

Mono atlas analysis

September 26, 2022

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2 Global observations of nonlinear mesoscale eddies

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The following figures are adaptated from Chelton, D. B., Schlax, M. G., Samelson, R. M. and de Szoeke, R. A.: Global observations of large oceanic eddies, *Geophys. Res. Lett.*, 34(15), L15606, <https://doi.org/10.1016/j.pocean.2011.01.002>

Load dataset

Loading with contours (large memory use)

General properties

Definitions

2.1 Period of the described Atlas

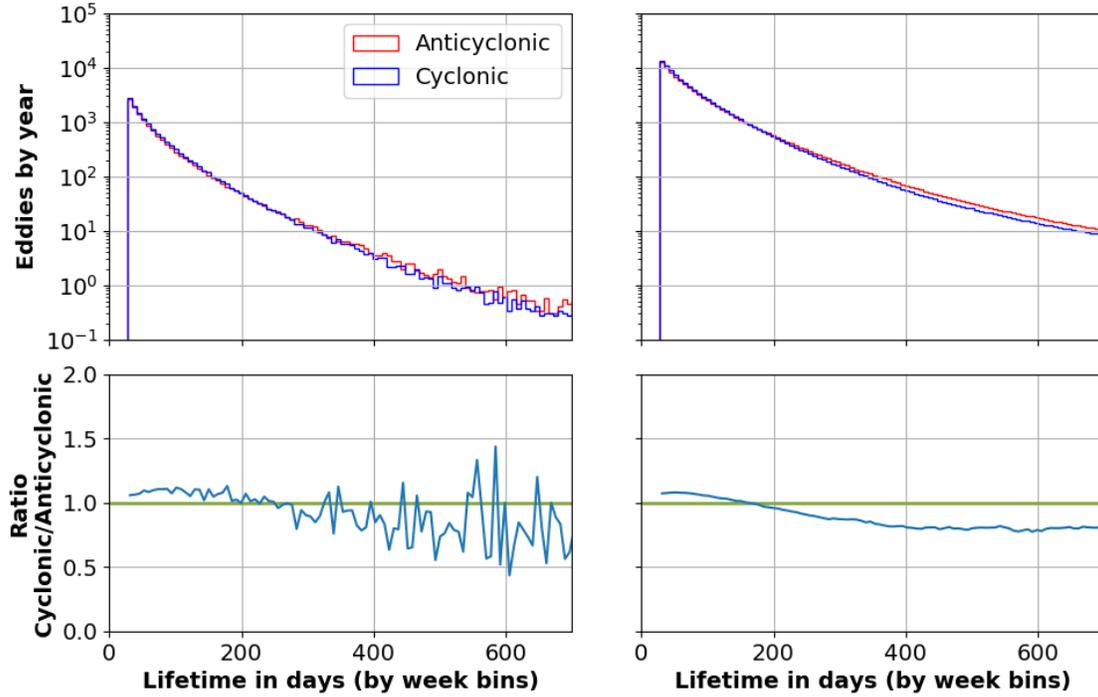
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The following figures are displayed on period January 1993 - February 2022

2.2 Figure 2 - Lifetime

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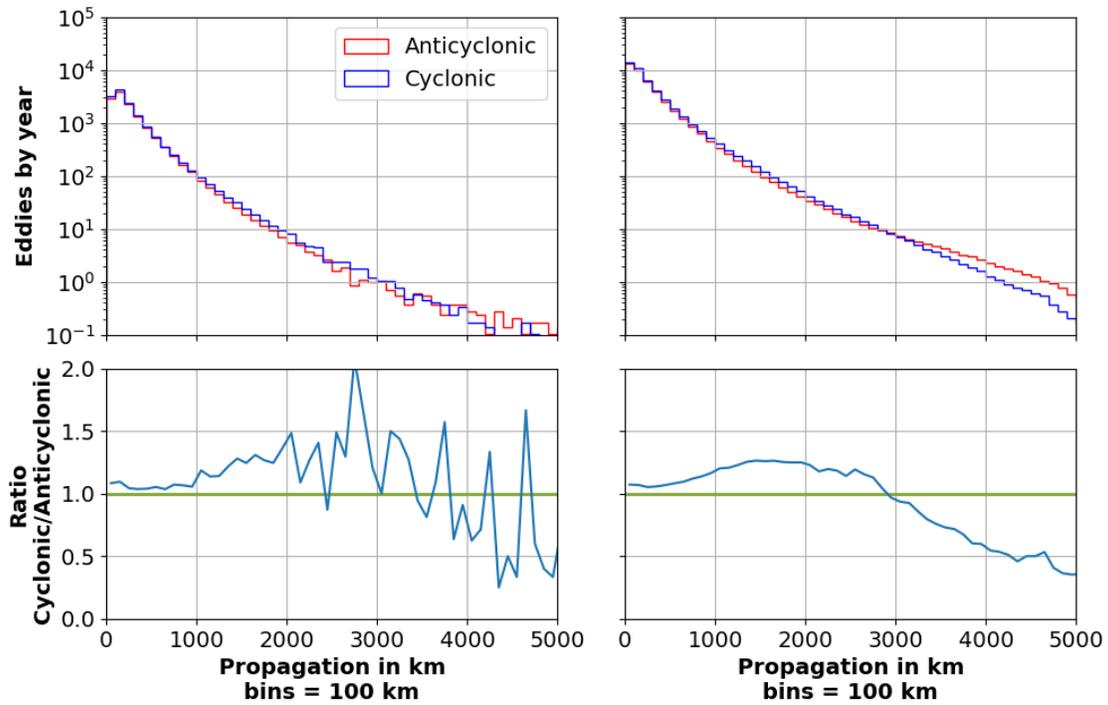
Histograms (left) and upper-tail cumulative histograms (right) of the lifetimes of the cyclonic (blue lines) and anticyclonic (red lines) eddies. The ratios of the histogram values are shown in the bottom left panel and in the bottom right panel with a 21-week running average.



