

Mono atlas analysis

September 26, 2022

1 Table of contents

1. Global observations of nonlinear mesoscale eddies
 1. Period of the described Atlas
 2. Figure 2 - Lifetime
 3. Figure 3 - Propagation
 4. Figure 4 - Long trajectories
 5. Figure 5 - Census
 6. Figure 6 - Birth and death
 7. Figure 8 - Ratio cyclones/anticyclones
 8. Figure 9 - Parameter's distributions
 9. Figure 10 - Amplitude
 10. Figure 12 - Speed radius
 11. Figure 18 - Long propagation
 12. Figure 20 - Deflection

2 Global observations of nonlinear mesoscale eddies

[top](#)

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

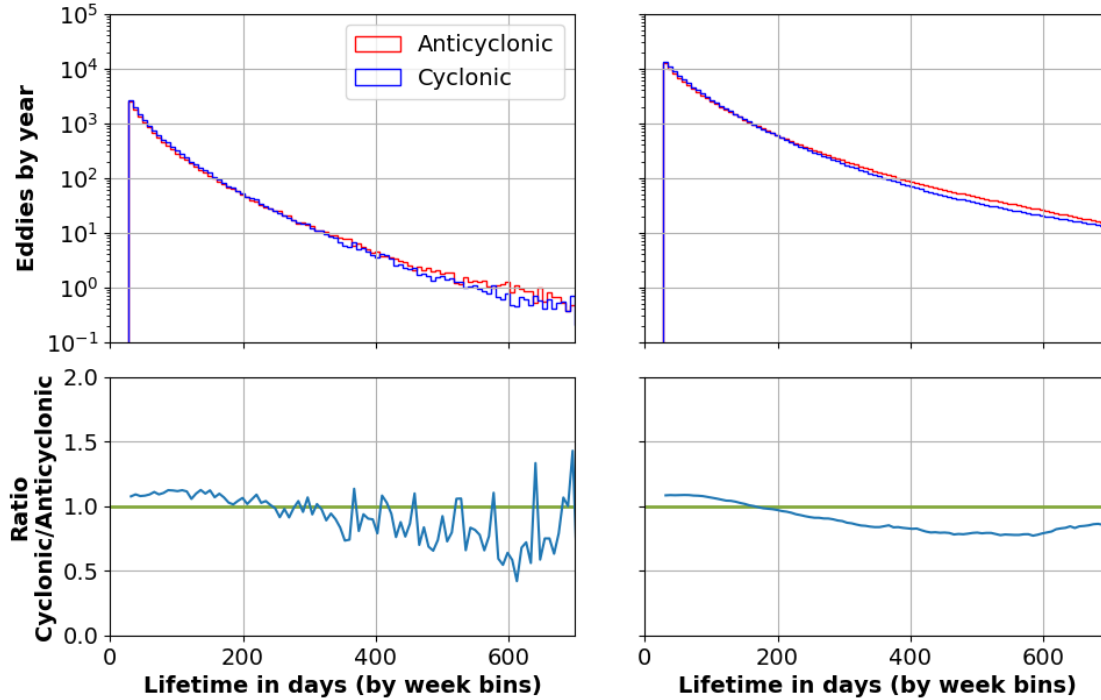
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The following figures are displayed on period January 1993 - February 2022

2.2 Figure 2 - Lifetime

top

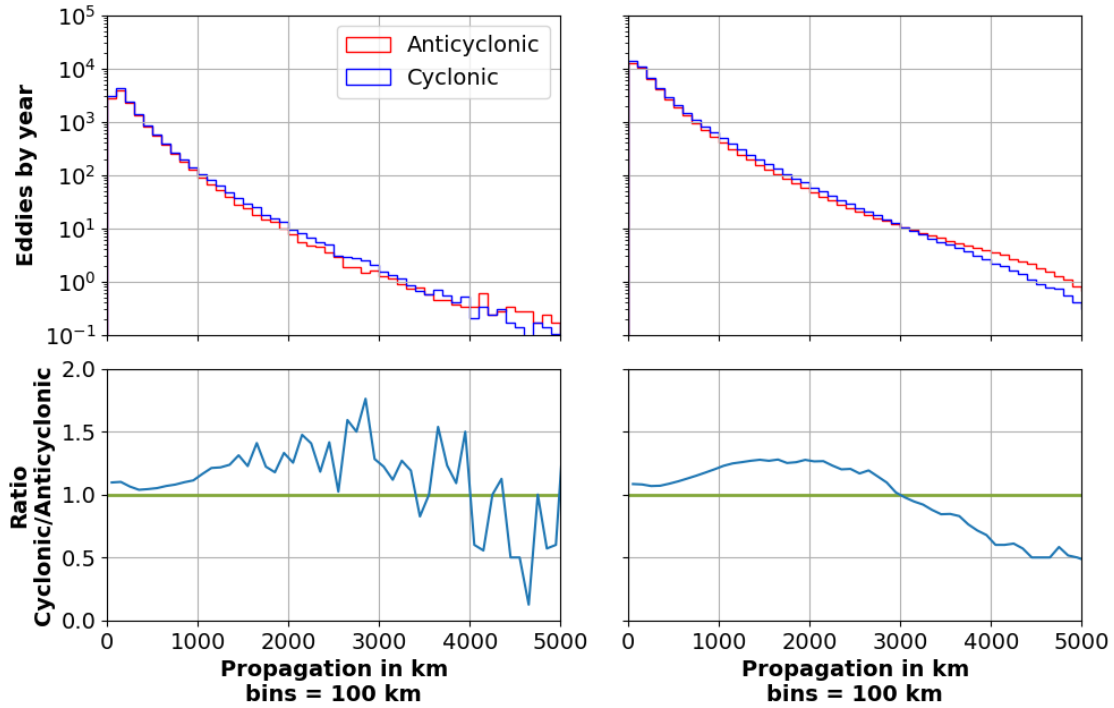
Histograms (left) and upper-tail cumulative histograms (right) of the lifetimes of the cyclonic (blue lines) and anticyclonic (red lines) eddies. The ratios of the histogram values are shown in the bottom left panel and in the bottom right panel with a 21-week running average.



