How to Read CONVERGE CODAR Imagery Data Primer

Overall Notes about the data:

- Everything is in Greenwich Mean Time (GMT), which is 5 hours ahead of the east cost.
- All time is presented in military time, which means it is from 0:00 (12:00am) to 23:59 (11:59pm).
- Wind measurements are in m/s and surface current measurements are in cm/s, check the units carefully when looking at arrowed maps to know which you are looking at.

2) CODAR Imagery

- *Current Map Viewer* – This website allows you to select a specific date and hour time range to see the data from all of the three CODAR stations. You can use the Date and Hour fields to input specific timeframes in which you want to plot the data. You also can use the << Play (back) and Play >> (forward) buttons to have the data be animated through time (using Faster and Slower to change the speed with which the hourly graphs switch on the screen and the Stop button to stop the animation). Or you can use the Back and Forward buttons to self-select what time period/map you are interested in looking at.

  The black arrows in the water represent the direction and speed that the surface water was moving. The color of the water under the arrows represents the different data being viewed in the map (the color scale bar on the right and title provide the units for the data). The black carrot arrow in the upper right corner is the North arrow. The three CODAR stations are marked with green shapes: triangle is at Palmer Station, square is at Joubin Island, and the diamond is at Wauwermans Island. In the zoomed in data files, the black line denotes the boating limit (this is the maximum distance the scientists can go in small boats from Palmer Station). The red vector plotted at the location of the CODAR stations (green shapes) indicates the wind speed and direction at the station. The red arrow at the bottom of some maps is the scale bar for the wind measurements and represents 10 m/s.

  The PLDP drop down menu allows you to select the type of CODAR data you are looking at:

  - Raw Vectors: This is the base observation from the CODAR data. It is a plot the net movement of water at the surface with all variables that could impact the water movement included like tide, wind, density currents, etc.
  - Raw Vectors – Zoom: This is the zoomed in image of the Raw Vectors CODAR data around Palmer Station.
  - Divergence: This is a processing that estimates divergence and convergence from the Raw Vectors CODAR data. Convergence and divergence are presented from the vertical movement of water from the surface to 1 m down. CODAR does not have a depth resolution (it cannot read down into the water column). Rather, convergence or divergence is inferred from changes in the horizontal movement/velocity of water. If currents are crashing into each other, scientists assume (which is a good assumption) that water has to

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be forced down at a speed that is directly related to the horizontal speeds of the water at the surface measured by CODAR. If currents are accelerating away from each other, we assume that water comes from deeper layers to replace it at a speed that is directly related to the horizontal speeds of the water at the surface measured by CODAR. So, vertical movements of water are calculated based on the measured horizontal movements of water. A positive vertical movement of the water indicates water coming from the deeper ocean to replace water that is moving away (divergence zone, red areas). Negative vertical movement of the water indicates water that is going down toward the deeper ocean as water builds up in one place because it is being pushed there (convergence zone, blue areas).

- Divergence Zoom: This is the zoomed in image of the Divergence CODAR data around Palmer Station.
- Divergence Trend: This is a processing that estimates the persistence if divergence over the last three days from the Divergence processed CODAR data. A Divergent Trend value of 1 (red) indicates that the area was always divergent over three days, and a value of -1 (blue) indicates that the area was always convergent over three days. This is helpful in detecting regions of persistent convergence or divergence zones that the penguins might be using.
- Divergence Trend – Zoom: This is the zoomed in image of the Divergence Trend CODAR data around Palmer Station.
- Vorticity: This is an estimate the rotation a particle would feel if it were moving through the Raw Vectors CODAR data current map. Positive values indicate that the currents are causing a particle to spin in the clockwise direction. Negative values indicate that the currents are causing a particle to spin in the clockwise direction. Scientists calculate vorticity because it helps them identify regions of spinning water, which allows us to identify regions where currents slide past each other (shear) and/or currents form circular patterns (eddies) that might be important for aggregations of krill and phytoplankton.
- Vorticity – Zoom: This is the zoomed in image of the Vorticity CODAR data around Palmer Station.
- Detided: This is a processing of the Raw Vectors CODAR data that has the influence of tides on the movement of water subtracted out.
- Filtered: This is a processing of the Detided CODAR data that has removed any movement of the water that happens over a time period shorter than 30 hours to remove longer term background movement of the water.
- Tidal: This is an estimate of the portion of the water movement in the Raw Vectors CODAR data current map that is due to tides. The maps show the tidal current only over the coverage area. The blue and yellow colors indicate the velocity of the tidal currents measured by CODAR. Yellow are faster currents, and blue are slower currents.