2.3 Figure 3 - Propagation

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Histograms (left) and upper-tail cumulative histograms (right) of the great-circle propagation distances of cyclonic (blue) and anticyclonic (red) eddies with lifetimes ≥ 16 weeks. The ratios of the histogram values are shown in the bottom left panel and in the bottom right panel with a 500-km running average.



2.4 Figure 4 - Long trajectories

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a and b. The trajectories of cyclonic (blue lines) and anticyclonic (red lines) eddies for (a) lifetimes ≥ 16 weeks and (b) lifetimes ≥ 16 weeks for only those eddies for which the net displacement was eastward. The numbers of eddies of each polarity are labeled at the top of each panel.

Figure 4a : Lifetime ≥ 16 weeks
Anticyclonic : 10585684 obs (363659 obs/year), 56863 tracks (1953 tracks/year)
Cyclonic : 10667363 obs, (366465 obs/year), 59078 tracks (2030 tracks/year)

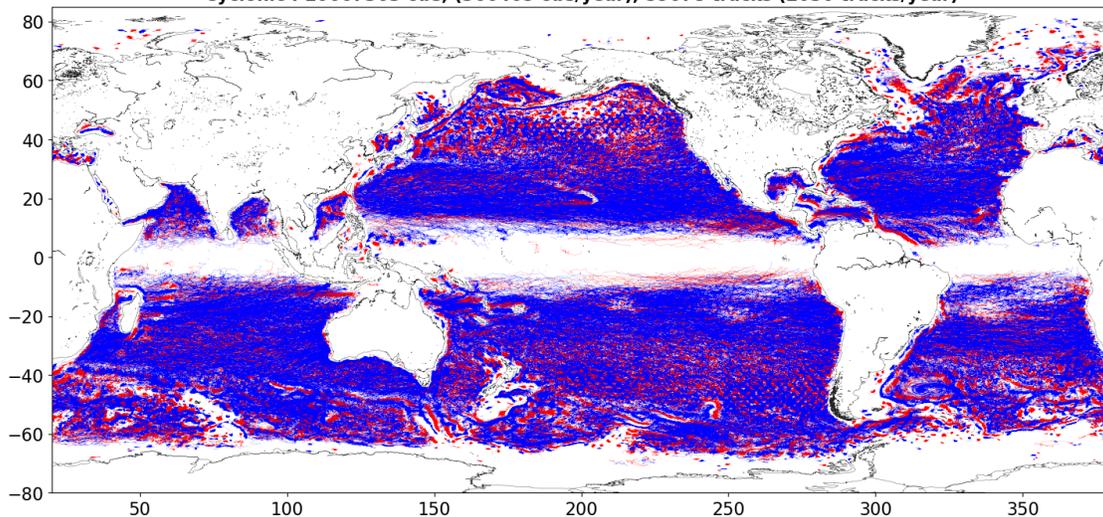
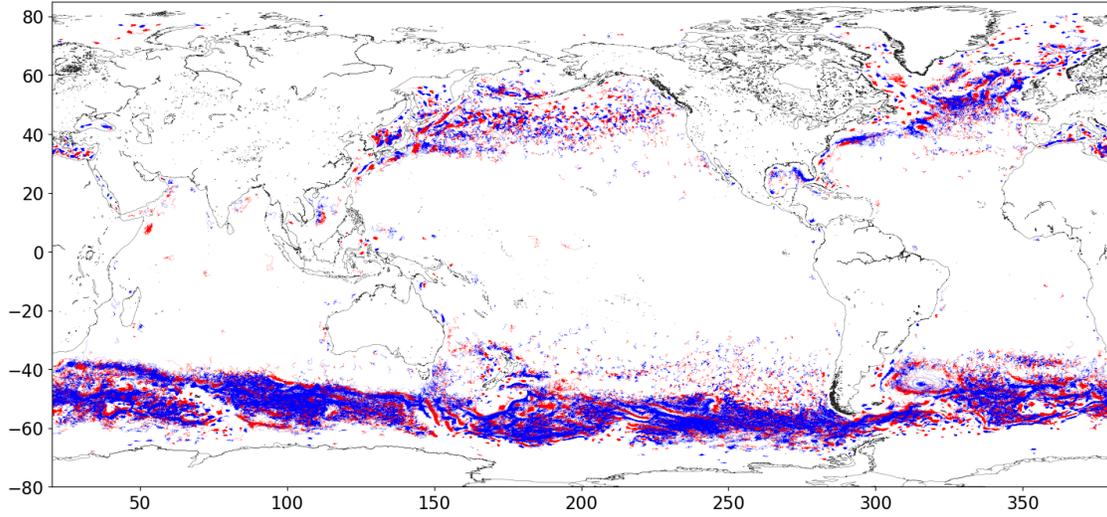


Figure 4b : Lifetime ≥ 16 weeks, and eastward propagation only
Anticyclonic : 2409543 obs (82777 obs/year), 13968 tracks (480 tracks/year)
Cyclonic : 2531949 obs, (86982 obs/year), 14807 tracks (509 tracks/year)



4c and d. The same as Fig. 4a, except: (c) lifetimes ≥ 26 weeks and (d) lifetimes ≥ 52 weeks.

