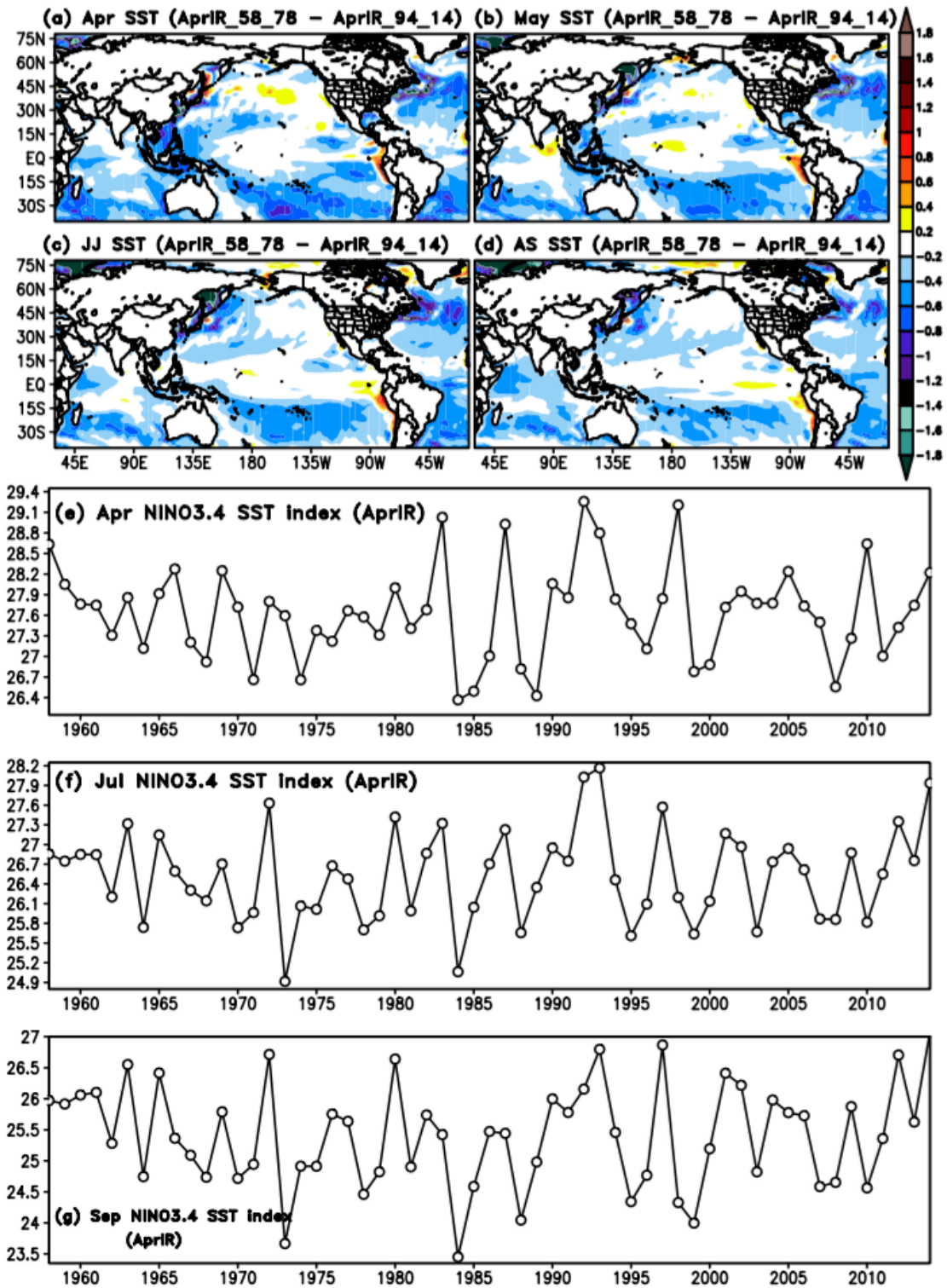
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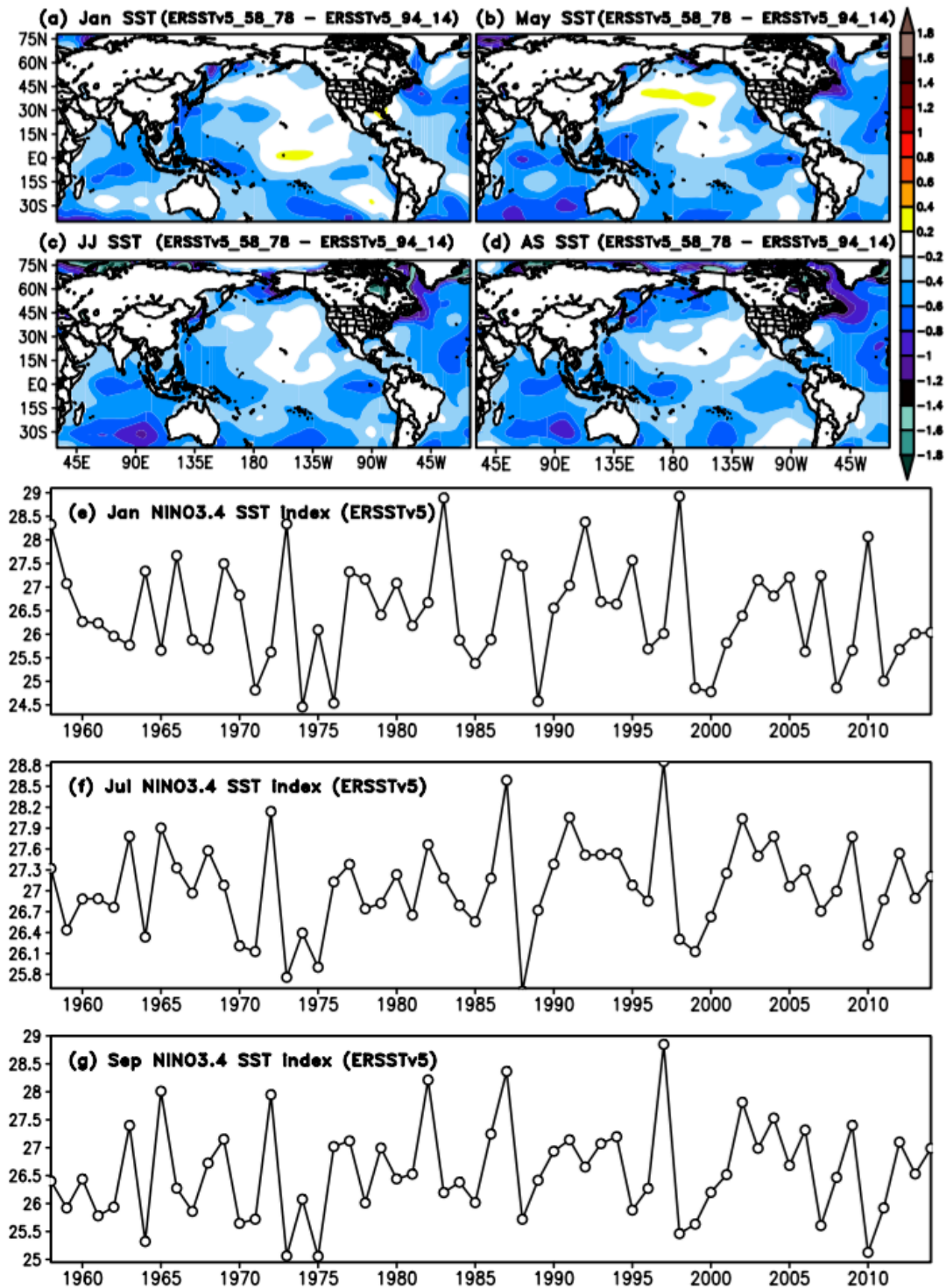
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 169 ERSSTv5 for period 1958-1978. (b)-(c) as in (a) but for JJ (b) and AS (c) SST bias for period 1958-
 170 1978. (d) The climatological bias of Jan SST in JIR for P94-14 relative to ERSSTv5 for period
 171 1994-2014. (e)-(f) as in (d) but for JJ (e) and AS (f) for period 1994-2014. (g) Spatial distribution of
 172 climatological bias of JJ rainfall in JIR for P94-14 relative to GPCP. (h) as in (g) but for AS rainfall
 173 bias for P94-14.

