Supplement of Atmos. Chem. Phys., 25, 6957–6973, 2025
https://doi.org/10.5194/acp-25-6957-2025-supplement

Atmospheric Chemistry and Physics
Open Access
EGU

Supplement of

Analysis of ship emission effects on clouds over the southeastern Atlantic using geostationary satellite observations

Nikos Benas et al.

Correspondence to: Nikos Benas (nikos.benas@knmi.nl)

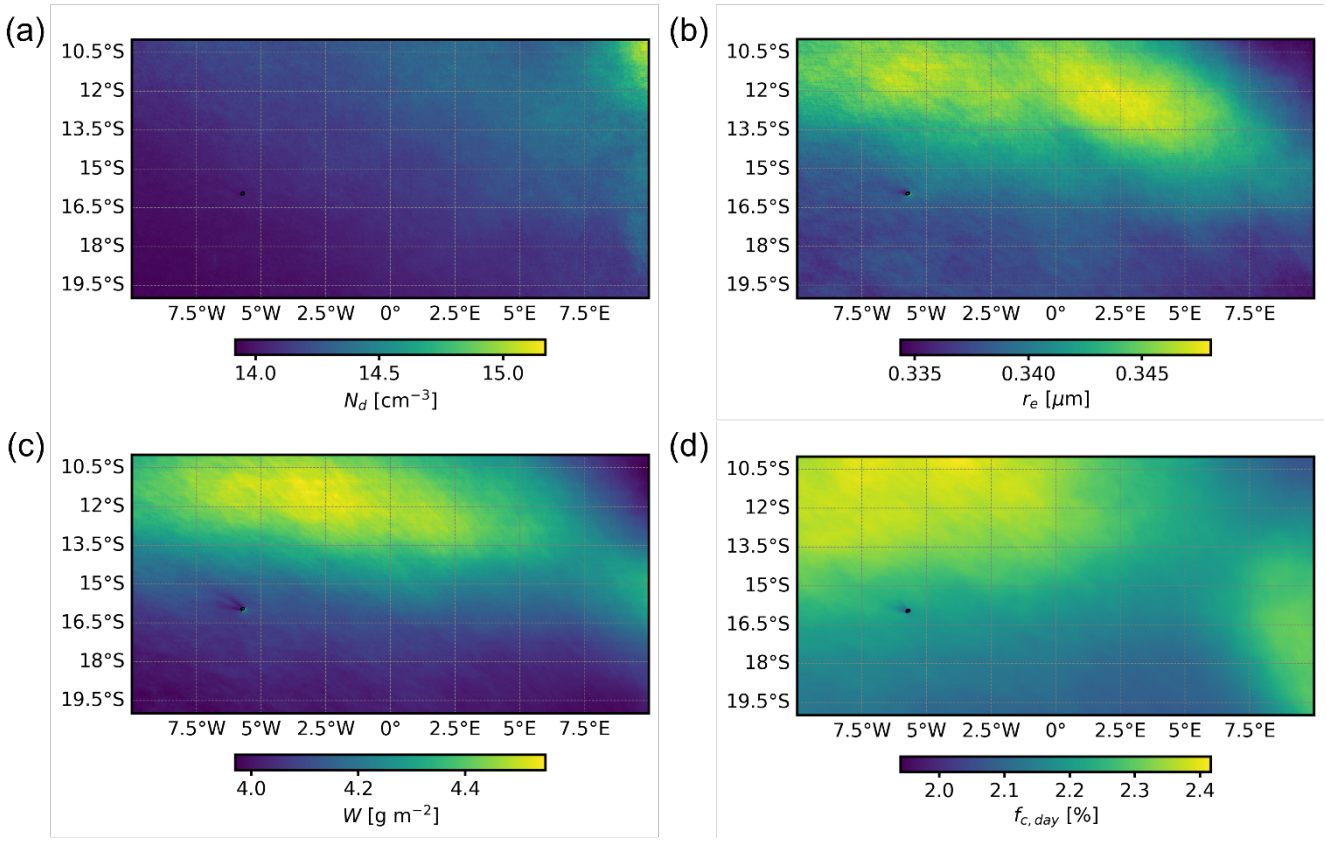


Figure S1: Propagated uncertainties (1σ) of monthly time series average N_d (a), r_e (b), W (c) and $f_{c,\,day}$ (d) over the study region.

