Supporting Information for "Flow structures with high Lagrangian coherence promote diatom blooms in oligotrophic waters"

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S1. Additional examples

In Figures S1 to S11 we provide further examples comparing the spatial distribution of Eulerian and Lagrangian computations of relative vorticity and Eddy Kinetic Energy with distribution of the dominant groups over the Algerian basin.

S2. Lagrangian Origin Maps

The origin location of fluid parcels is analyzed by means of maps displaying the paths of trajectories computed backwards in time. These maps provide information of the origin of the particles allowing to reconstruct the total backward path followed by fluid parcels. To build these maps we integrate the particles trajectories backward in time during four months. Then pixels of the map, corresponding to the initial positions of the particle trajectories, are colored depending on the time needed for the particles to cross a fixed boundary. There are many possible combinations of boundaries and its choice depends on the process to be studied. In our case, since we are interested in analyzing if particles come from the coast or near the coast we estimate the time that particles need to reach the coastline, the 100m of bathymetry and the 200 m of bathymetry boundaries (Figures S12, S13 and S14, respectively). Particles that do not reach these boundaries after the total period of integration are considered as open ocean particles.

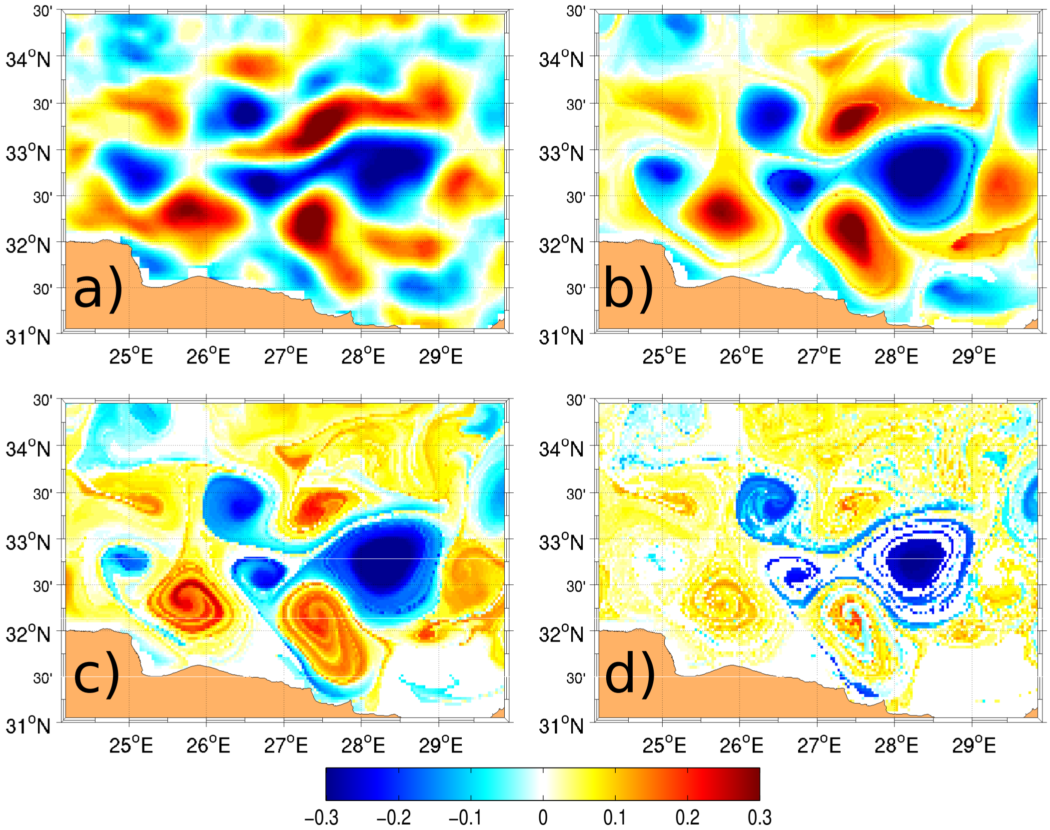

Figure S1. Snapshots of Ω_T for different values of T: a) T= 0 days, b) T = 15 days, c) T = 30 days and d) T = 80 days corresponding to March 22, 2016. This figure shows how the spatial pattern of Ω_T clearly departs from the Eulerian vorticity structures for integration times of 15 days.