2.3 Figure 3 - Propagation

top

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

top

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 : 11278529 obs (387461 obs/year), 58964 tracks (2026 tracks/year)
Cyclonic : 11433148 obs, (392773 obs/year), 62010 tracks (2130 tracks/year)

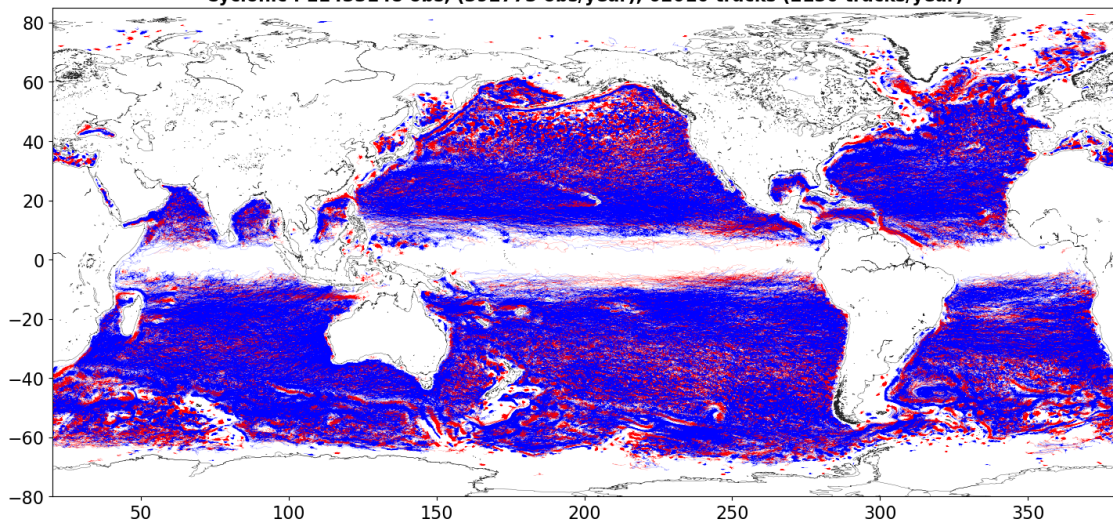
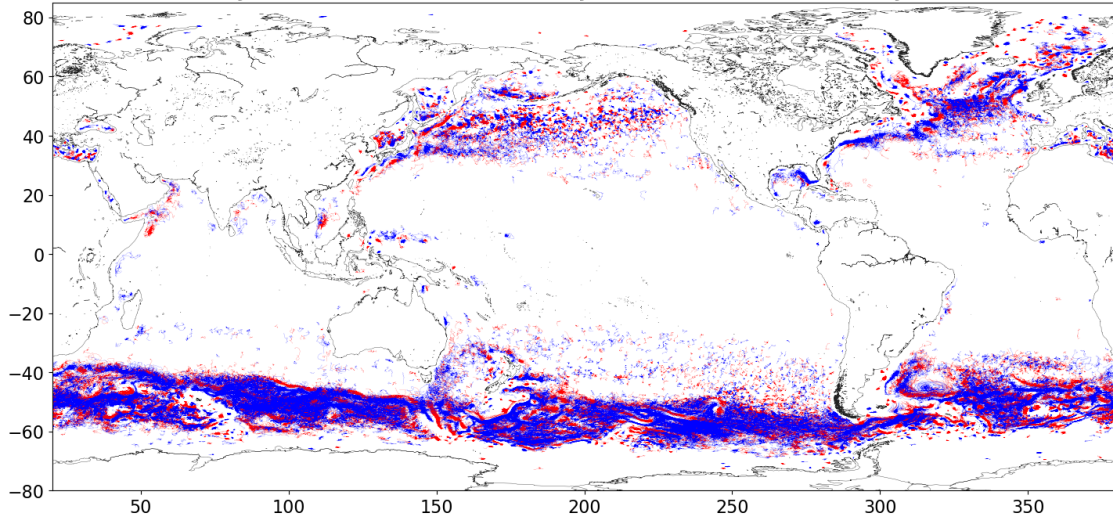


Figure 4b : Lifetime ≥ 16 weeks, and eastward propagation only
Anticyclonic : 2648849 obs (90998 obs/year), 15067 tracks (518 tracks/year)
Cyclonic : 2879611 obs, (98926 obs/year), 16559 tracks (569 tracks/year)



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

Figure 4c : Lifetime ≥ 26 weeks
Anticyclonic : 6113336 obs (210017 obs/year), 21575 tracks (741 tracks/year)
Cyclonic : 5790182 obs, (198915 obs/year), 21117 tracks (725 tracks/year)