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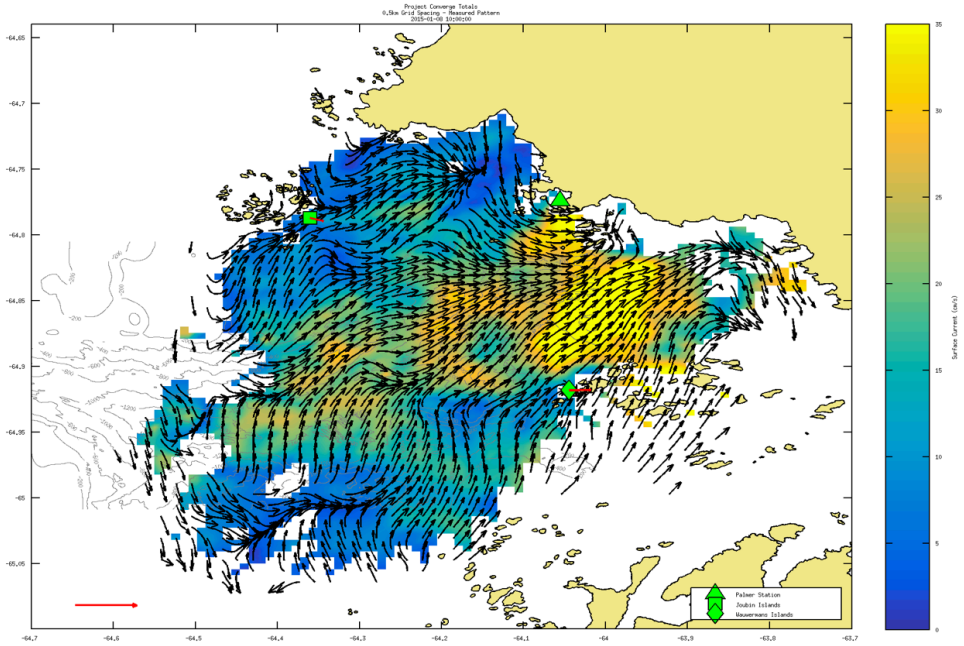
Antarctica Archive Totals Viewer

Current archived images are available between **05/27/2011** and **1/8/2015 10:00**. Images are available every hour.

Date: 01/08/2015 Hour: 10 Goto

PLDP : Raw Vectors

<< Play | < Back | Stop | Forward > | Play >> | Faster | Slower



- *Current Map Images* – This links to a directory of folders and files of the different CODAR raw and processed data over time from the project that you can toggle through using the Current Map Viewer. The folders include:
    a. 2014_11/ - This includes all of the November 2014 Measured Pattern of the CODAR raw data that enables scientists to determine how the data needs to be corrected for the naturally occurring variation due to the fact that the data is being triangulated from three CODAR stations and the potential aspects of the environment that would distort the data. These data are then processed to make the Raw Vectors CODAR data maps. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM.png.
    b. 2014_12/ - This includes all of the December 2014 Measured Pattern of the CODAR raw data.
    c. 2015_01/ - This includes all of the January 2015 Measured Pattern of the CODAR raw data.

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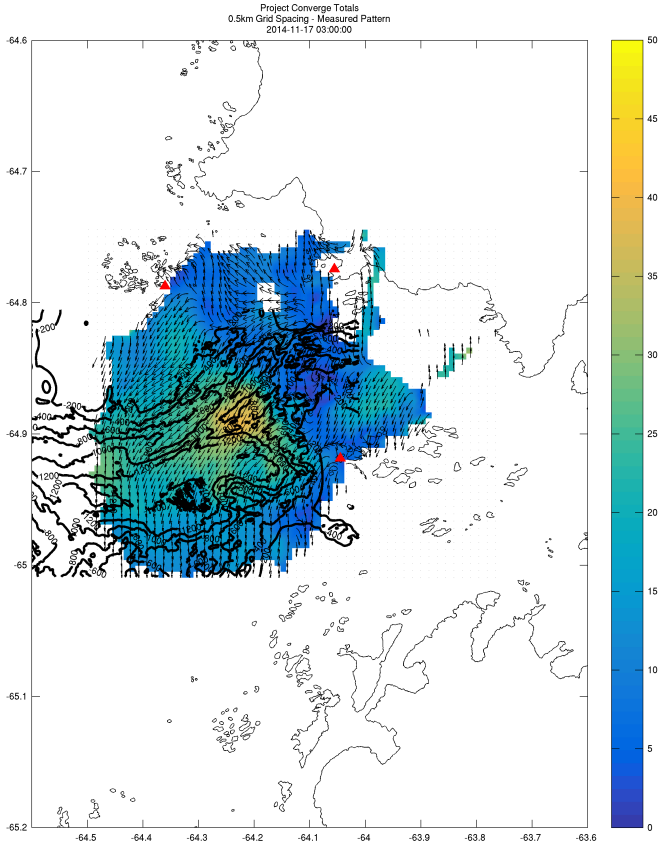

