Supplement of Atmos. Chem. Phys., 22, 4005–4018, 2022
https://doi.org/10.5194/acp-22-4005-2022-supplement

Supplement of

Full latitudinal marine atmospheric measurements of iodine monoxide

Hisahiro Takashima et al.

Correspondence to: Hisahiro Takashima (hisahiro@fukuoka-u.ac.jp) and Yugo Kanaya (yugo@jamstec.go.jp)

Supplement

Figures S1 to S7.

Typical averaging kernels for IO are presented in Figure S1. Ozone mixing ratio observed from the R/V *Mirai* during seven research cruises during 2014–2018 are presented in Figure S2. Minimum concentrations of O_3 were observed over the tropical western Pacific. Correlation between O_3 and IO simulated by two global chemistry-transport models over the tropical western Pacific are shown in Figures S3 and S4. In the low ozone concentration range (e.g., <12 ppb), positive correlations between ozone and IO concentrations were evident for the two global chemistry-transport models including halogen chemistry, where the "O_3-dependent" flux was dominant. Diurnal variations of IO mixing ratio for 0–200 m during MR14-06 (leg1) are shown in Figure S5. No clear diurnal variation is observed, but large day-to-day variation is observed. Scatter diagram between SST and IO DSCDs over the remote ocean are shown in Figure S6. High IO contents are observed over high SST region (> 30°C).

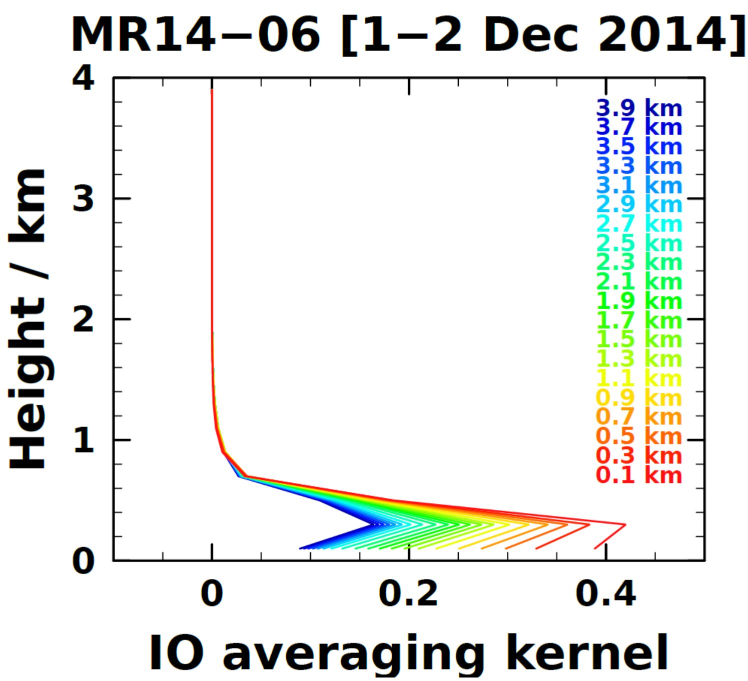


Figure S1. Typical IO averaging kernels for IO (1–2 December 2014 over the tropical Western Pacific; average during the period for Figure 2).