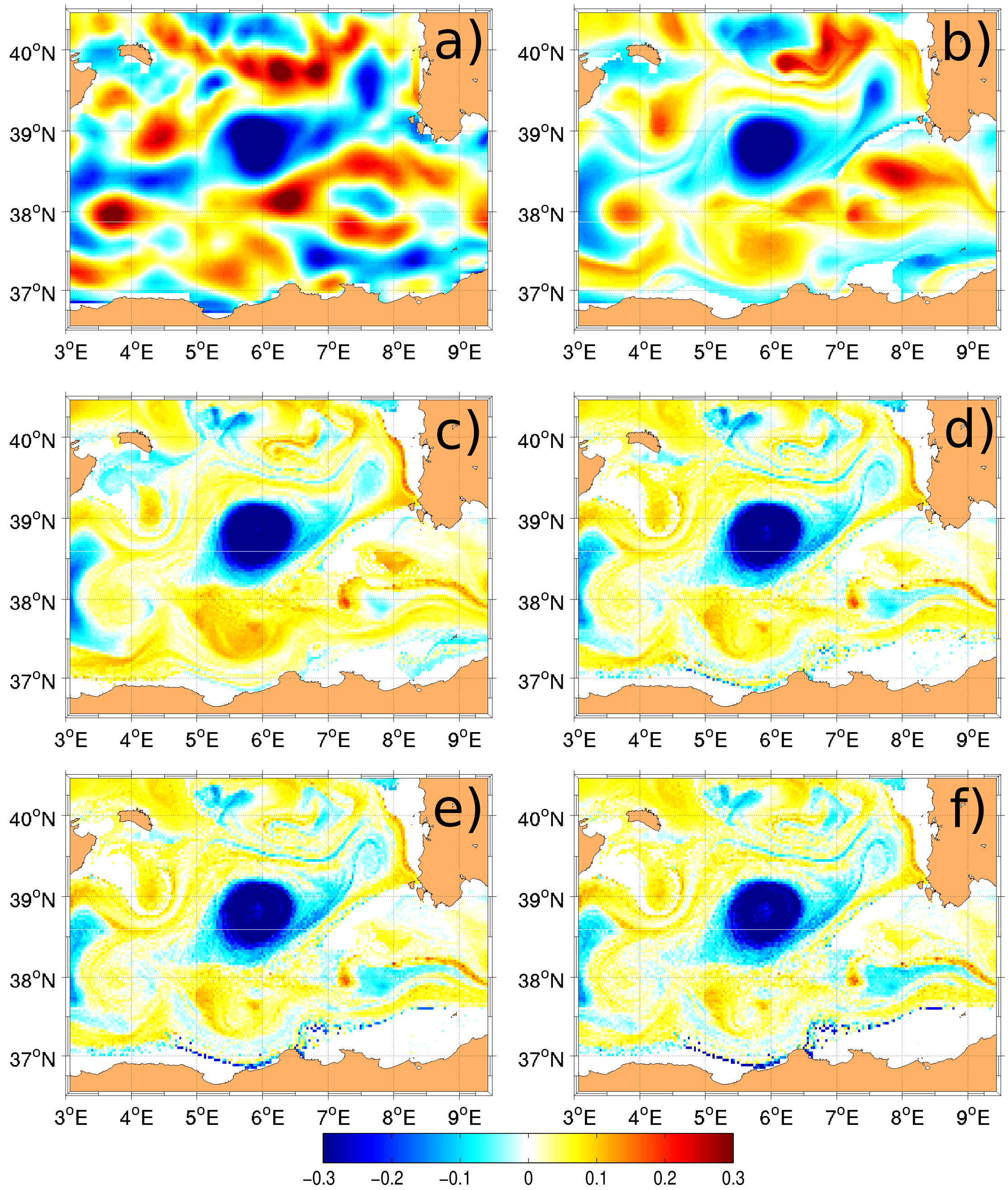

Figure S2. Daily snapshots of Ω_T for different values of T: a) T= 0 days, b) T = 15 days, c) T = 40 days, d) T = 60 days, e) T = 70 days and f) T = 80 days corresponding to May 28, 2009. This figure shows how some structures in Ω_T persist for time periods of integration longer than 40 days.

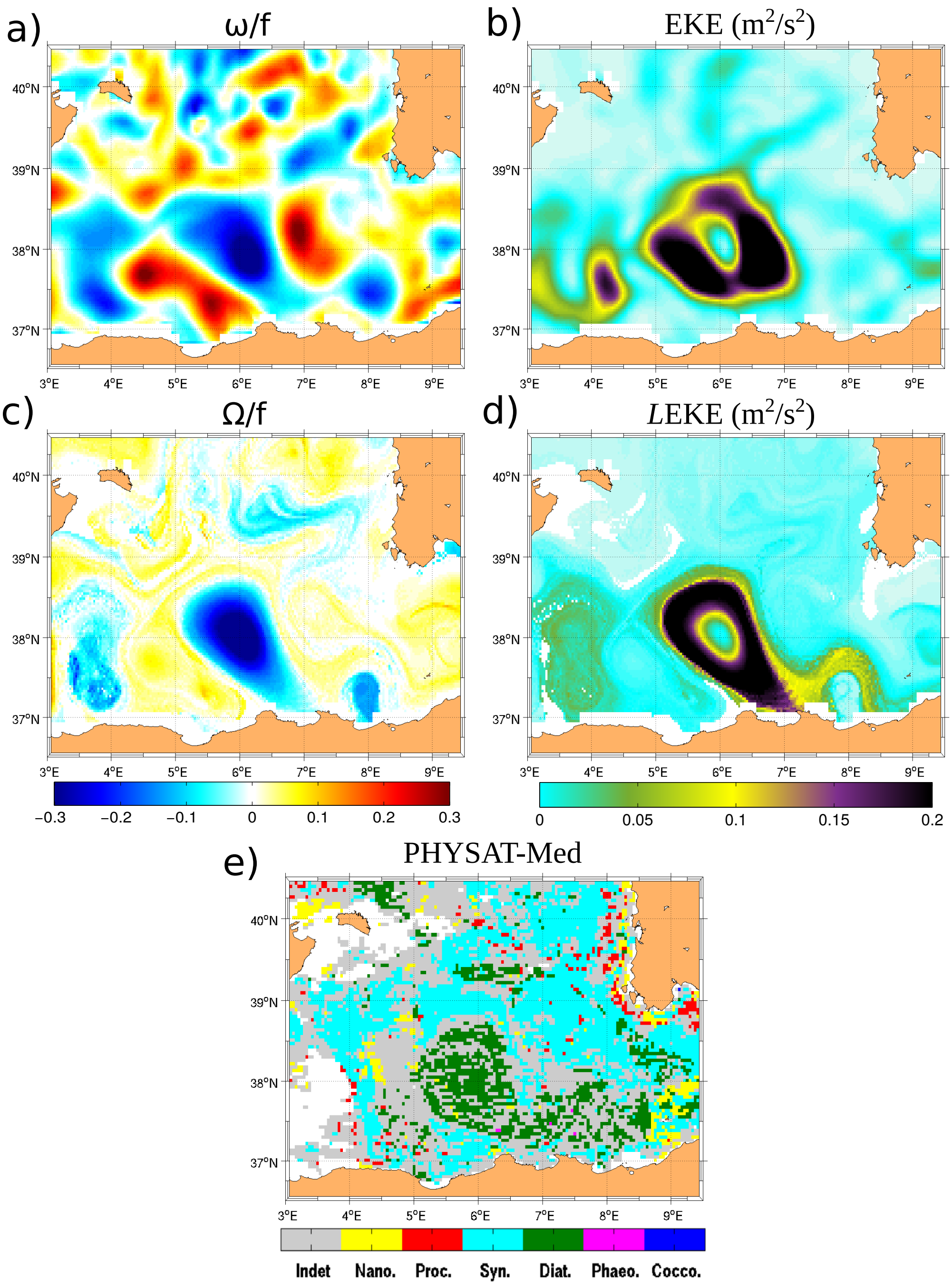

Figure S3. a) and b) are time averages of daily snapshots of Ω_0 and K_0 over 10 days period (May 04, 2006 - May 13, 2006) . c) and d) are time averages of daily Ω_{40} and K_{40} computed for a integration time of T=40 days averaged over the same 10 days period. e) Chlorophyll a derived from satellite averaged over the same 10 days period and f) corresponding map of dominant phytoplankton functional groups over the area of study.