d. detided/ (by each month) - This is a processing of the Raw Vectors CODAR data that has the influence of tides on the movement of water subtracted out. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM-detided.png.

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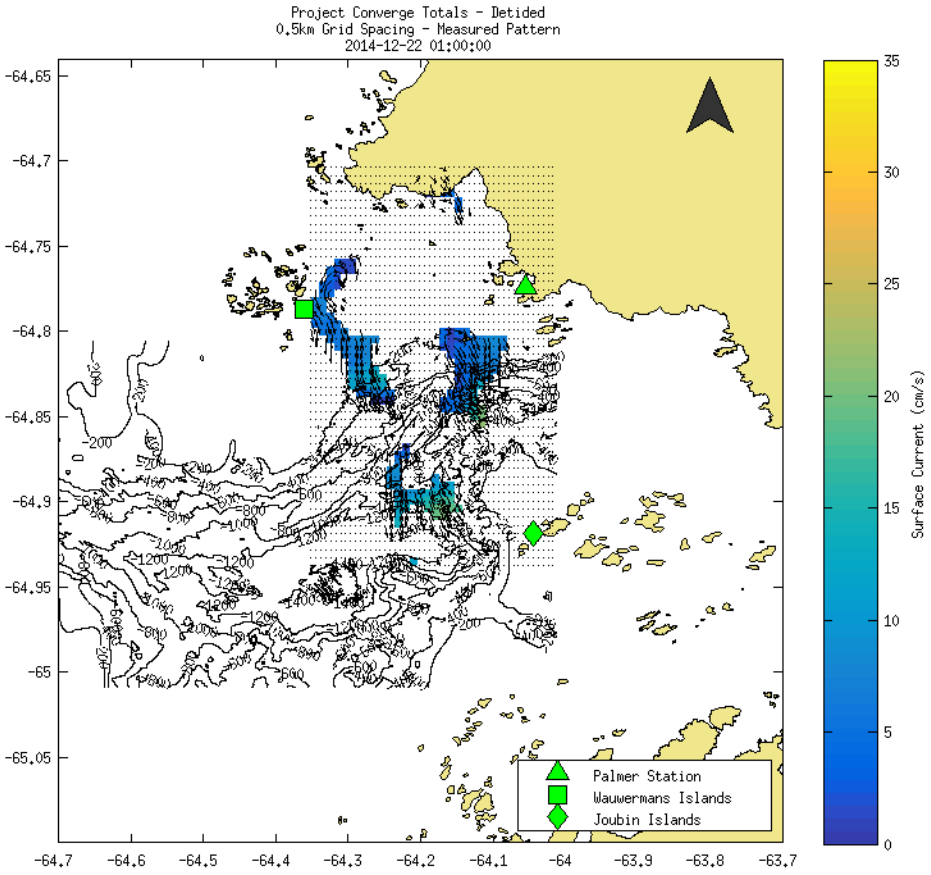

e. divergence/ (by each month) - This is a processing that estimates divergence and convergence from the Raw Vectors CODAR data. Convergence and divergence are presented from the vertical movement of water from the surface to 1 m down. CODAR does not have a depth resolution (it cannot read down into the water column). Rather, convergence or divergence is inferred from changes in the horizontal movement/velocity of water. If currents are crashing into each other, scientists assume (which is a good assumption) that water has to be forced down at a speed that is directly related to the horizontal speeds of the water at the surface measured by CODAR. If currents are accelerating away from each other, we assume that water comes from deeper layers to replace it at a speed that is directly related to the horizontal speeds of the water at the surface measured by CODAR. So, vertical movements of water are calculated based on the measured horizontal movements of water. A positive vertical movement of the water indicates water coming from the deeper ocean to replace water that is moving away (divergence zone, red areas). Negative vertical movement of the water indicates water that is going down toward the deeper ocean as water builds up in one place because it is being pushed there (convergence zone, blue areas). The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM-divergence.png.