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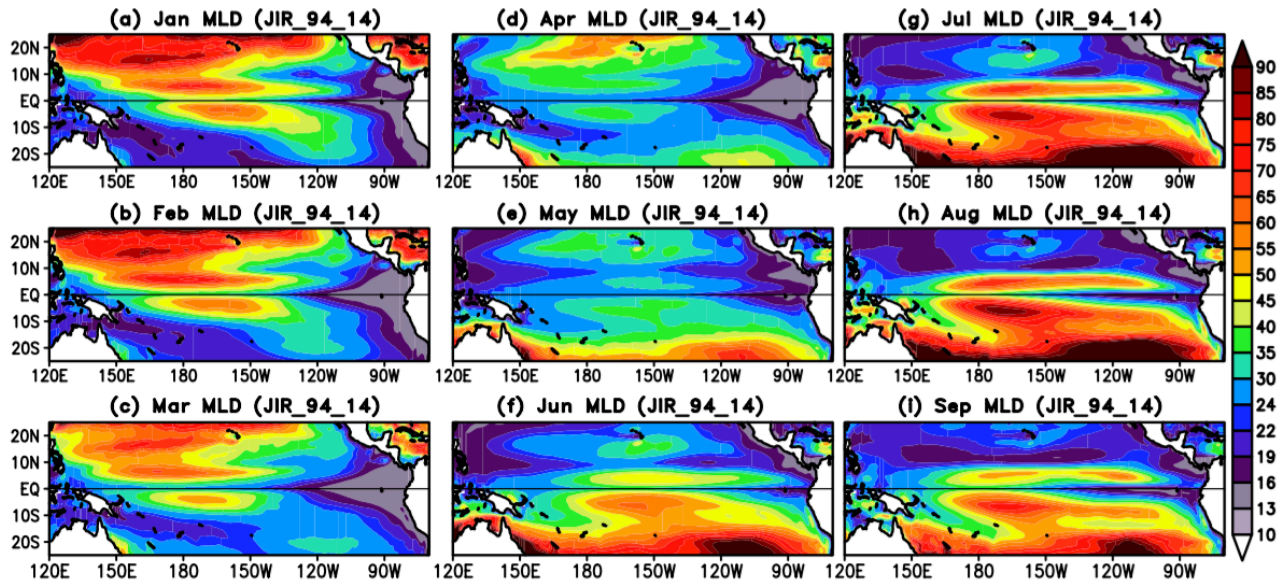
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 177 initialized reforecasts (hereafter, AprIR) during mean of P58-78 and P94-14. (b) as in (a) but for
 178 May SST. (c) as in (a) but for mean of JJ SST. (d) as in (a) but for mean of AS SST. (e) Year-to-
 179 year variations of April actual value of NINO3.4 SST index in AprIR for period 1958-2014. (f) as in
 180 (e) but for July. (g) as in (e) but for September NINO3.4 SST index.



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182 **Figure S6:** (a) Spatial distribution of the climatological difference of January SST between
 183 ERSSTv5 during mean of P58-78 and P94-14. (b) as in (a) but for May SST. (c) as in (a) but for JJ
 184 SST. (d) as in (a) but for AS SST. (e) Year-to-year variations of January actual value of NINO3.4
 185 SST index in ERSSTv5 for period 1958-2014. (f) as in (e) but for July NINO3.4 SST index. (g) as in
 186 (e) but for September ERSSTv5 NINO3.4 SST index.