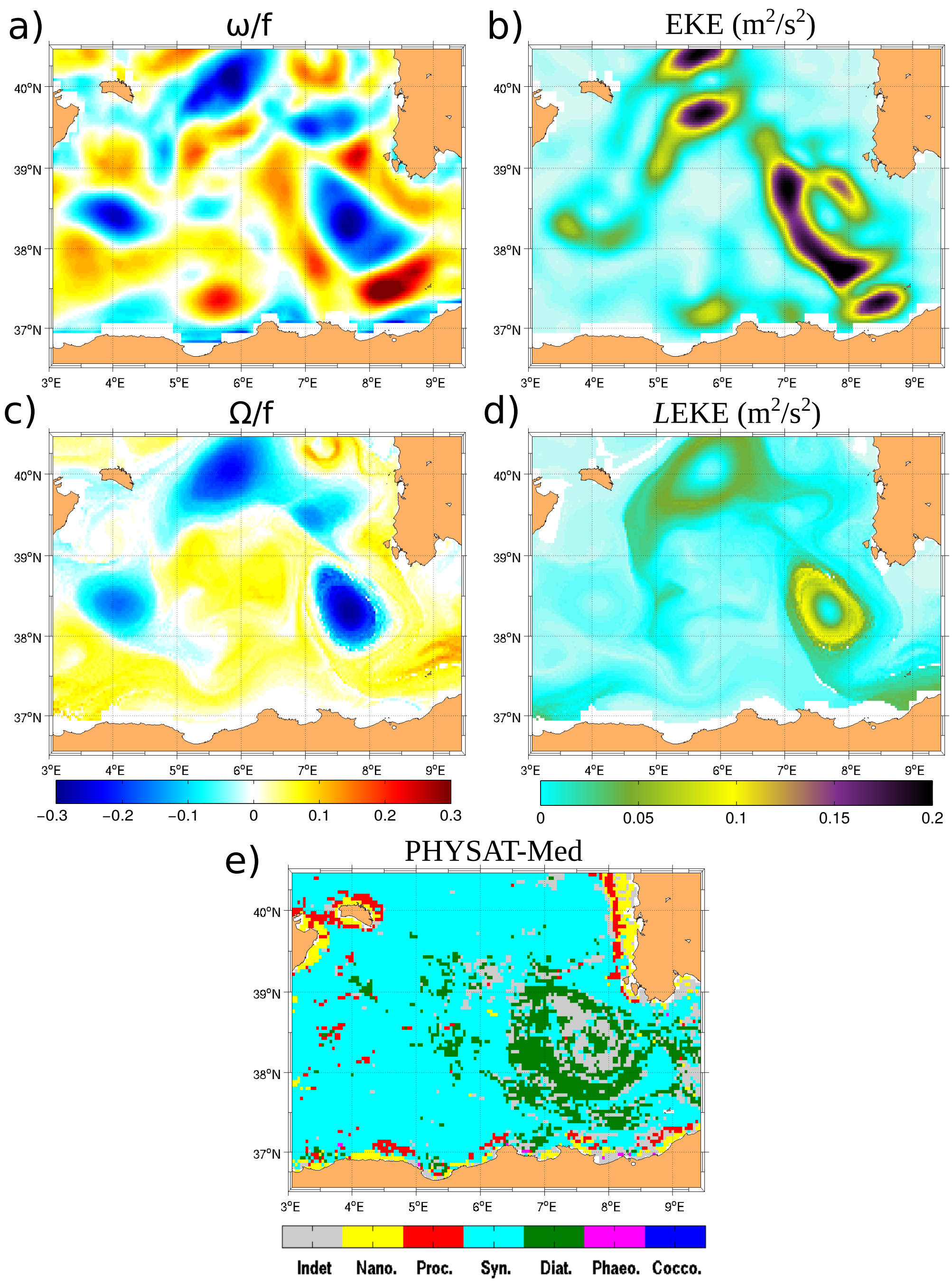

Figure S4. the same as S3 but for the time period: May 09, 2007 - May 18, 2007.

