Supplementary Figures

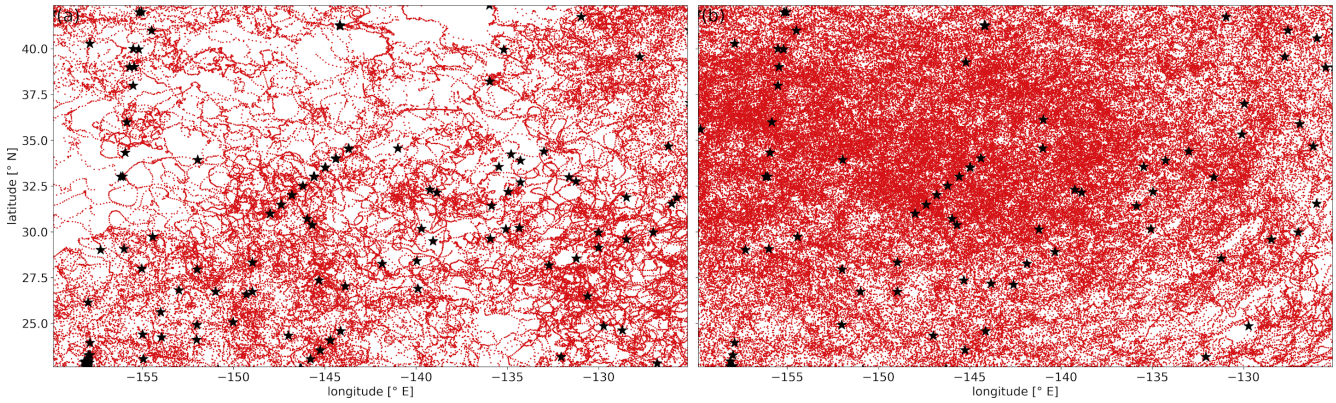

Figure S1. Drifter positions within the study domain and period 2000-2019. (a) Circle markers indicate 24-hourly drifter positions at UTC midnight for drogued drifters from the Global Drifter Program (Lumpkin and Centurioni, 2019). Black stars indicate the deployment sites of the respective drifters. (b) as (a) but for undrogued drifters.