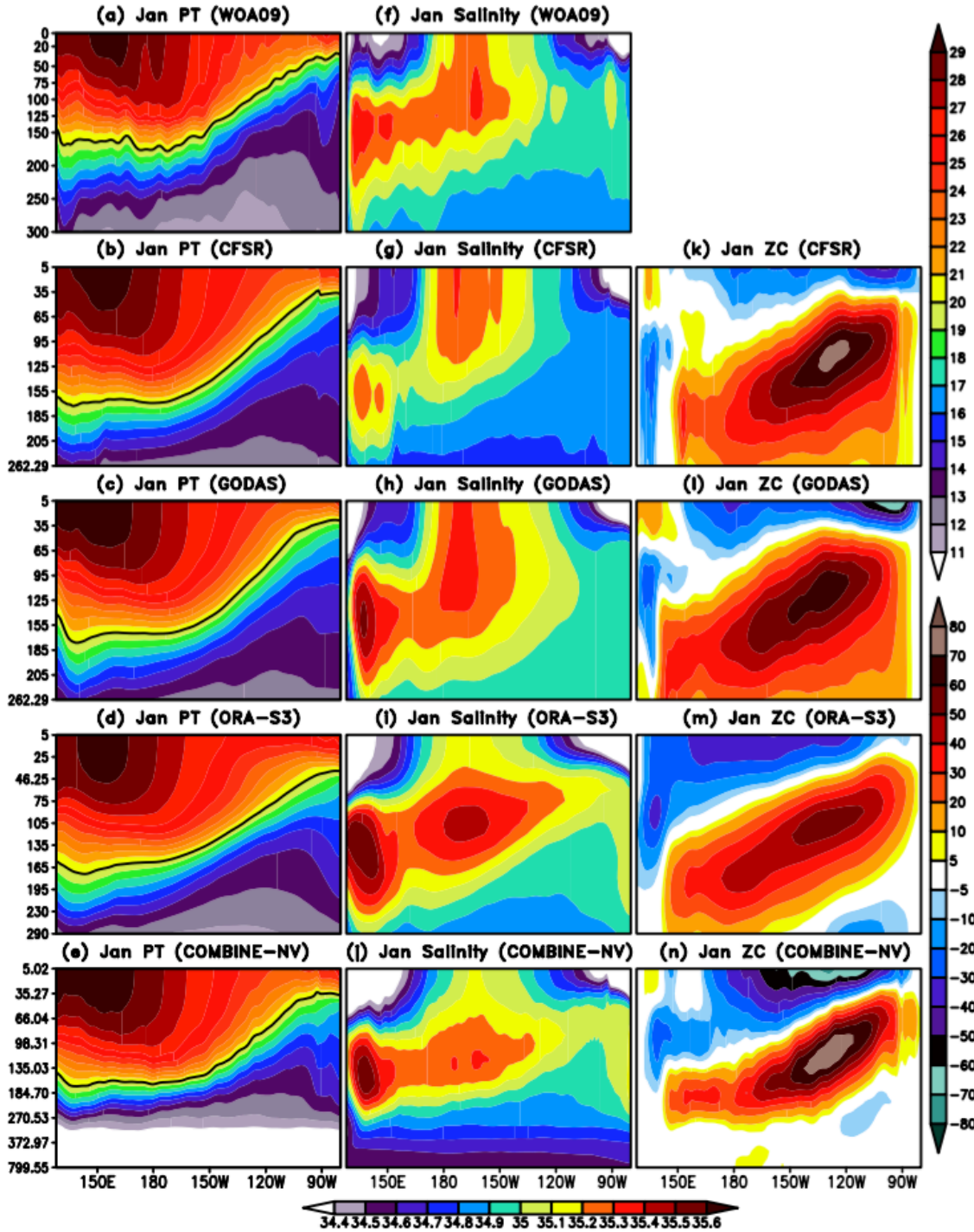
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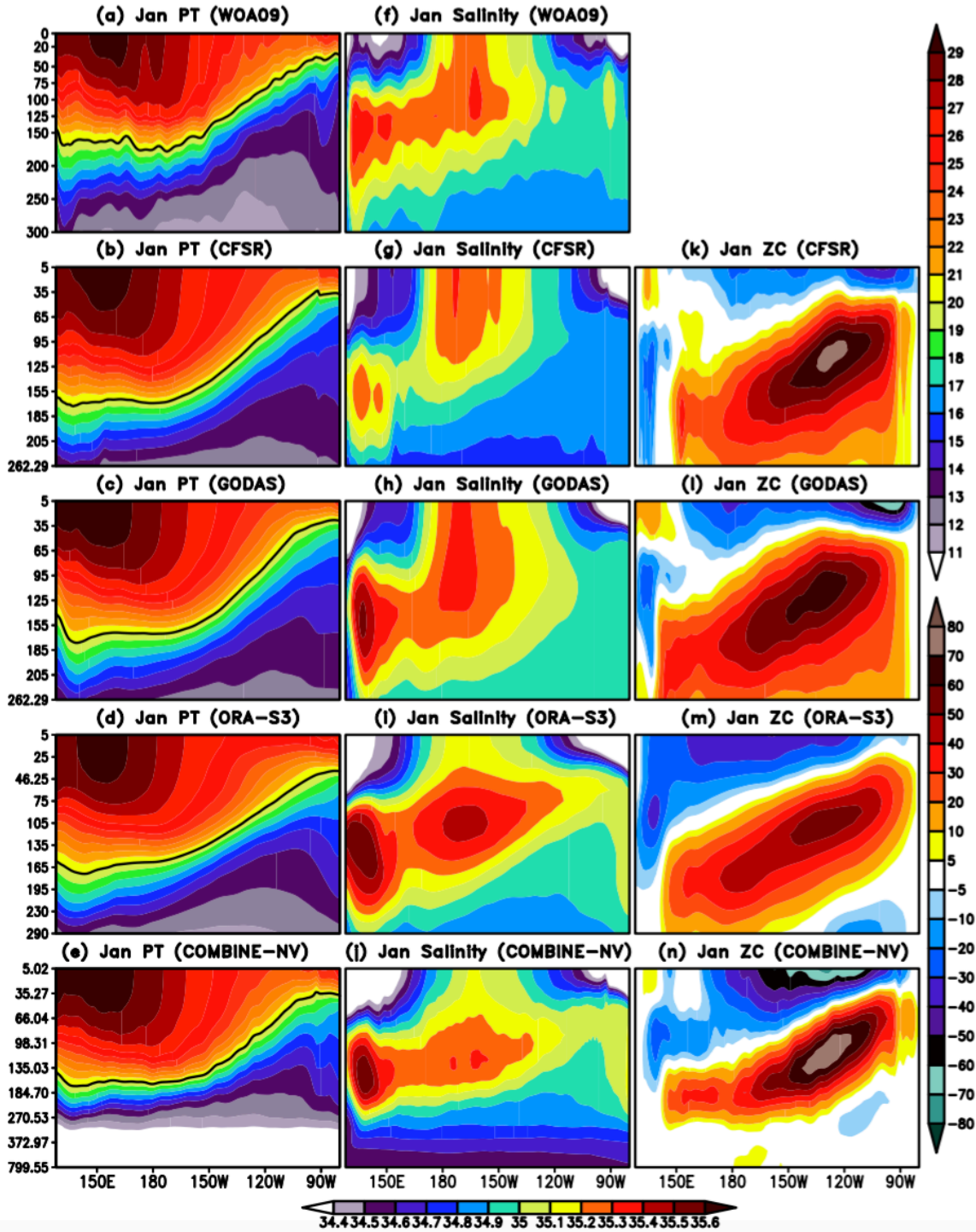
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193 1994-2014 in (a) January, (b) February, (c) March, (d) April, (e) May, (f) June, (g) July, (h) August
194 and (i) September MLD in JIR.