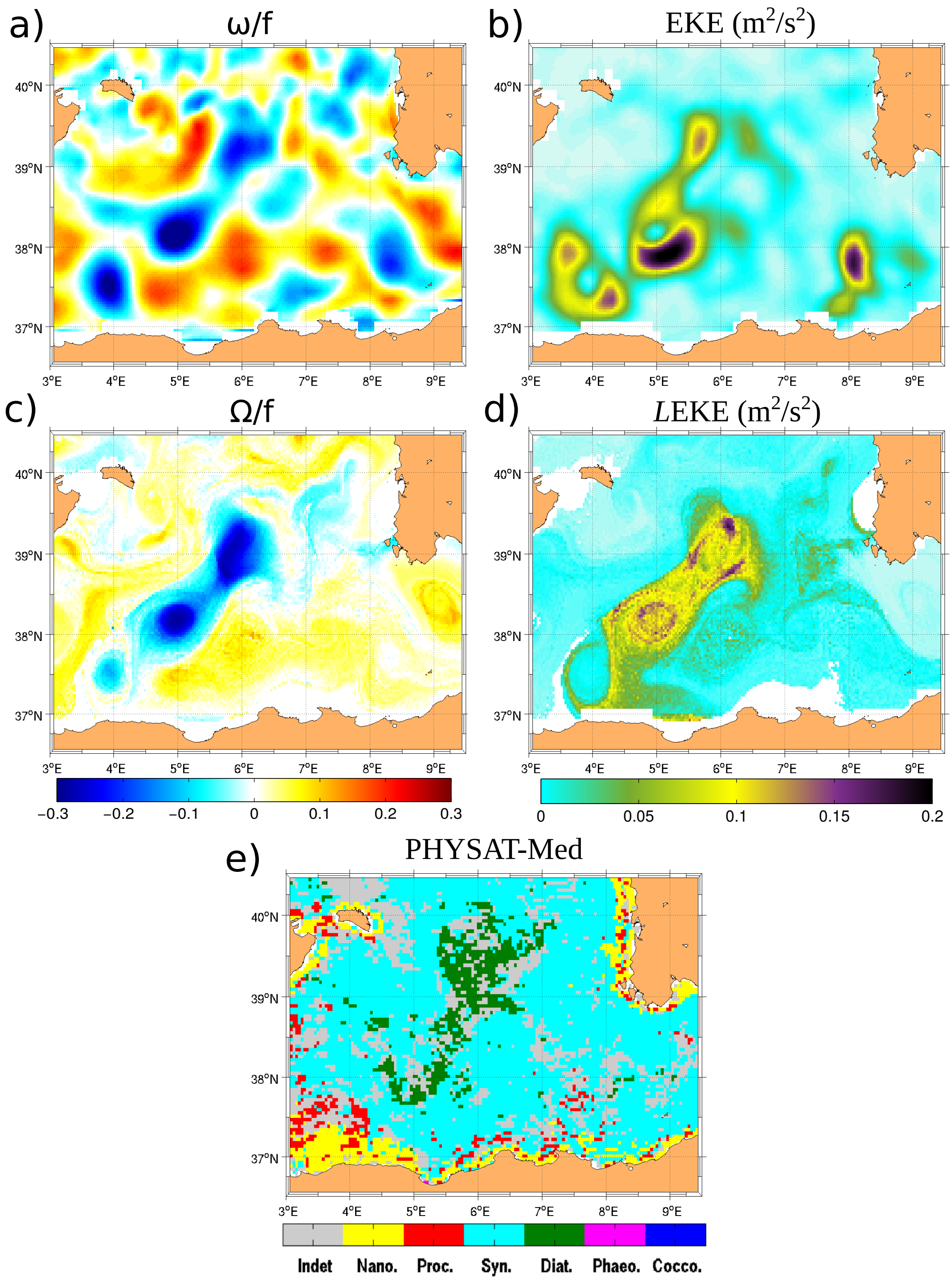

Figure S5. the same as S3 but for the time period: June 27, 2009 - July 07, 2009.

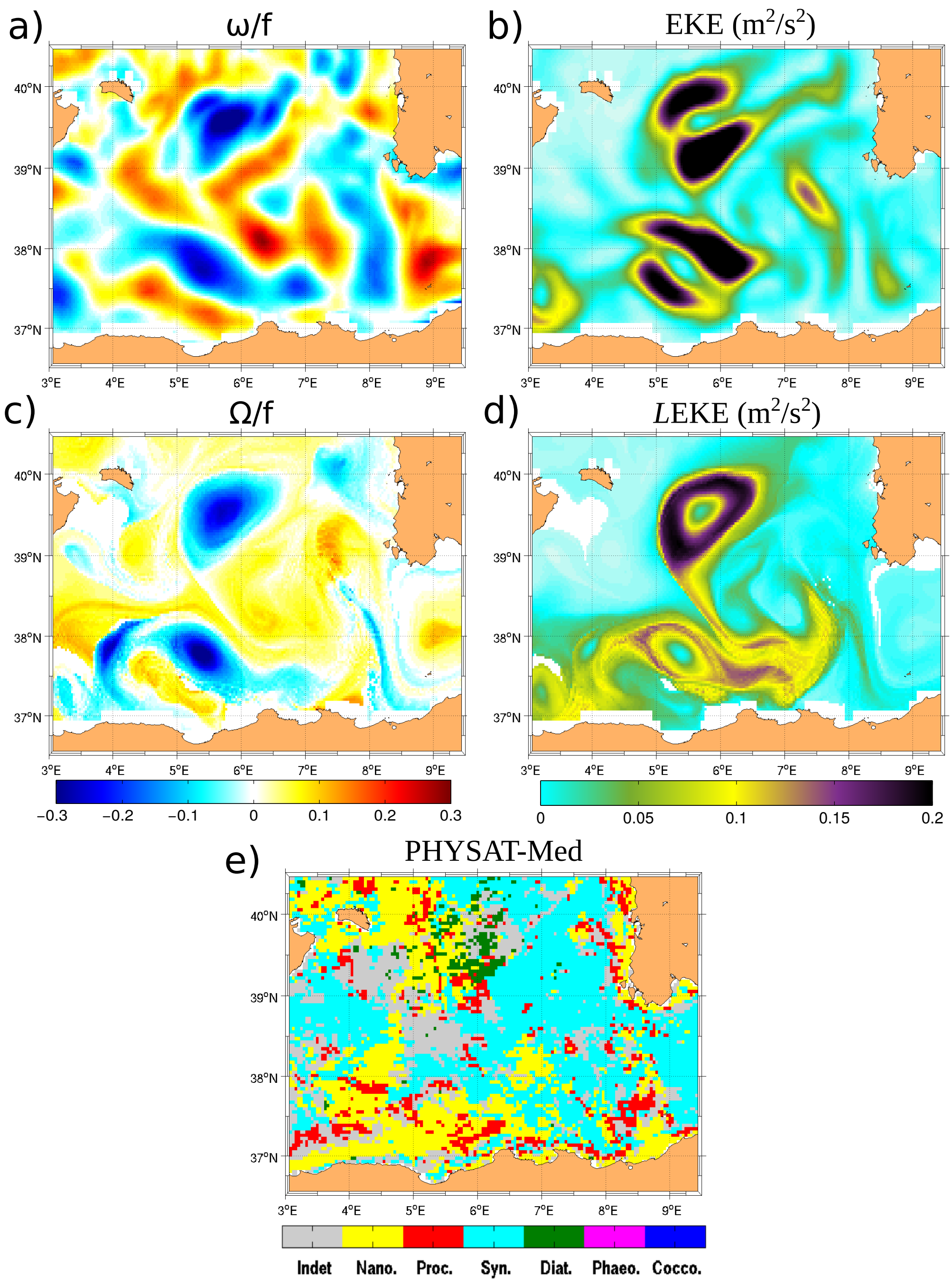

Figure S6. the same as S3 but for the time period: July 27, 2009 - August 06, 2009.