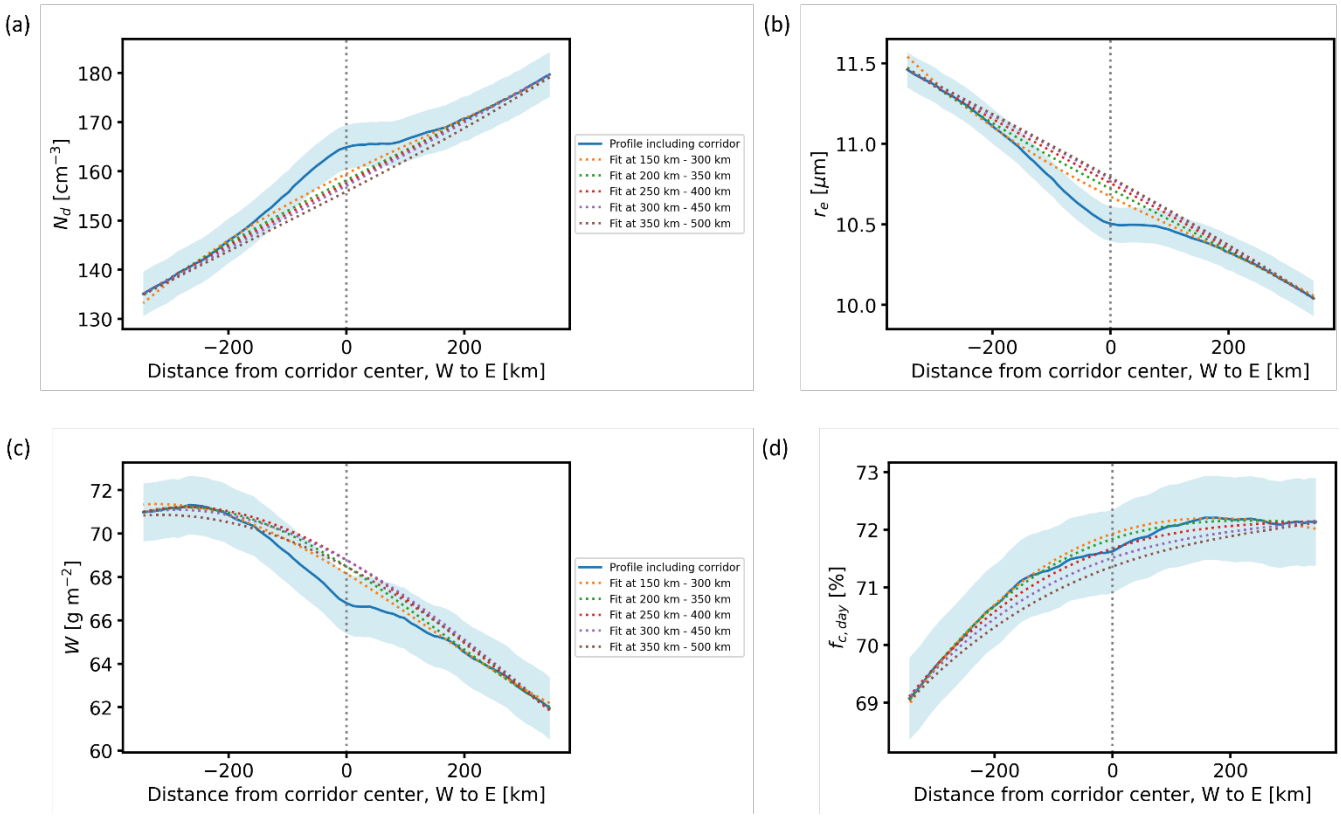


Figure S2: Across-corridor time series average distributions of N_d (a), liquid r_e (b), W (c) and $f_{c,\,day}$ (d), with the propagated uncertainties (1σ) in light blue shades. The coloured dotted lines show the five no-ship scenarios, calculated using cubic fits based on data from different distance ranges from the corridor center. These ranges are shown in the legend, while the corridor center is shown in each plot as a vertical dotted line.