Figure 4c : Lifetime ≥ 26 weeks
Anticyclonic : 5502110 obs (189019 obs/year), 20044 tracks (689 tracks/year)
Cyclonic : 5199450 obs, (178621 obs/year), 19479 tracks (669 tracks/year)

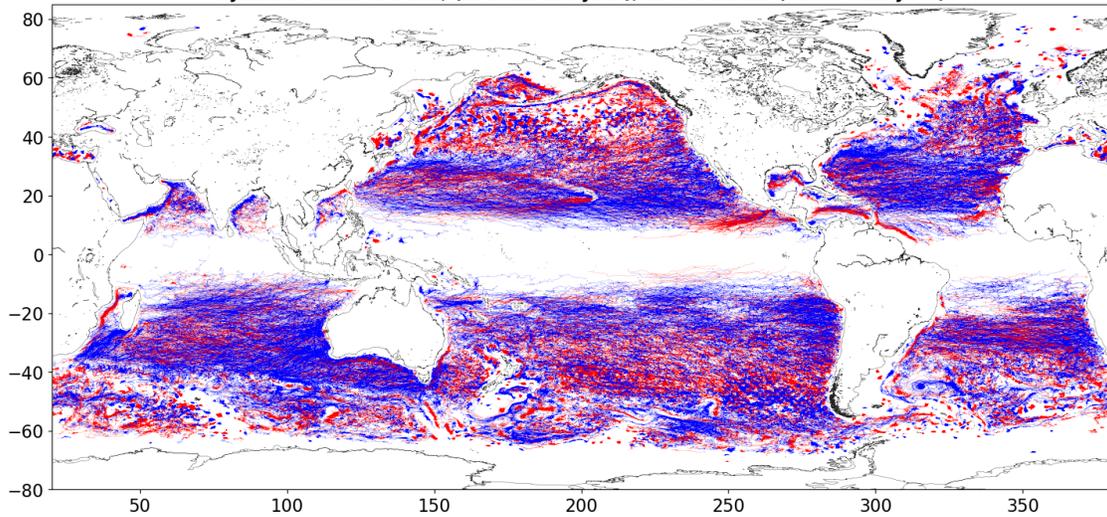
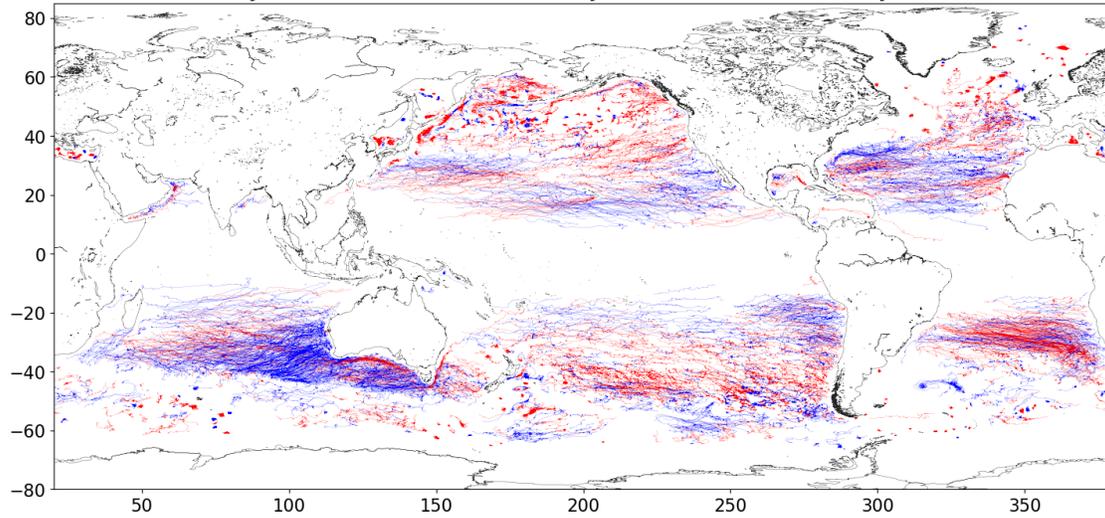


Figure 4d : Lifetime ≥ 52 weeks
Anticyclonic : 1384847 obs (47575 obs/year), 2734 tracks (94 tracks/year)
Cyclonic : 1133780 obs, (38950 obs/year), 2254 tracks (77 tracks/year)



4e and f. The same as Fig. 4a, except: (e) lifetimes ≥ 78 weeks and (f) lifetimes ≥ 104 weeks.

Figure 4e : Lifetime ≥ 78 weeks
Anticyclonic : 505308 obs (17359 obs/year), 673 tracks (23 tracks/year)
Cyclonic : 408095 obs, (14020 obs/year), 546 tracks (19 tracks/year)

