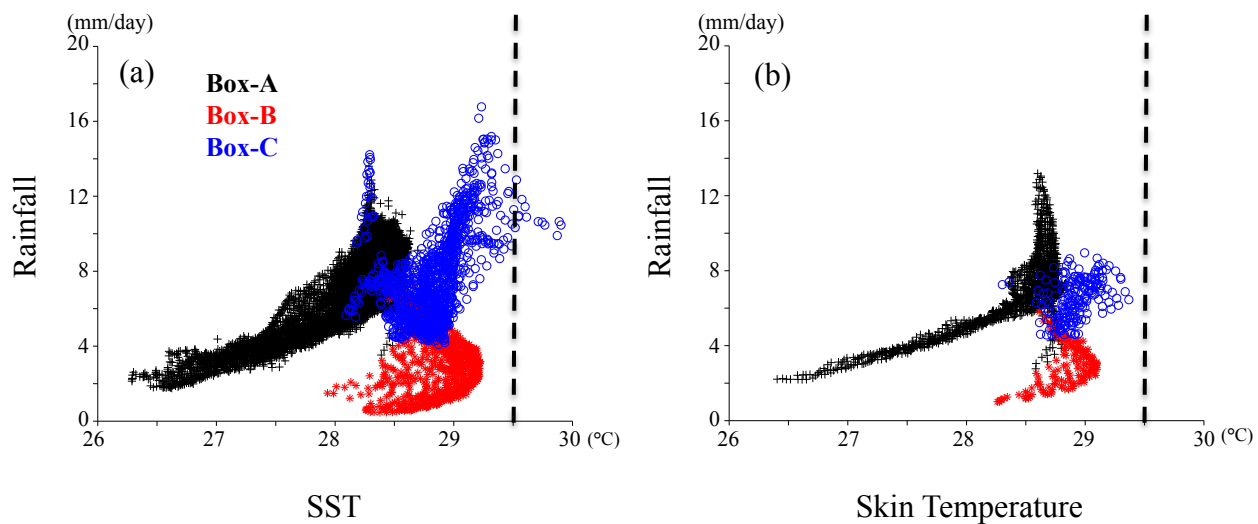
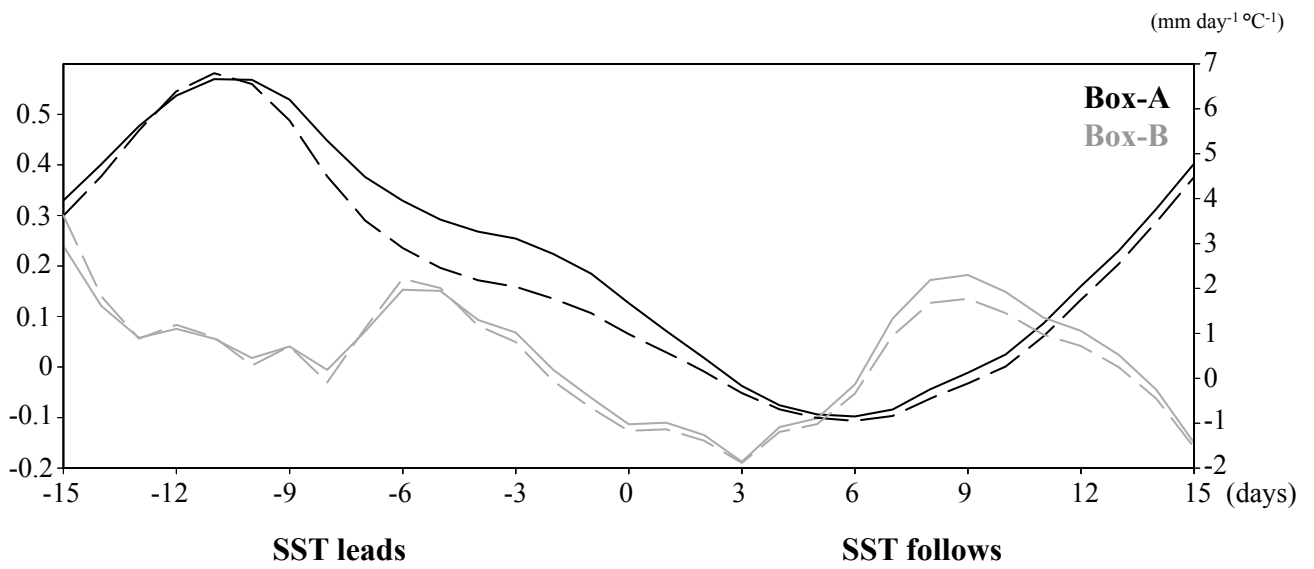


**Figure 1.** Climatology of JF-mean (a) rainfall rate (mm/day) obtained from TRMM 3B42 for 1998-2014, (b) surface wind (m/s, arrows) and its meridional component (shading, only showing wind less than 3 m/s) obtained from QuikSCAT for 2000-2008, (c) sea surface temperature (°C) obtained from OISST for 1982-2012, (d)-(f) rainfall rate (mm/day), 10m wind (m/s, arrows) and its meridional component (shading, only showing wind less than 3 m/s), and sea skin temperature obtained from MERRA in 1979-2010. The 3 boxes are regions for scatter plot in Figs.2 and 4.