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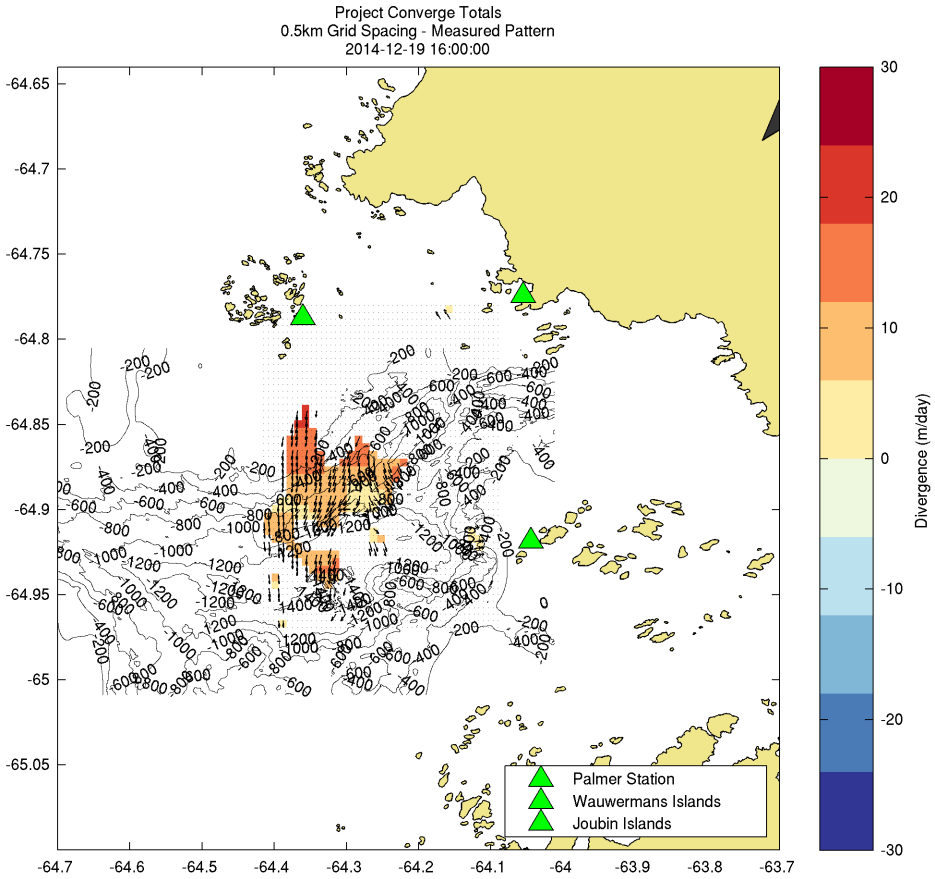

f. divergenceTrend/ (by each month) - This is a processing that estimates the persistence if divergence over the last three days from the Divergence processed CODAR data. A Divergent Trend value of 1 (red) indicates that the area was always divergent over three days, and a value of -1 (blue) indicates that the area was always convergent over three days. This is helpful in detecting regions of persistent convergence or divergence zones that the penguins might be using. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM-divergenceTrend.png.