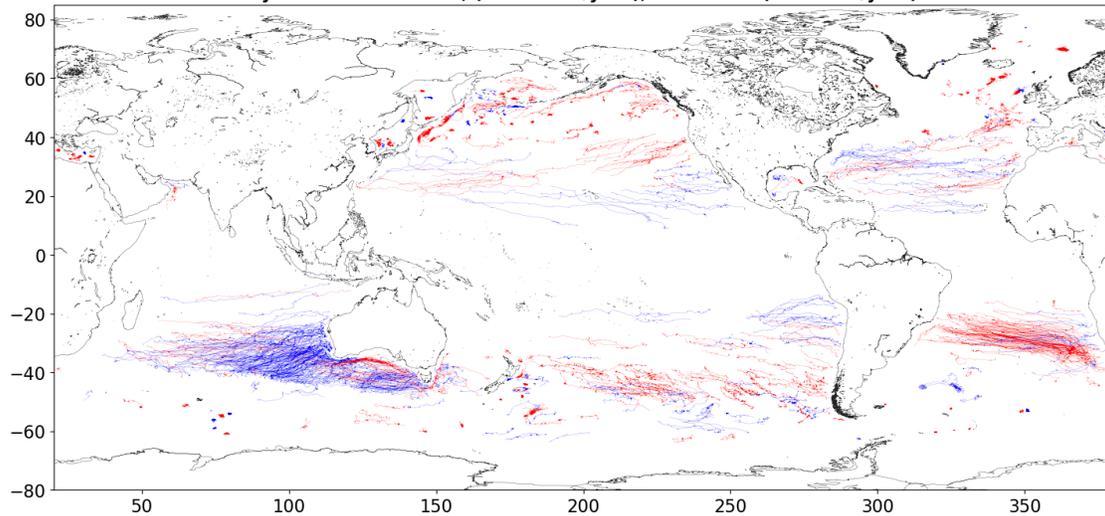
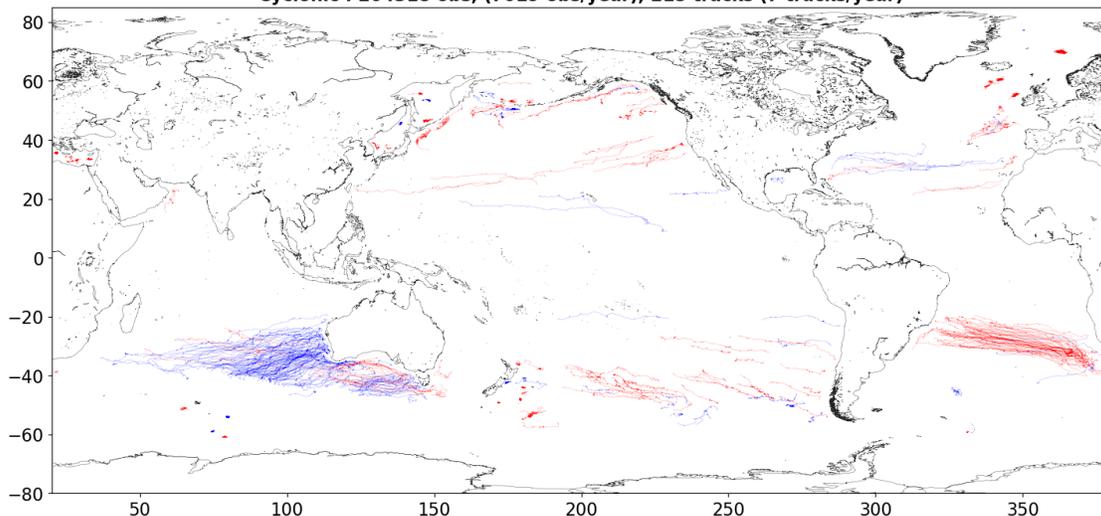


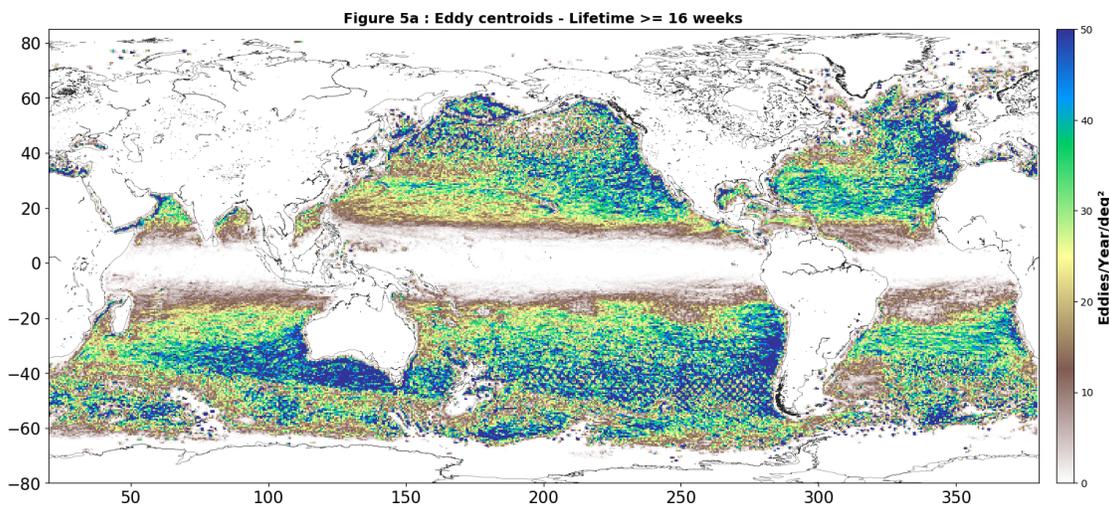
Figure 4f : Lifetime ≥ 104 weeks
Anticyclonic : 244293 obs (8392 obs/year), 253 tracks (9 tracks/year)
Cyclonic : 204318 obs, (7019 obs/year), 215 tracks (7 tracks/year)

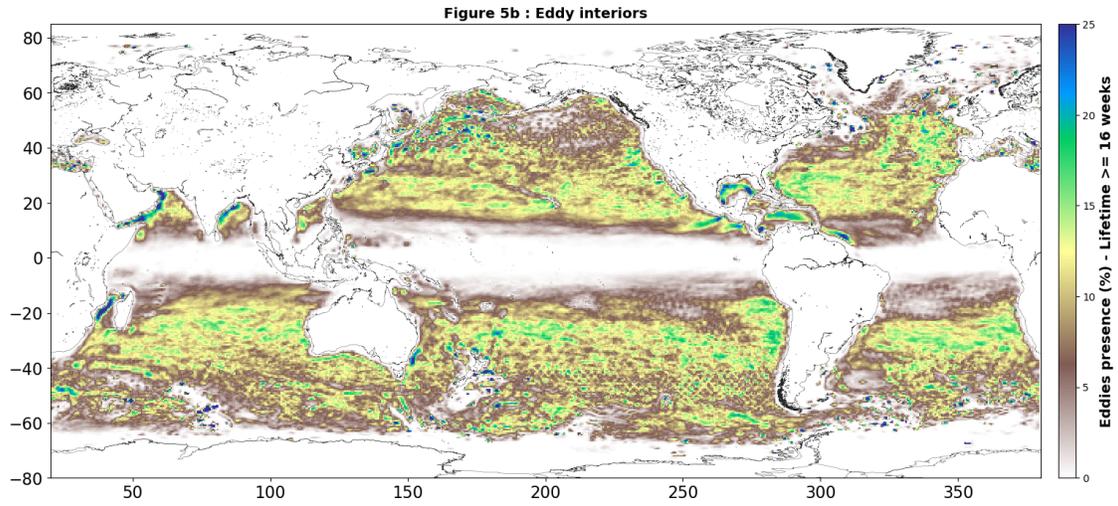


2.5 Figure 5 - Census

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Census statistics for the numbers of eddy centroids (a) and eddy interiors (b) for eddies with lifetimes ≥ 16 weeks that passed through each 1×1 region. The eddy interiors are defined by the contour of SSH around which the average geostrophic speed is maximum (corresponding approximately to a contour of zero relative vorticity).