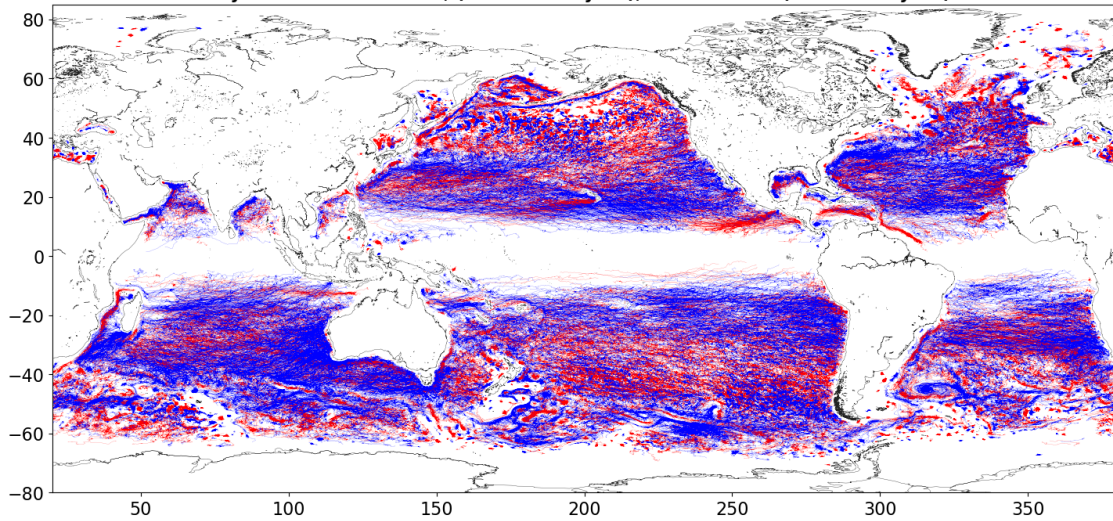
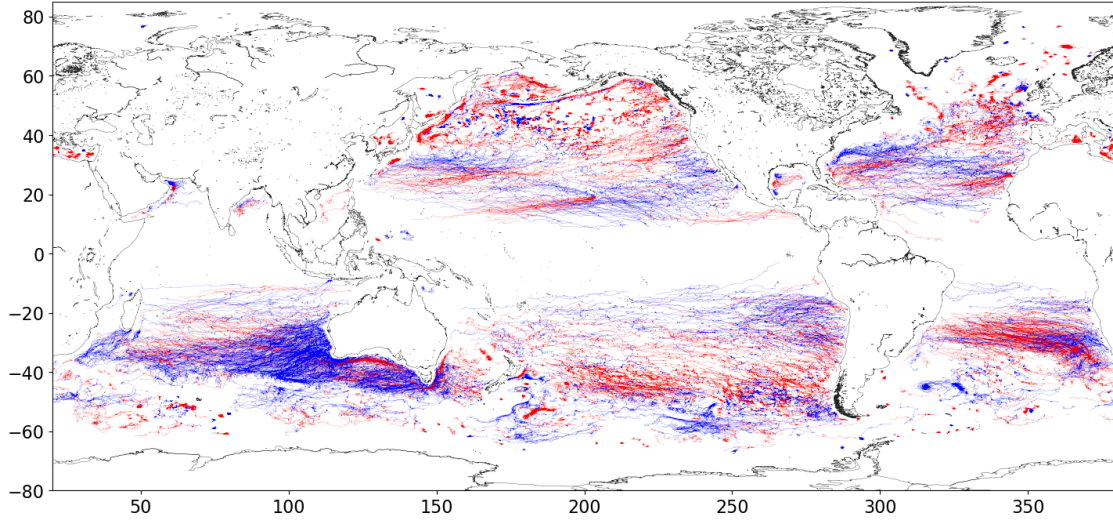


Figure 4d : Lifetime \geq 52 weeks
Anticyclonic : 1750333 obs (60131 obs/year), 3297 tracks (113 tracks/year)
Cyclonic : 1459127 obs, (50127 obs/year), 2805 tracks (96 tracks/year)



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

Figure 4e : Lifetime \geq 78 weeks
Anticyclonic : 767825 obs (26378 obs/year), 1007 tracks (35 tracks/year)
Cyclonic : 597523 obs, (20527 obs/year), 782 tracks (27 tracks/year)

