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Supplement of

Ozone and carbon monoxide observations over open oceans on R/V *Mirai* from 67° S to 75° N during 2012 to 2017: testing global chemical reanalysis in terms of Arctic processes, low ozone levels at low latitudes, and pollution transport

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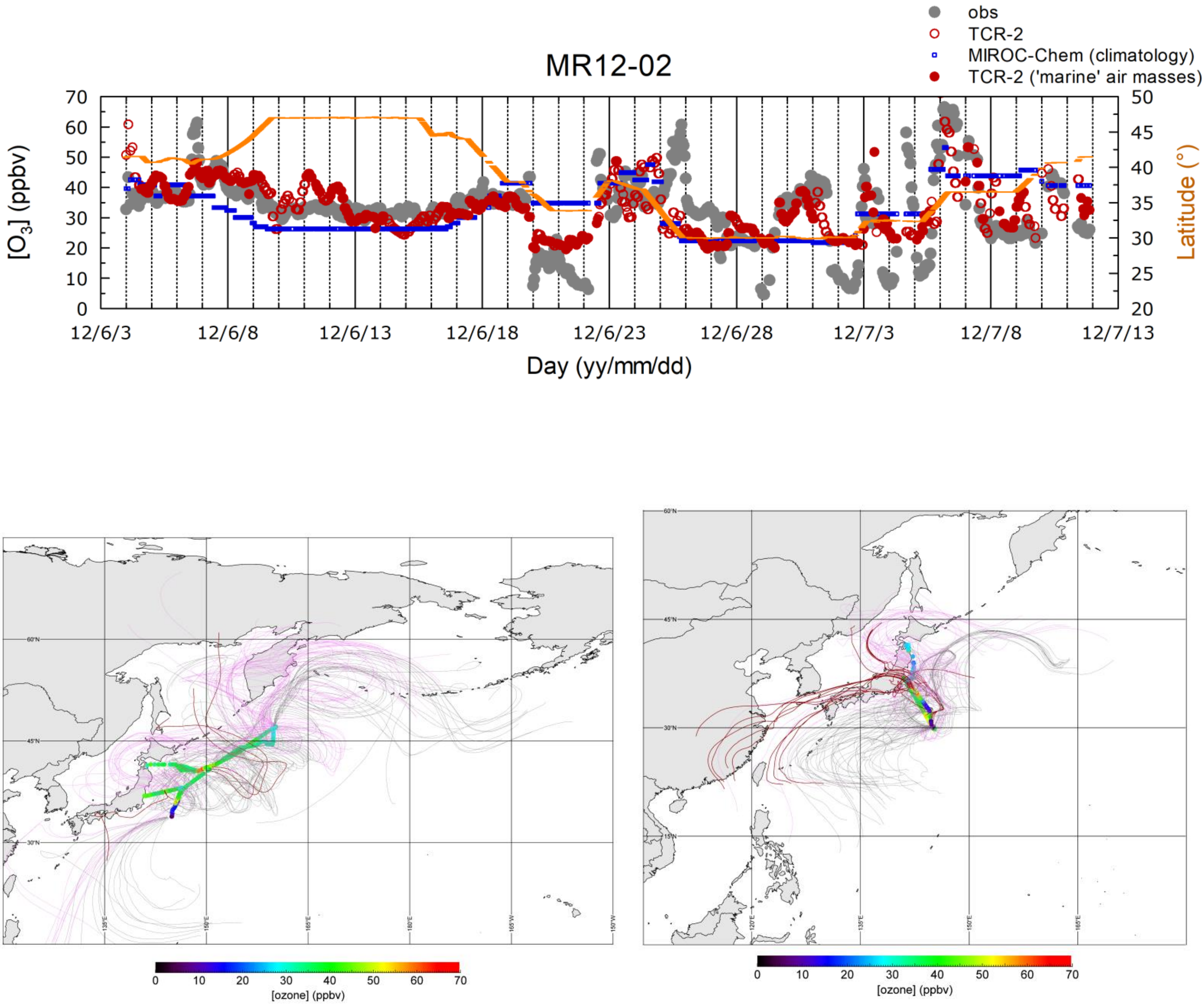


Figure S1a. Time series of observed and simulated ozone mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR12-02.

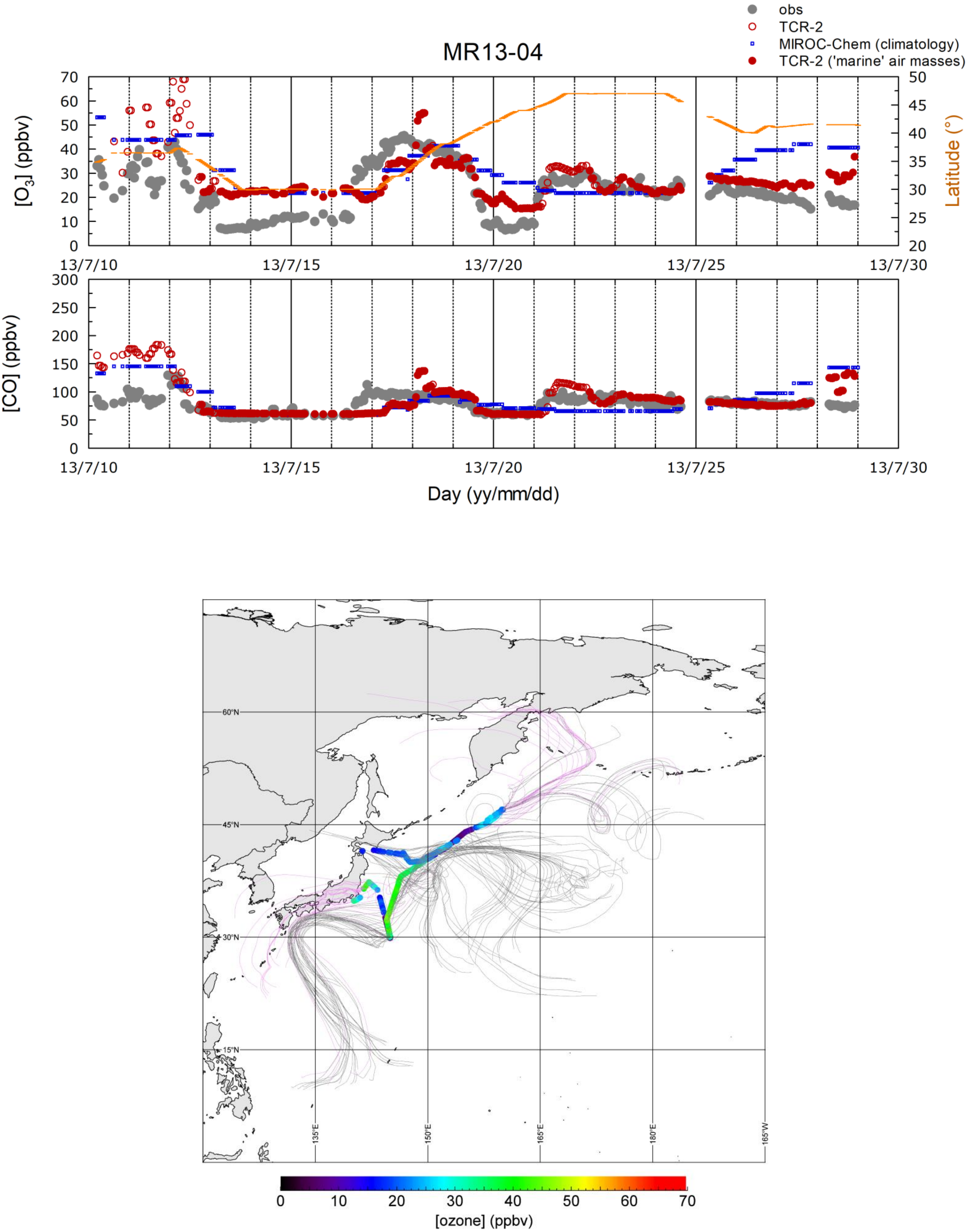


Figure S1b. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR13-04.

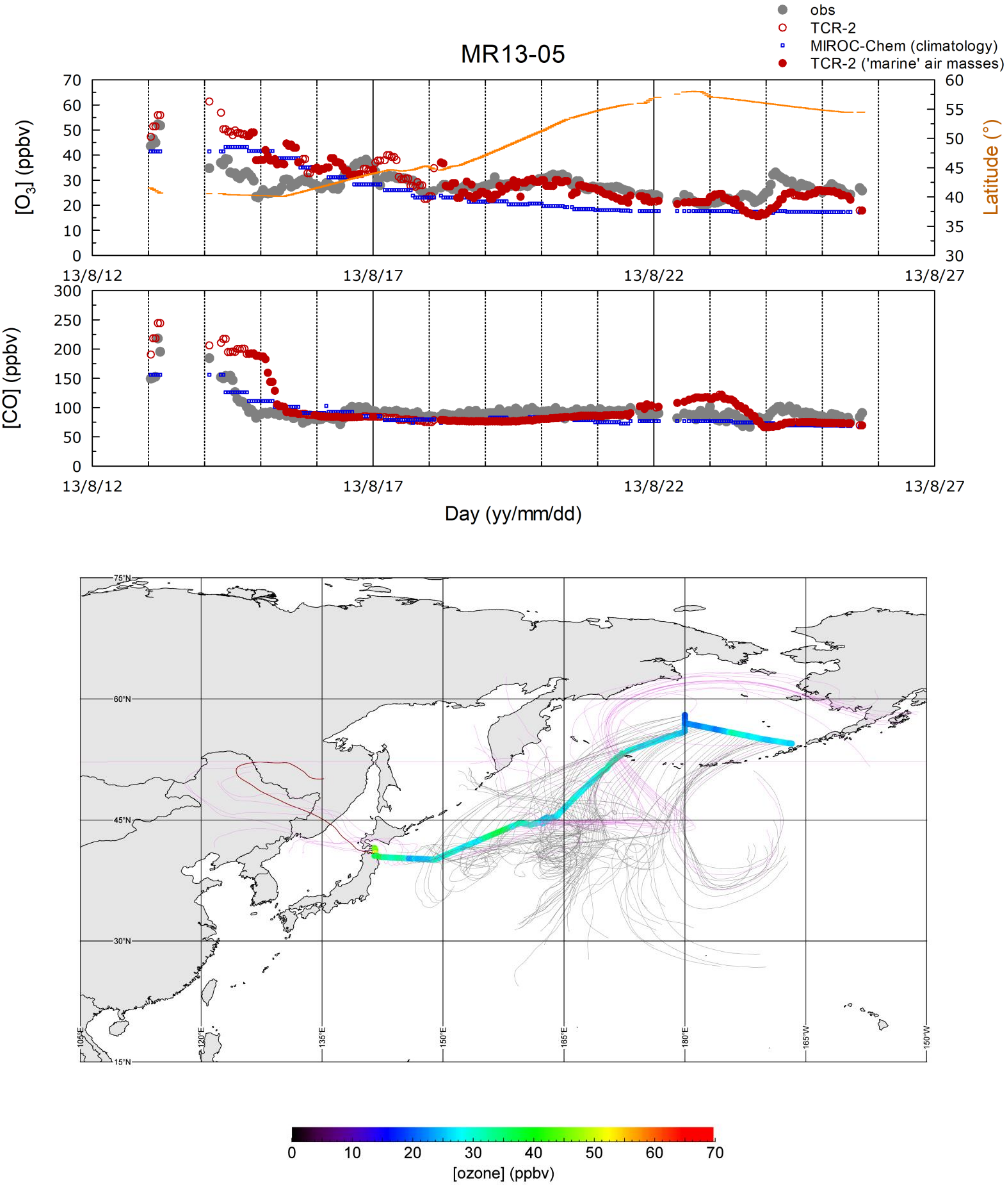


Figure S1c. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR13-05.