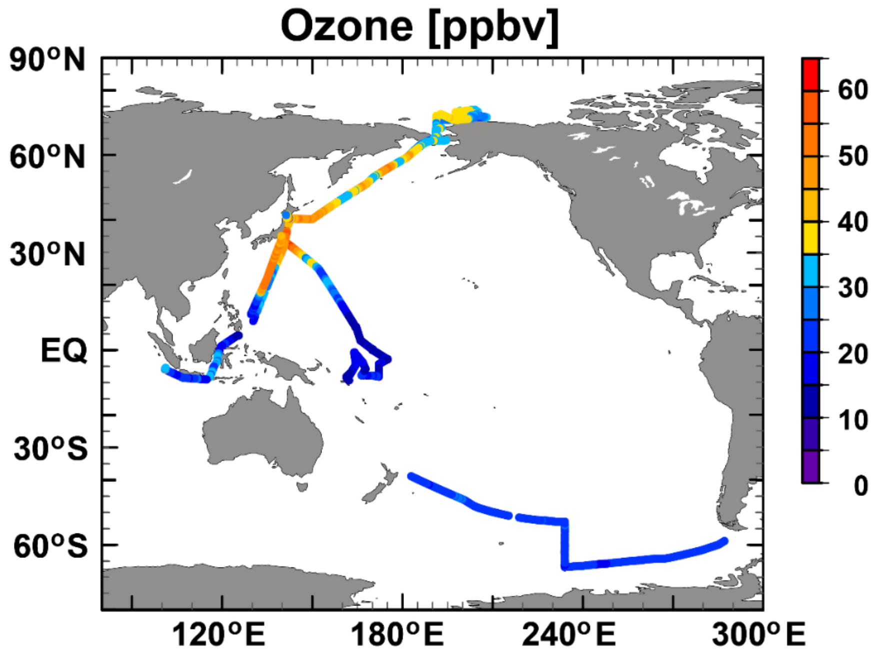


Figure S2: Ozone mixing ratio [ppbv] observed from the R/V *Mirai* cruises presented in Table 1 during 2014–2018.

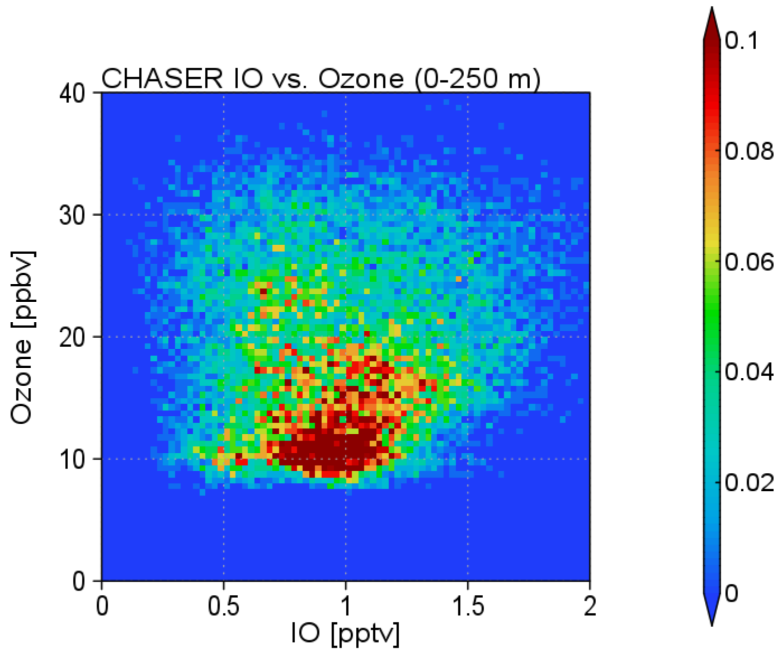


Figure S3: Two-dimensional histogram [%] as a function of IO volume mixing ratio [pptv] and ozone mixing ratio [ppbv] for 0–250 m altitudes simulated using a global chemical model (Sekiya et al., 2020) during the observation period (Nov–Dec 2014) over the tropical western Pacific (0–15°N, 150–165°E).