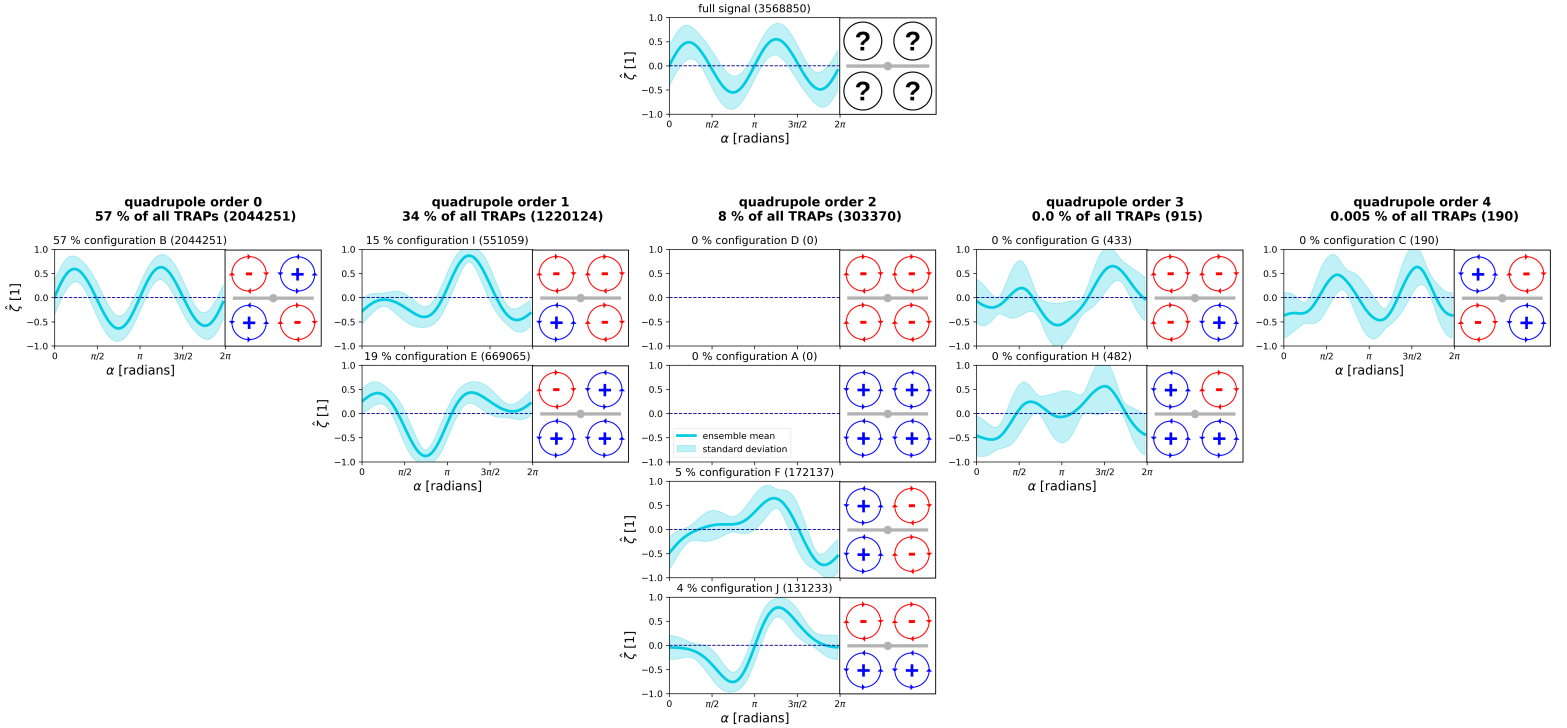

Figure S2. Vorticity patterns around TRAPs. We remove a constant average background vorticity from each of the 3,568,850 vorticity curves $\zeta(\alpha)$ and filter the ensemble for combinations of four vortices that are unique under rotations of 180° around a TRAP core. We derive 10 unique vorticity patterns and for every pattern, we present the mean and standard deviation of the associated normalised vorticity curves $\hat{\zeta}(\alpha)$ as blue lines and shaded bands, respectively. We sketch each configuration with cyclonic (blue) and anticyclonic (red) vortices around a grey TRAP. Titles indicate the count of each pattern and its share in the overall signal. The patterns are grouped by their quadrupole order q with q increasing from left to right.