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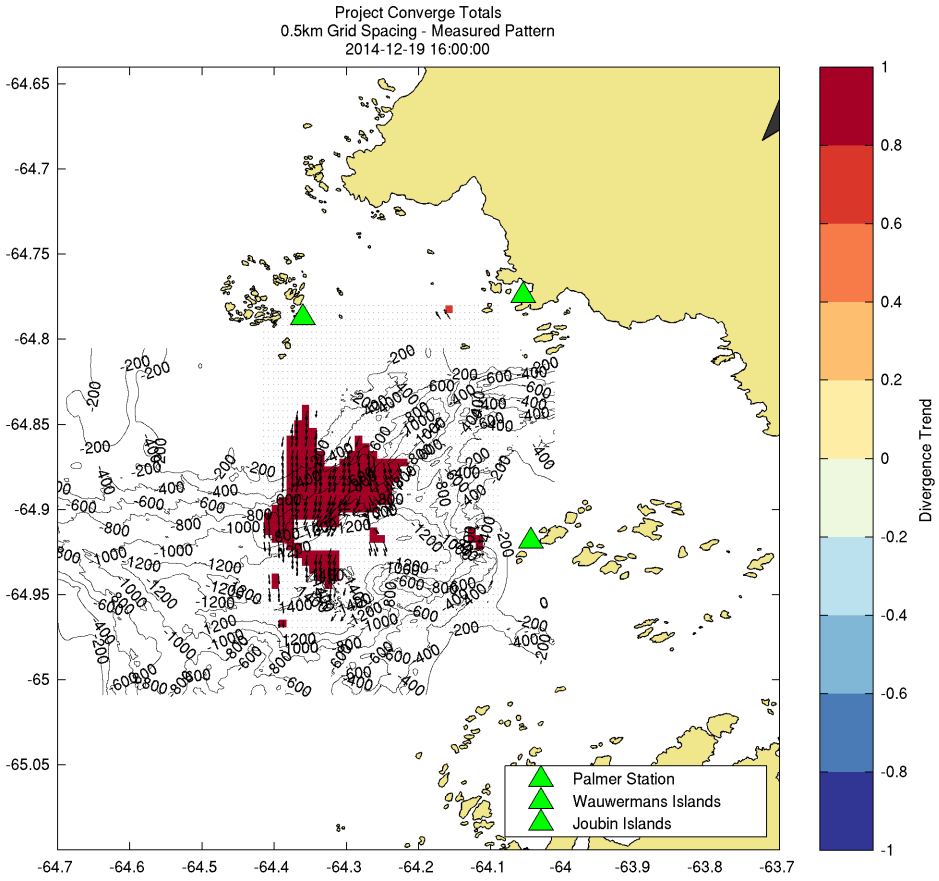

g. divergenceTrendZoom/ (by each month) - This is the zoomed in image of the Divergence Trend CODAR data around Palmer Station. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM- divergenceTrendZoom.png.

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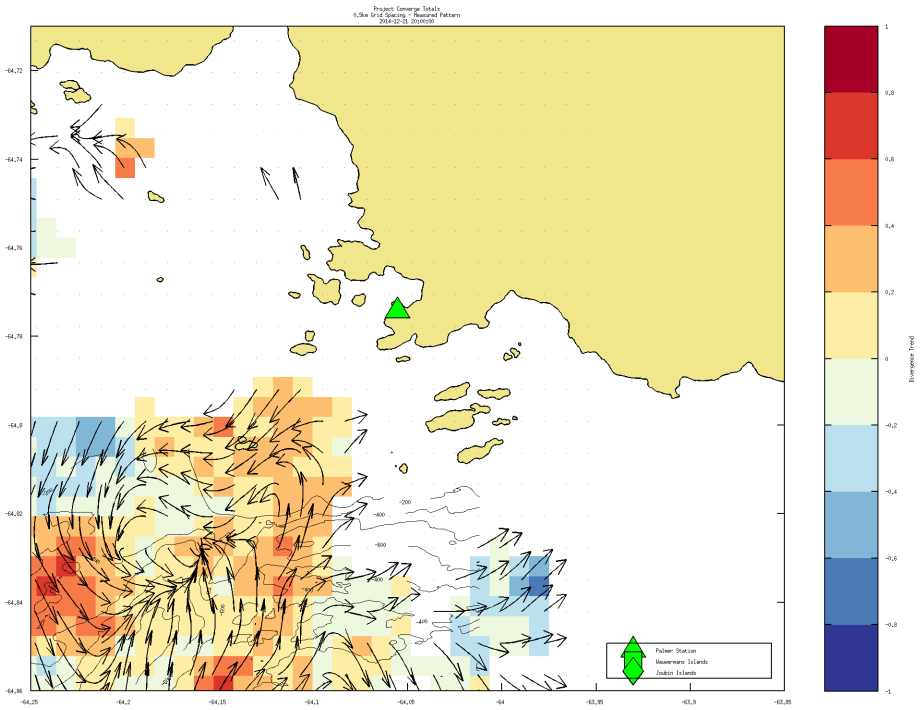
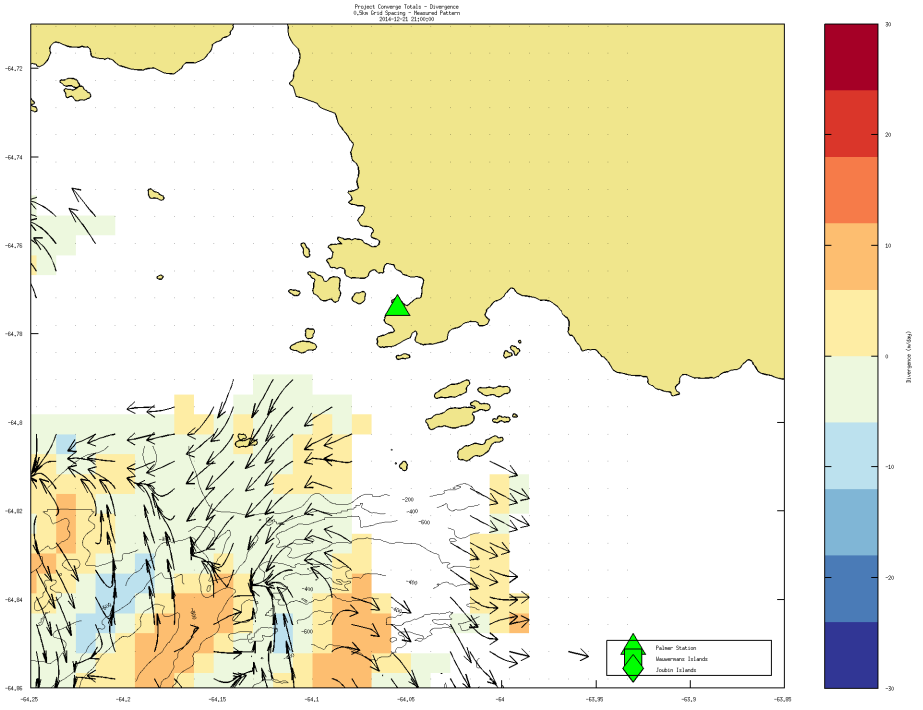