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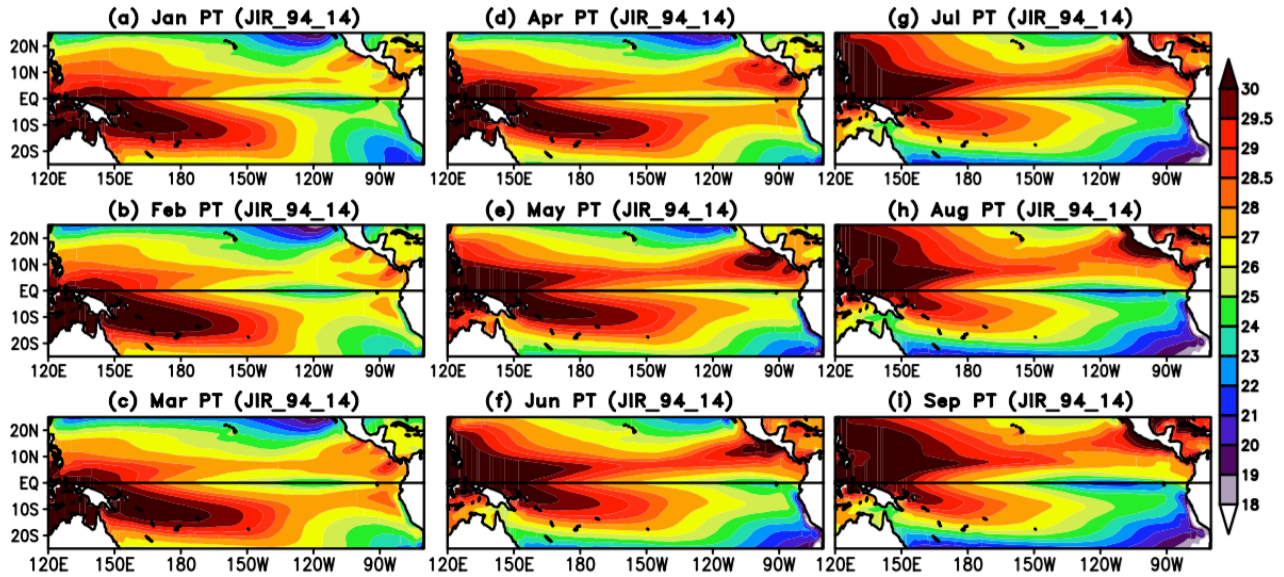
206 **Figure S8:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of January
 207 Potential temperature (PT) in (a) WOA09, (b) CFSR, (c) GODAS, (d) ORA-S3 and (e) COMBINE-NV. The
 208 black line indicates 20°C isotherm (Z20) in January. The scale for the magnitude of PT in “°C” is shown at
 209 right of these panels (upper one). (f)-(j) as in (a)-(e) but for Salinity. The scale for the magnitude of salinity in
 210 “psu” is shown below these panels. (k)-(n) as in (b)-(e) for zonal current in (k) CFSR, (l) GODAS, (m)
 211 HOPE and (n) NEMO. The scale for the magnitude of ZC in “cm/s” is shown at right of these panels (below
 212 one).



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214 **Figure S9:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of August
 215 Potential temperature (PT) in (a) WOA09, (b) CFSR, (c) GODAS, (d) ORA-S3 and (e) COMBINE-NV. The
 216 black line indicates 20°C isotherm (Z20) in August. The scale for the magnitude of PT in “C” is shown at
 217 right of these panels (upper one). (f)-(j) as in (a)-(e) but for Salinity. The scale for the magnitude of salinity in