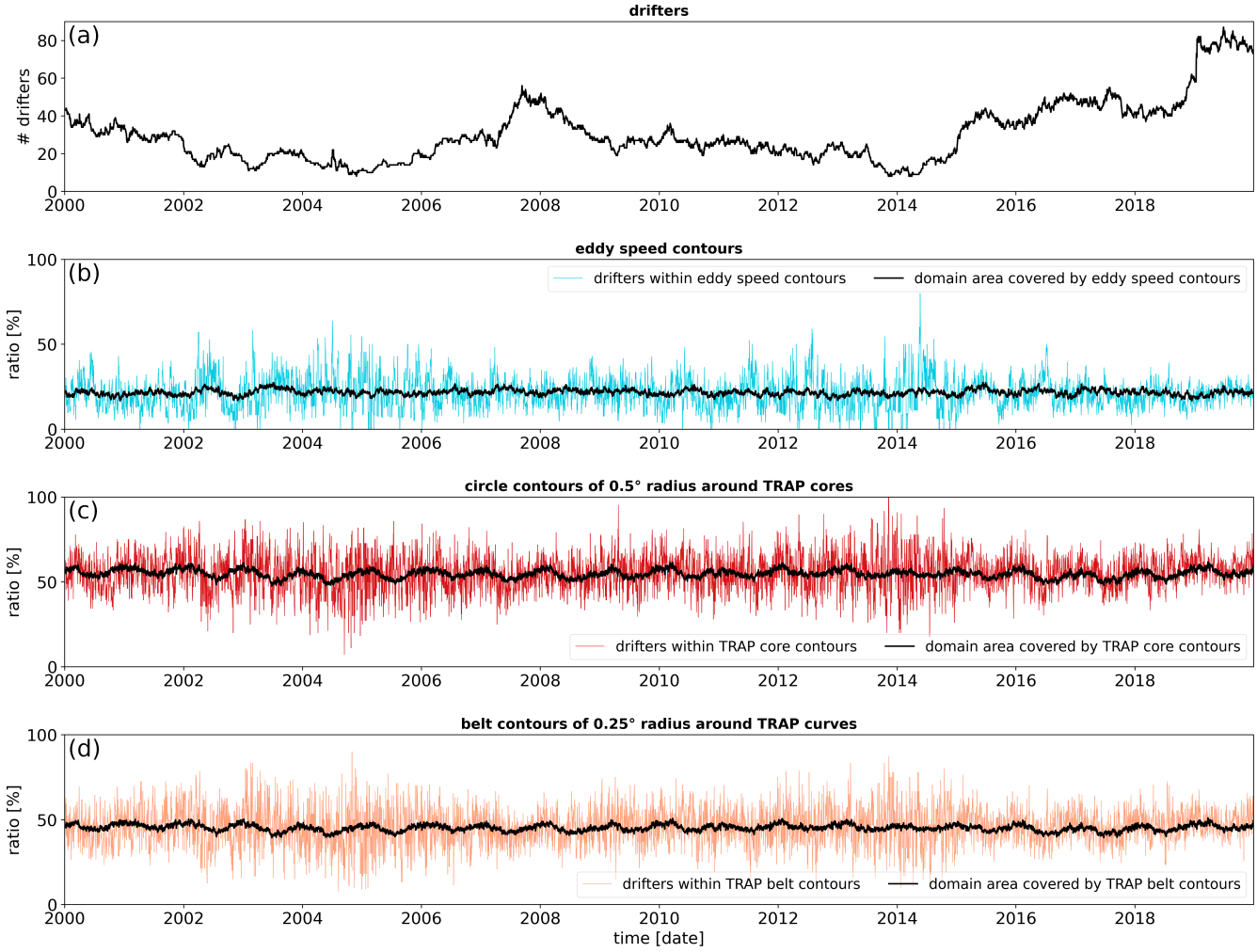

Figure S3. Time series of surface area enclosed by and drifter positions detected within TRAP and eddy contours. (a) Time series of the daily number of drifter positions within the study domain. (b) The black line indicates the proportion of domain area covered by daily eddy speed contours. The coloured line represents the ratio of daily drifter positions within these eddy contours. (c) and (d) as (b) but for contours around TRAP cores and TRAP curves, respectively. Mesoscale eddies as detected by AVISO+ et al. (2022).