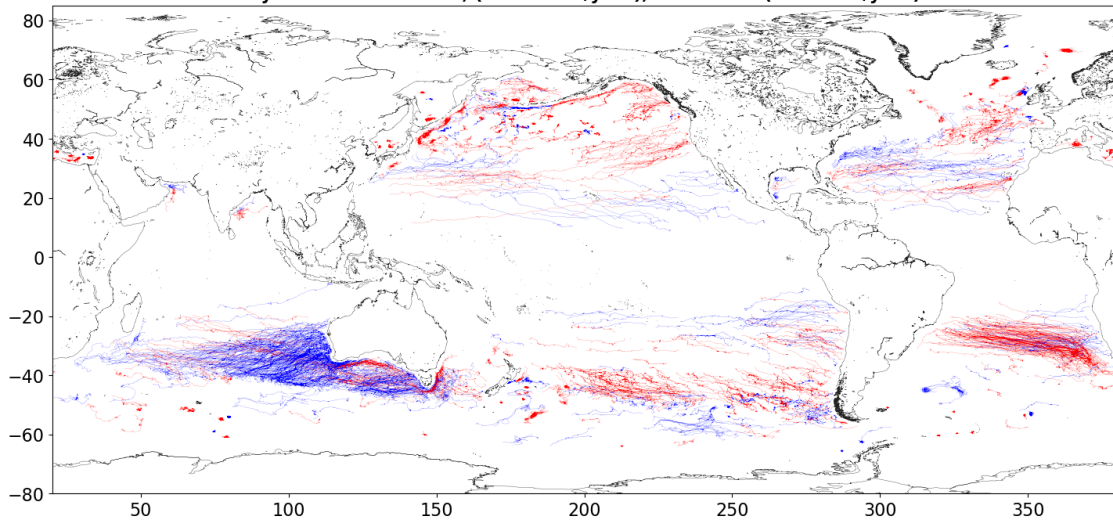
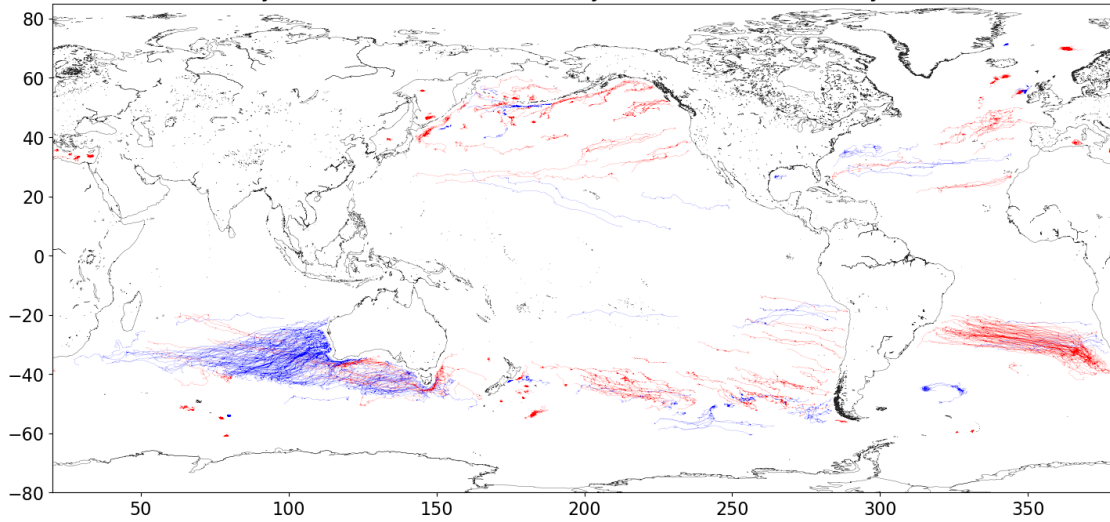


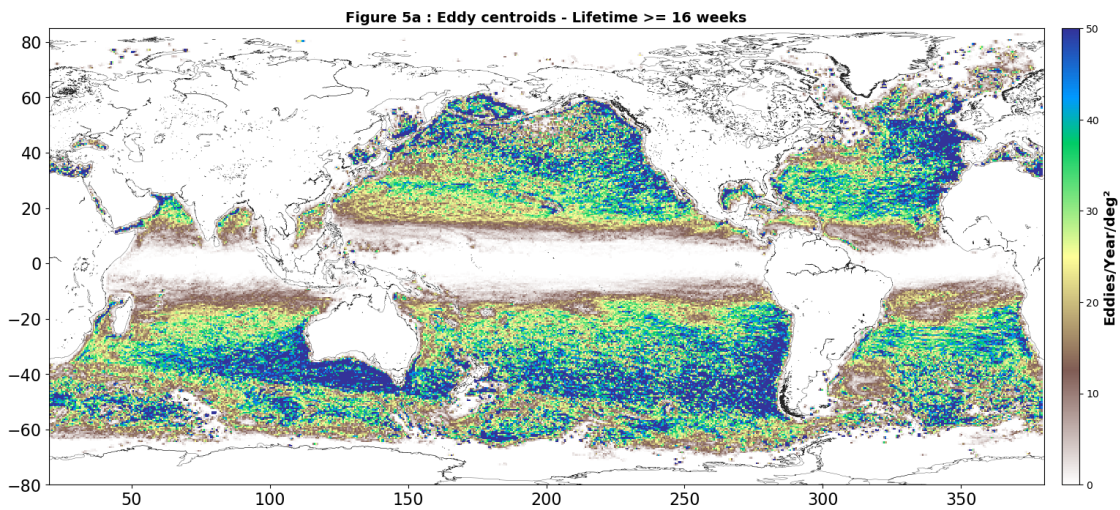
Figure 4f : Lifetime ≥ 104 weeks
Anticyclonic : 388814 obs (13357 obs/year), 392 tracks (13 tracks/year)
Cyclonic : 304586 obs, (10464 obs/year), 311 tracks (11 tracks/year)

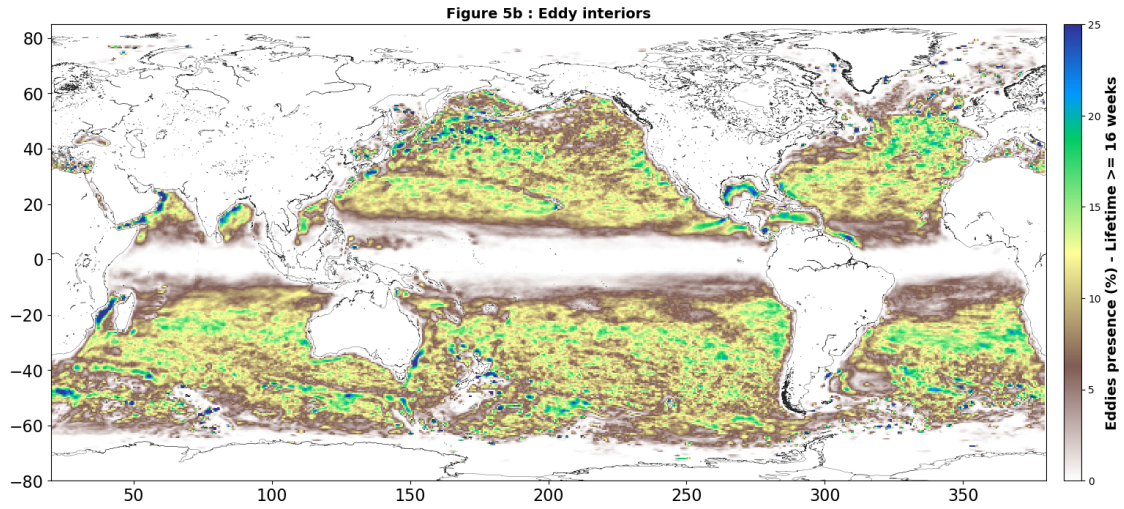


2.5 Figure 5 - Census

top

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).