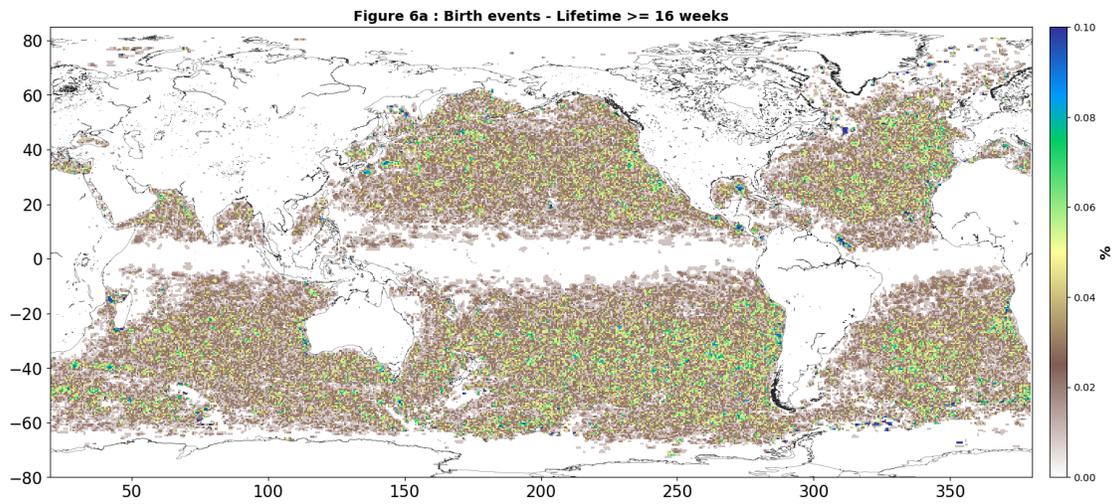


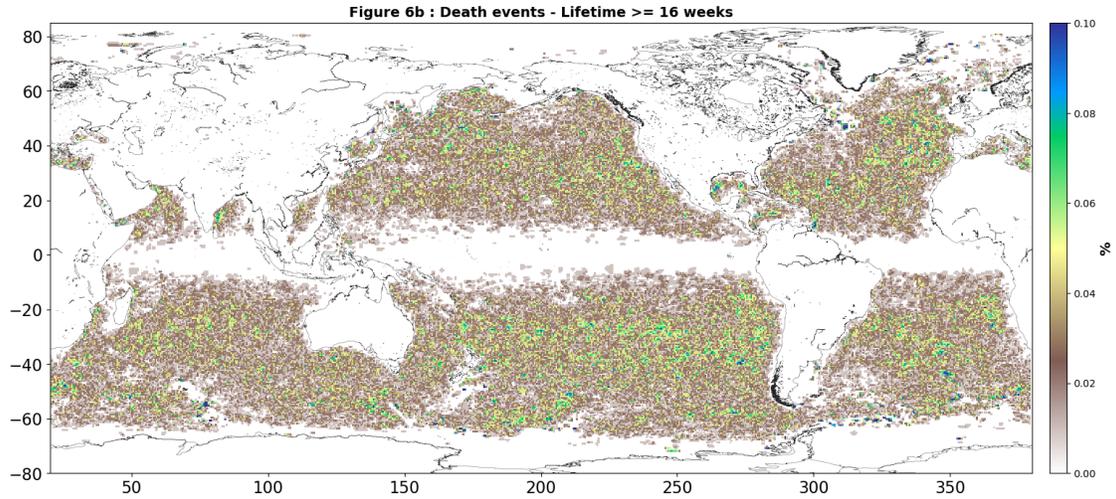


2.6 Figure 6 - Birth and death

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Census statistics for eddies with lifetimes \geq 16 weeks showing the percentage of (a) eddy origins and (b) eddy terminations for each 1 x 1 region.

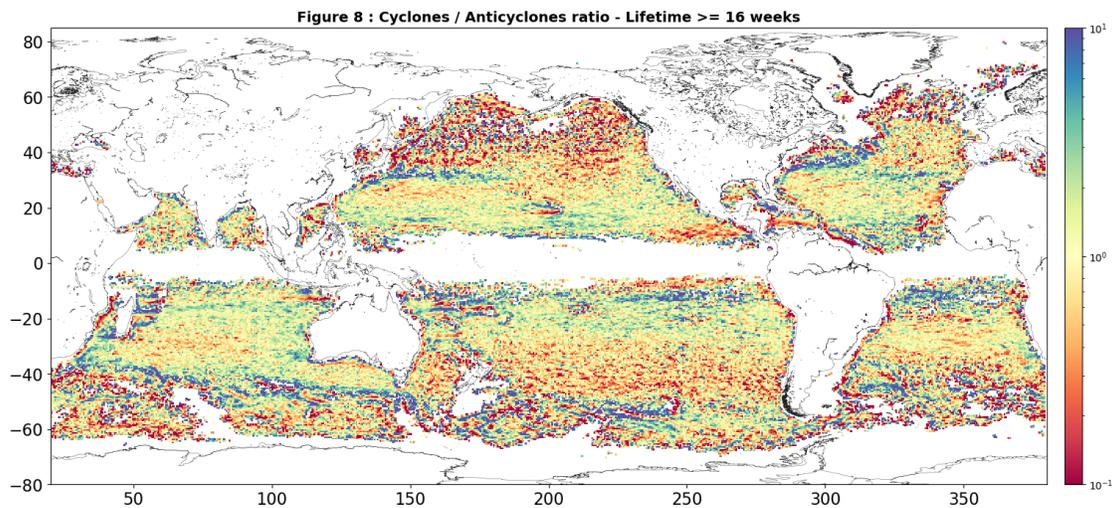




2.7 Figure 8 - Ratio cyclones/anticyclones

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The ratio of the numbers of cyclonic to anticyclonic eddy centers for eddies with lifetimes ≥ 16 weeks that propagated through each 1×1 region. A logarithmic scale is used for the color bar in order to give equal emphasis to the ratios r and $1/r$.