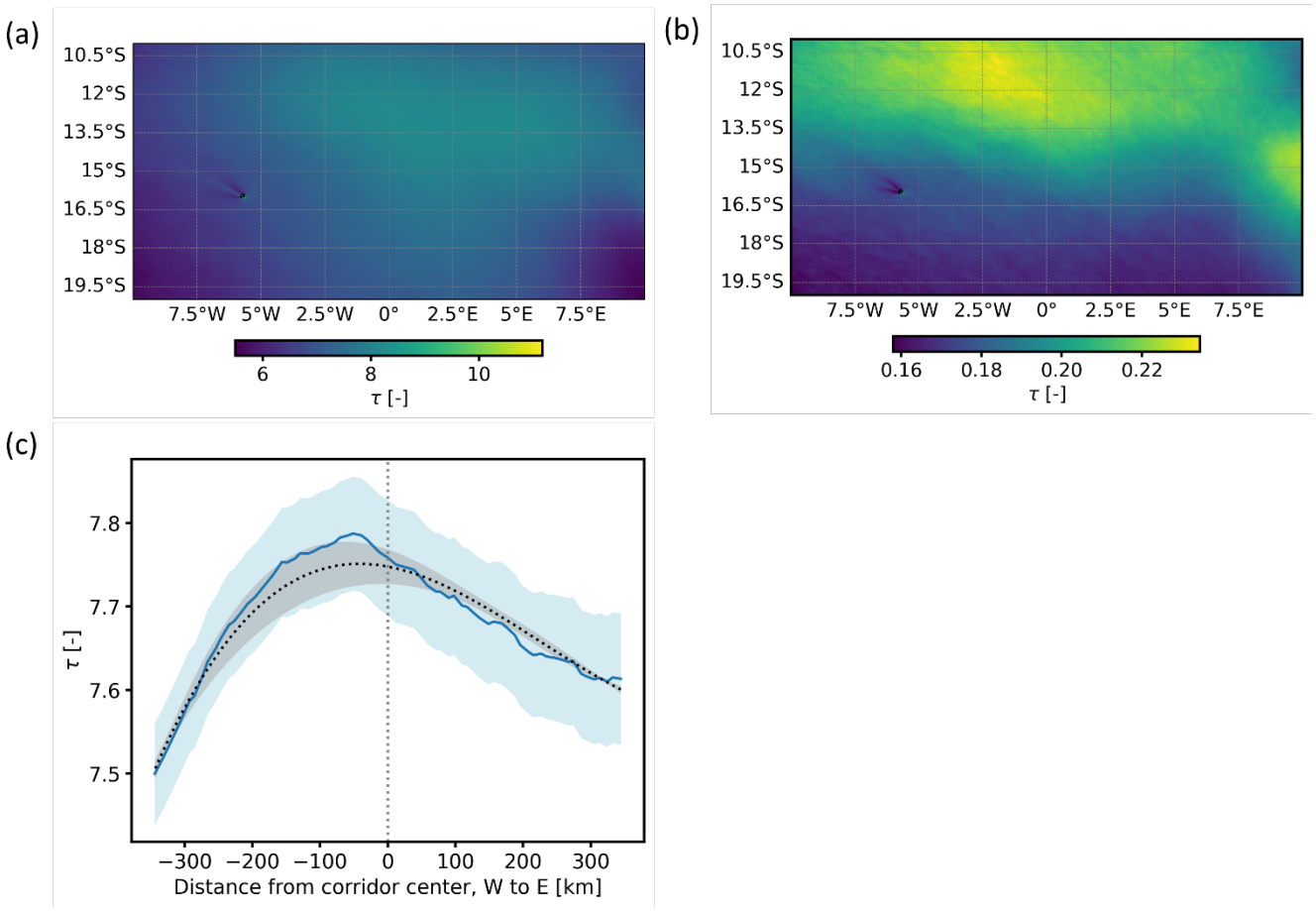