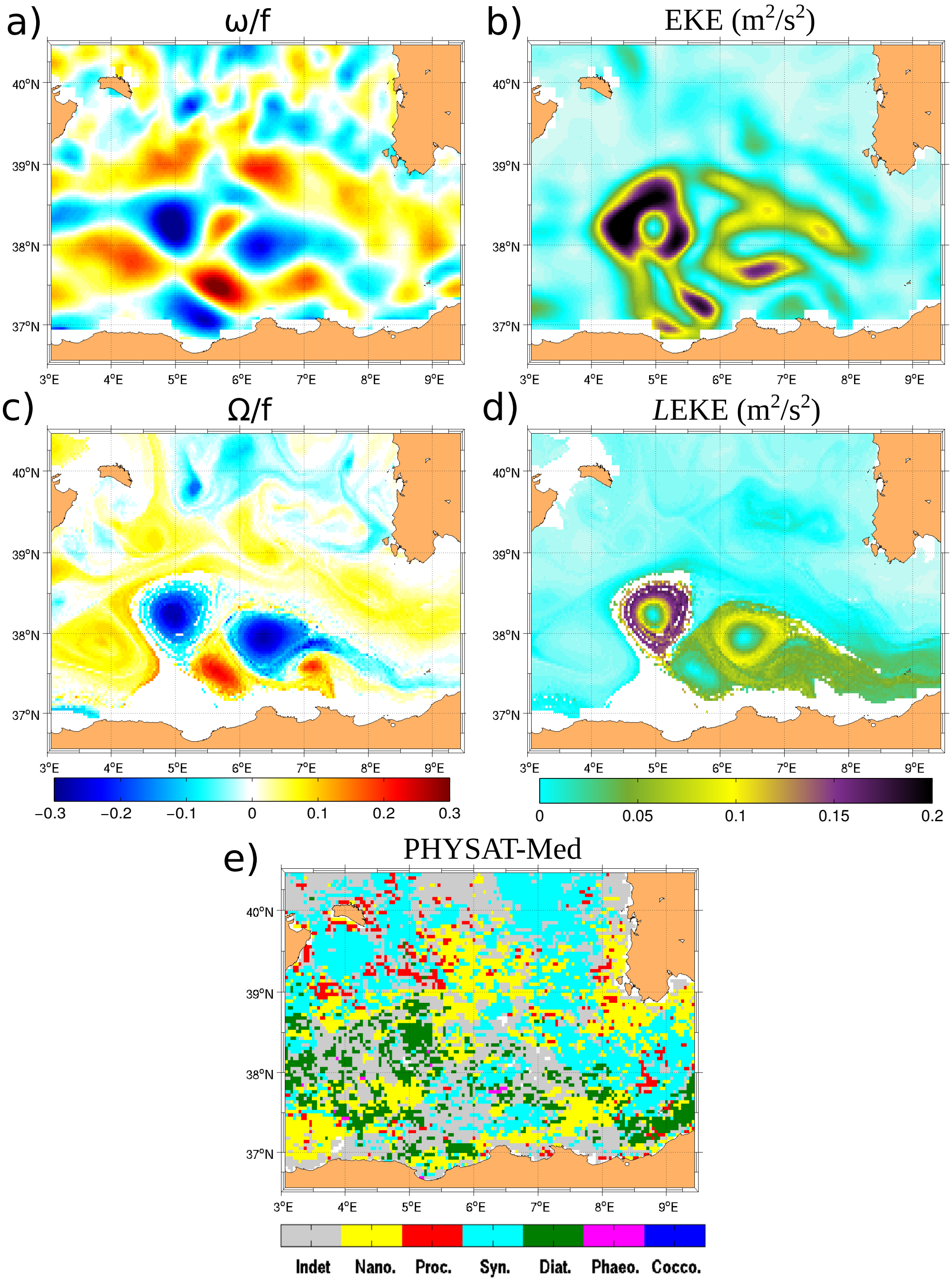

Figure S7. the same as S3 but for the time period: April 12, 2014 - April 21, 2014.