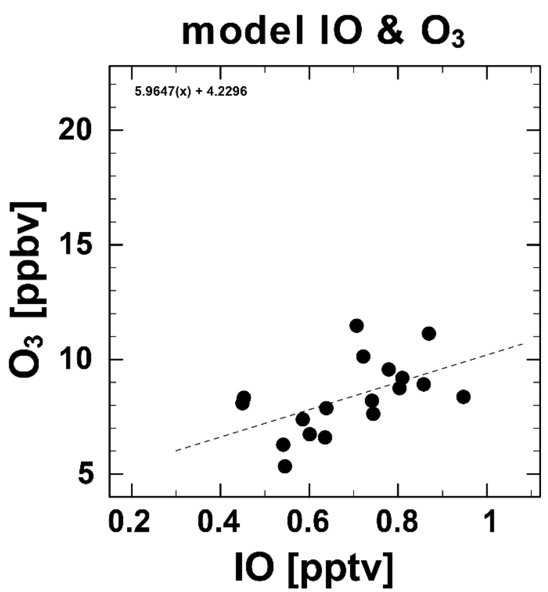


Figure S4: Scatterplot of IO mixing ratio [pptv] and ozone mixing ratio [ppbv] simulated by global chemical model (Saiz-Lopez et al., 2014) along the cruise track (MR14-06) over the tropical western Pacific.

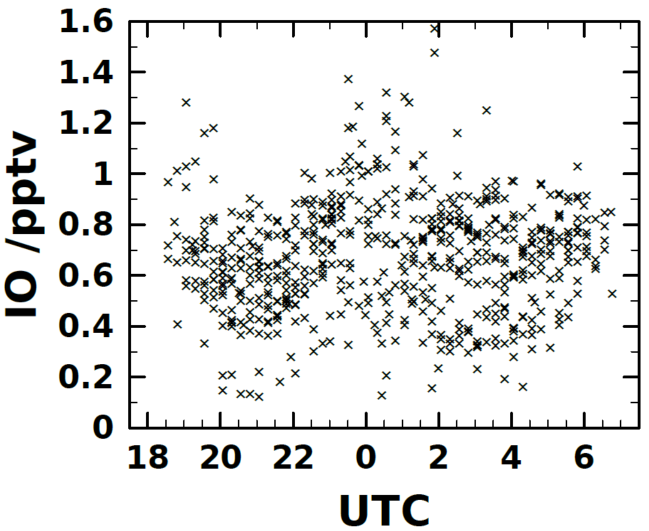


Figure S5: Diurnal variation of IO mixing ratio for 0–200 m [pptv] during the MR14-06 (leg1) cruise.