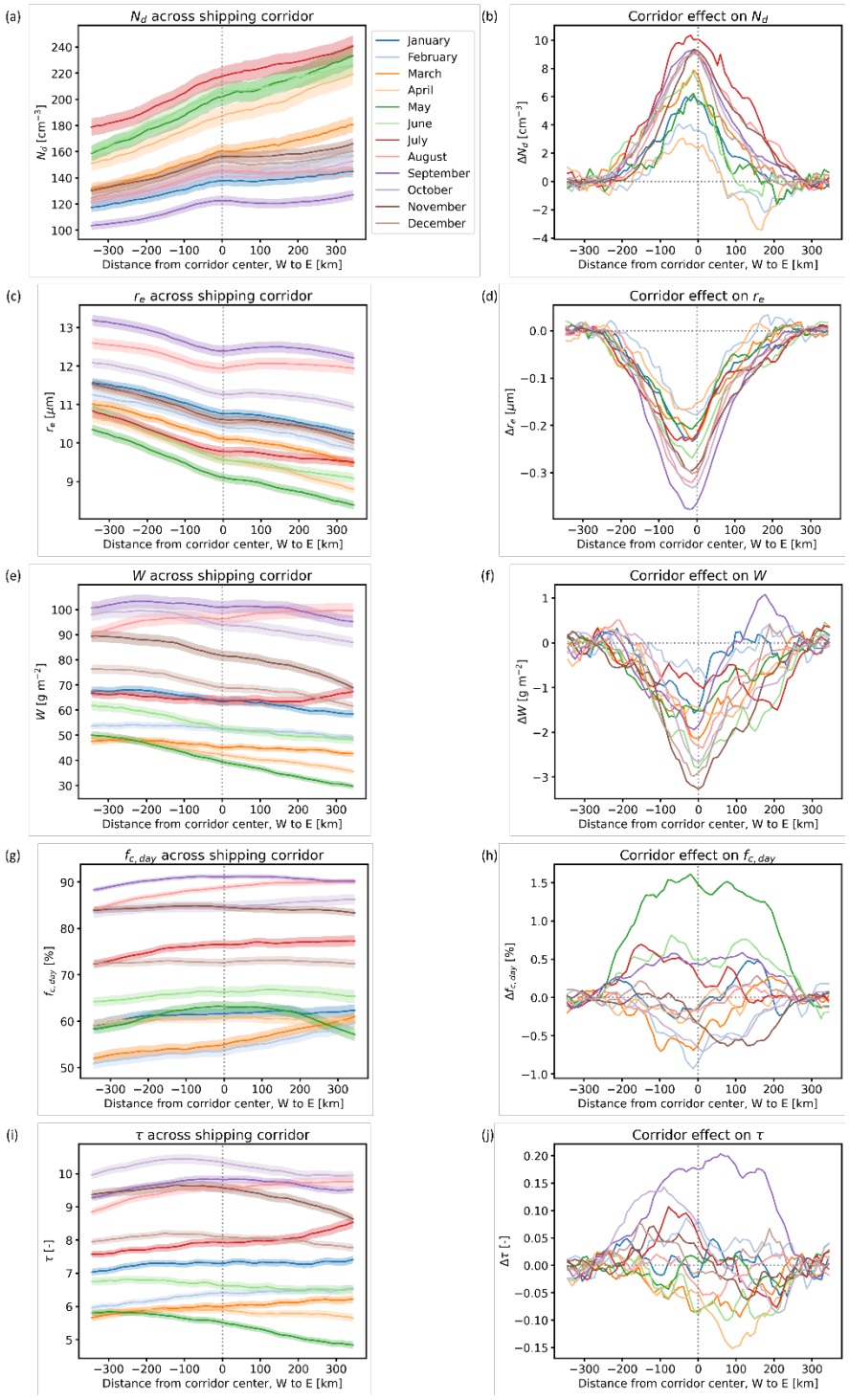