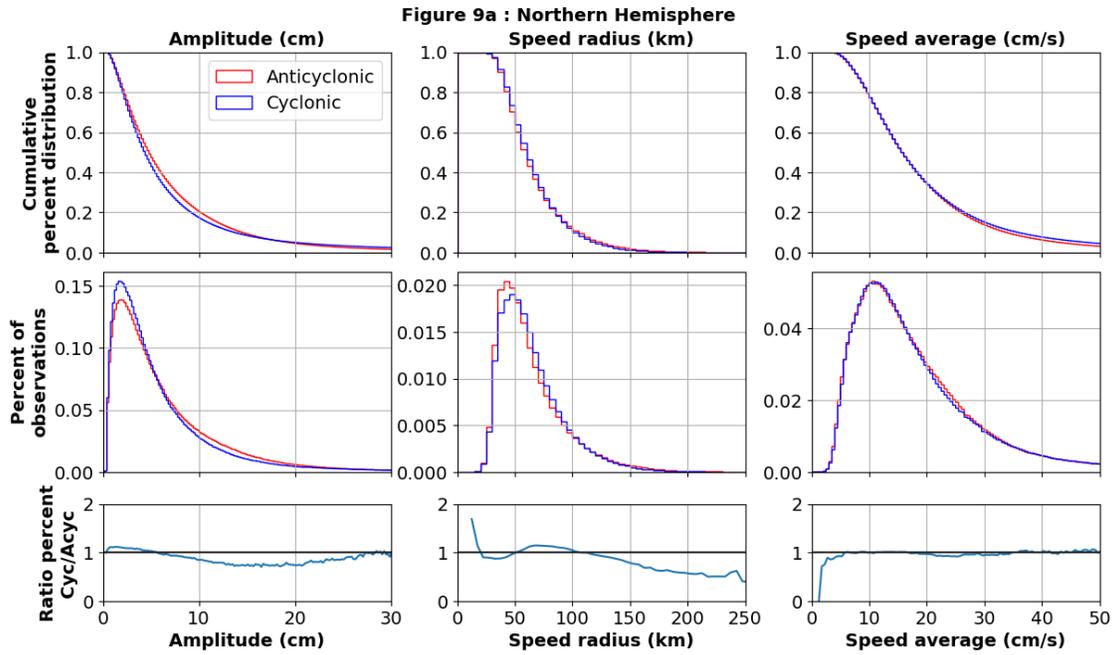


2.8 Figure 9 - Parameter's distributions

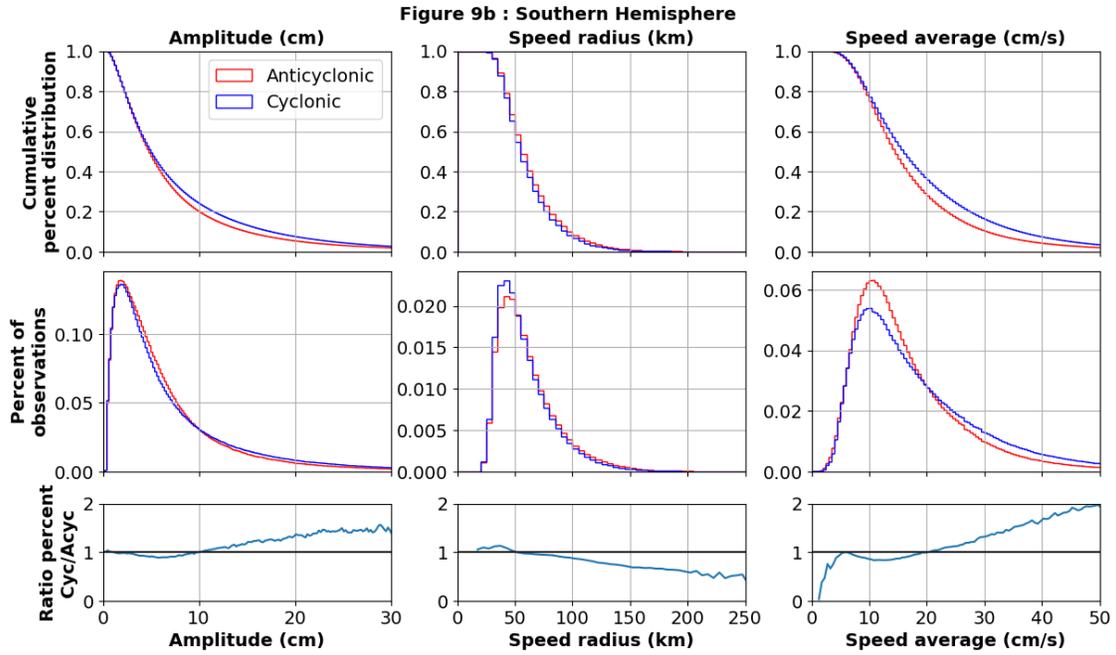
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The distributions of the amplitudes, speed-based radius scales, and rotational speeds (left to right) of eddies with lifetimes ≥ 16 weeks in (a) the northern hemisphere and (b) the southern hemisphere. Upper-tail cumulative histograms and histograms are shown in the first and second rows of panels, respectively, with blue and red lines corresponding, respectively, to histograms for cyclonic and anticyclonic eddies. The ratios of cyclonic to anticyclonic eddies are shown in the third rows of panels. The global two-dimensional histogram of the joint distribution of the amplitude and speed radius is shown in panel (c).