**Figure 2.** Scatter plots of JF-mean climatological rainfall versus sea temperature for (a) observation and (b) MERRA over Indian Ocean monsoon trough (box-A, 20°S-5°S and 50°E-80°E), northern entrance of the Mozambique Channel (box-B, 10°S-5°S and 30°E-50°E), and Mozambique Channel (box-C, 20°S-10°S and 30°E-50°E). The plots are only over the ocean grid. The black dashed-line denotes 29.5 °C that is the threshold by Waliser et al. (1993). The box for each region is shown in Fig.1a.



**Figure 3.** Lag correlation (solid) and regression (dashed) coefficients between daily-mean precipitation and SST over the ITCZ (box-A, 20°S-5°S and 50°E-80°E, shown by black) and northern entrance of Mozambique Channel (box-B, 10°S-5°S and 40°E-50°E, shown by gray). Label on left (right) is for lag correlation (lag regression).

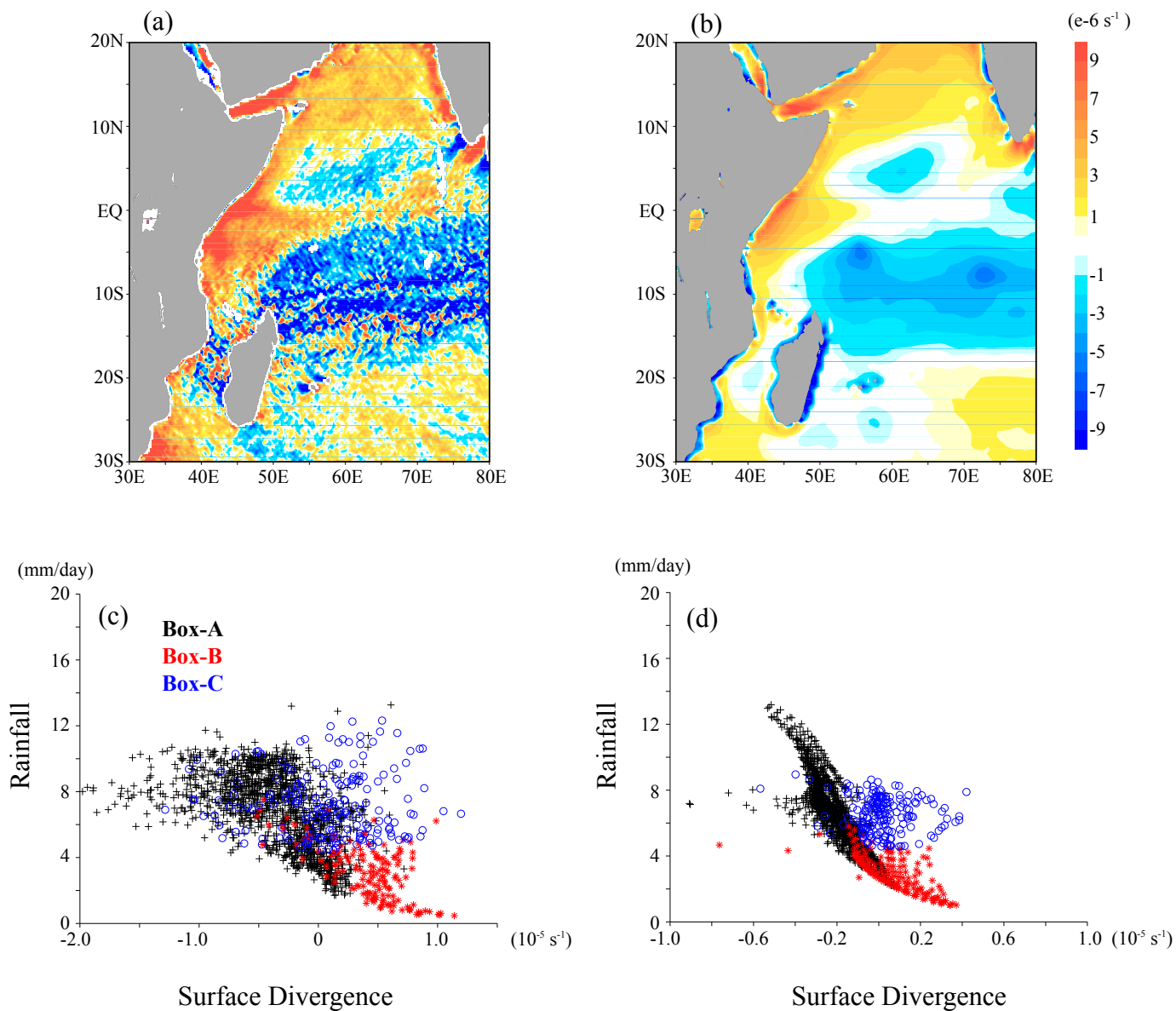
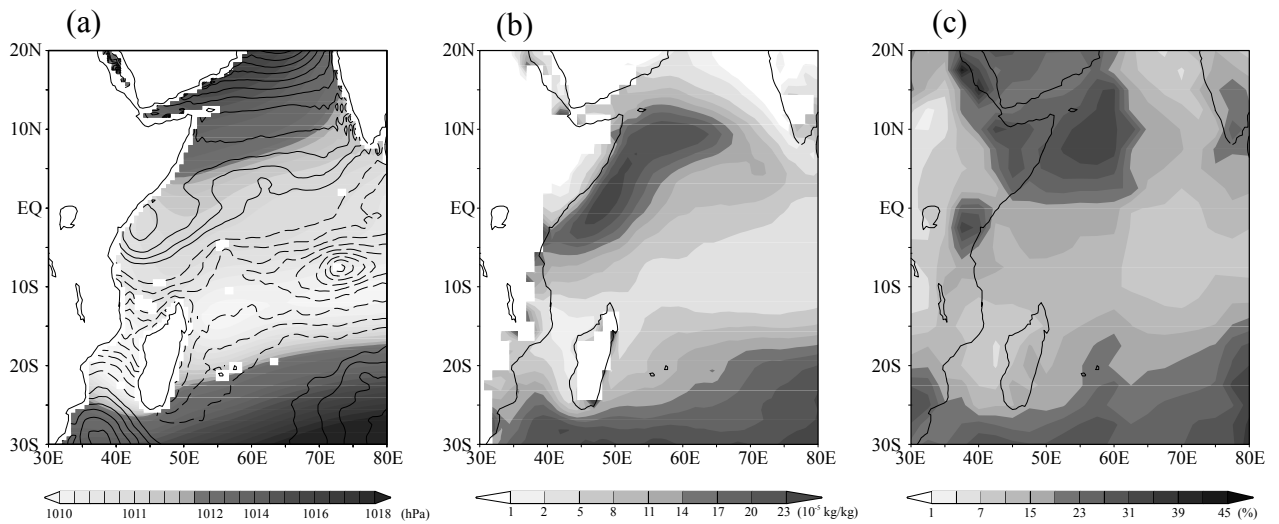
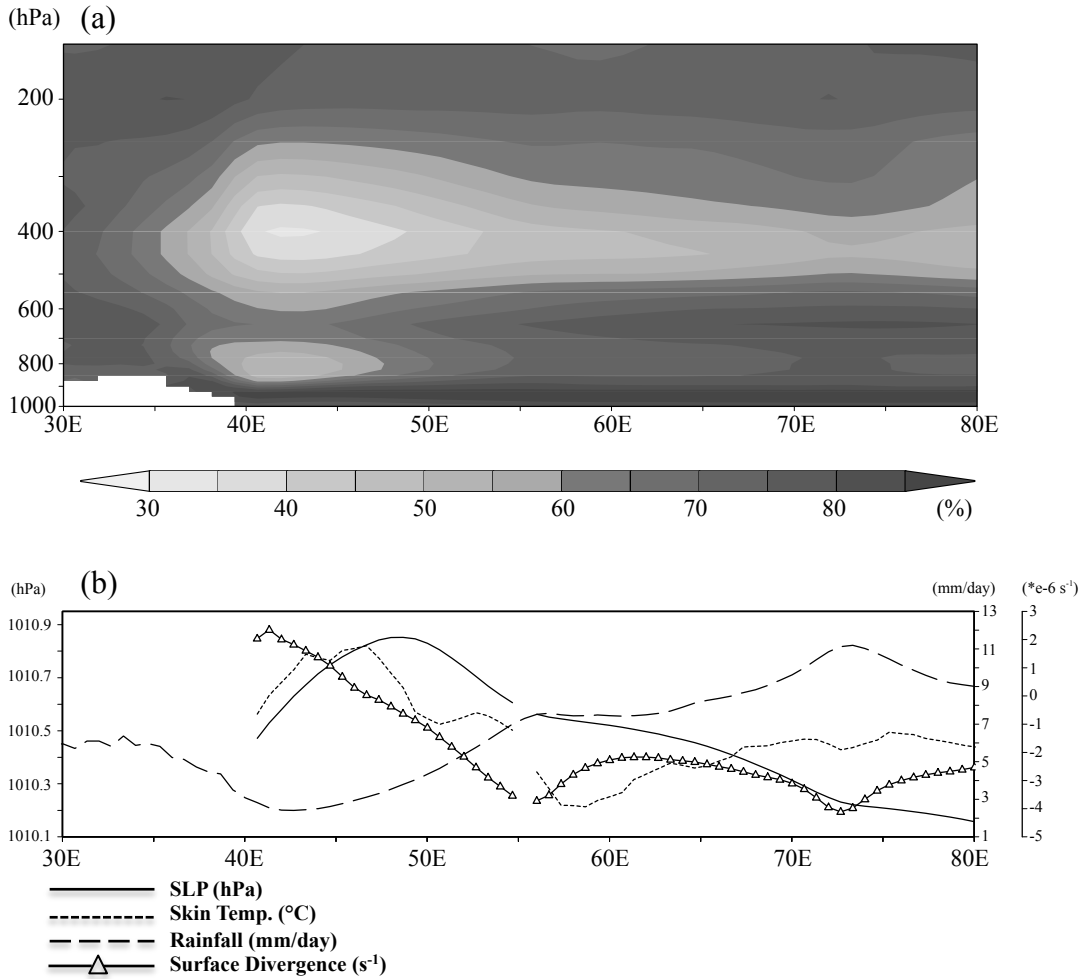


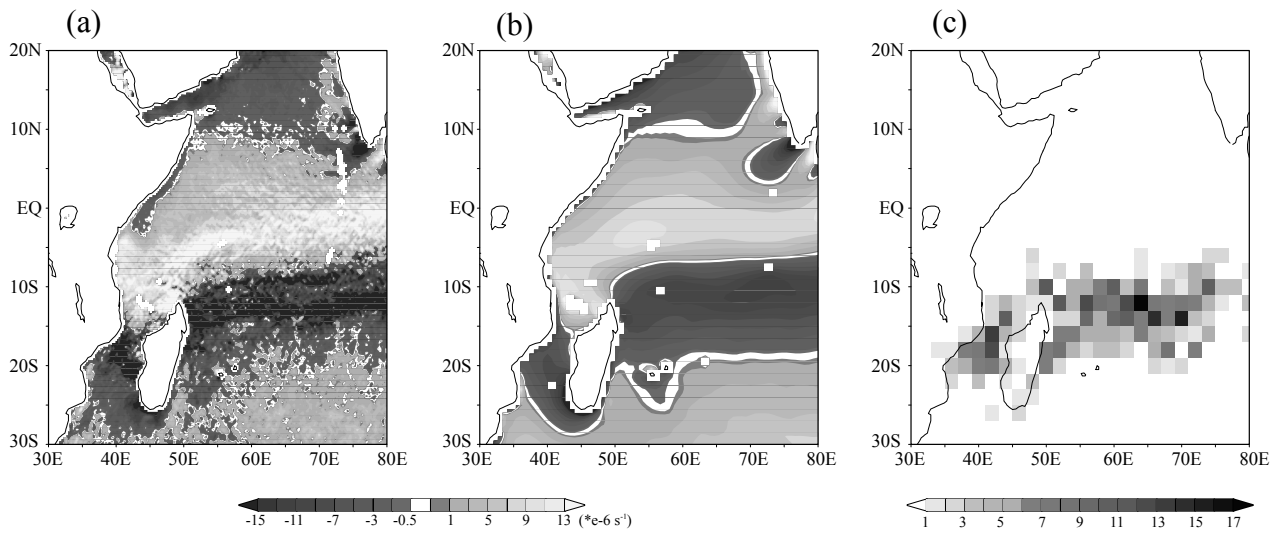
Figure 4. JF-mean climatology of surface divergence for (a) QuikSCAT and (b) MERRA. (c) and (d) same as Fig.4, but for rainfall versus surface divergence for QuikSCAT and MERRA, respectively. For (c), QuikSCAT data is interpolated into MERRA's grid box.