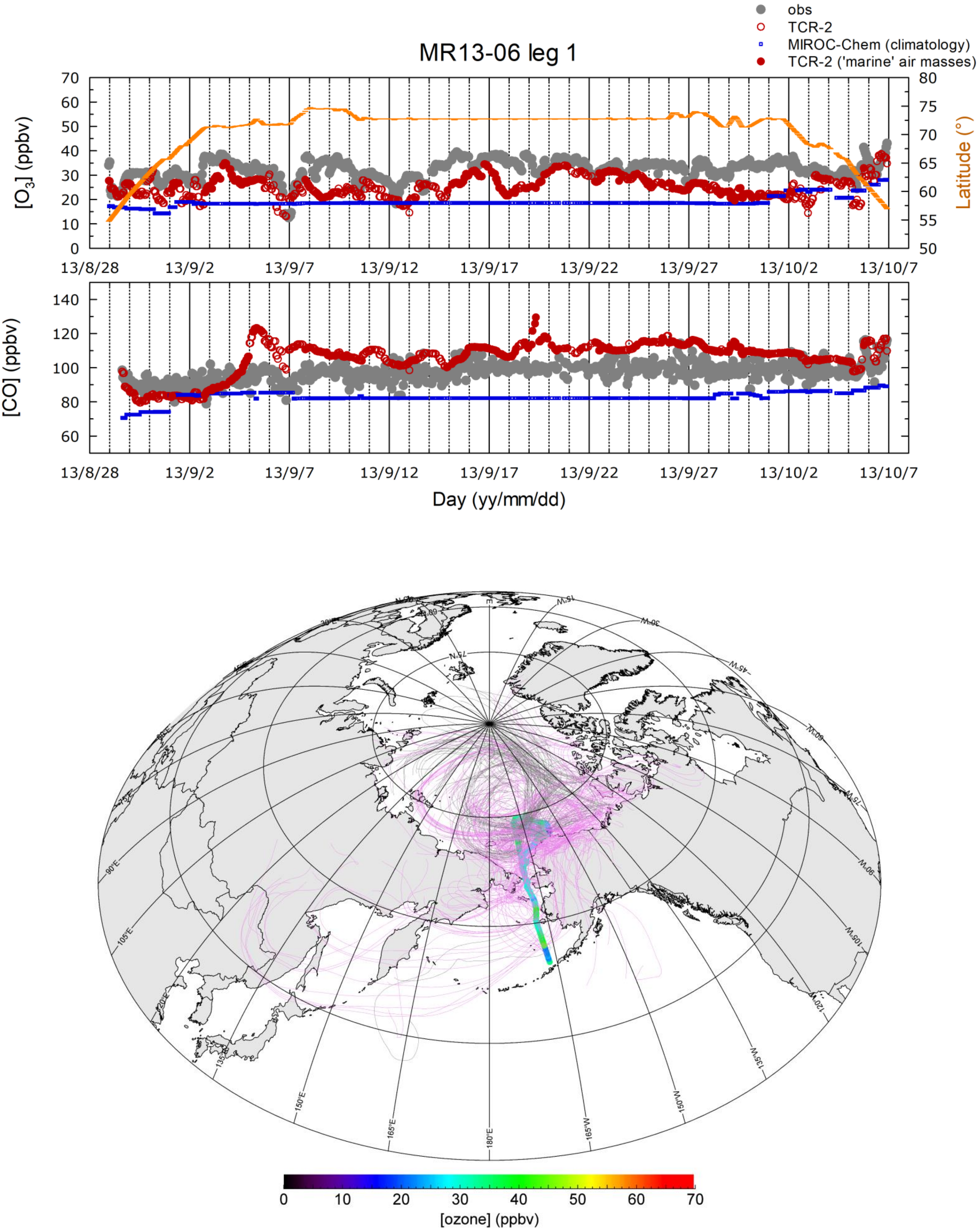
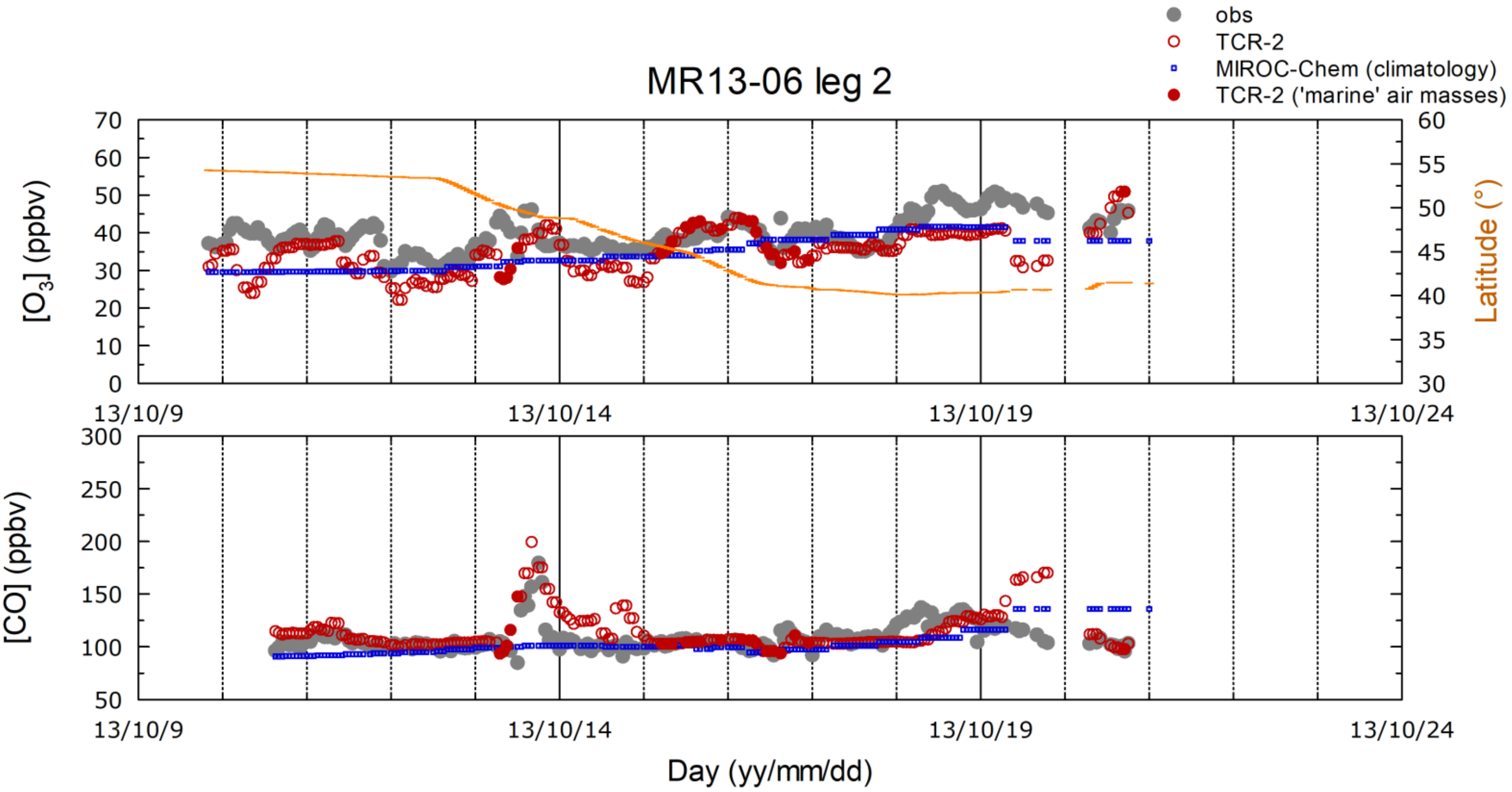


Figure S1d. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR13-06 leg1.



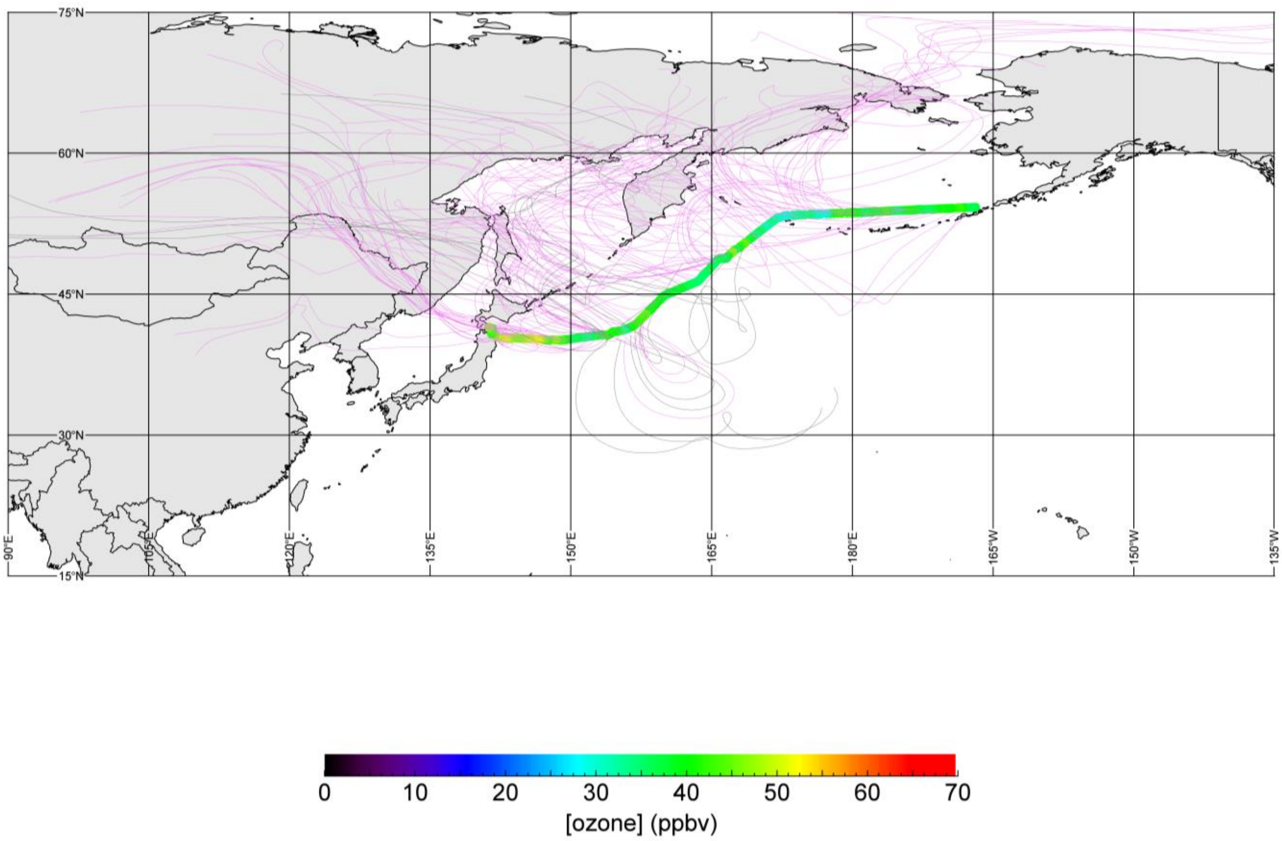


Figure S1e. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR13-06 leg2.

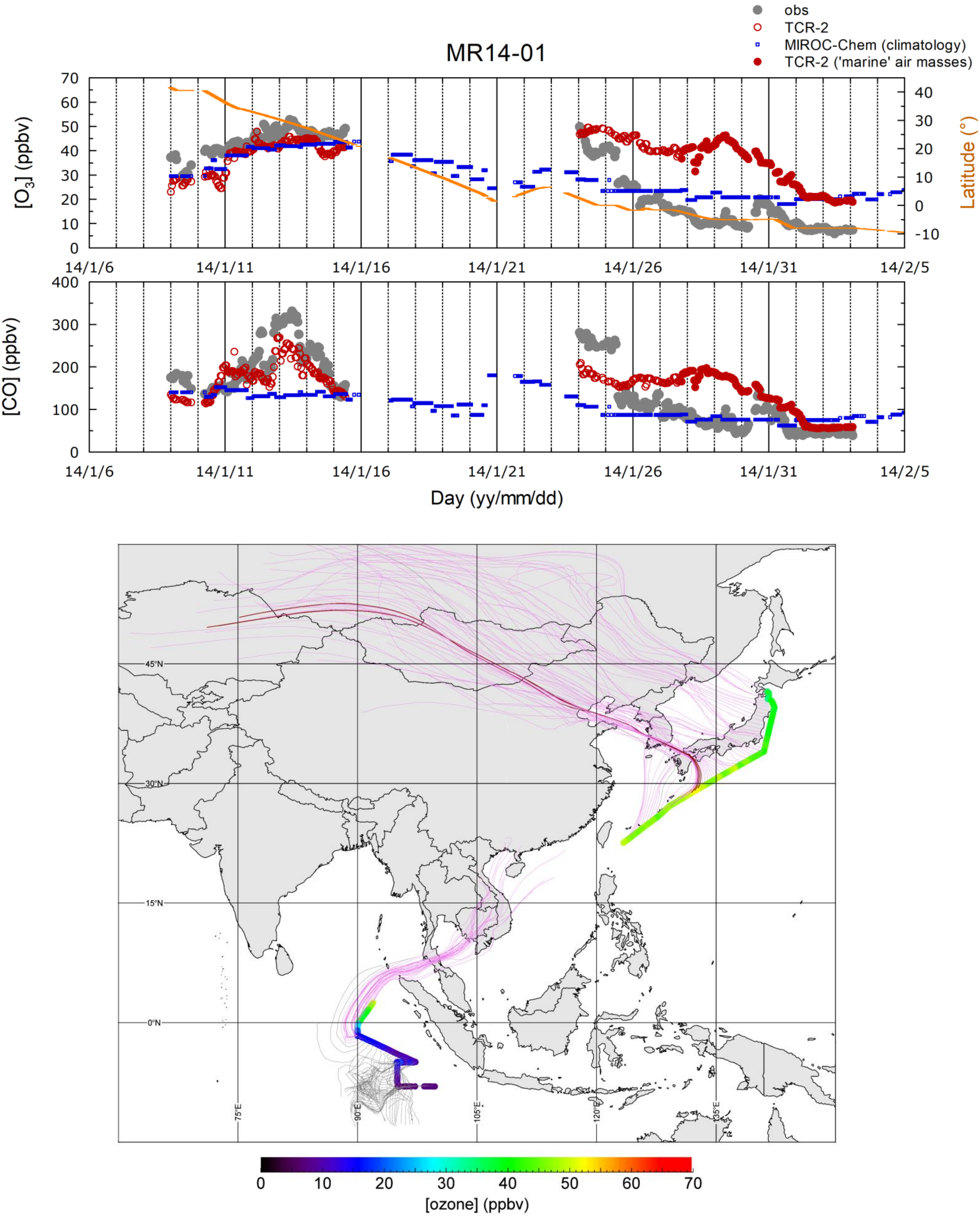


Figure S1f. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-01.