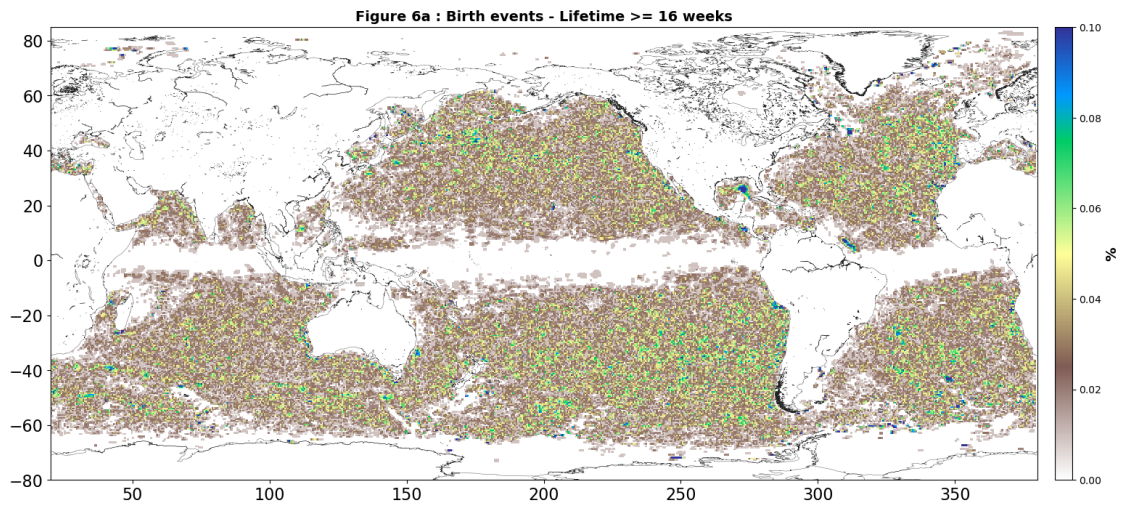


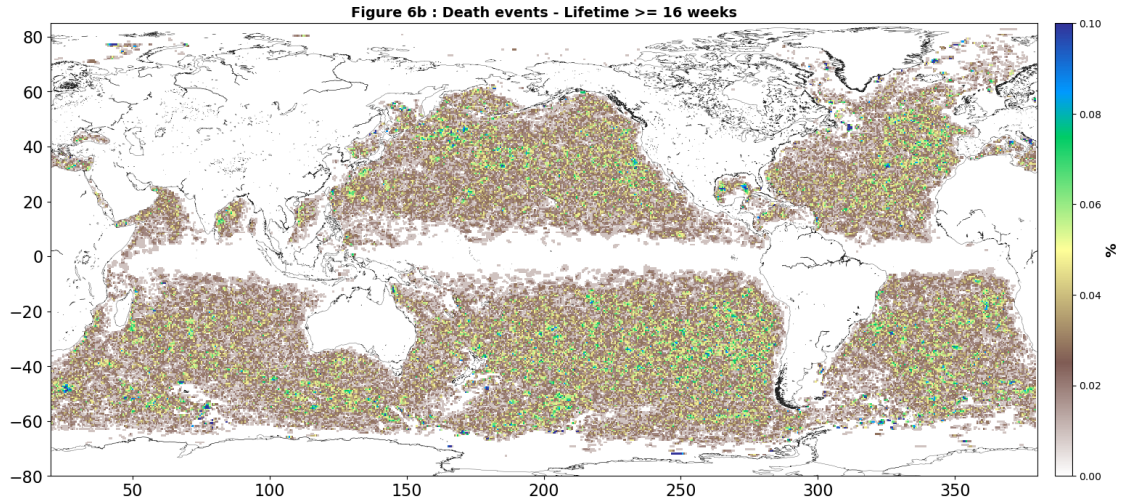


2.6 Figure 6 - Birth and death

top

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.