North



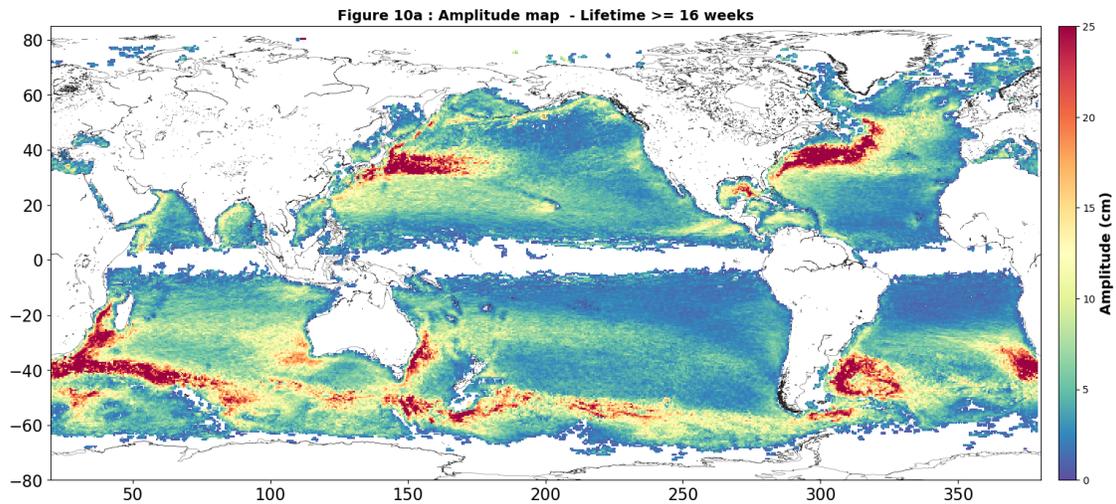
South

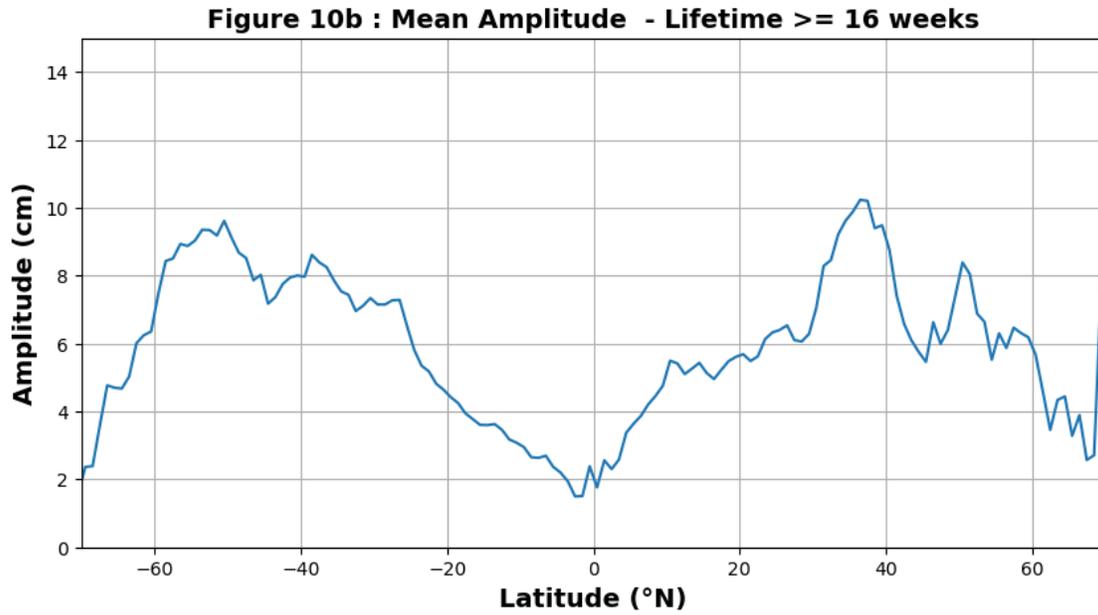


2.9 Figure 10 - Amplitude

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- (a) Map of the average amplitude of eddies with lifetimes ≥ 16 weeks. (b) Mean amplitude as a function of latitude.