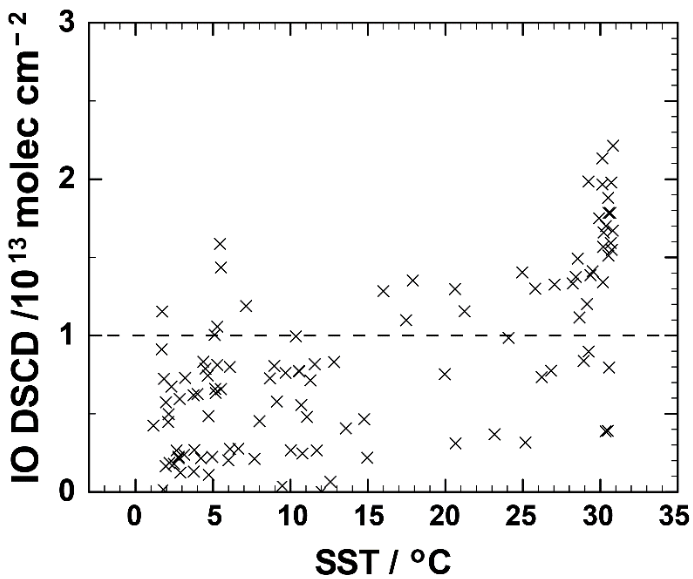
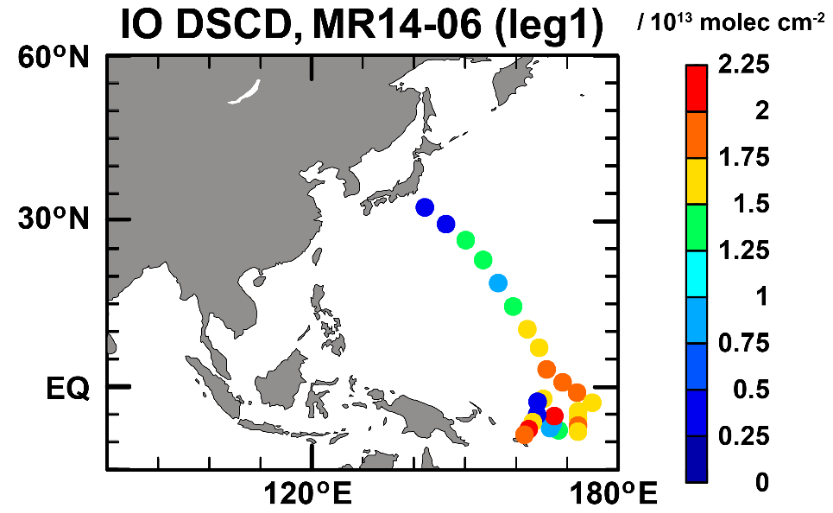
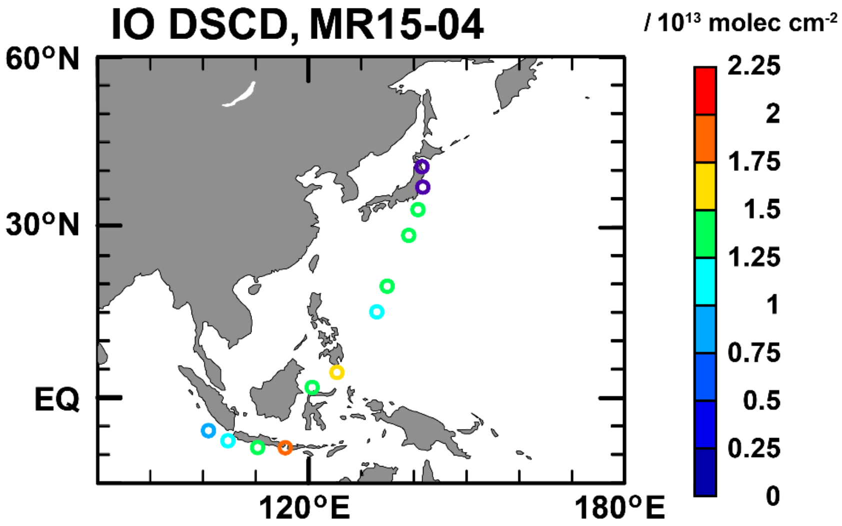
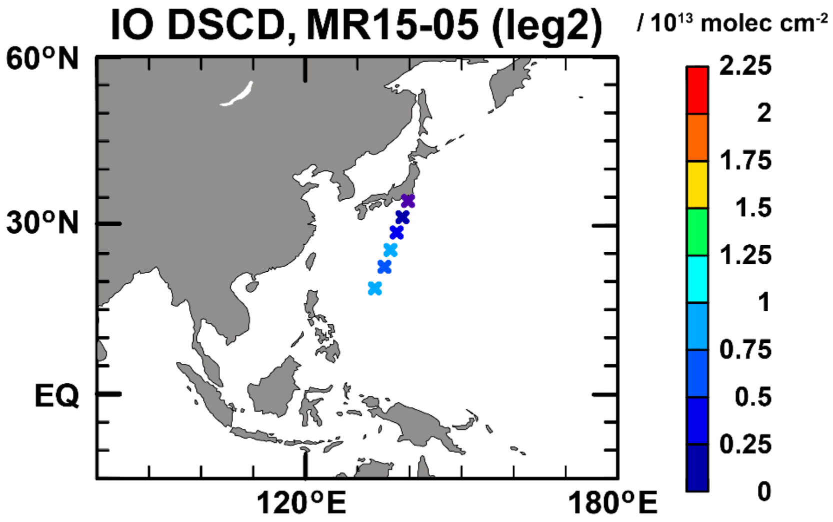
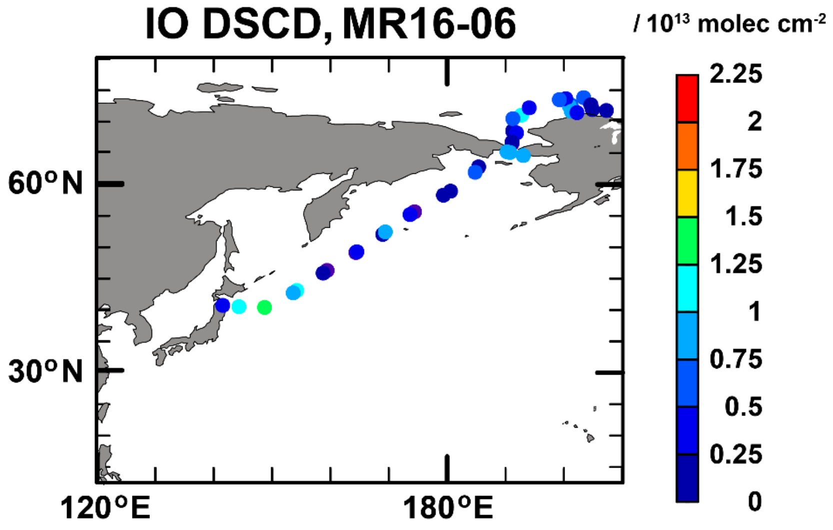