 218 “psu” is shown below these panels. (k)-(n) as in (b)-(e) for zonal current in (k) CFSR, (l) GODAS, (m) ORA-
 219 S3 and (n) COMBINE-NV. The scale for the magnitude of ZC in “cm/s” is shown at right of these panels
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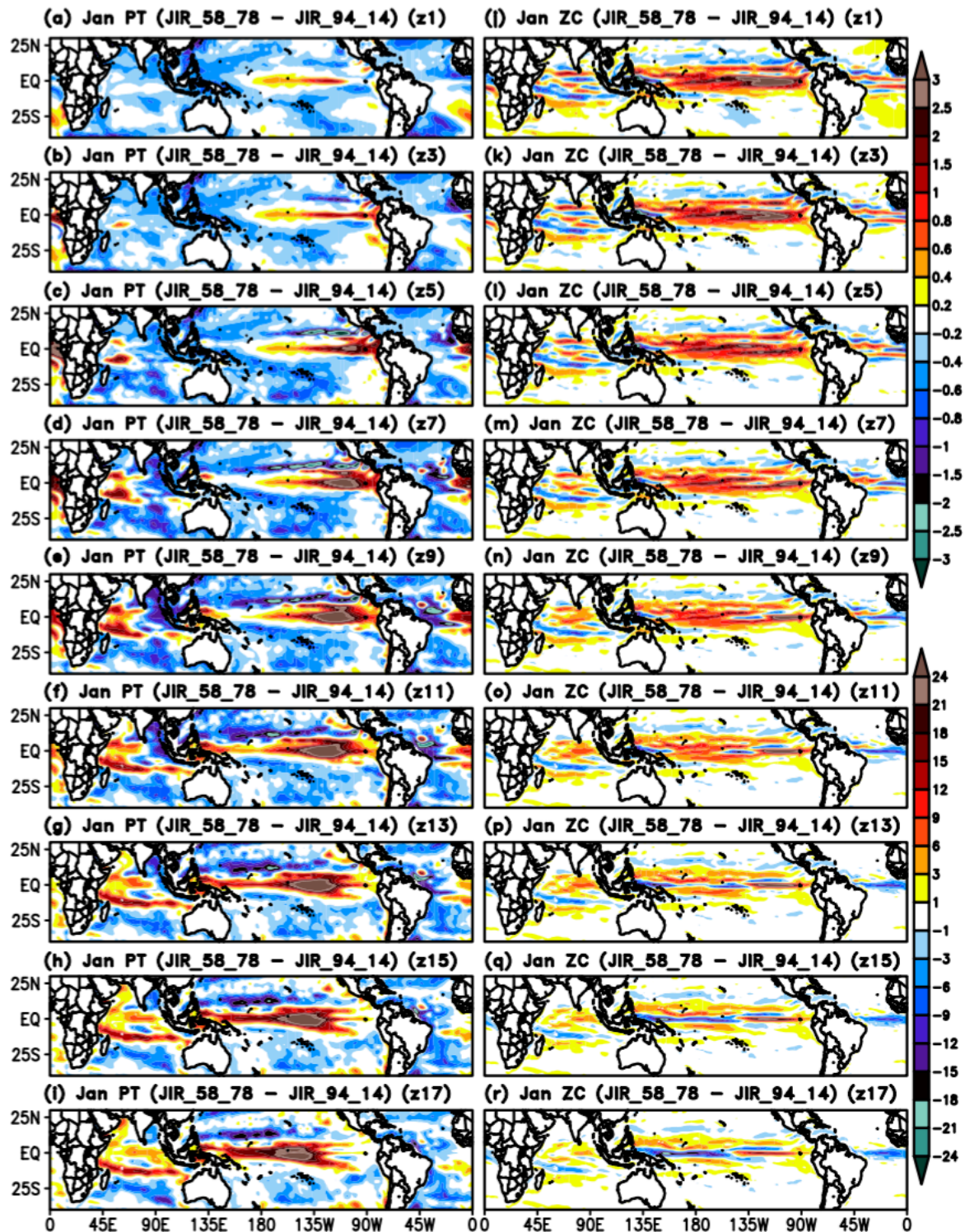
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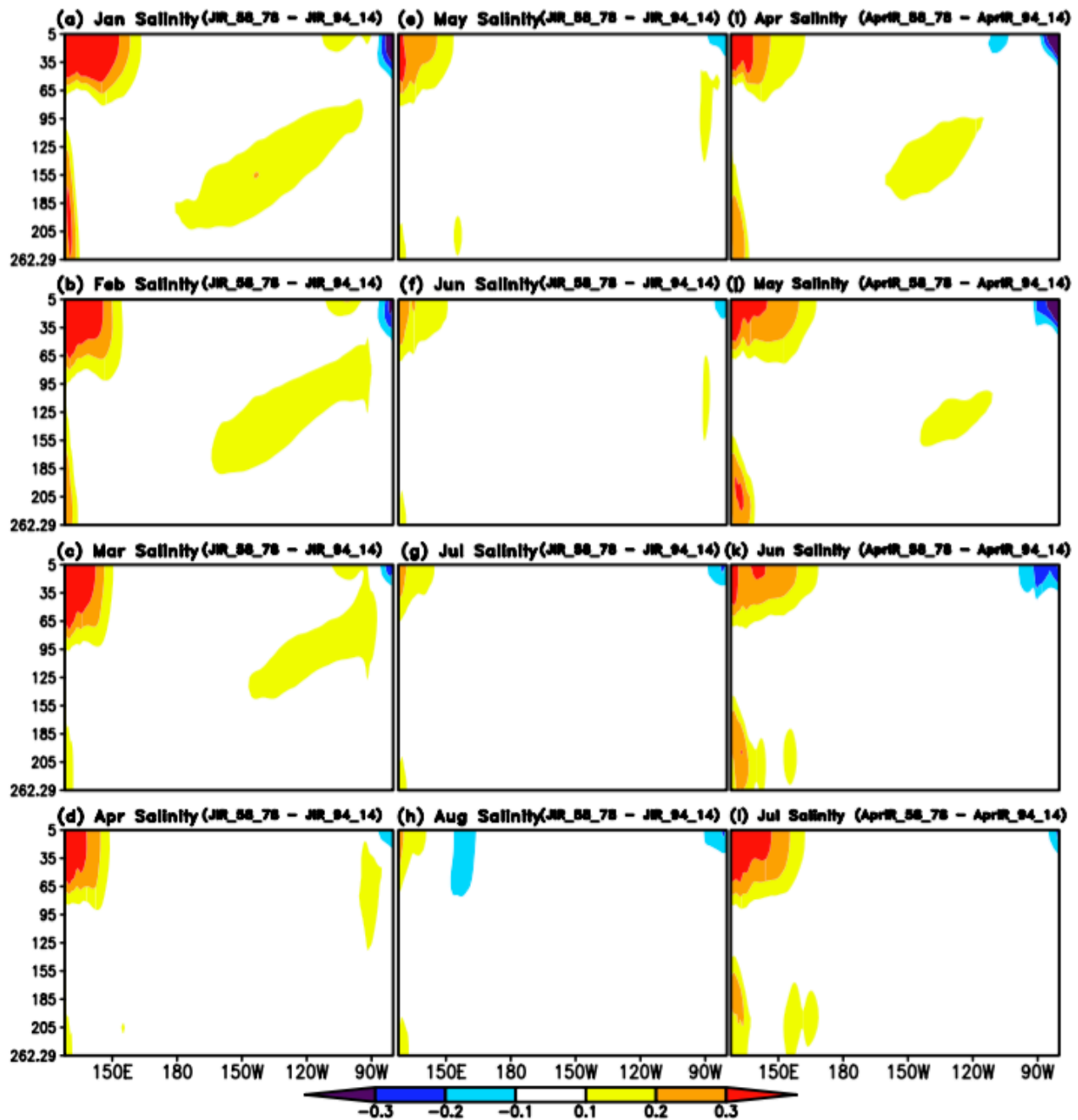
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226 period 1994-2014 in (a) January, (b) February, (c) March, (d) April, (e) May, (f) June, (g) July, (h)
227 August and (i) September MLD in JIR.

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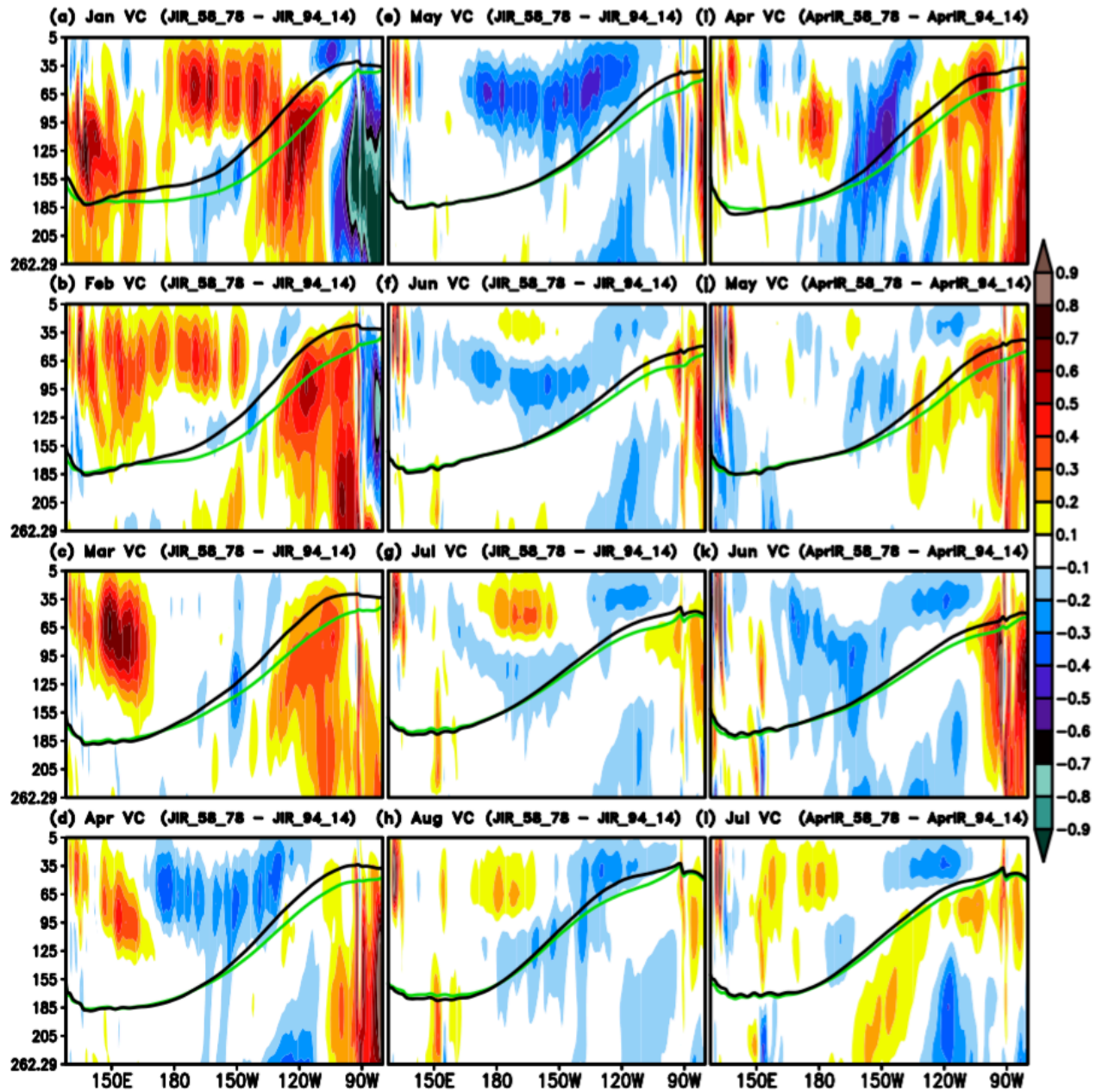
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 241 78 and P94-14 at (a) z1 (5m), (b) z3 (25m), (c) z5 (45m), (d) z7 (65m), (e) z9 (85m), (f) z11 (105m), (g) z13
 242 (125m), (h) z15 (145m) and (i) z17 (165m). The scale for the magnitude of PT in “°C” is shown at right of
 243 these panels (upper one). (j)-(r) as in (a)-(i) but for Jan ZC in difference between JIR P58-78 and P94-14. The
 244 scale for the magnitude of ZC in “cm/s” is shown at right of these panels (below one).