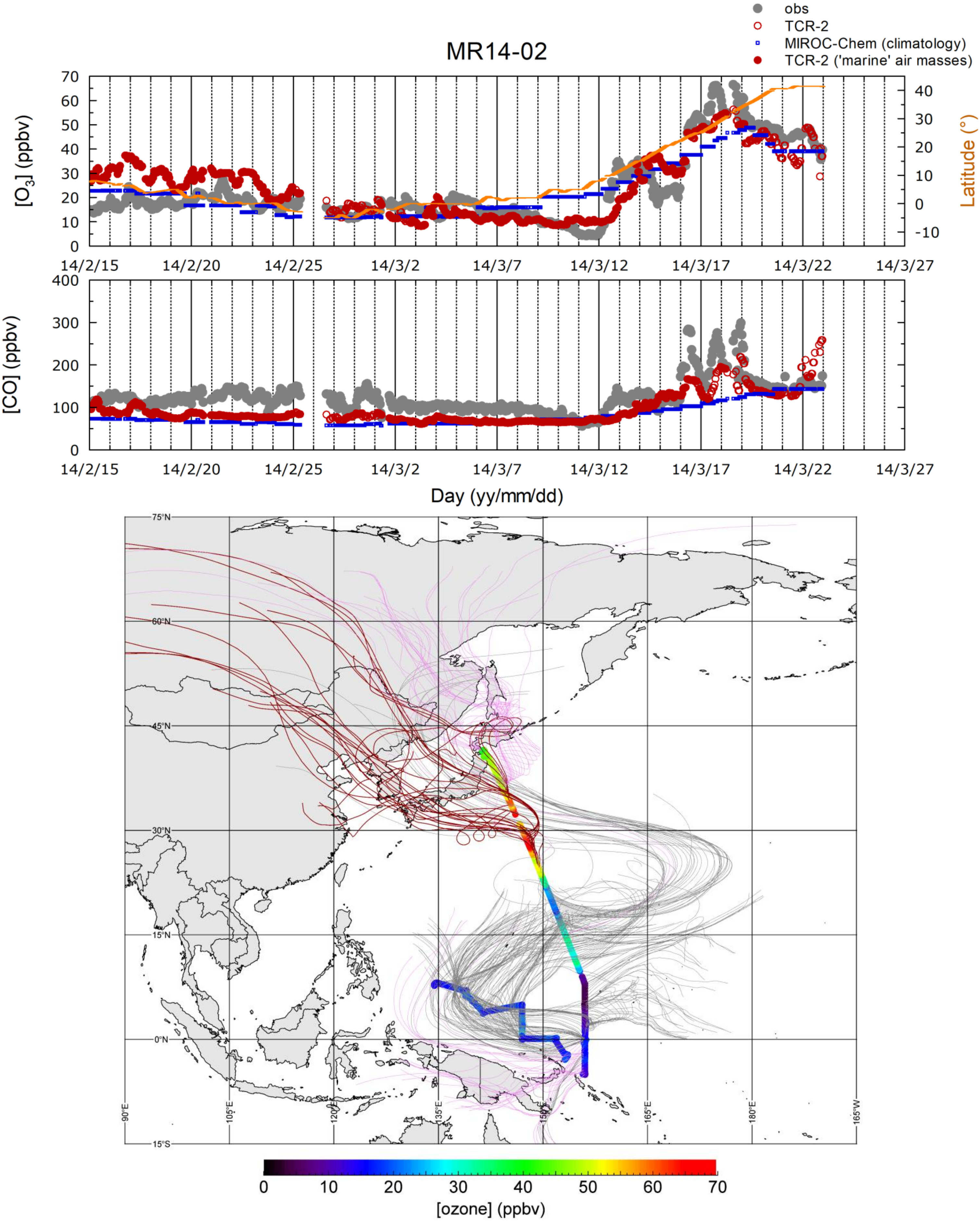


Figure S1g. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-02.

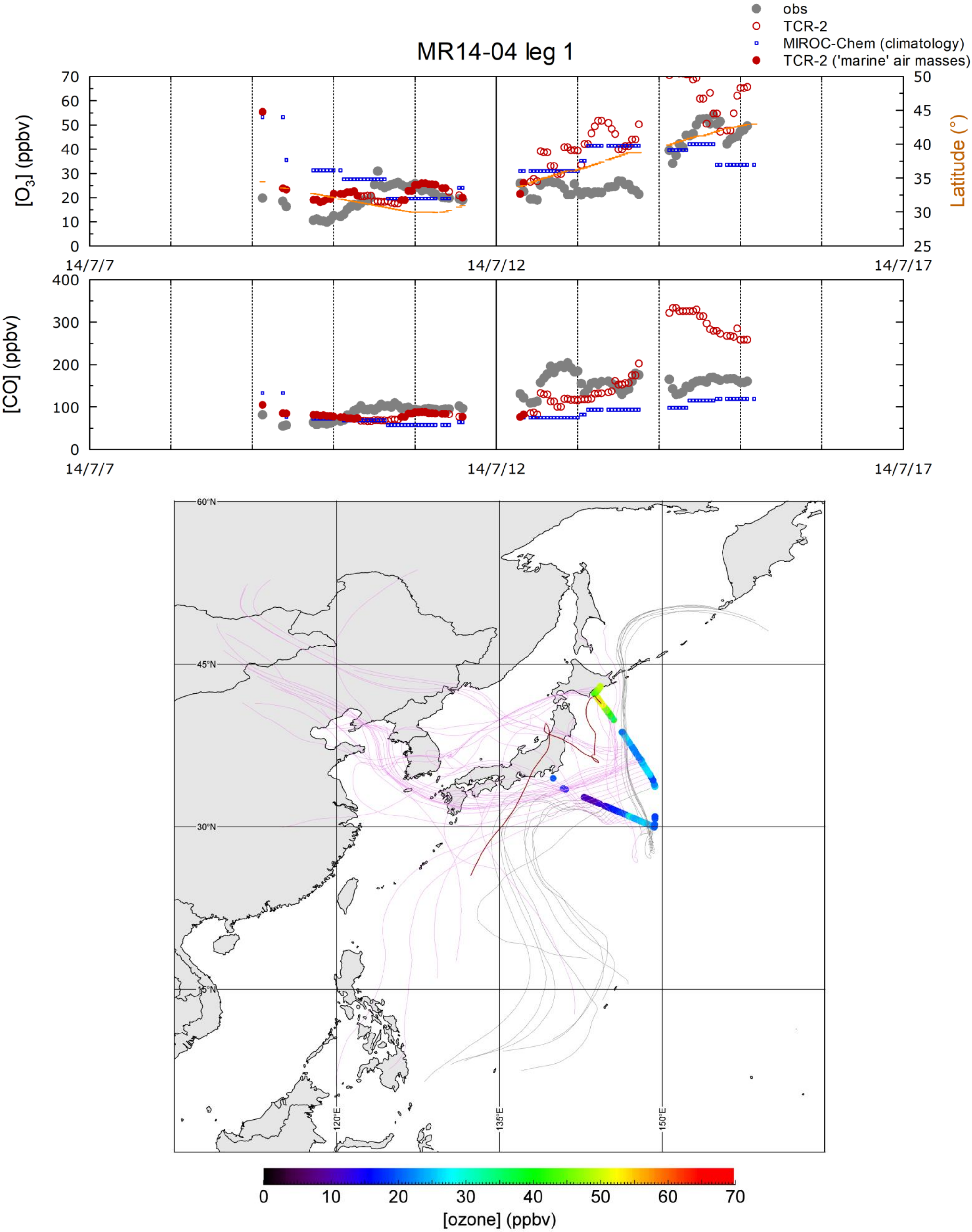


Figure S1h. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-04 leg1.

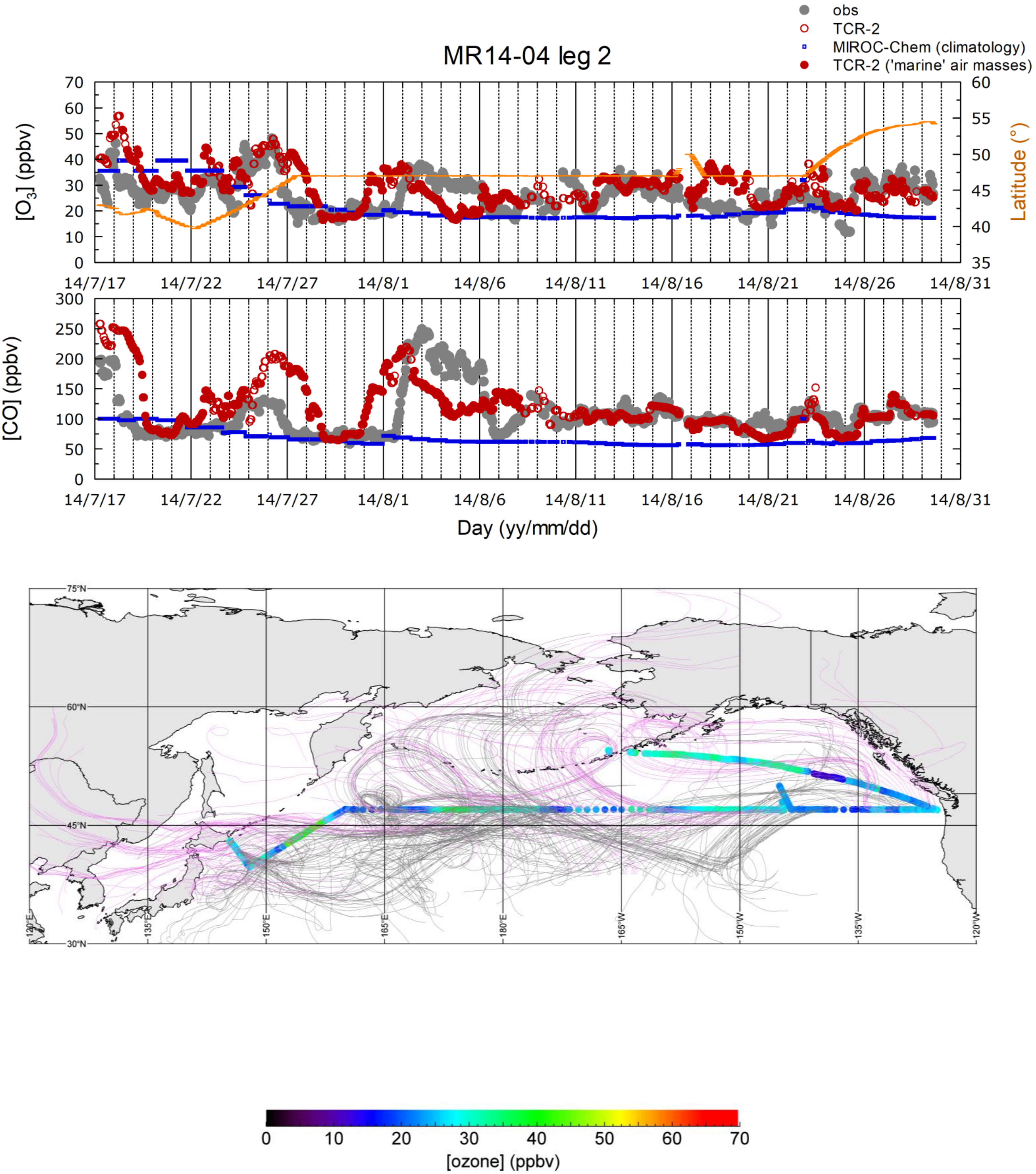


Figure S1i. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-04 leg 2.