Figure S3: (a), (b) Maps of monthly time series averages of liquid cloud optical thickness τ and corresponding propagated uncertainties (1σ) over the study region. (c) Across-corridor average distribution of τ, with the propagated uncertainties (1σ) in light blue shade. The no-ship scenario is included as a dotted line, with its uncertainty shown in grey.



15 **Figure S4: Monthly across-corridor average distributions of N_d (a), liquid r_e (c), W (e), $f_{c,day}$ (g) and τ (i), with the 1σ uncertainties shown in shades. Plots (b), (d), (f), (h) and (j) show the corresponding monthly profiles of corridor effects, with uncertainties omitted for clarity.**

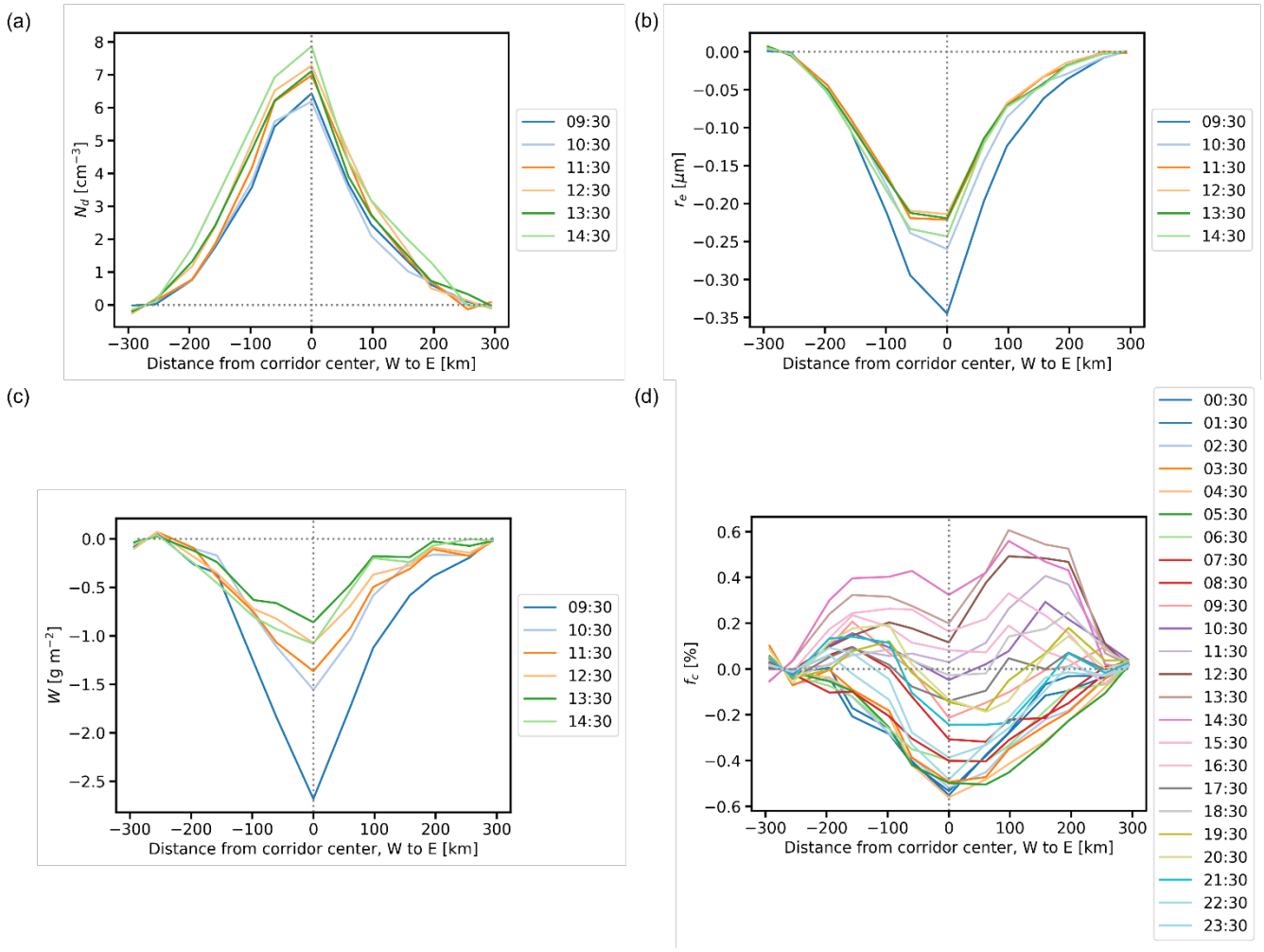


Figure S5: Hourly across-corridor average distributions of corridor effects on N_d (a), liquid r_e (b), W (c) and f_c (d). Vertical dotted lines denote the corridor center.

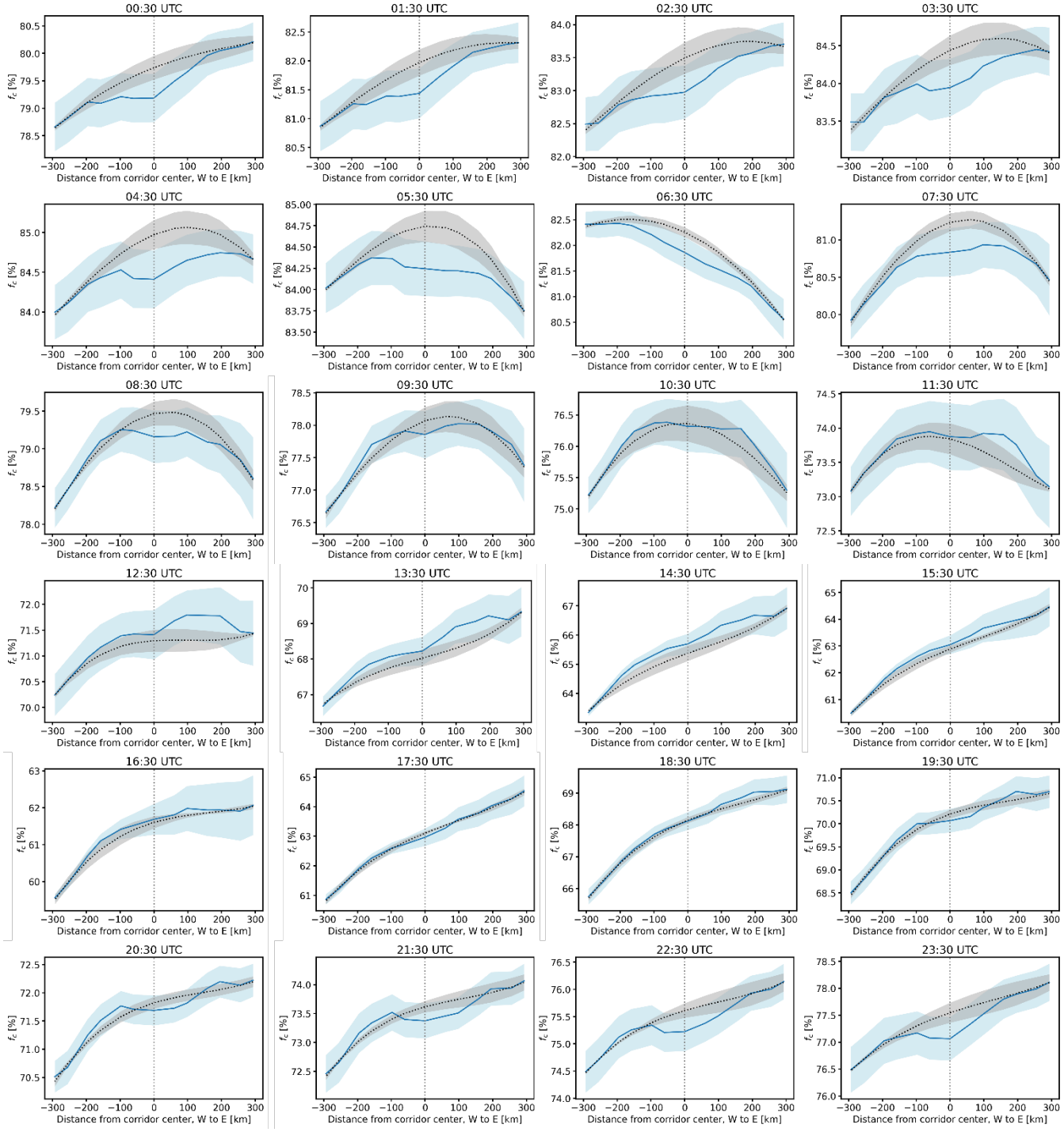


Figure S6: Across-corridor time series average distributions of f_c per 1-hour time slot in 24 hours (blue solid lines), with corresponding propagated uncertainties (1σ) shown in light blue shades. No-ship scenarios are included as dotted lines, with their uncertainties shown in grey shades. Dotted vertical lines denote the corridor center.