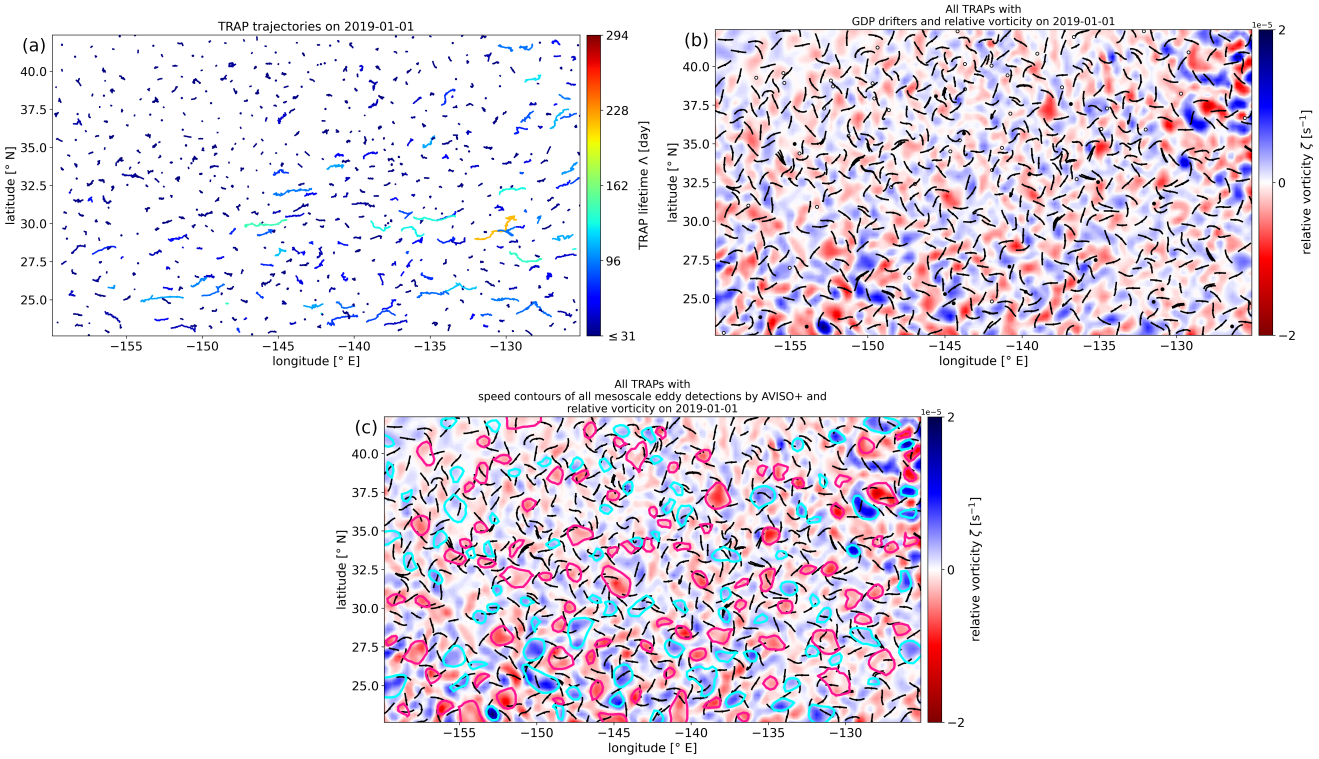

Figure S4. Information to the supplementary videos. (a) Coloured lines represent the trajectories of propagating TRAPs which we derive with our tracking algorithm. Colours indicate the estimated total lifetime of a TRAP, ephemeral TRAPs appear as flickering points in the respective Supplementary Video SV1. (b) Black lines indicate TRAPs upon a colourmap of the relative voriticity field ζ. Filled and empty black circles represent the 24-hourly positions of drogued and undrogued drifters provided by Lumpkin and Centurioni (2019), respectively. SV2 then shows the simultaneous motion of TRAPs, drifters and the relative vorticity field. (c) as (b) but for detections of mesoscale eddies instead of drifter positions. SV3 animates the simultaneous propagation of TRAPs and eddies, blue lines indicate the speed contour of cyclonic, pink lines the speed contour of anticyclonic eddy detections by AVISO+ et al. (2022).

References

AVISO+, CNES, SSALTO/DUACS, and IMEDEA: Mesoscale Eddy Trajectories Atlas 3.2 Delayed-Time (META3.2 DT) Allsat Version, https://doi.org/10.24400/527896/a01-2022.005.220209, 2022.

Lumpkin, R. and Centurioni, L.: Global Drifter Program quality-controlled 6-hour interpolated data from ocean surface drifting buoys, https://doi.org/10.25921/7ntx-z961, last access: 15 December 2022, 2019.