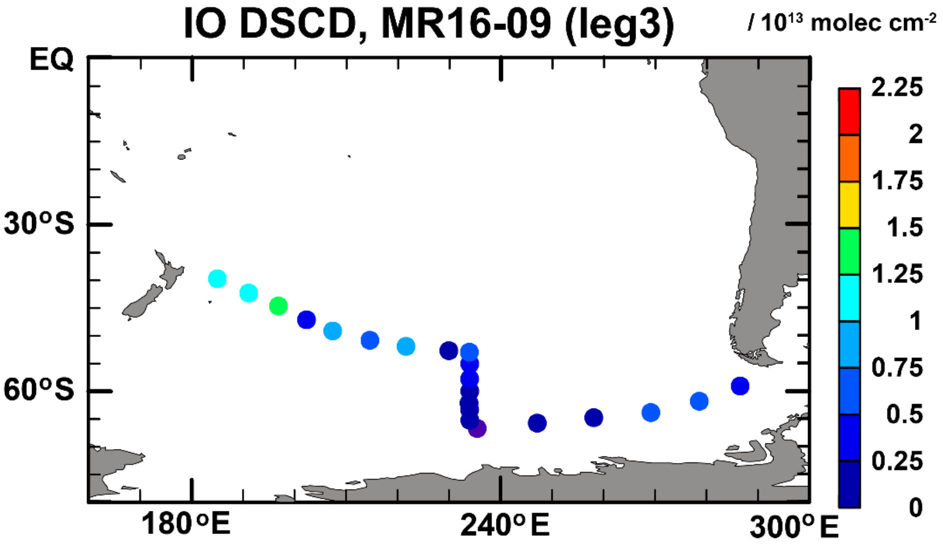
Figure S6: Scatter plot of SST [°C] and IO DSCD (el = 3°) [10^{13} molecules cm^{-2}] over the remote ocean.