**Figure 5.** JF-mean climatology of (a) SLP (color) and vertical motion at 500hPa (contour, dashed is negative and solid is positive) and (b) mixing ratio of cloud water due to large-scale condensation at 925 hPa from MERRA in 1979-2010. Note that the color scale is exaggerated between 1010 and 1012 hPa and the contour interval in (a) is 0.01 and 0.005 Pa/s for negative and positive values, respectively. (c) JF-mean climatology of low-level cloud fraction between 1000 and 680 hPa obtained from ISCCP in 1983-1999.



**Figure 6.** Pressure-longitude section of (a) JF-mean climatological relative humidity averaged between  $10^{\circ}\text{S}$  and  $5^{\circ}\text{S}$ . (b) Latitude-averaged ( $10^{\circ}\text{S}$ - $5^{\circ}\text{S}$ ) plots of sea level pressure (solid), rainfall (dashed), skin temperature (dot), and surface divergence (solid with triangle marker). All plots are from MERRA.



**Figure 7.** JF-mean climatology of surface relative vorticity for (a) QuikSCAT (2000-2008) and (b) MERRA (1979-2010). (c) JF cyclonogenesis over the SWIO estimated from IBTrACS in 1900-2010. Only the initial location of each tropical cyclone is binned into  $2^\circ \times 2^\circ$  grid.