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 248 difference of Jan salinity between JIR during mean of P58-78 and P94-14. (b)-(h) as in (a) but for
 249 Feb (b), Mar (c), Apr (d), May (e), Jun (f), Jul (g) and Aug (h) salinity in JIR. (i) Longitude-depth
 250 section (latitude averaged from 1°S to 1°N) of climatological difference of Apr salinity between
 251 AprIR during mean of P58-78 and P94-14. (j)-(l) as in (i) but for May (j), Jun (k) and Jul (l) in
 252 salinity in AprIR.

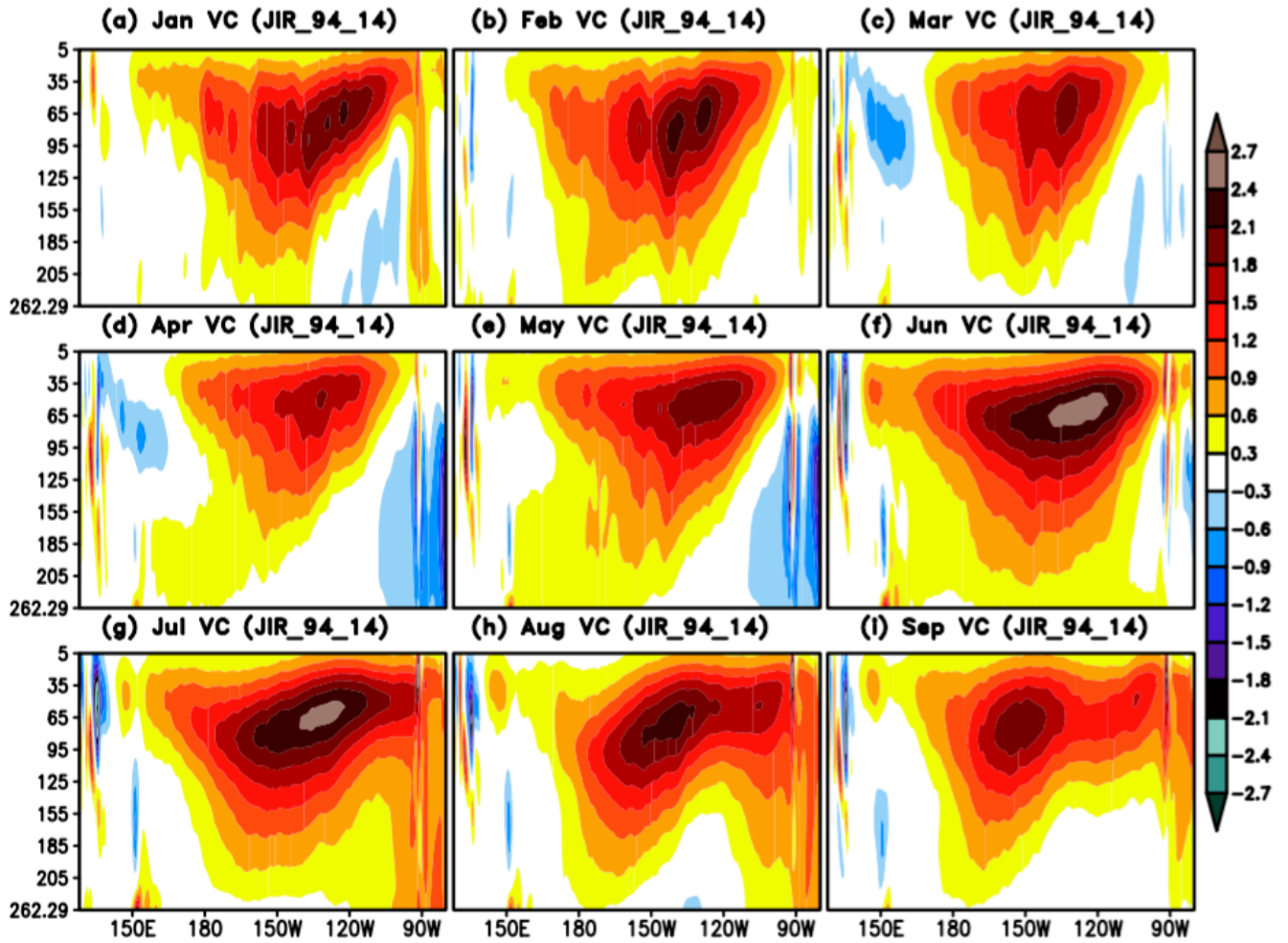
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 256 **Figure S13:** (a) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological
 257 difference of Jan vertical current (VC; meter/day) between JIR during mean of P58-78 and P94-14.
 258 (b)-(h) as in (a) but for Feb (b), Mar (c), Apr (d), May (e), Jun (f), Jul (g) and Aug (h) VC in JIR.
 259 The green line (black line) indicates 20°C isotherm (Z20) in the period P58-78 (P94-14) in both JIR
 260 and AprIR. (i) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological
 261 difference of Apr VC between AprIR during mean of P58-78 and P94-14. (j)-(l) as in (i) but for May
 262 (j), Jun (k) and Jul (l) VC in AprIR.