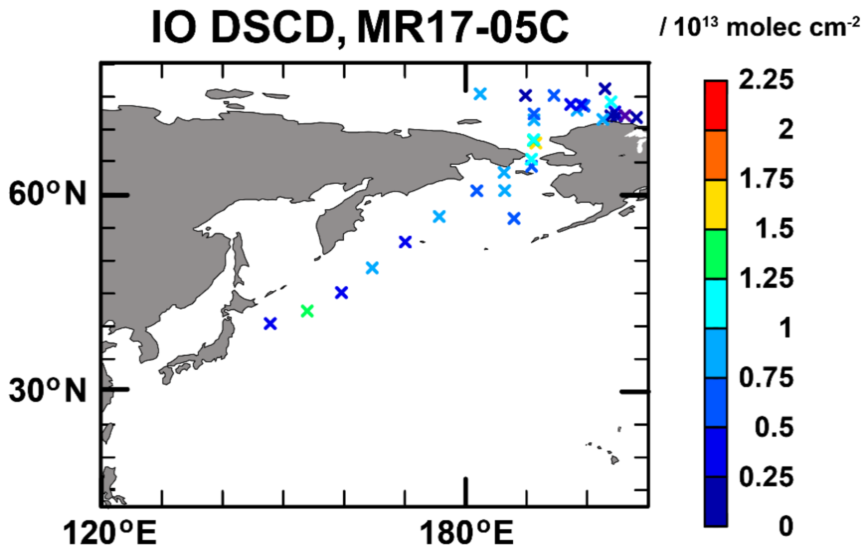

IO DSCD, MR14-06 (leg1)
/ 10^13 molec cm^-2
60°N
30°N
EQ
120°E
180°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0


IO DSCD, MR15-04
/ 10^13 molec cm^-2
60°N
30°N
EQ
120°E
180°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0


IO DSCD, MR15-05 (leg2)
/ 10^13 molec cm^-2
60°N
30°N
EQ
120°E
180°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0


IO DSCD, MR16-06
/ 10^13 molec cm^-2
60°N
30°N
120°E
180°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0


IO DSCD, MR16-09 (leg3)
/ 10^13 molec cm^-2
EQ
30°S
60°S
180°E
240°E
300°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0


IO DSCD, MR17-05C
/ 10^13 molec cm^-2
60°N
30°N
120°E
180°E
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0

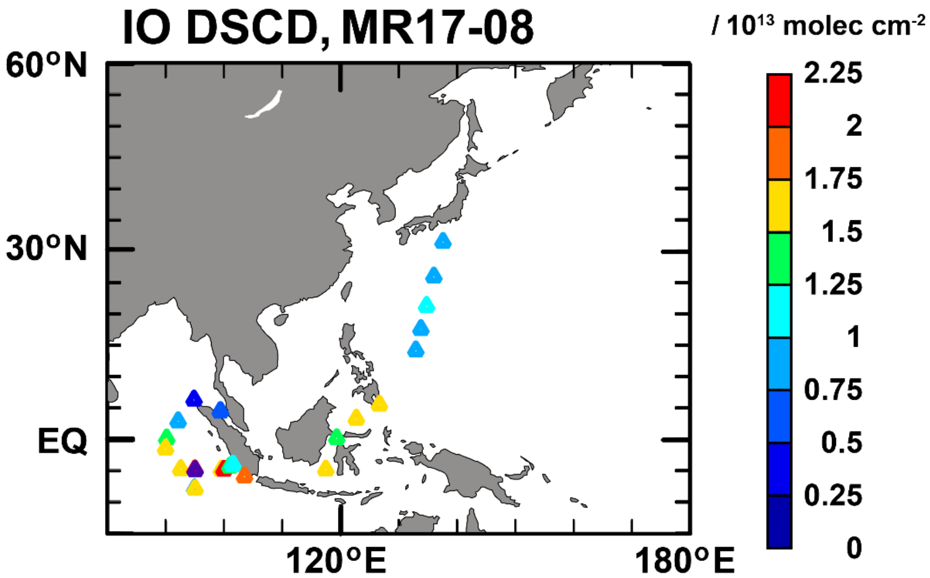


Figure S7: Daily median IO content ((DSCD) for an elevation angle of 3°; molecules cm^{-2}) observed from the R/V *Mirai* for the MR14-06 (leg1), MR15-04, MR15-05, MR16-06, MR16-09 (leg3), MR17-05C, and MR17-08 cruises.

References

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