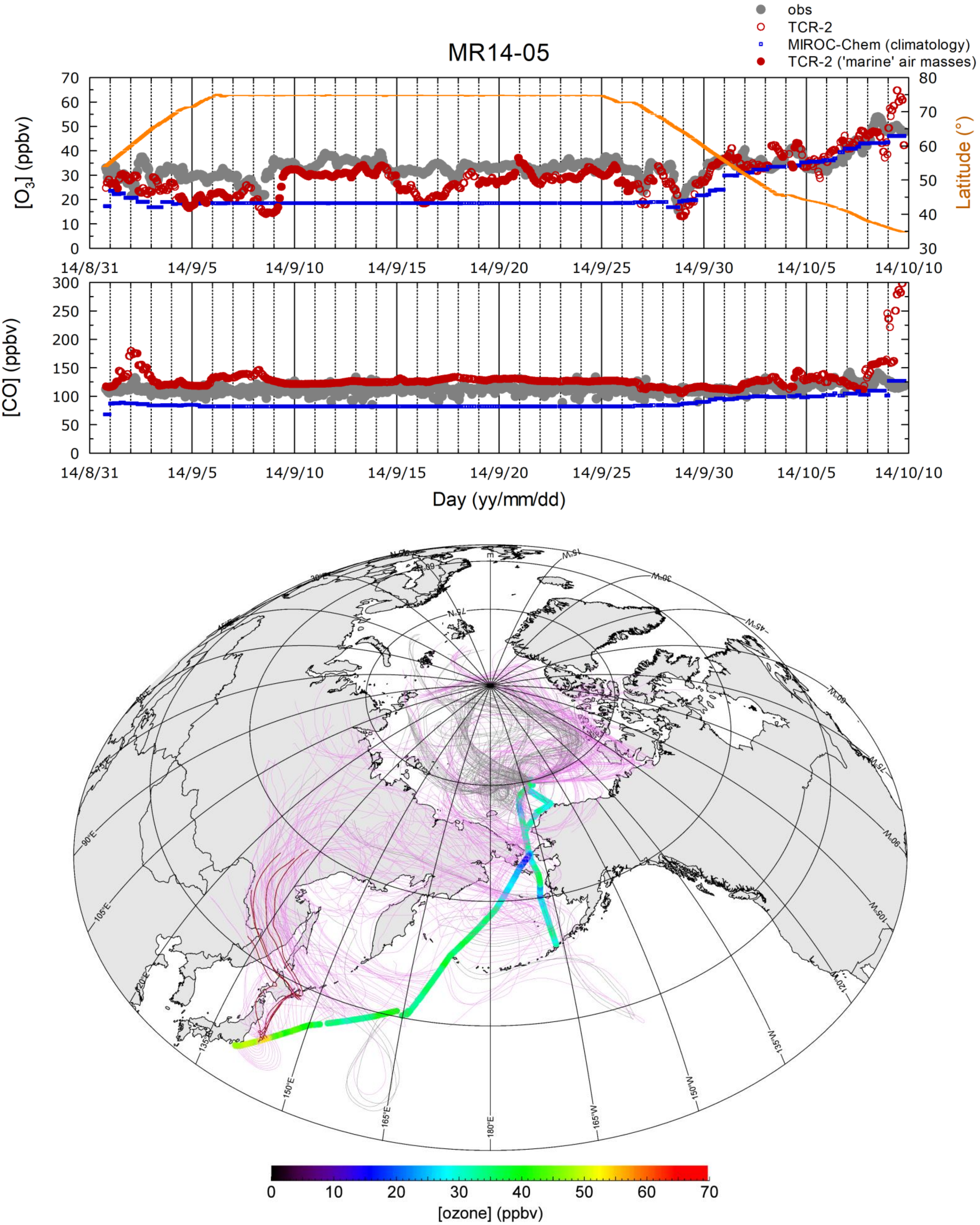
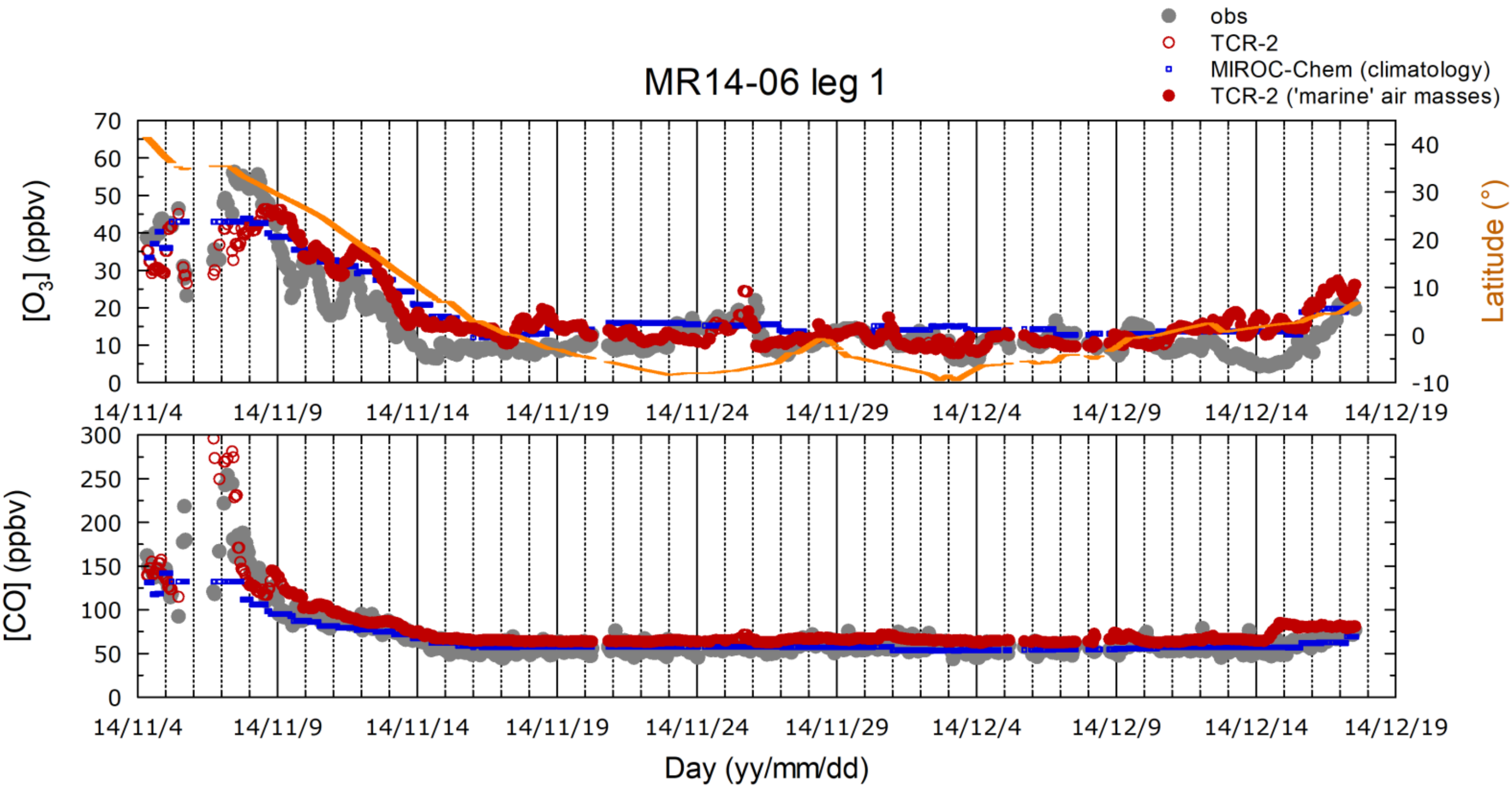


Figure S1j. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-05.



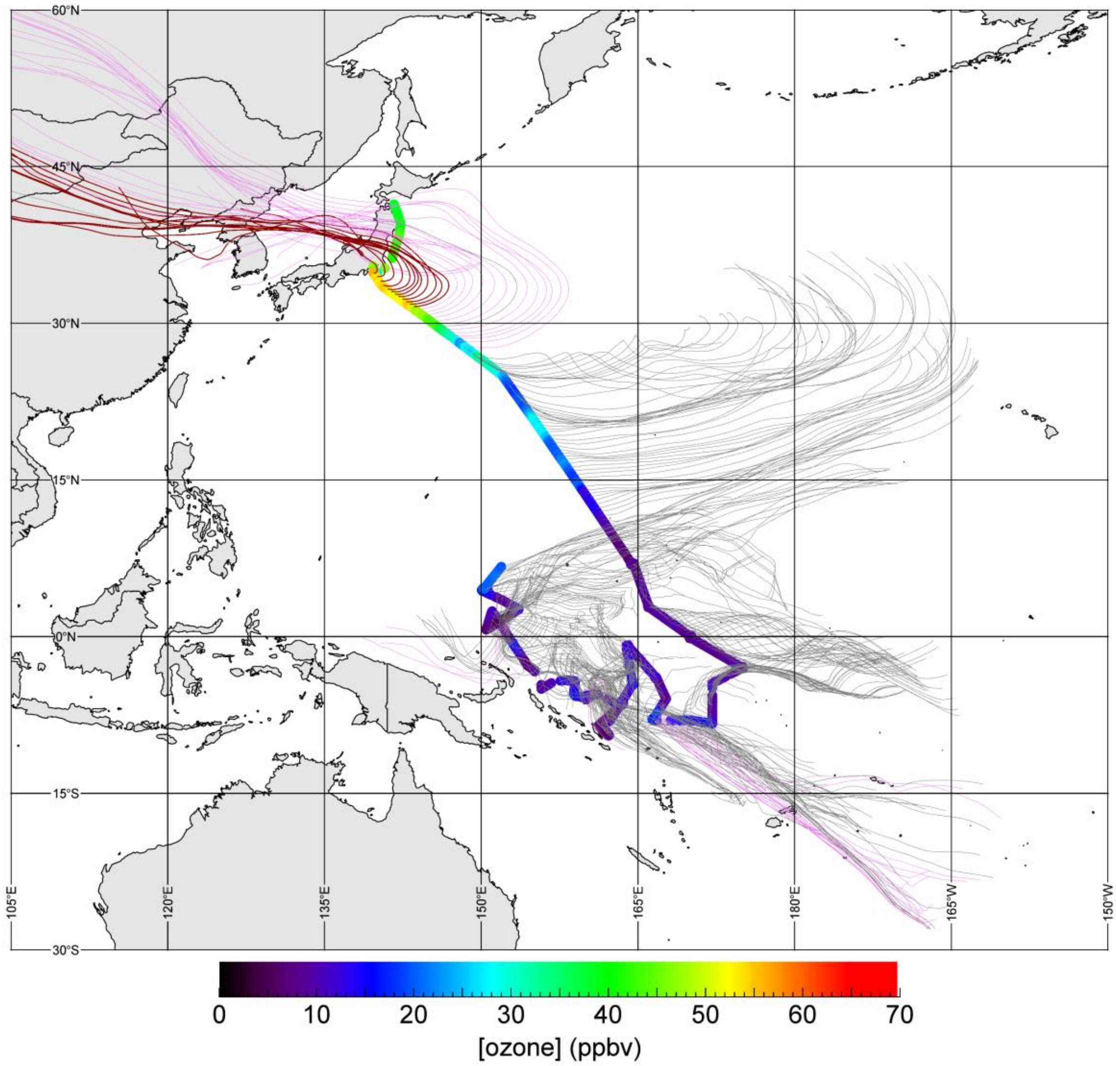


Figure S1k. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-06 leg1.