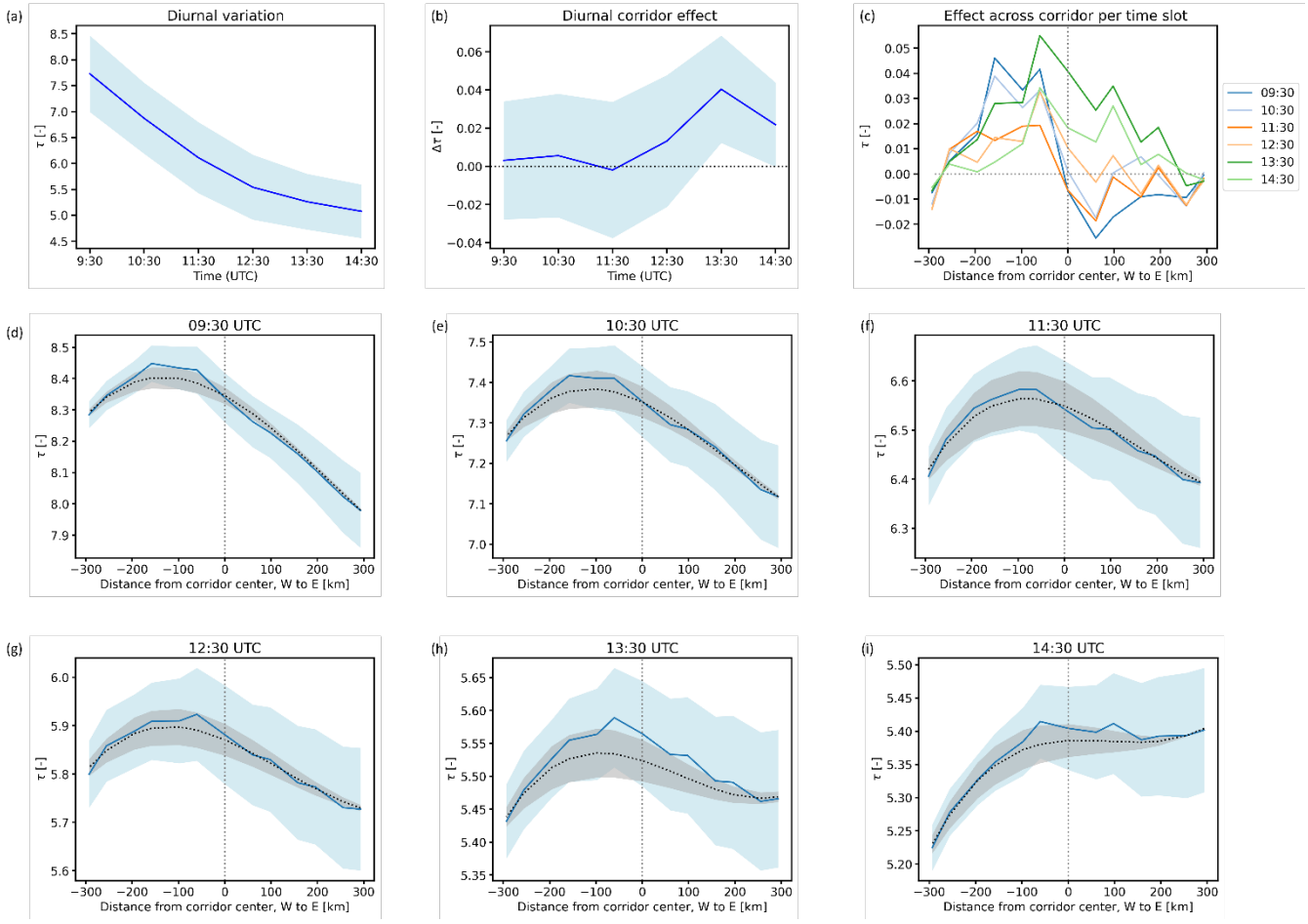
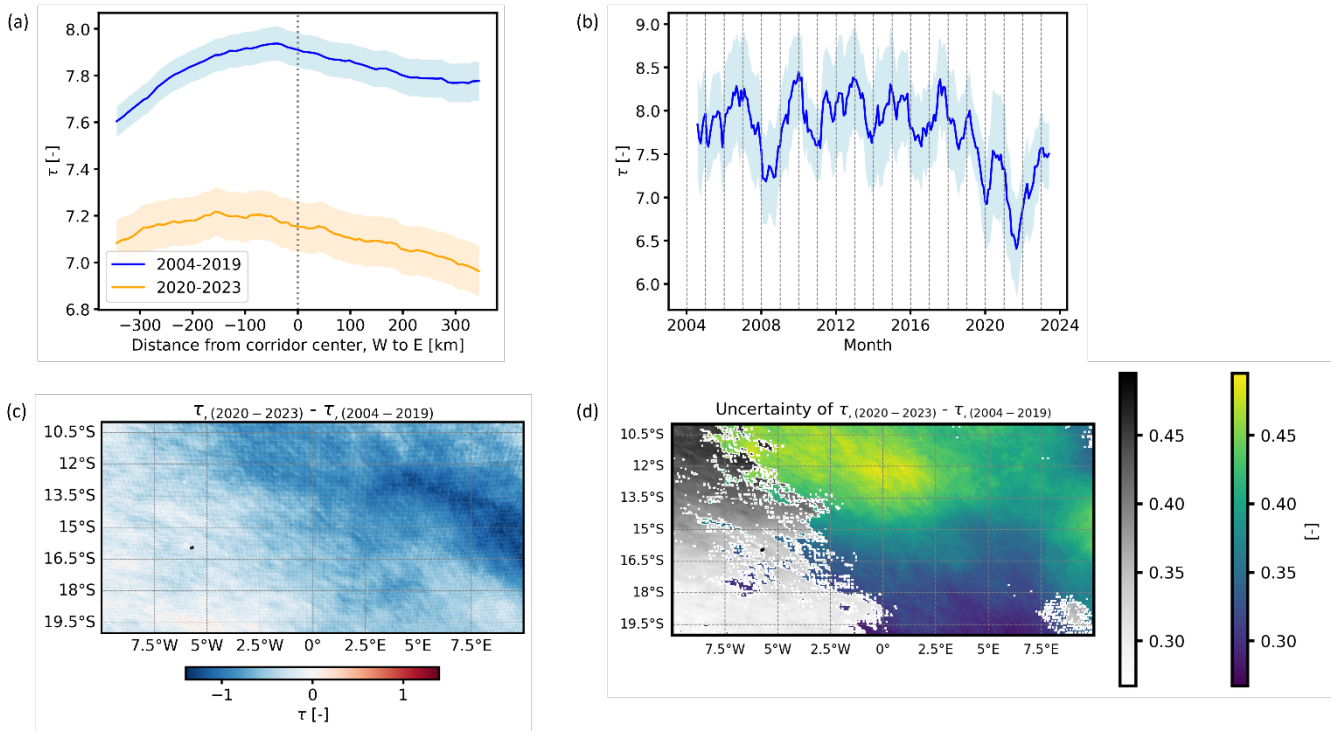