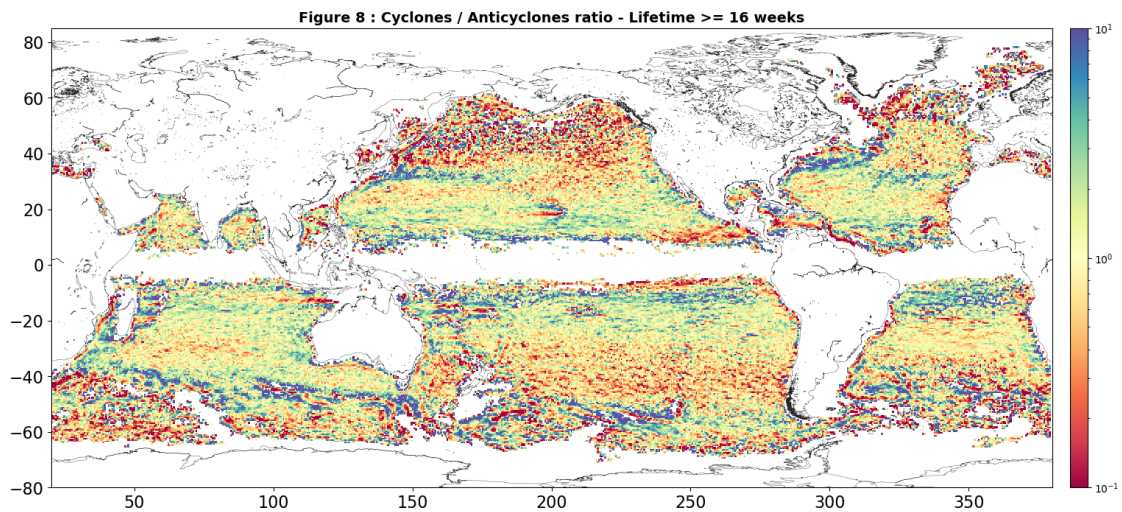




2.7 Figure 8 - Ratio cyclones/anticyclones

top

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 $1/r$.