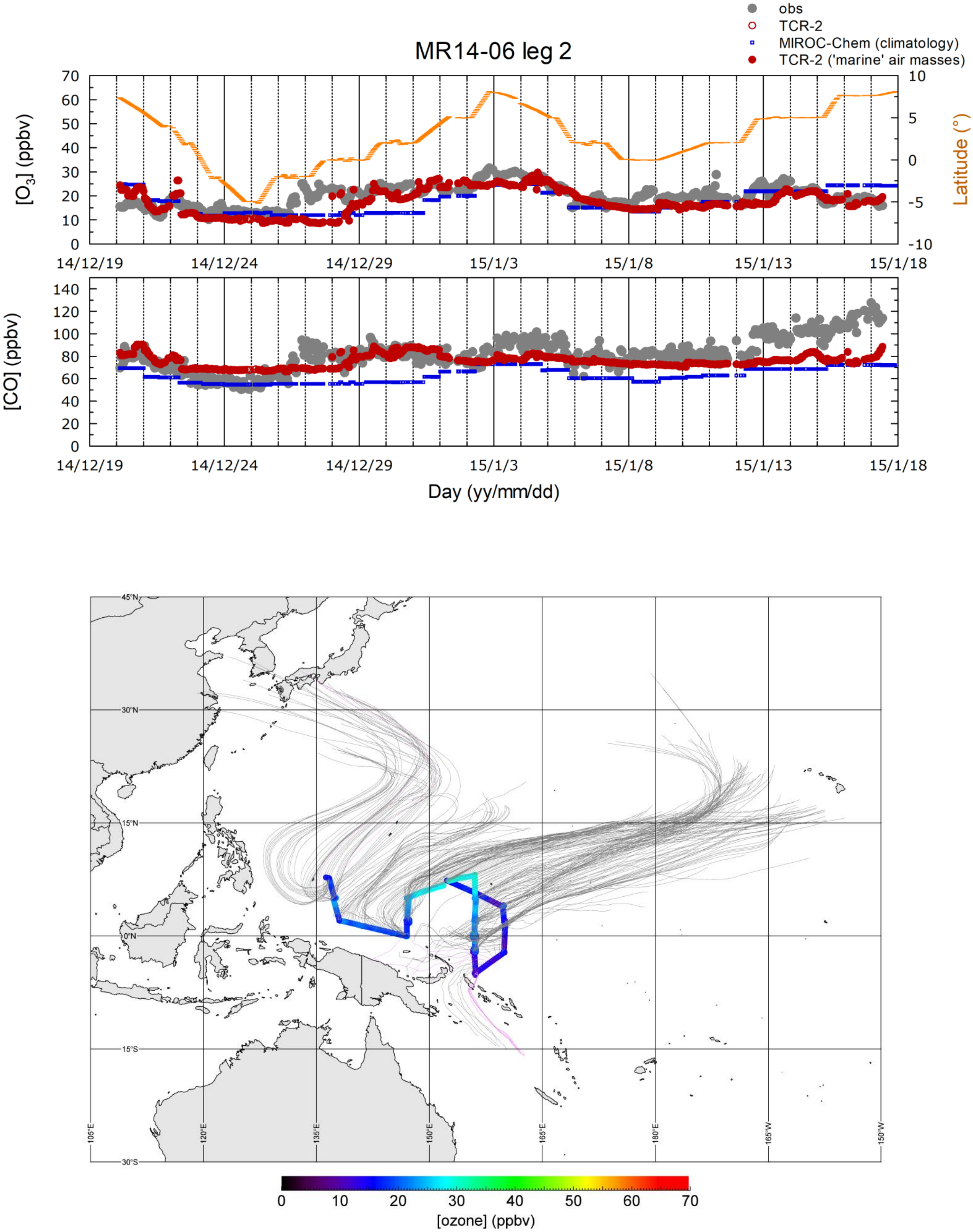
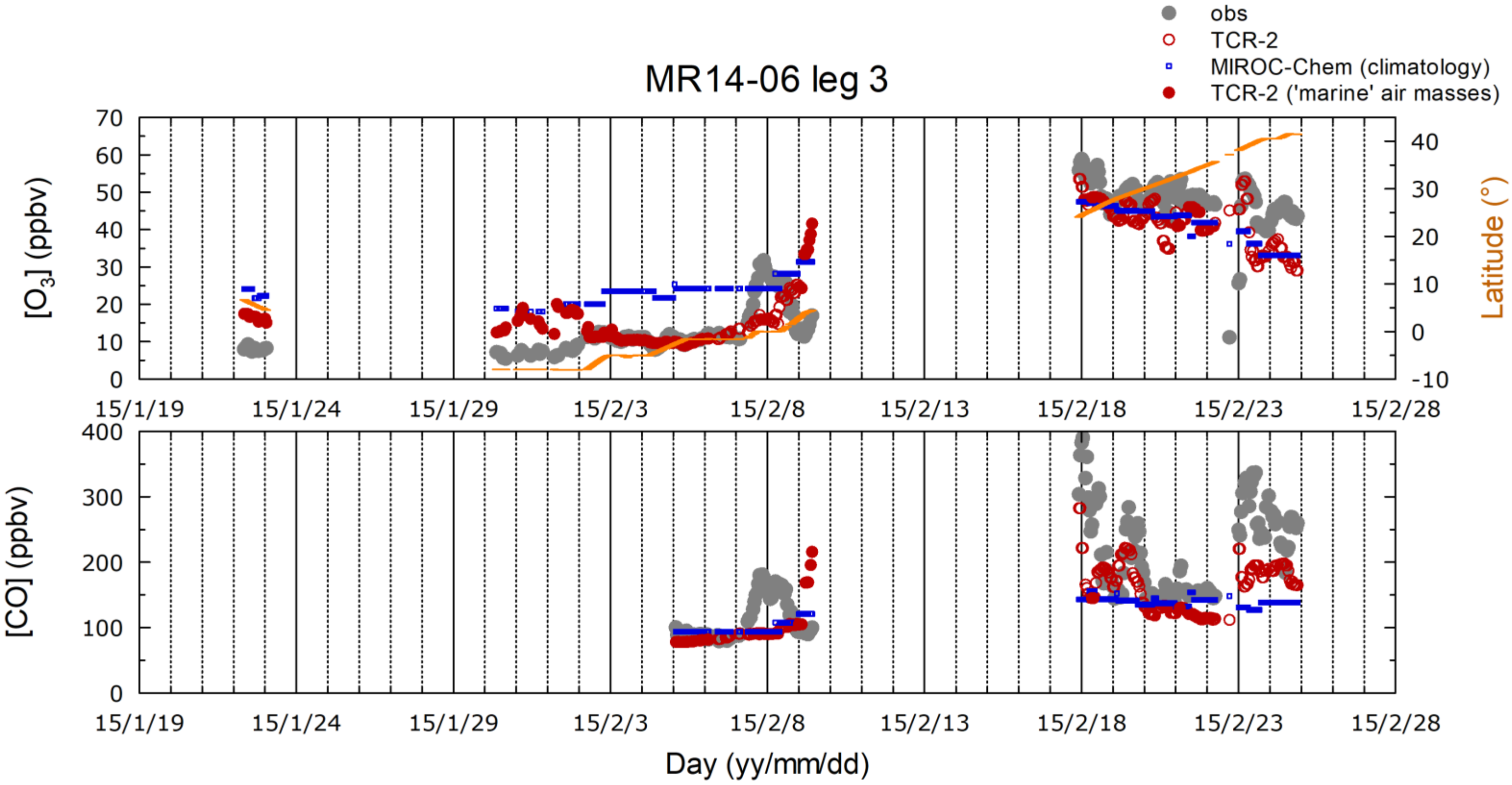


Figure S1l. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-06 leg2.



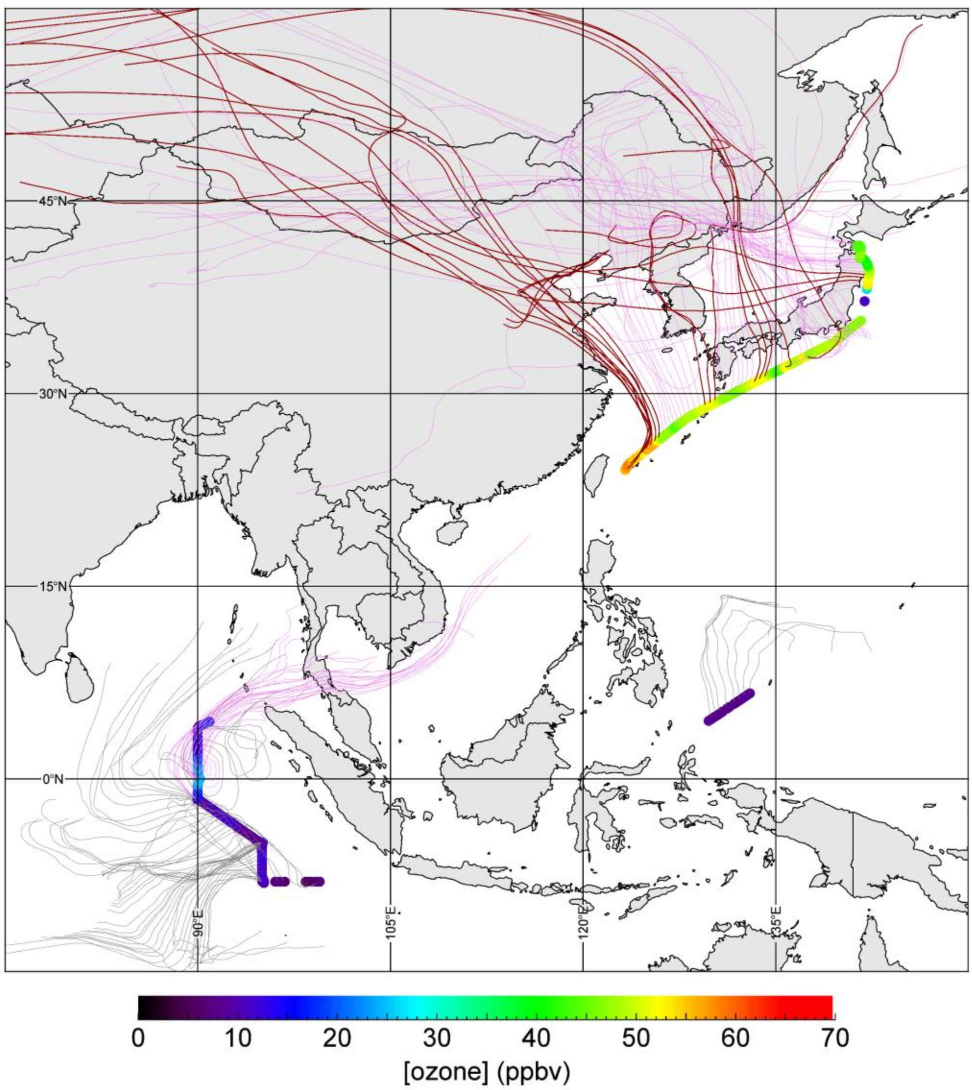


Figure S1m. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR14-06 leg3.

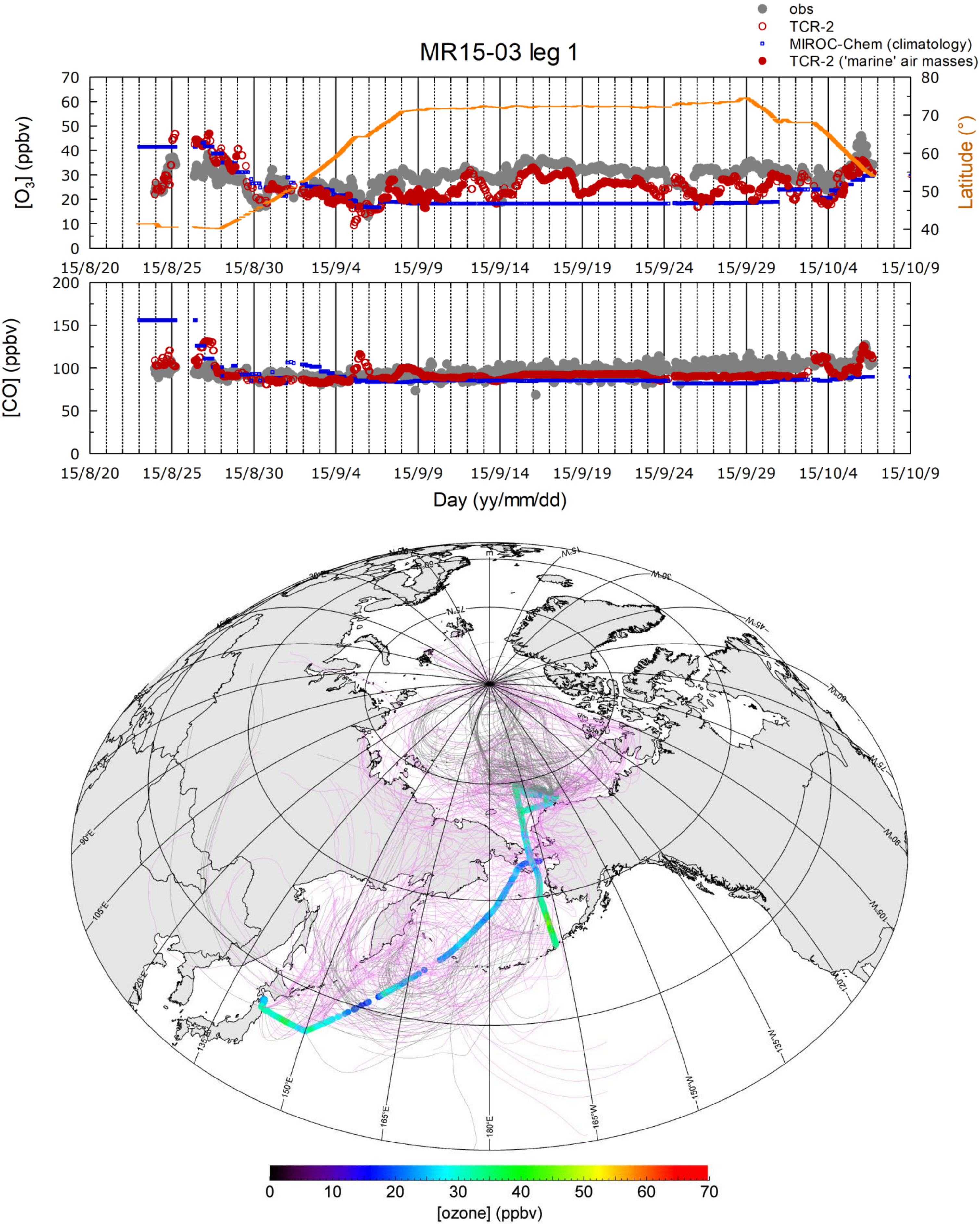


Figure S1n. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR15-03 leg1.

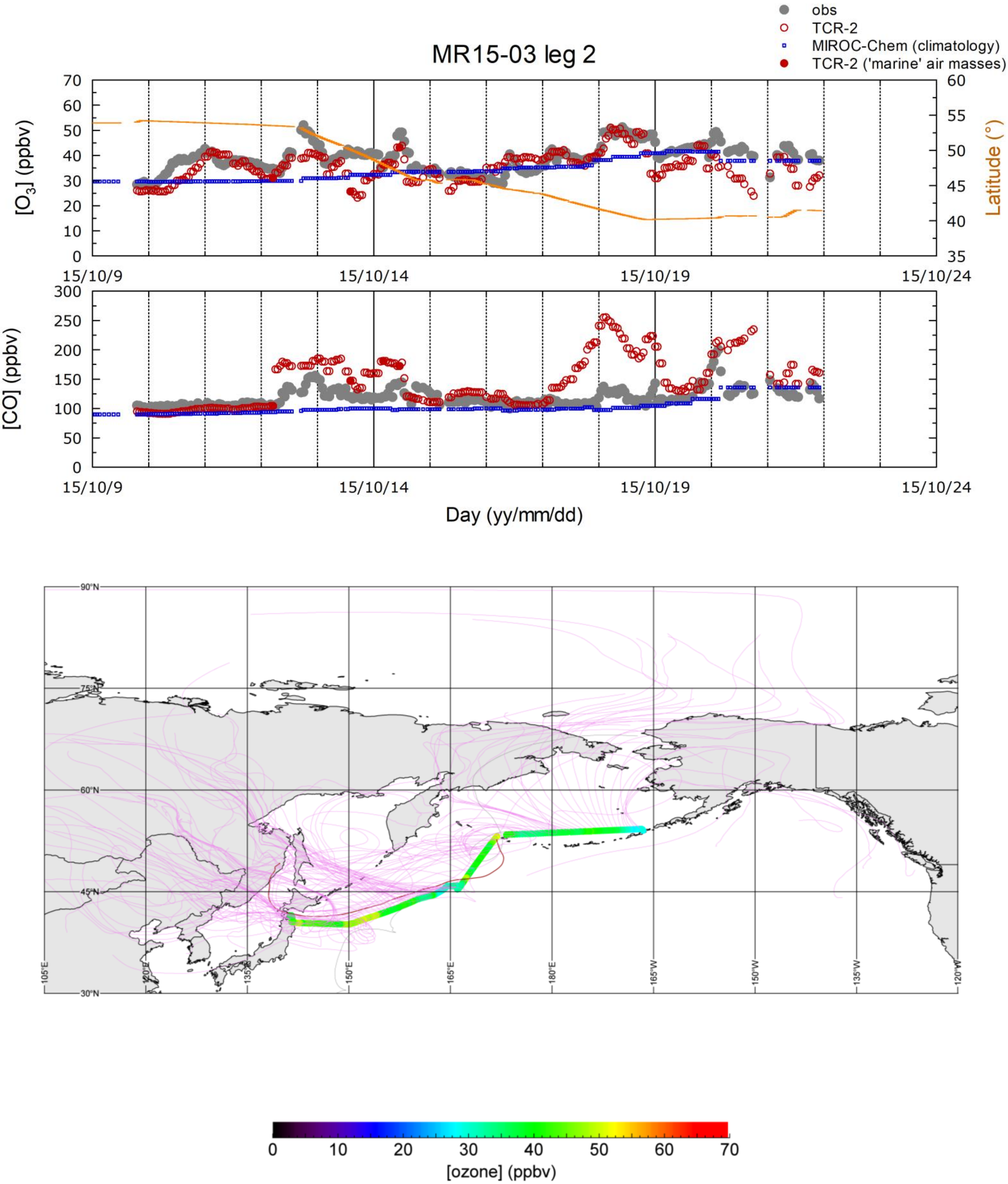


Figure S1o. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR15-03 leg2.