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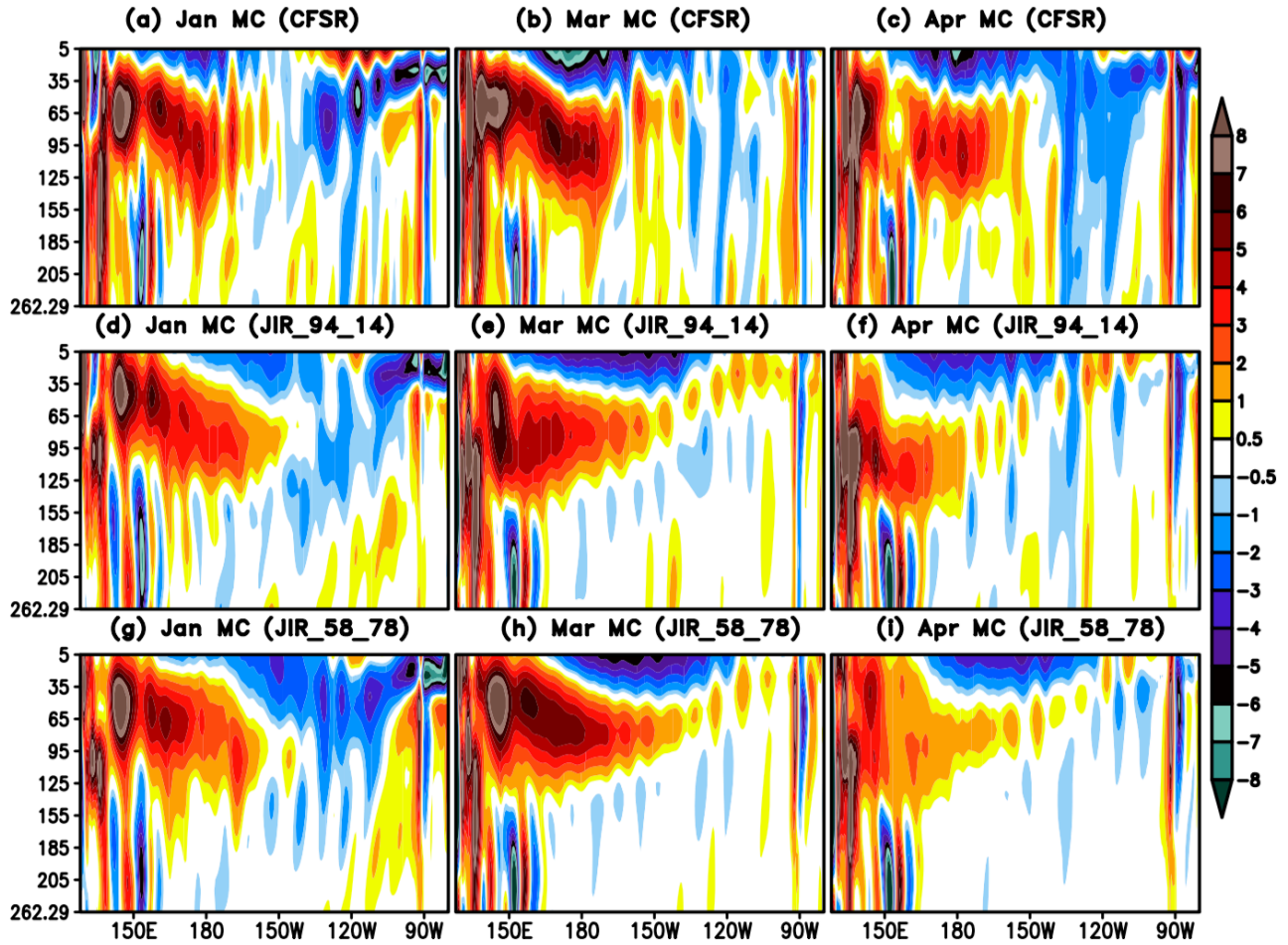
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268 **Figure S14:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of
269 vertical current (VC; meter/day) in JIR during mean of P94-14 for (a) Jan, (b) Feb, (c) Mar, (d) Apr, (e)
270 May, (f) Jun, (g) Jul, (h) Aug and (i) Sep.

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281 **Figure S15:** Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological mean of
282 meridional current (MC) in CFSR for (a) Jan, (b) May and (c) April. **(d)-(f)** as in (a)-(c) but for MC
283 in JIR during mean of P94-14 for Jan, Mar and April. **(g)-(i)** as in (d)-(f) but for MC in JIR during
284 mean of P58-78.

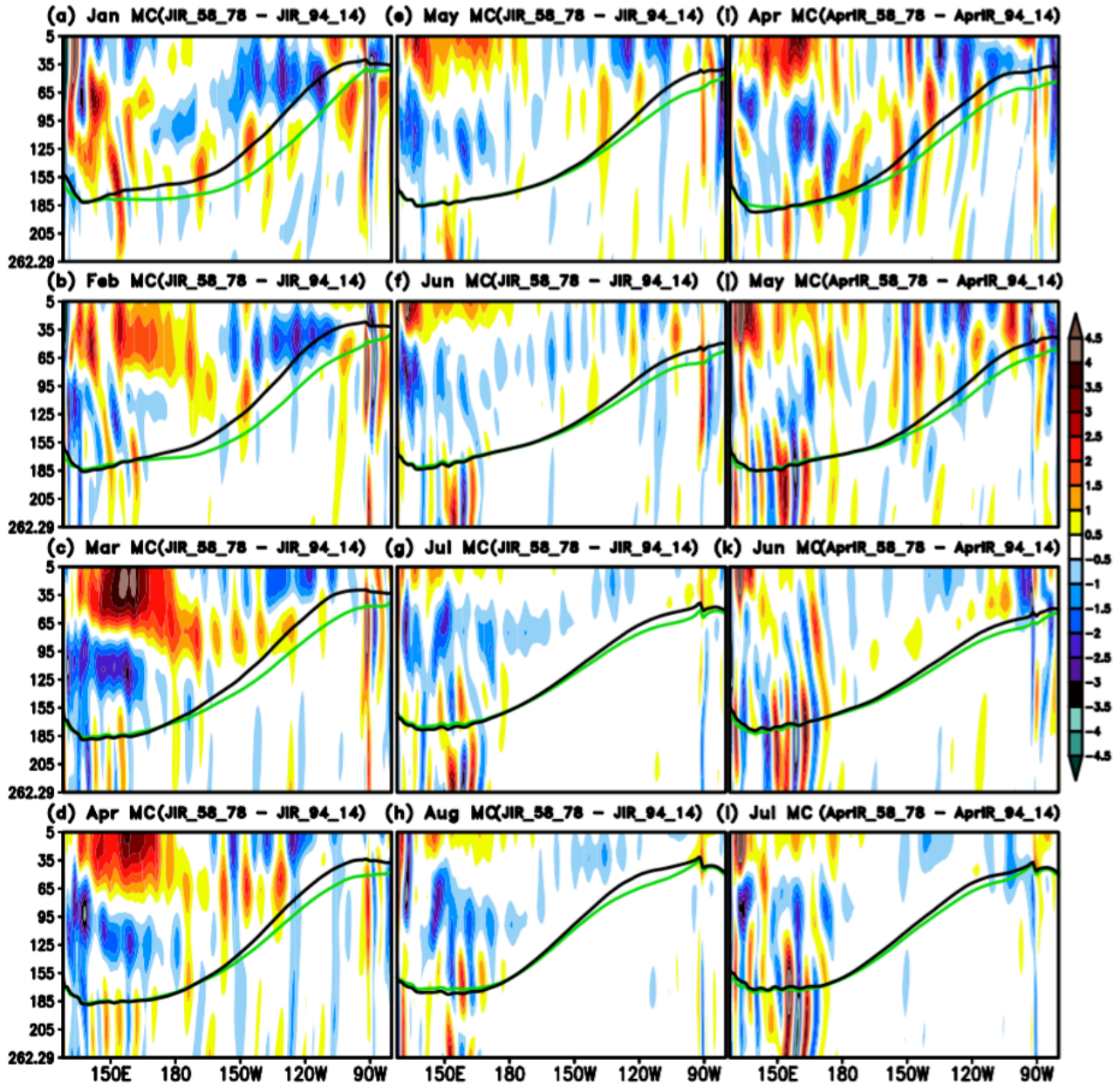
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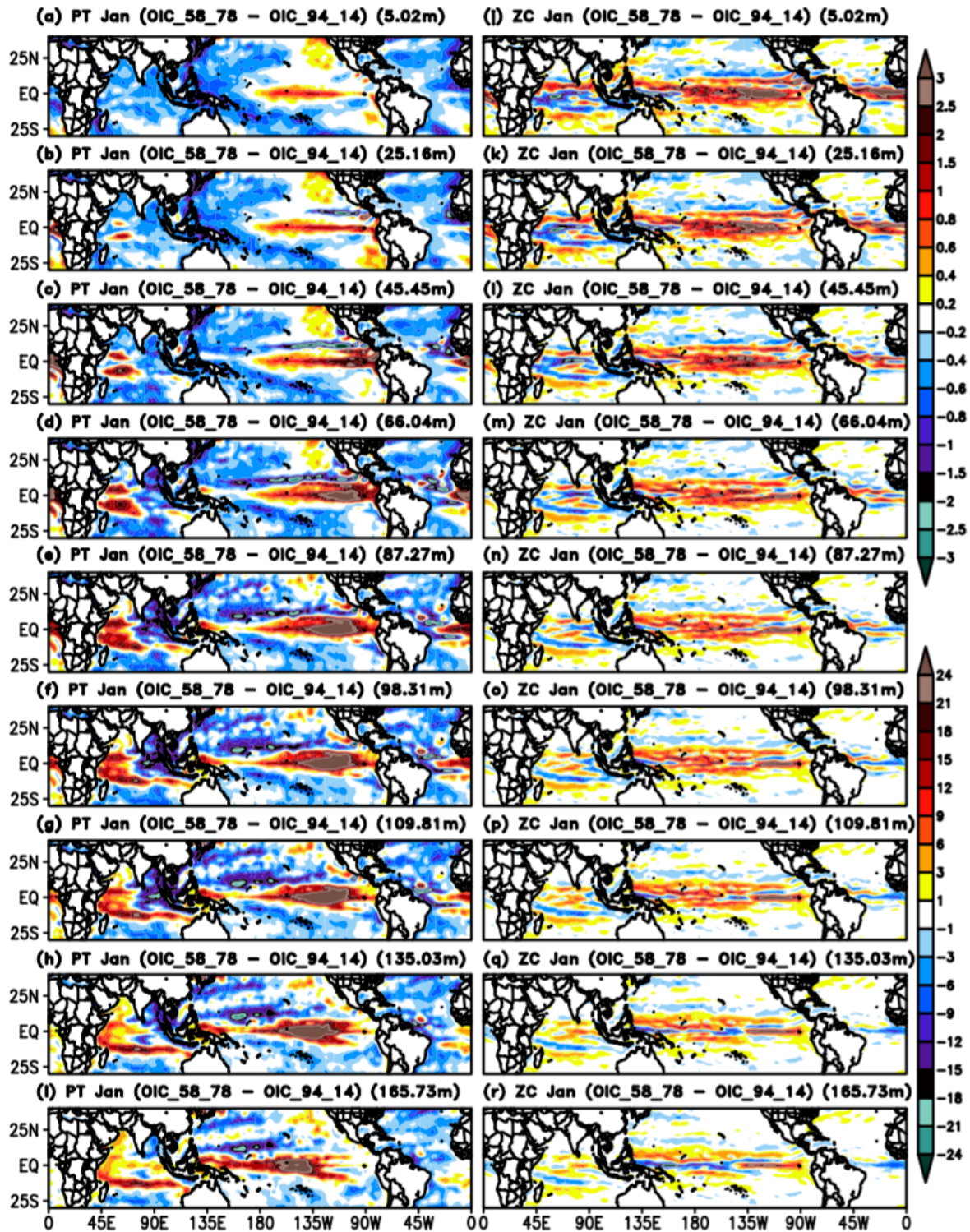
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291 **Figure S16:** (a) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological