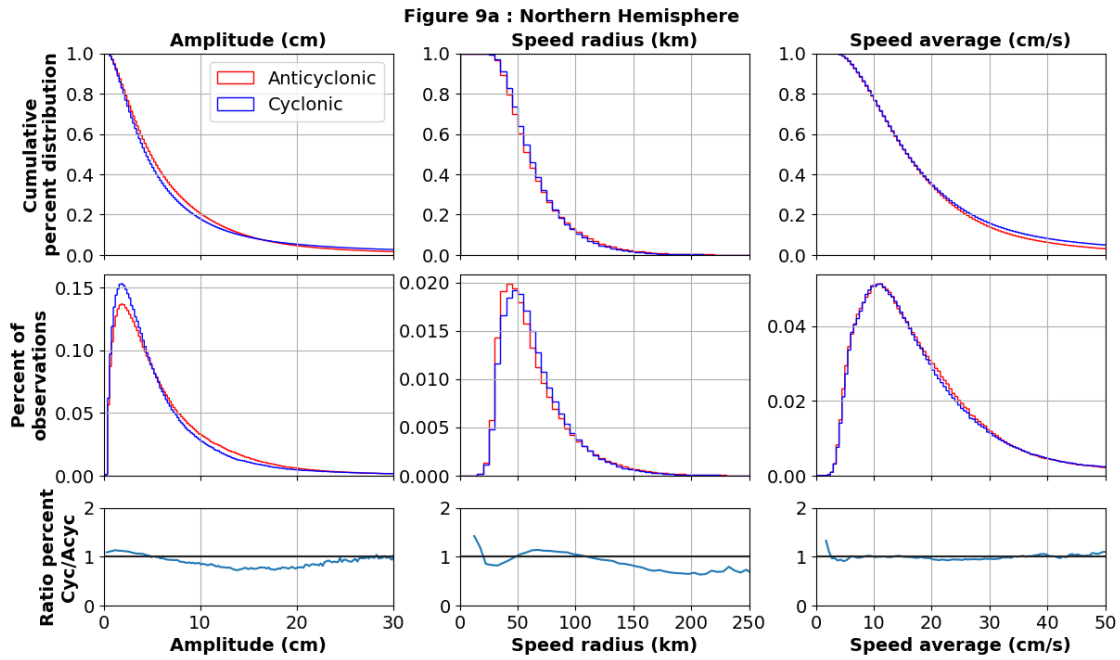


2.8 Figure 9 - Parameter's distributions

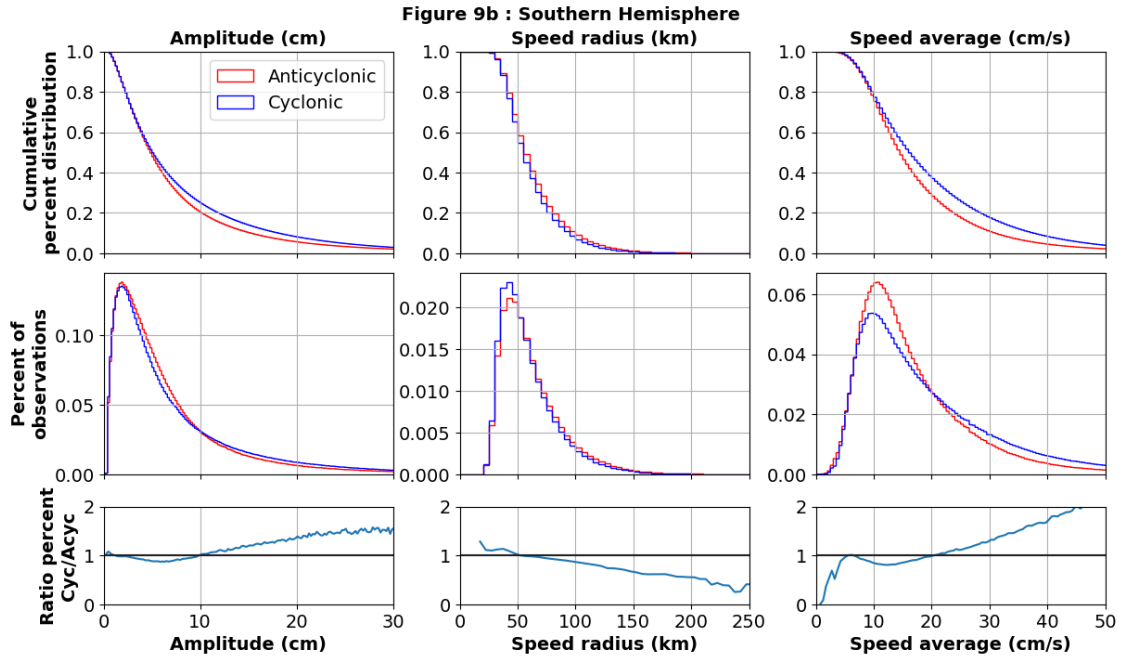
top

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



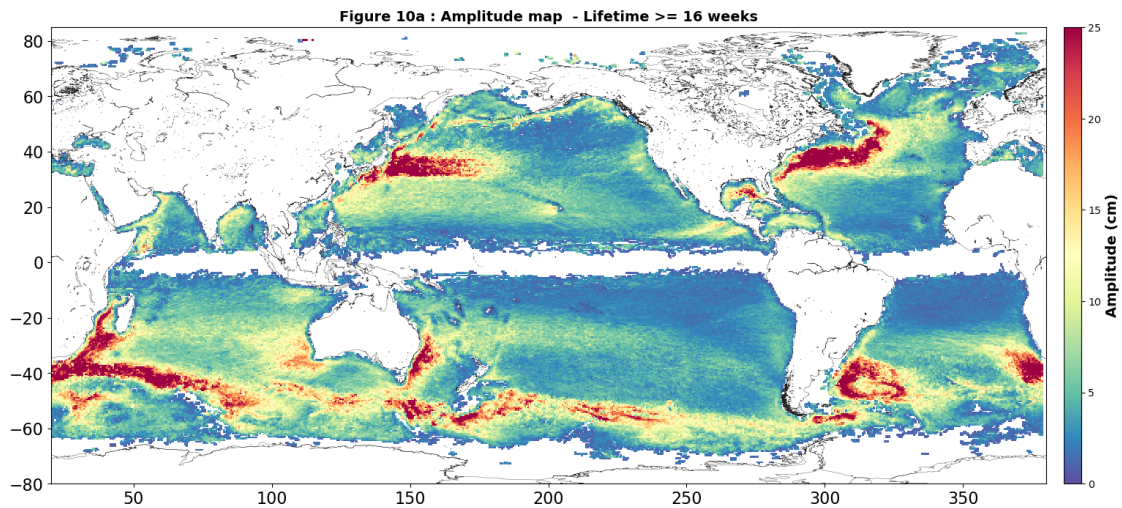
South

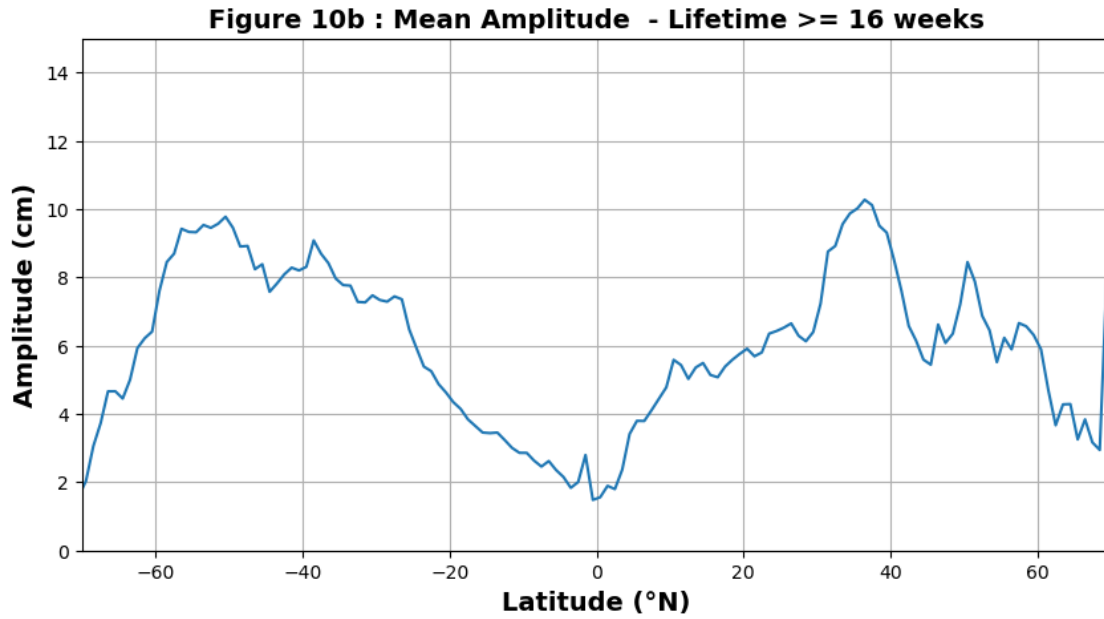


2.9 Figure 10 - Amplitude

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