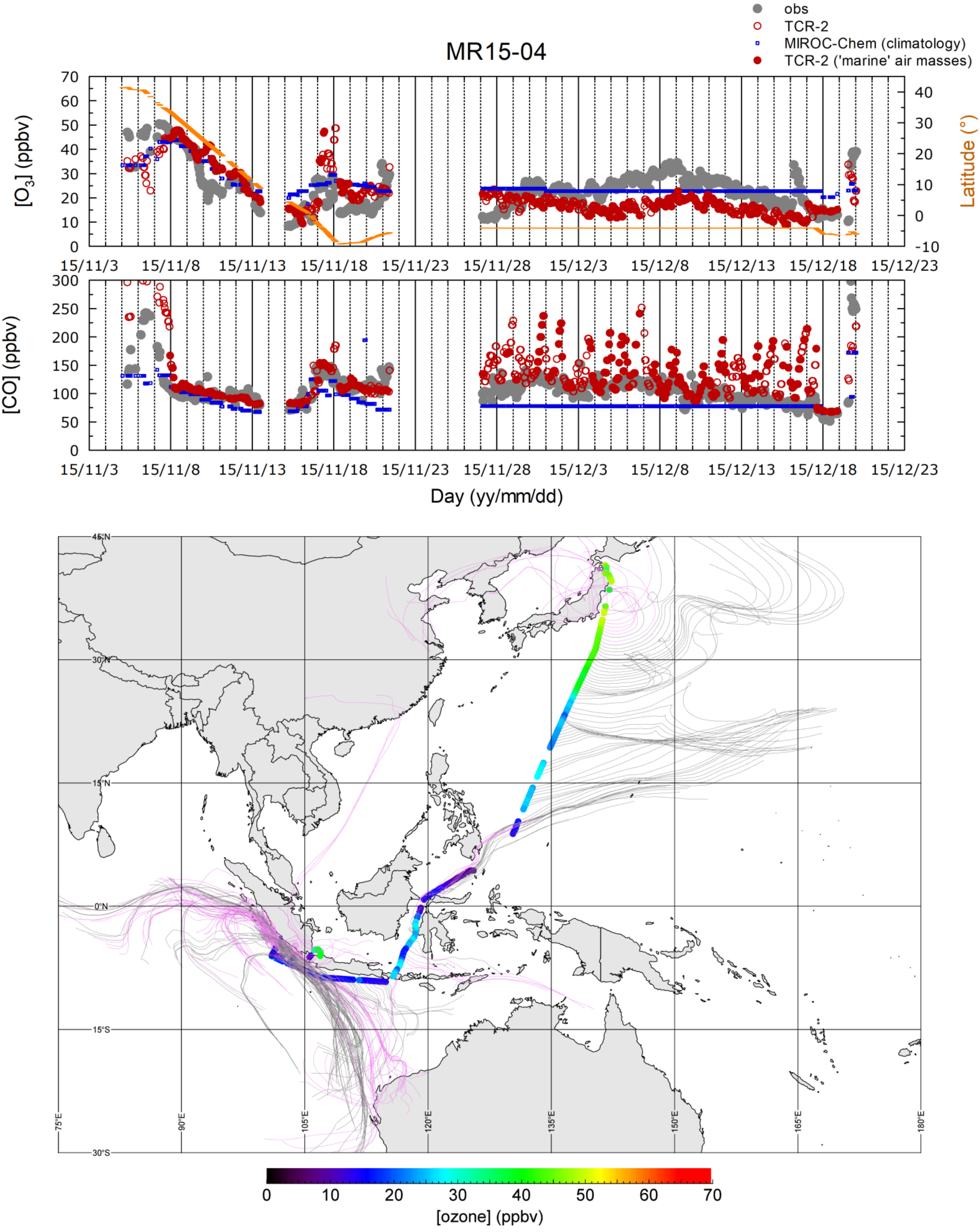


Figure S1p. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR15-04.

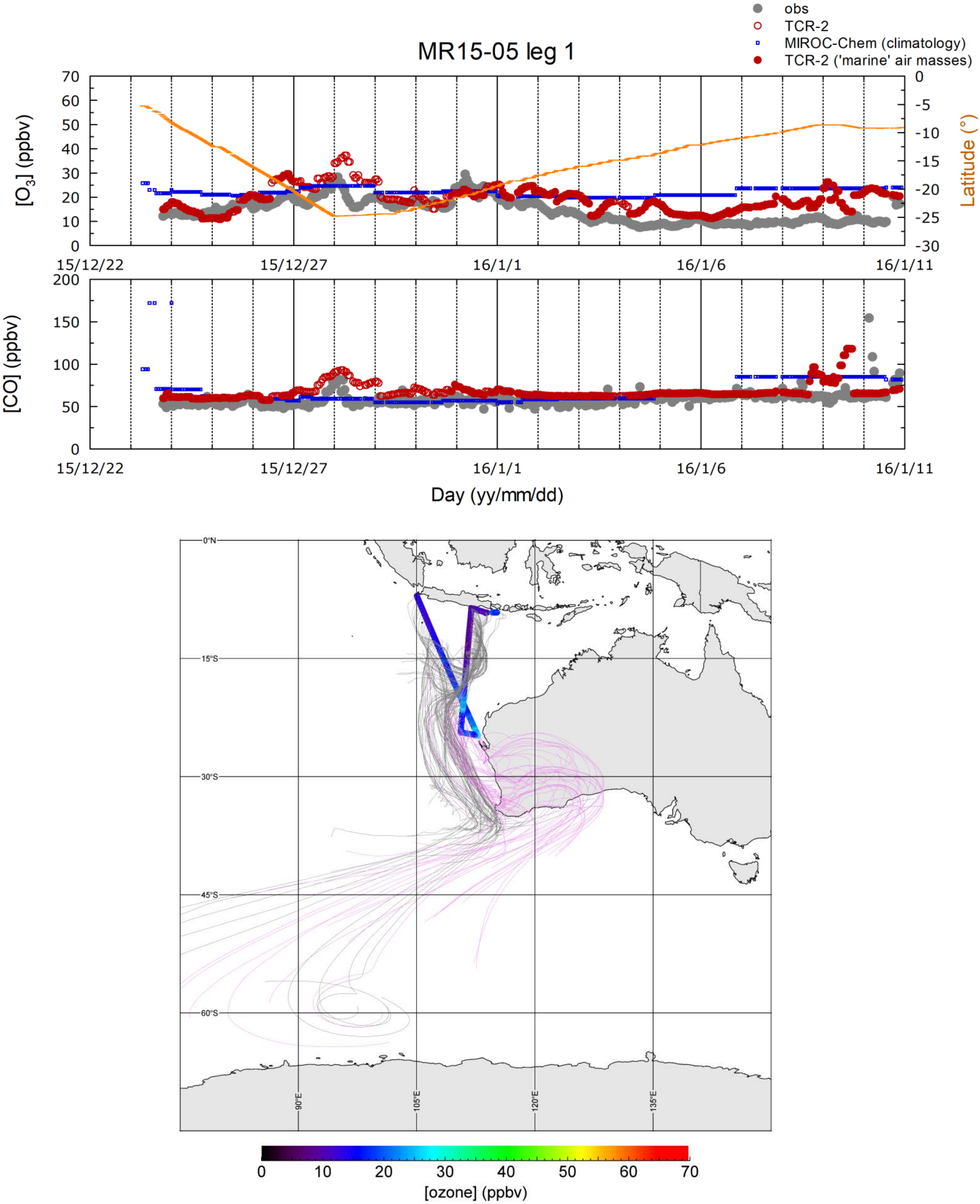
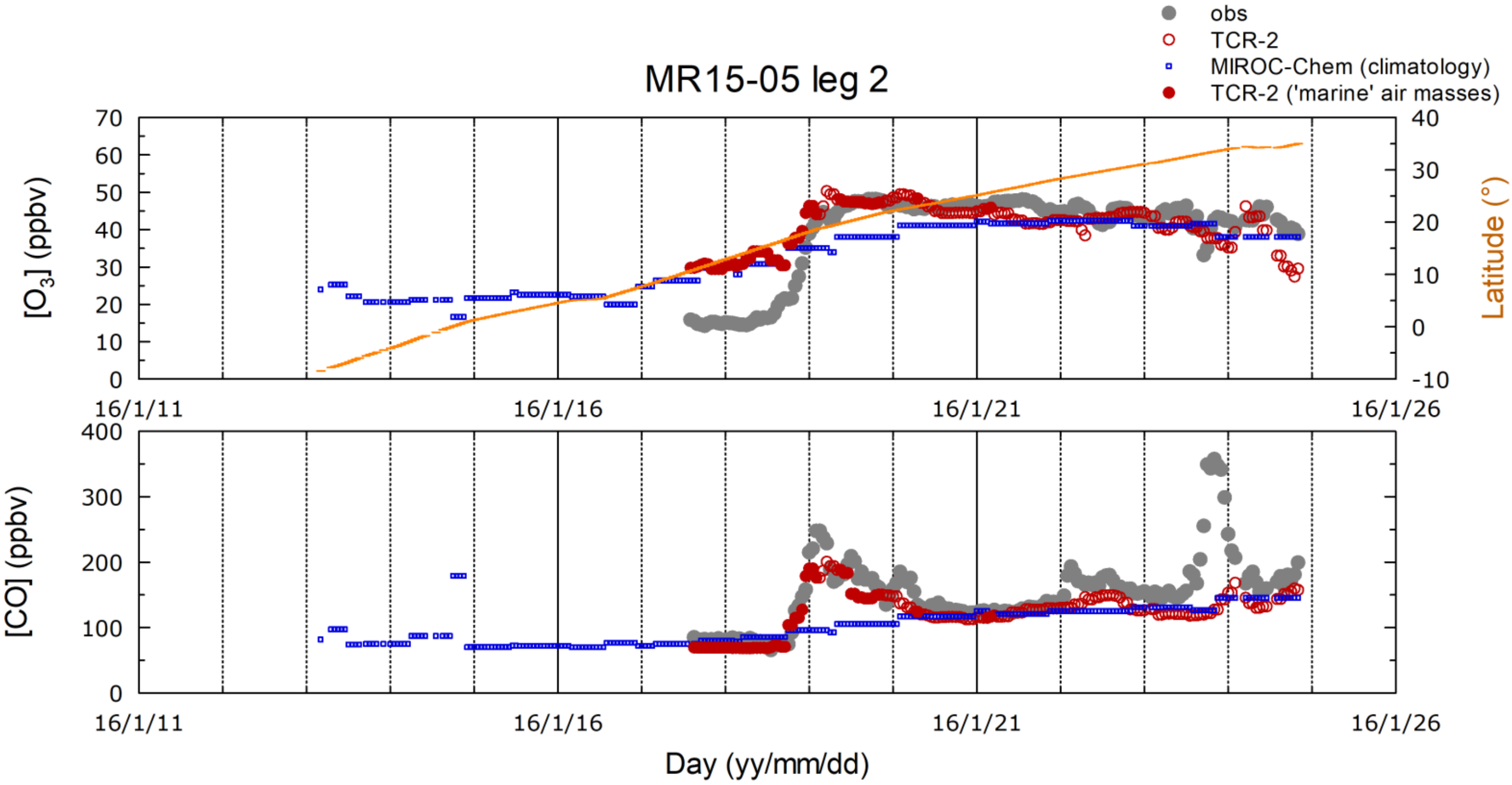


Figure S1q. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR15-05 leg1.