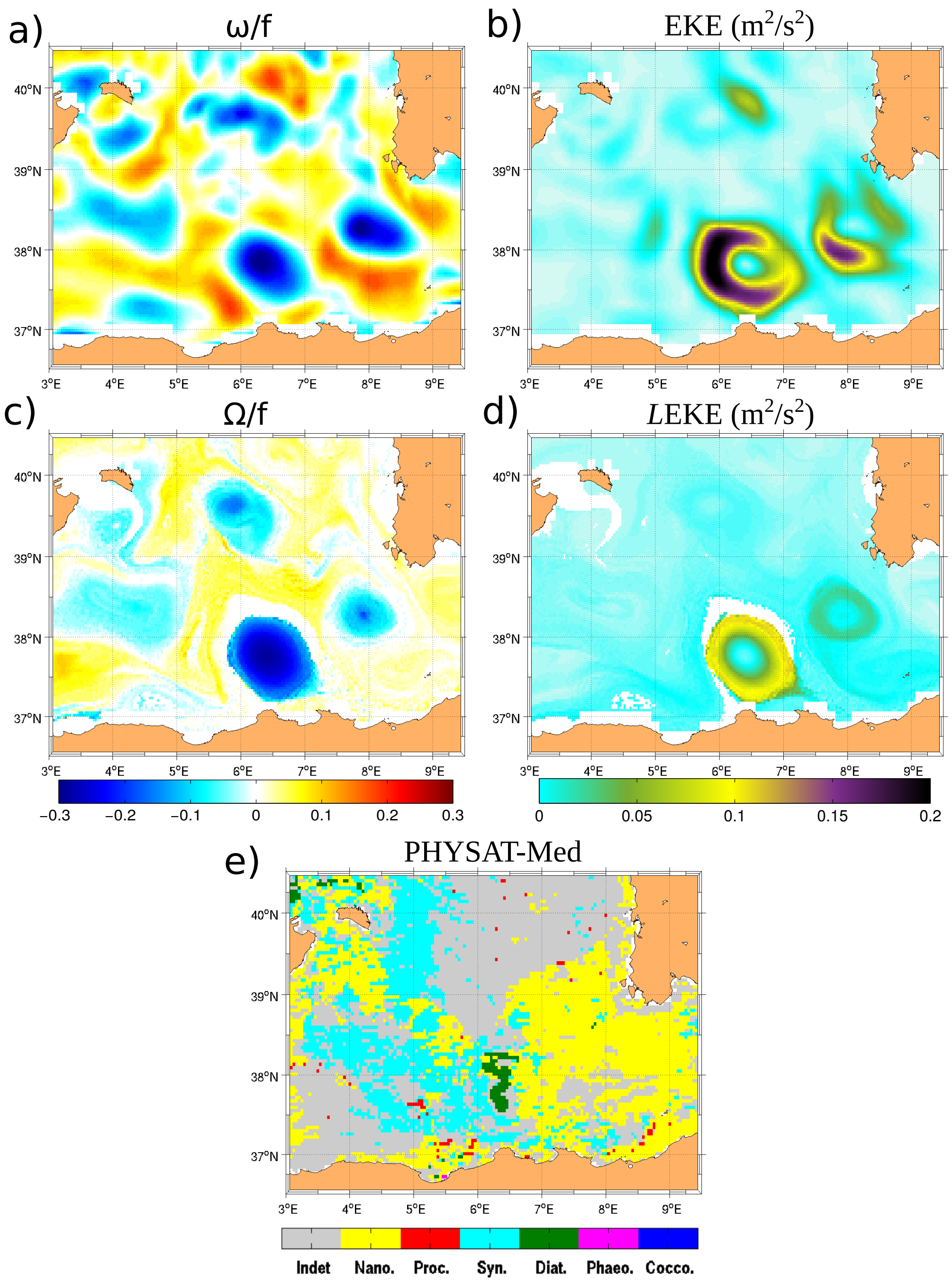

Figure S8. the same as S3 but for the time period: July 06, 2015 - July 15, 2015.

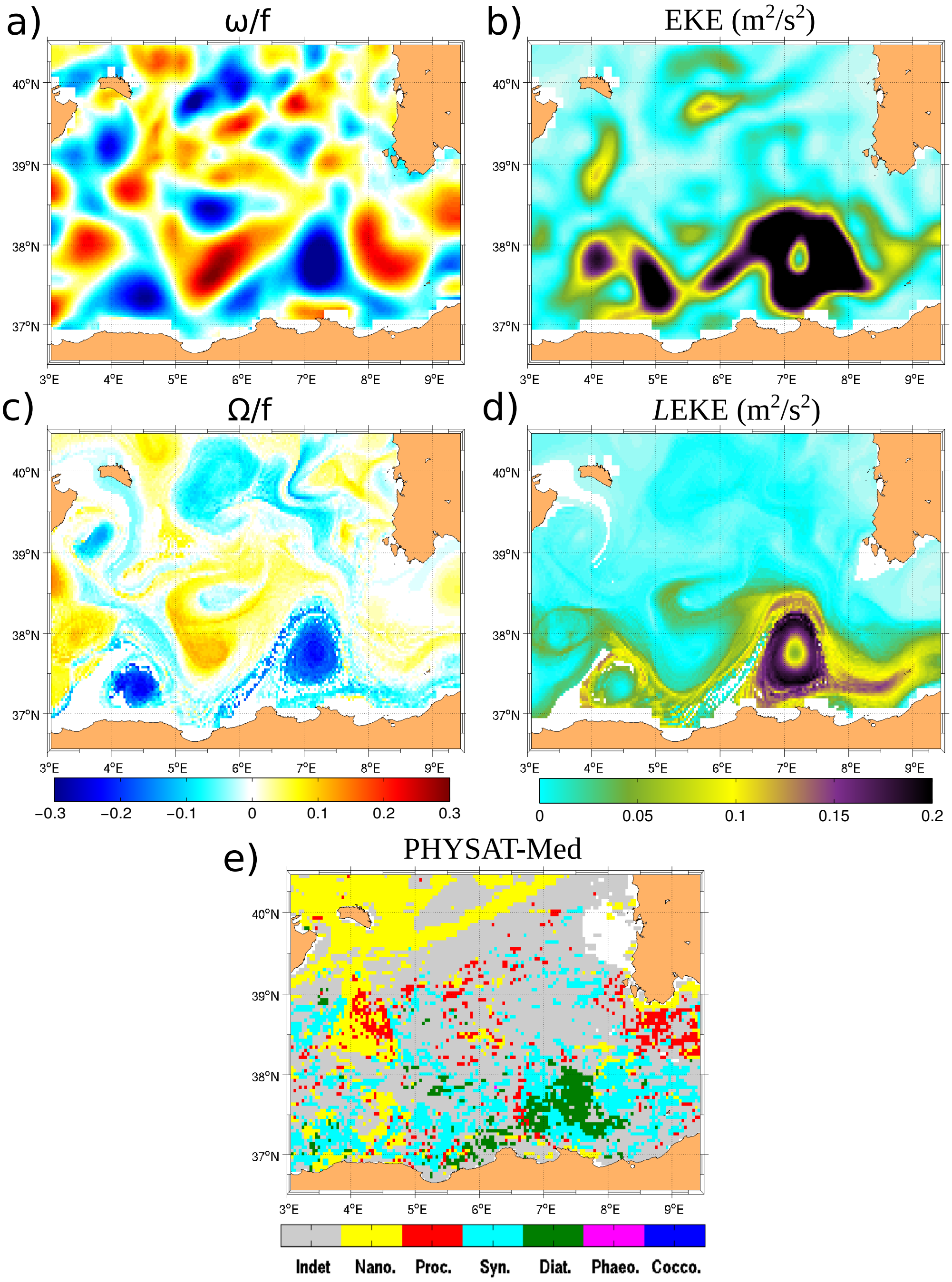

Figure S9. the same as S3 but for the time period: March 22, 2016 - April 01, 2016.