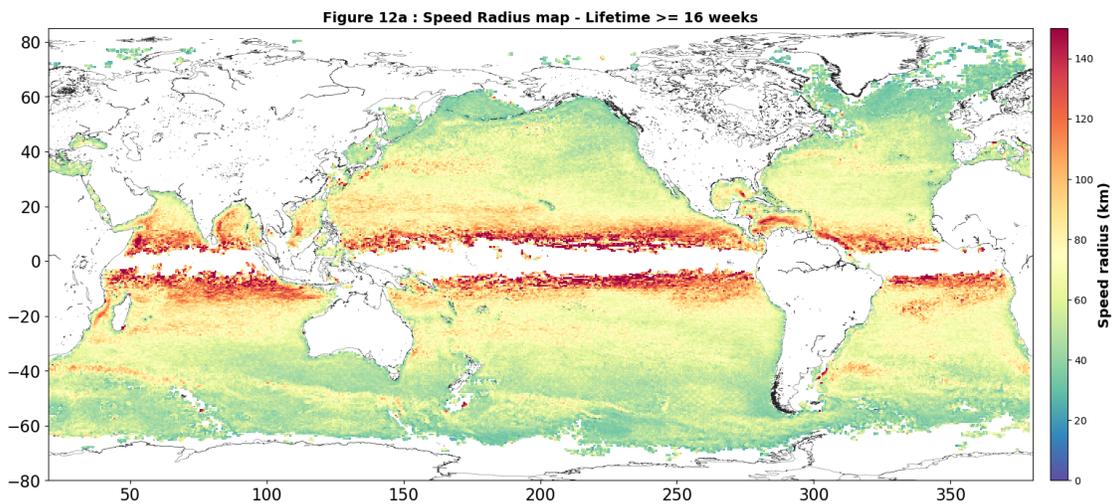


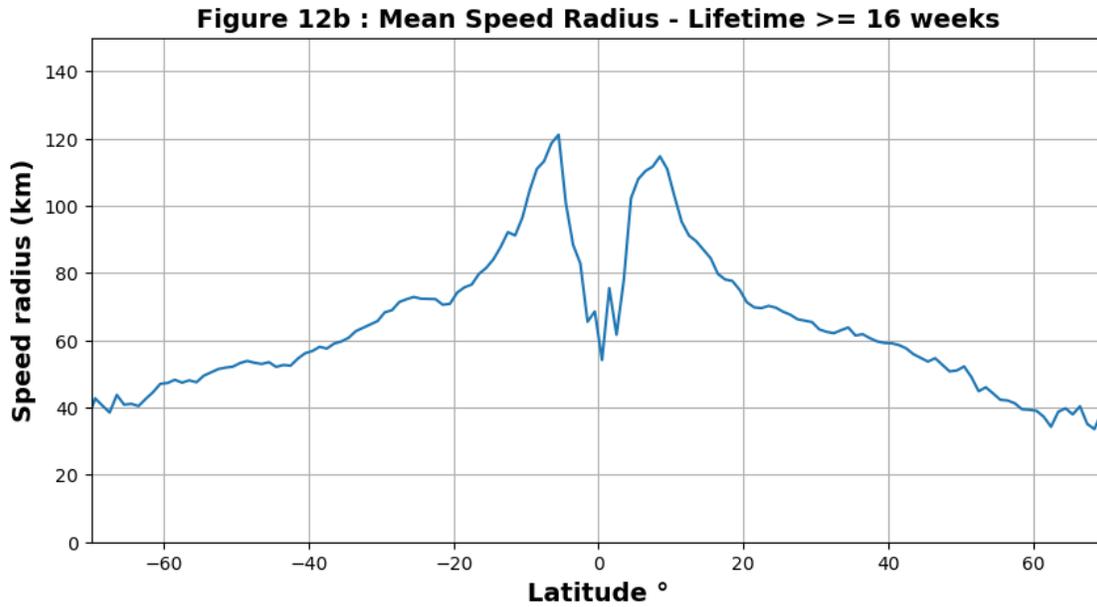


2.10 Figure 12 - Speed radius

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- (a) Map of the average speed radius of eddies with lifetimes \geq 16 weeks. (b) Mean speed radius as a function of latitude.

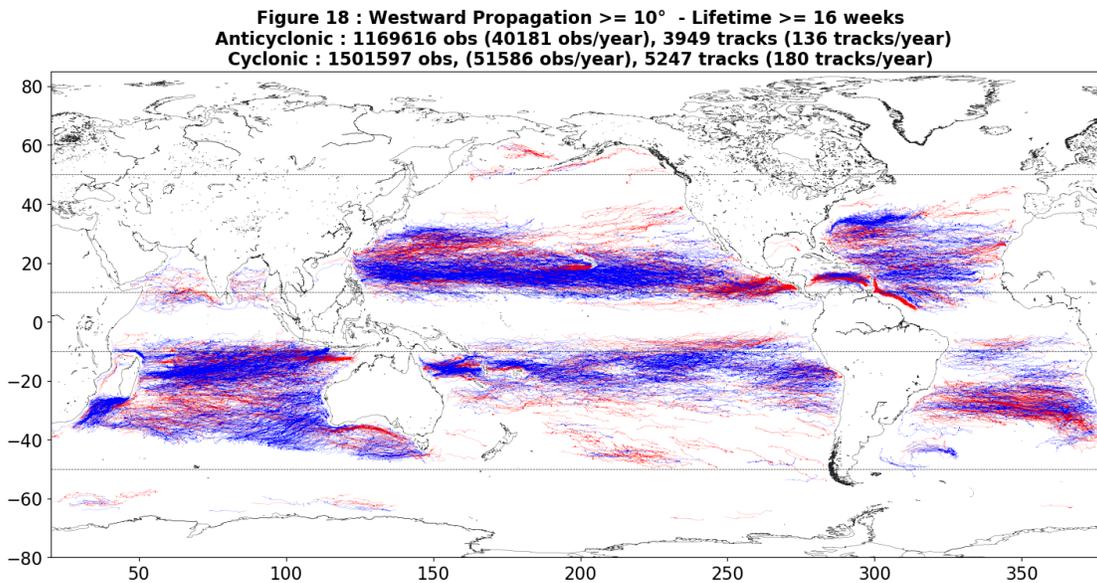




2.11 Figure 18 - Long propagation

top

The trajectories of all of the cyclonic (blue lines) and anticyclonic (red lines) eddies with lifetimes \geq 16 weeks and propagating westward a minimum of 10° of longitude. The horizontal lines show the latitude ranges of $10\text{--}50$ that were considered for the analyses in Figs. 20.



2.12 Figure 20 - Deflection

top

The meridional deflections of the cyclonic (upper panels) and anticyclonic (lower panels) eddies with lifetimes ≥ 16 weeks and starting points at latitudes between 10° and 50° of both hemispheres that propagated westward a minimum of 10° of longitude (see Fig. 18). The left panels show the changes in longitude (negative westward) and latitude (positive for poleward and negative for equatorward) relative to the initial location of each eddy. The right panels show histograms of the averaged azimuth of each eddy trajectory, defined as the angle with respect to due west formed by the great circle connecting the starting and ending points of the trajectory.

Figure 20 : Deflection - Lifetime ≥ 16 weeks