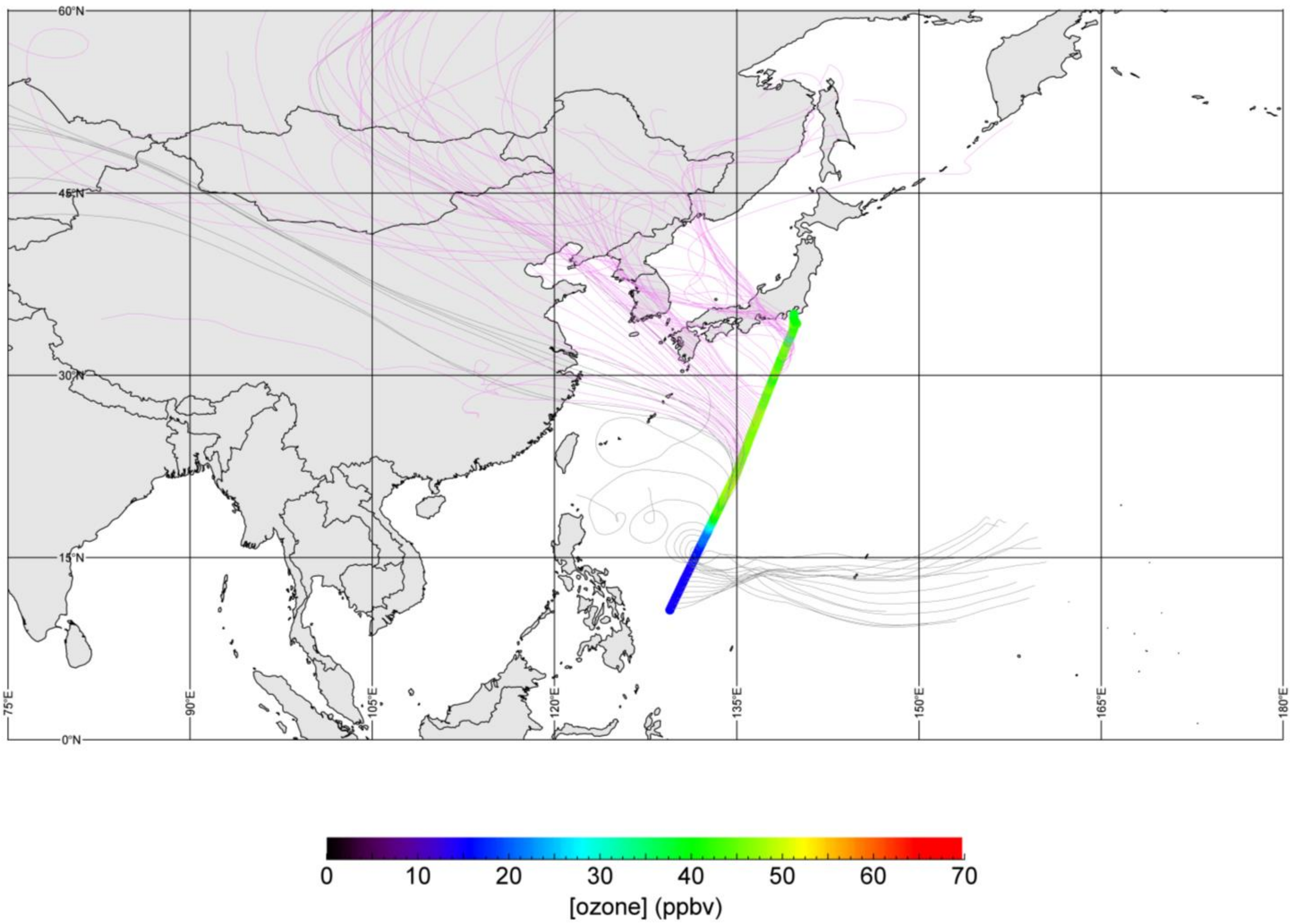


Figure S1r. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR15-05 leg2.

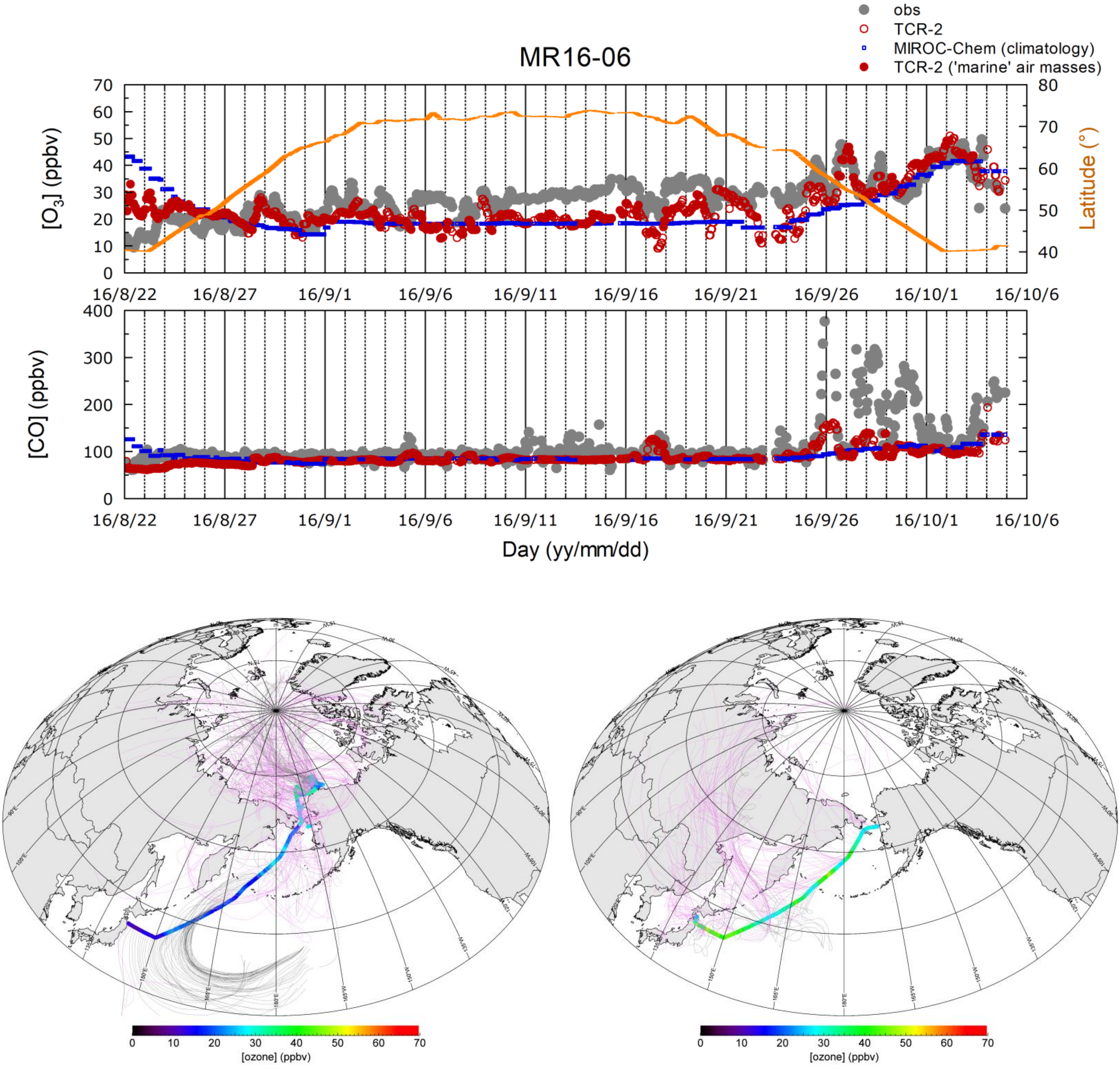


Figure S1s. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR16-06.

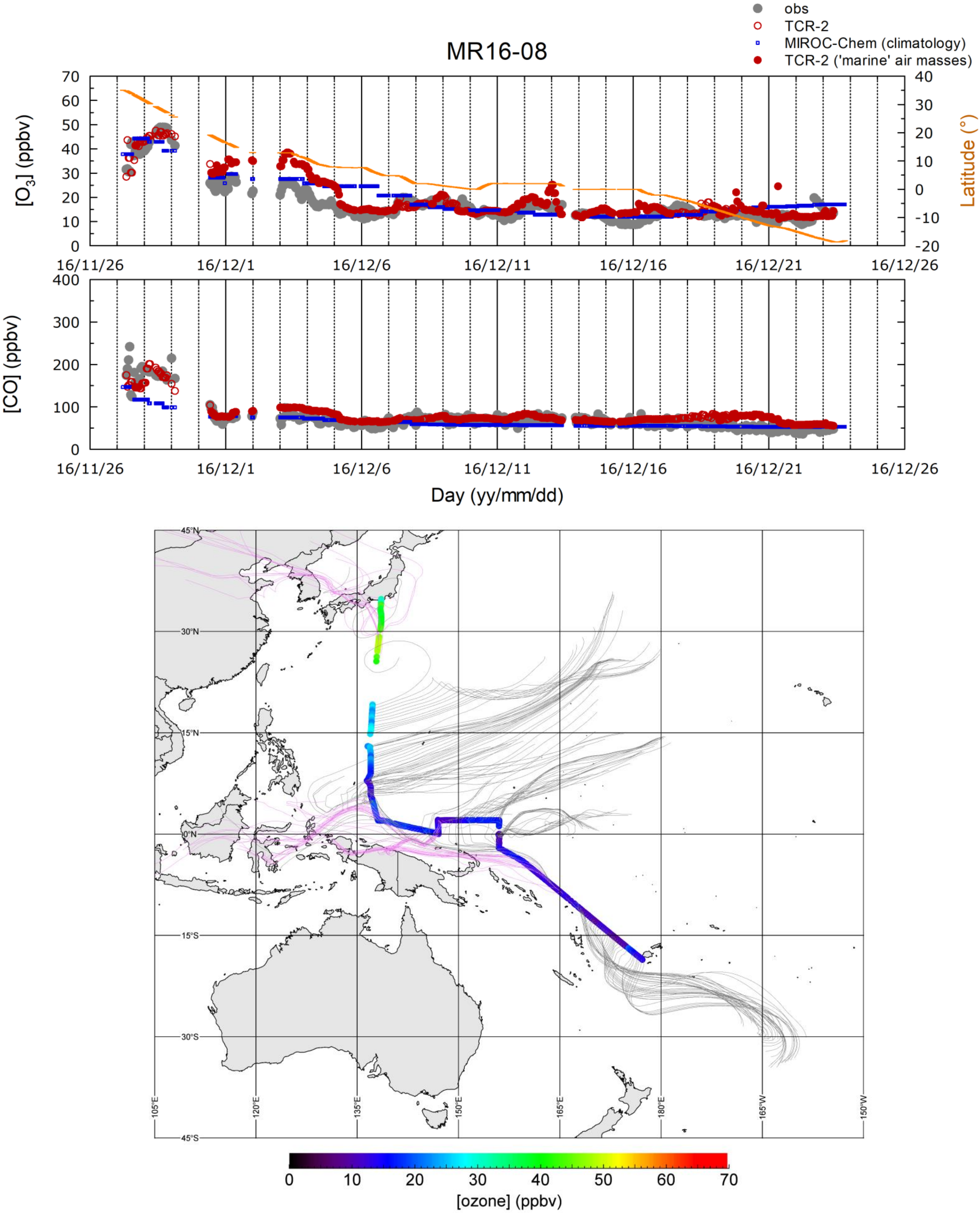


Figure S1t. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR16-08.

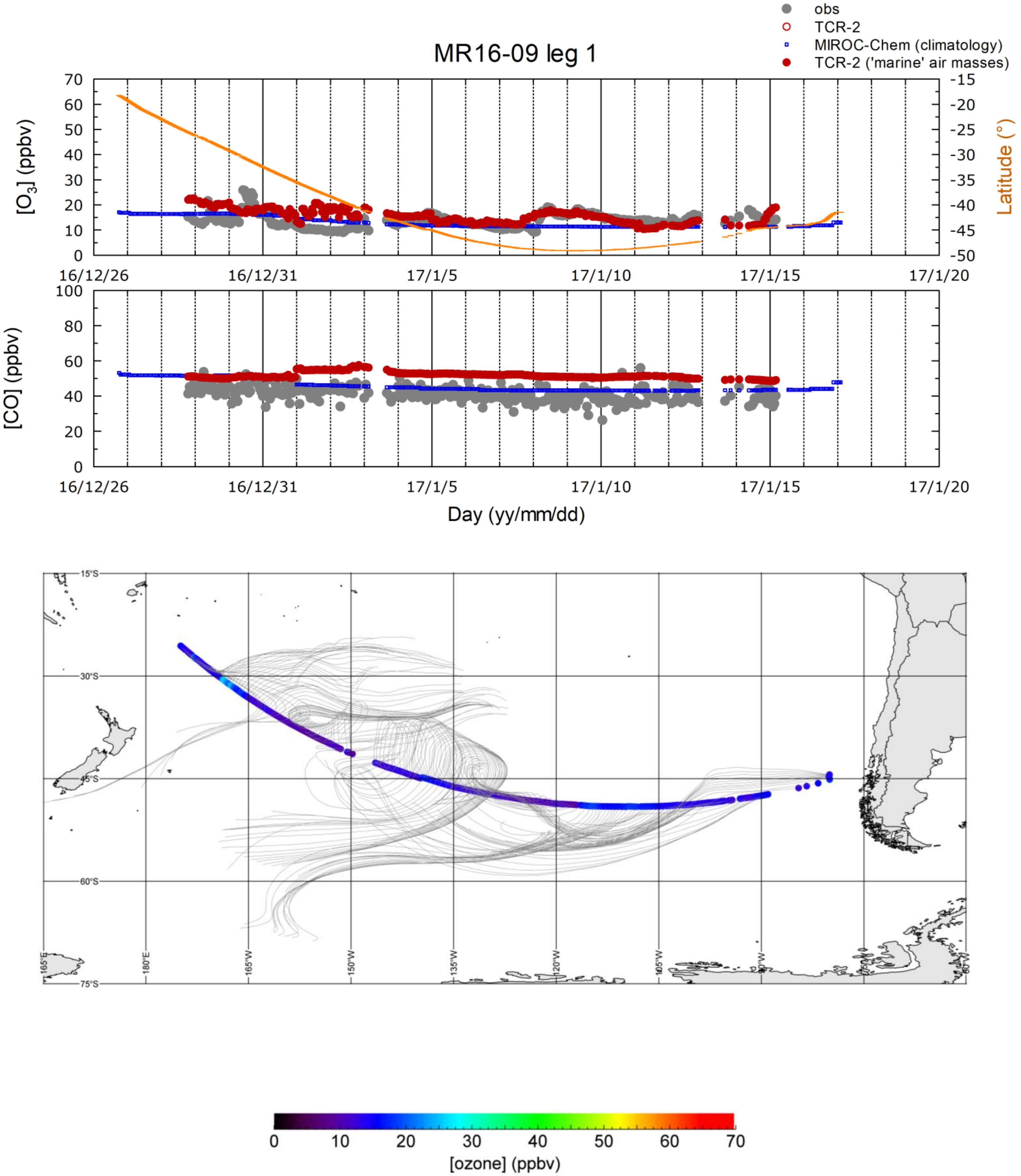


Figure S1u. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR16-09 leg1.