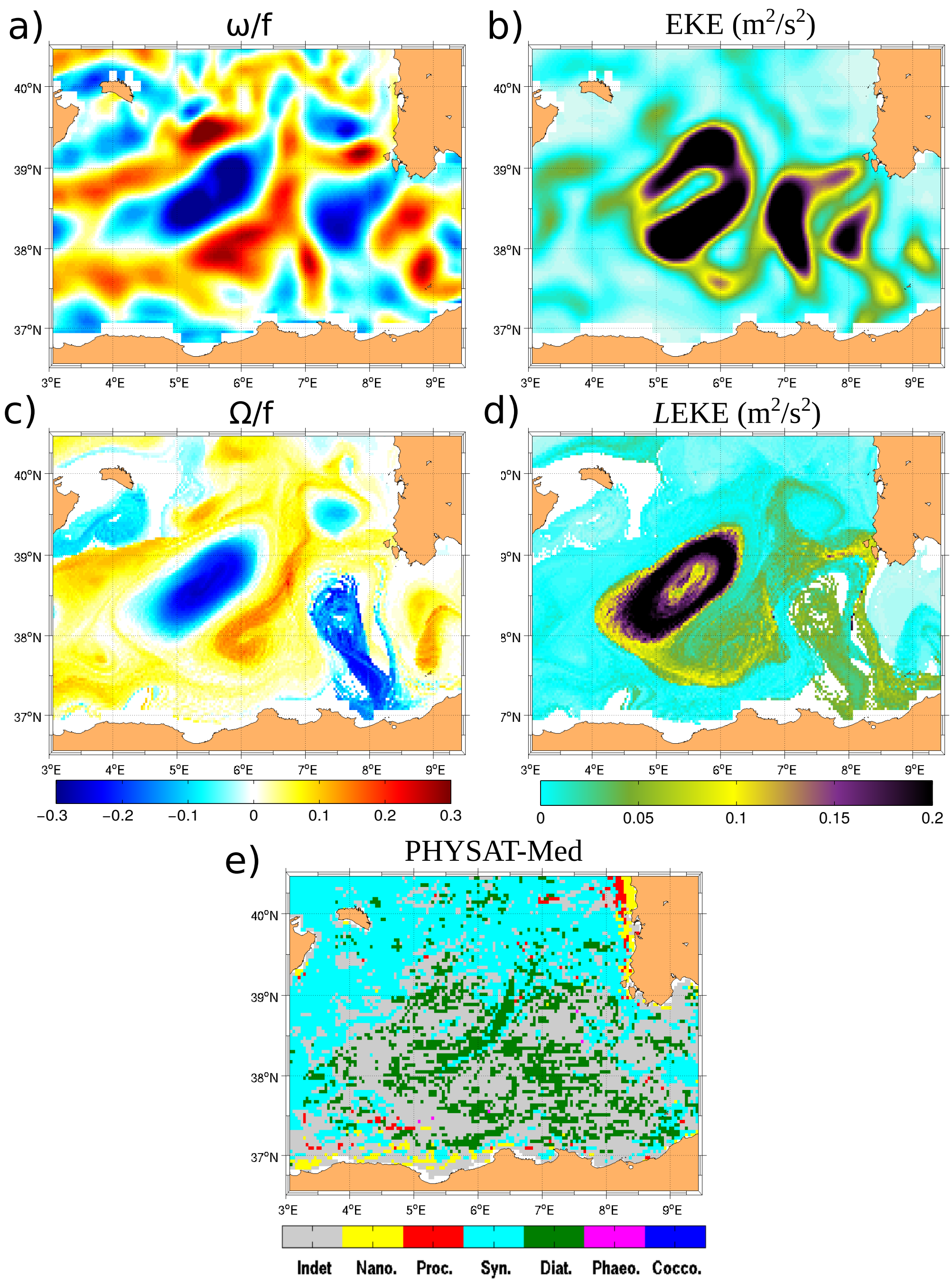

Figure S10. the same as S3 but for the time period: May 31, 2016 - June 09, 2016.