 292 difference of Jan meridional current (MC) between JIR during mean of P58-78 and P94-14. (b)-(h)
 293 as in (a) but for Feb (b), Mar (c), Apr (d), May (e), Jun (f), Jul (g) and Aug (h) MC in JIR. The
 294 green line (black line) indicates 20°C isotherm (Z20) in the period P58-78 (P94-14) in both JIR and
 295 AprIR. (i) Longitude-depth section (latitude averaged from 1°S to 1°N) of climatological difference
 296 of Apr VC between AprIR during mean of P58-78 and P94-14. (j)-(l) as in (i) but for May (j), Jun
 297 (k) and Jul (l) MC in AprIR.

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302 **Figure S17:** Spatial distribution of the climatological difference of January PT in OICs (ECMWF ORAS4)
 303 between mean of P58-78 and P94-14 at (a) 5.02m, (b) 25.16m, (c) 45.45m, (d) 66.04m, (e) 87.27m, (f)
 304 98.31m, (g) 109.81m, (h) 135.03m and (i) 165.73m. The scale for the magnitude of PT in “°C” is shown at
 305 right of these panels (upper one). (j)-(r) as in (a)-(i) but January ZC in OICs (ECMWF ORAS4). The scale
 306 for the magnitude of ZC in “cm/s” is shown at right of these panels (below one).