Figure S7: (a) Diurnal variability of the spatially averaged τ (blue line) and associated uncertainty (light blue band). (b) Corresponding calculated diurnal corridor effect on τ. (c) Hourly across-corridor average distributions of corridor effects on τ. (d) – (i): Across-corridor time series average distributions of τ per time slot (blue lines), with corresponding propagated uncertainties shown in light blue shades. No-ship scenarios are included as dotted lines, with their uncertainties shown in grey shades. Dotted vertical lines denote the corridor center. All uncertainties correspond to 1σ.



35 **Figure S8: (a) Across corridor distribution of τ during 2004-2019 and 2020-2023. (b) Time series of monthly average τ over the shipping corridor in 2004-2023, deseasonalized using a 12-month running average. (c) Map of τ differences between the average values for the periods after and before 2020. (d) Map of uncertainties of the τ differences between the after and before 2020 averages. Statistically significant differences are shown in colour, while a grey scale is used for the non-significant differences.**

40

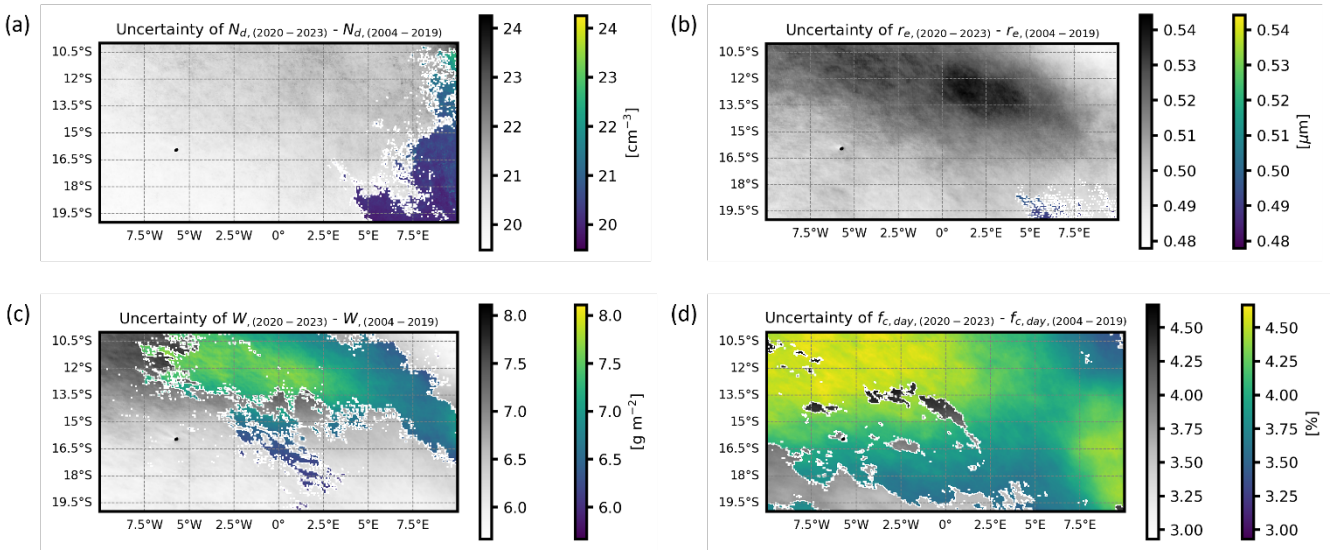


Figure S9: Maps of uncertainties (1σ) of the differences between the after and before 2020 averages for N_d (a), liquid r_e (b), W (c) and $f_{c,\,day}$ (d). Statistically significant differences are shown in colour, while a grey scale is used for the non-significant differences.

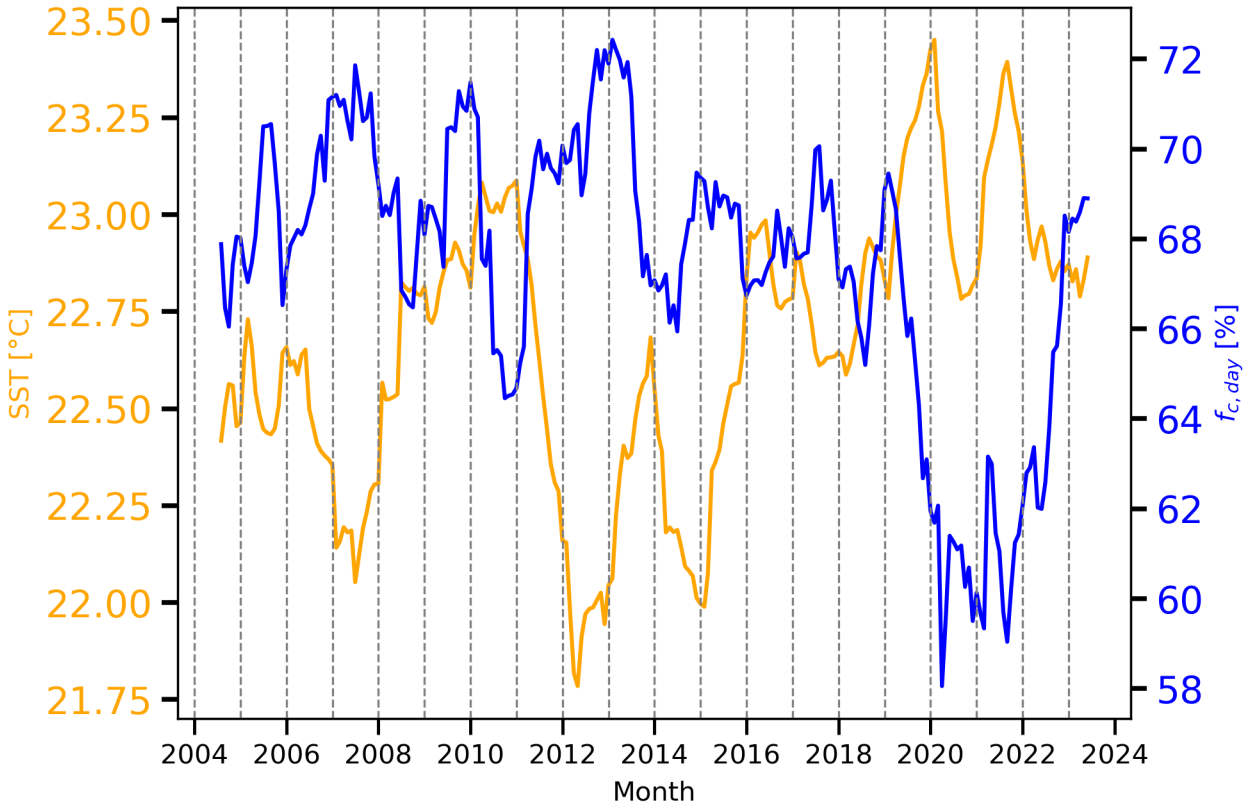


Figure S10: Time series of monthly averaged $f_{c,\,day}$ and SST during 2003-2024 over the study region, deseasonalized using a 12-month running average. The bands of propagated uncertainties are omitted for clarity.