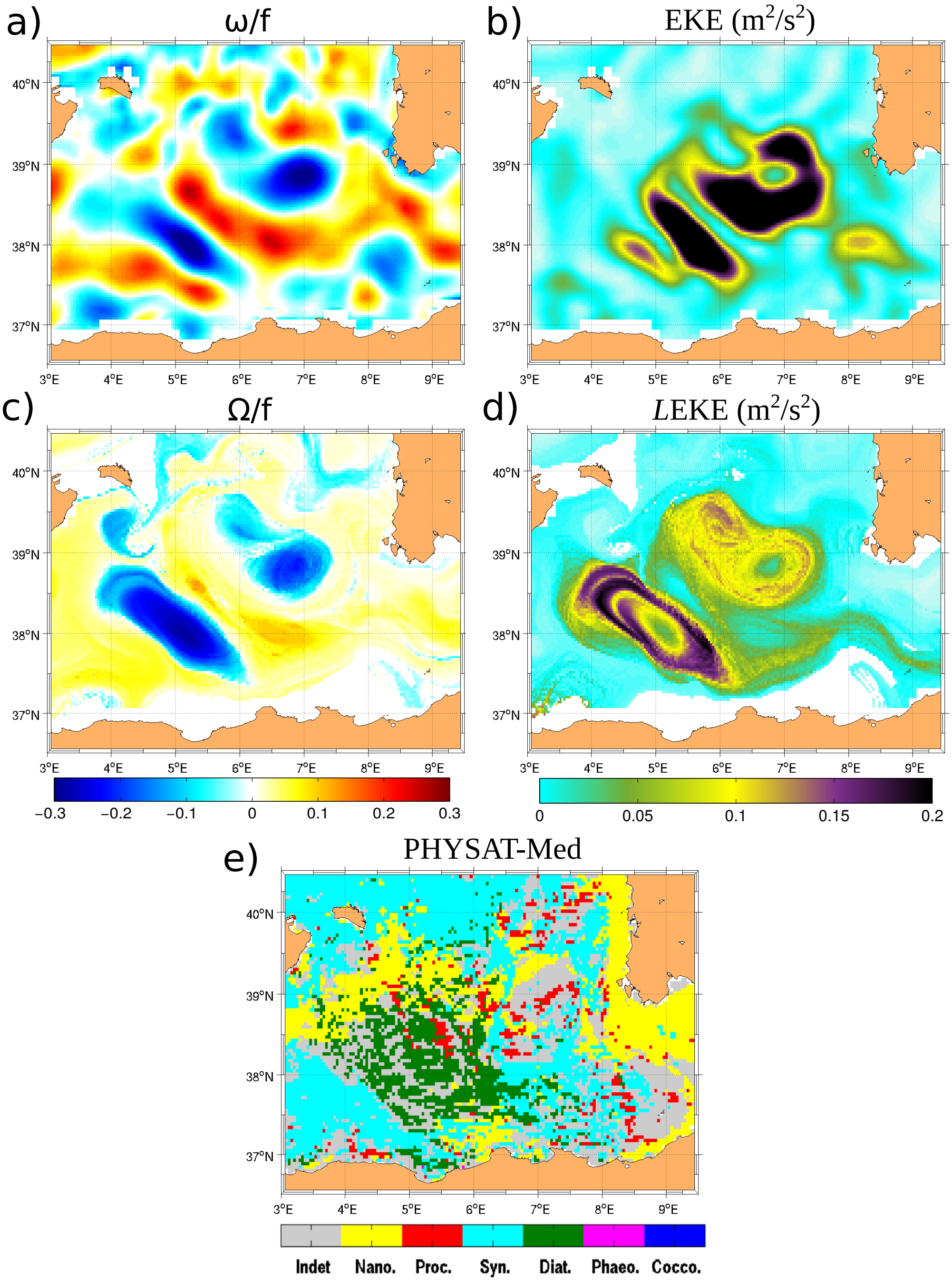

Figure S11. the same as S3 but for the time period: June 20, 2016 - June 29, 2016.

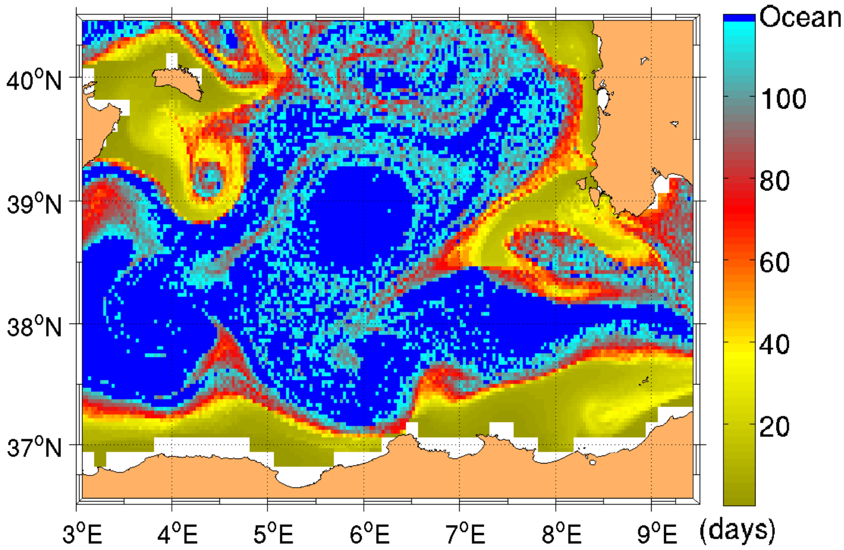

Figure S12. Lagrangian origin map showing the time needed to reach the coastline for particles launched on may 28, 2009.

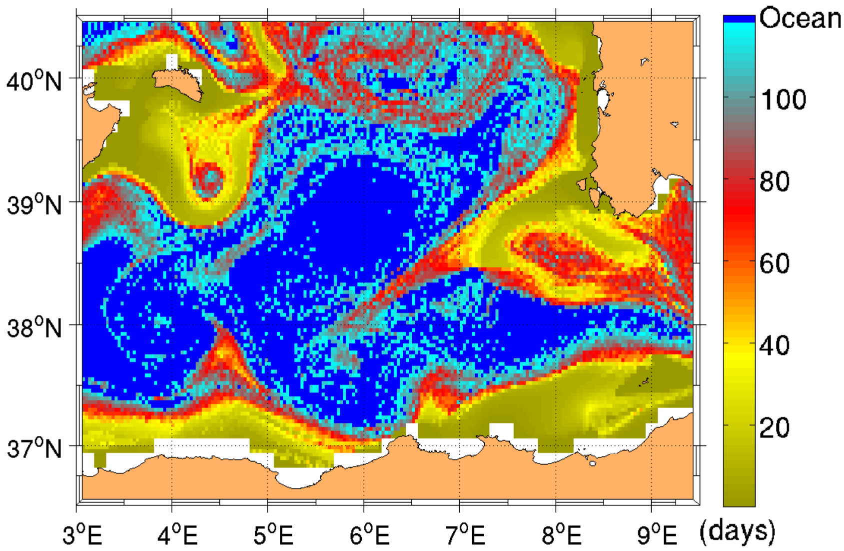

Figure S13. Lagrangian origin map showing the time needed to reach the 100 meters bathymetry boundary for particles launched on may 28, 2009.

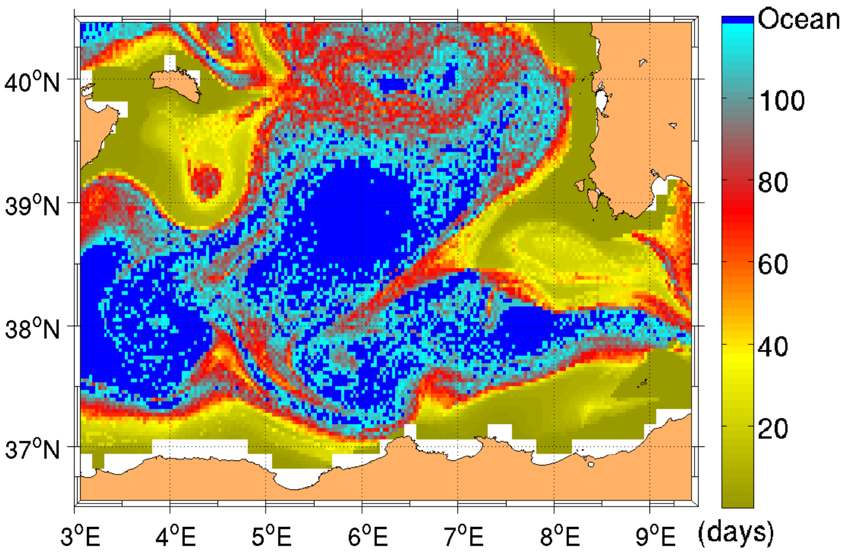

Figure S14. Lagrangian origin map showing the time needed to reach the 200 meters bathymetry boundary for particles launched on may 28, 2009.