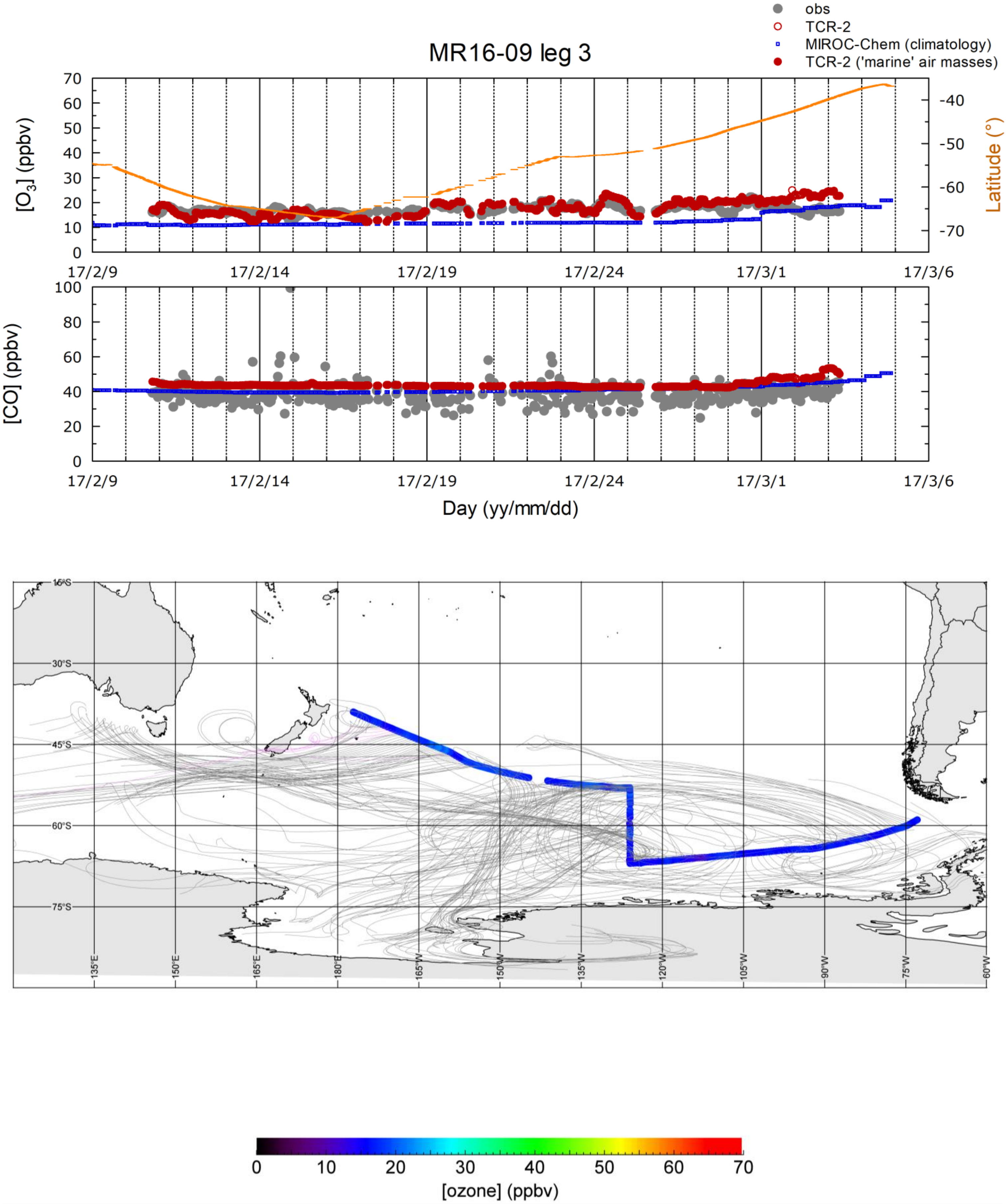


Figure S1v. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR16-09 leg3.

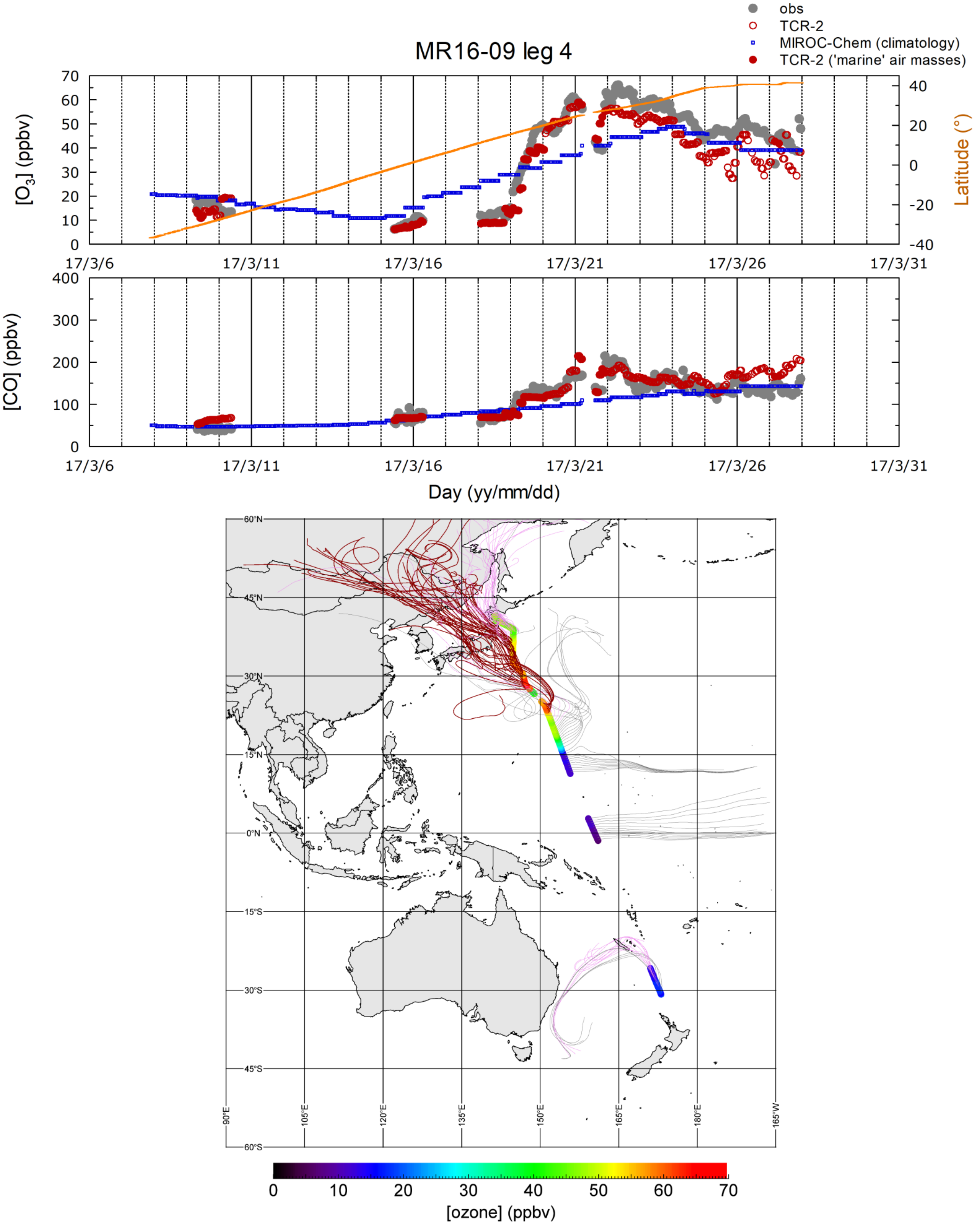


Figure S1w. Time series of observed and simulated ozone and CO mixing ratios and geographical distribution of observed ozone, with 5-day backward trajectories (red: ozone mixing ratios > 50 ppb, magenta: traced back to continents (<2500 m), gray: others (basically marine air masses)) during MR16-09 leg4.

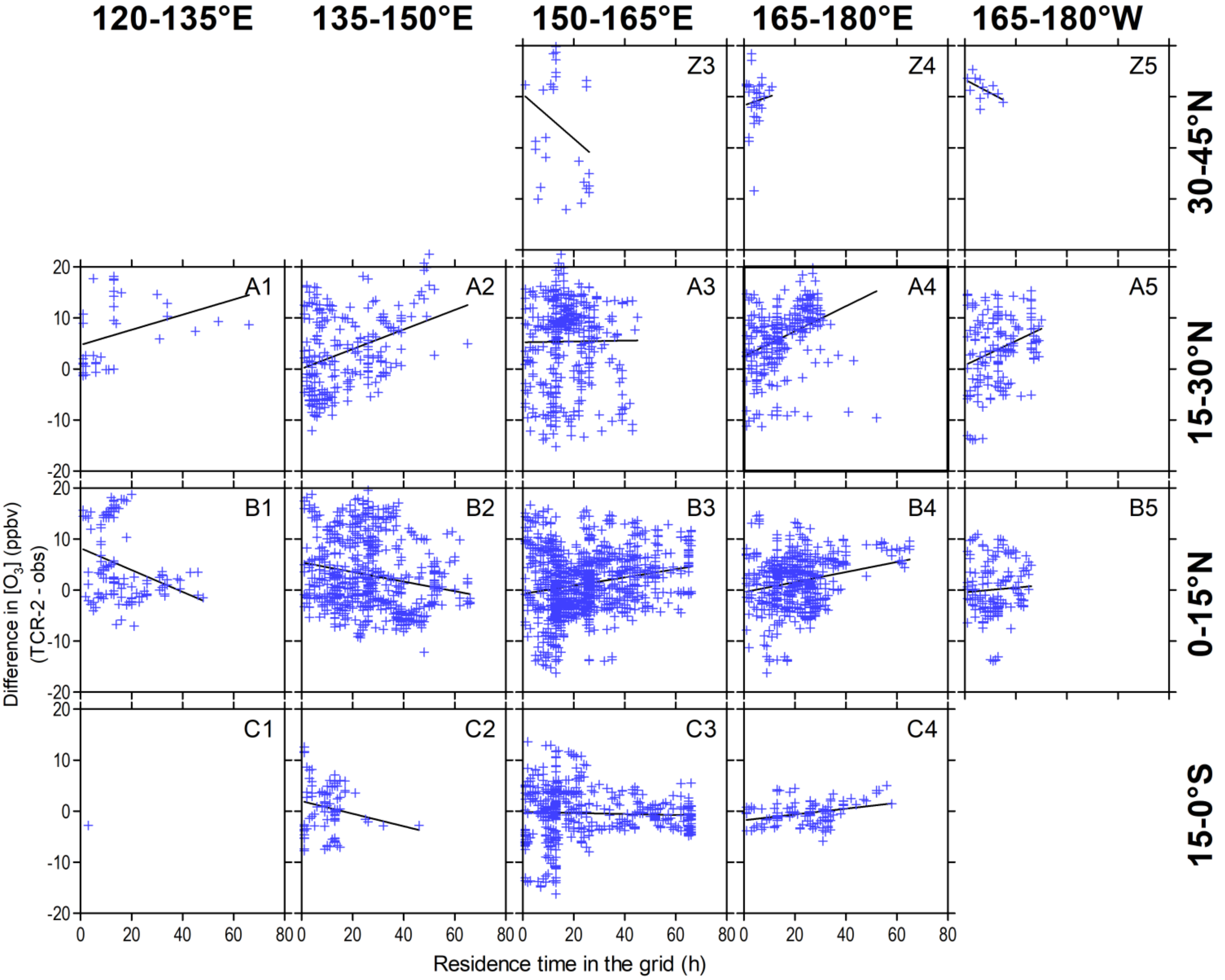


Figure S2. Correlation between differences in observed and TCR-2 ozone mixing ratios and daytime residence time of air masses over 17 grids.