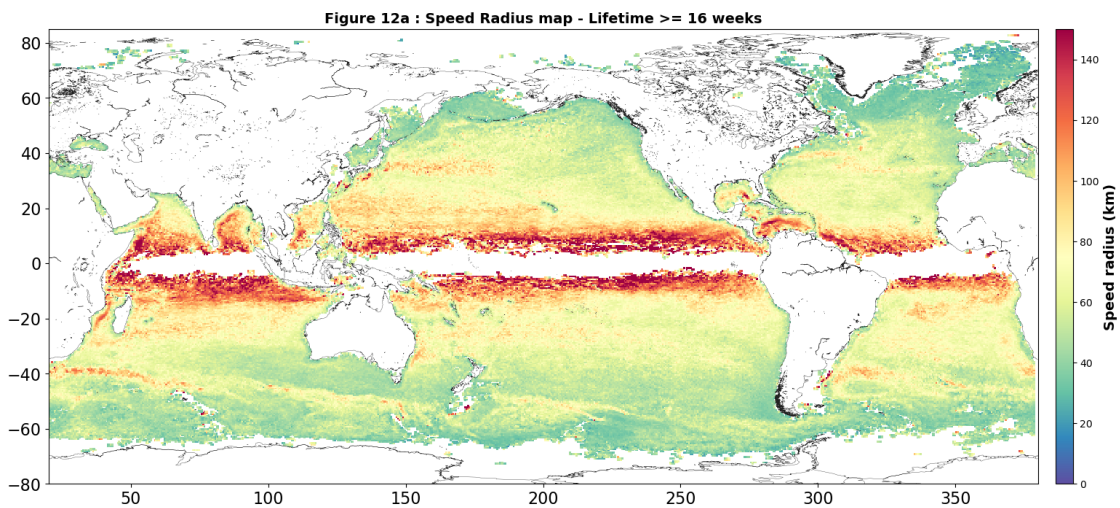


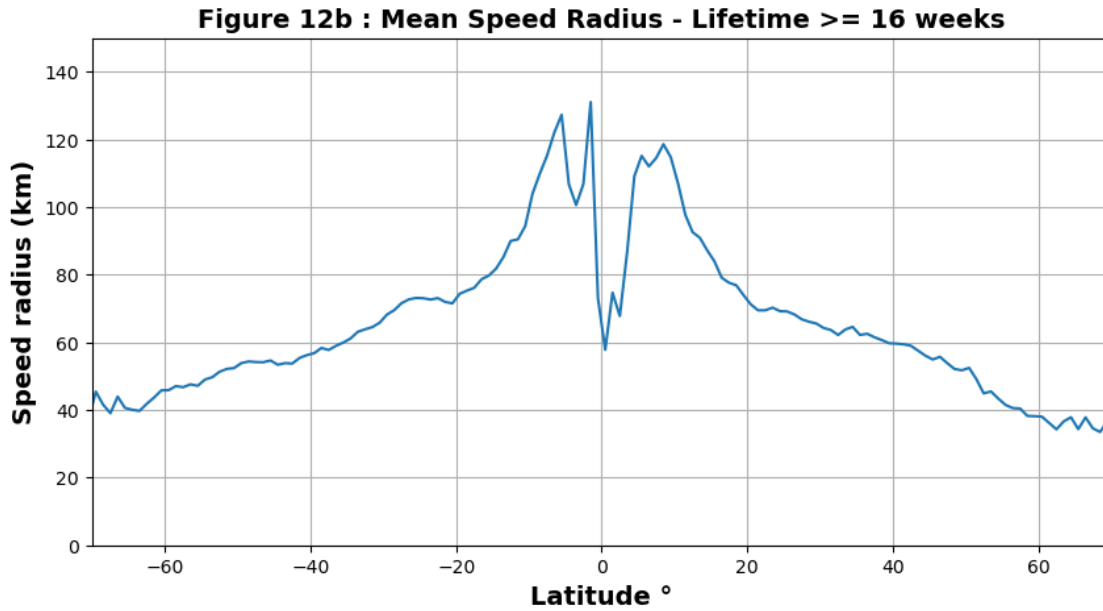


2.10 Figure 12 - Speed radius

top

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

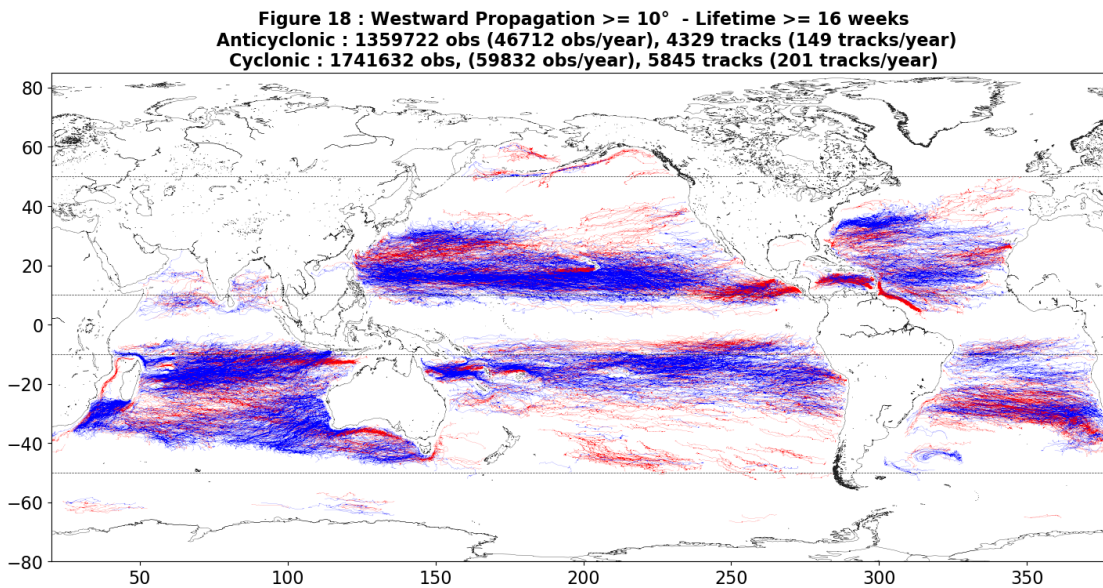




2.11 Figure 18 - Long propagation

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