h. divergenceZoom/ (by each month) - This is the zoomed in image of the Divergence CODAR data around Palmer Station. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM- divergenceZoom.png.



i. rawZoom/ (by each month) - This is the zoomed in image of the Raw Vectors CODAR data around Palmer Station. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM- rawZoom.png.

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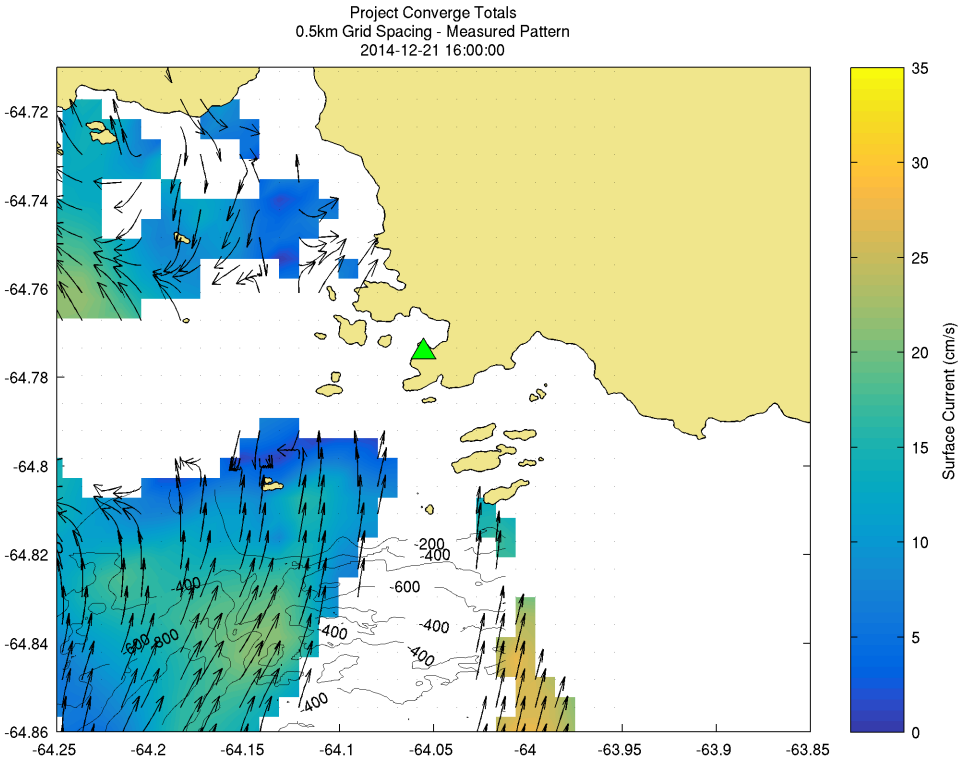

j. tidal/ (by each month) - This is an estimate of the portion of the water movement in the Raw Vectors CODAR data current map that is due to tides. The maps show the tidal current only over the coverage area. The blue and yellow colors indicate the velocity of the tidal currents measured by CODAR. Yellow are faster currents, and blue are slower currents. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM-tidal.png.

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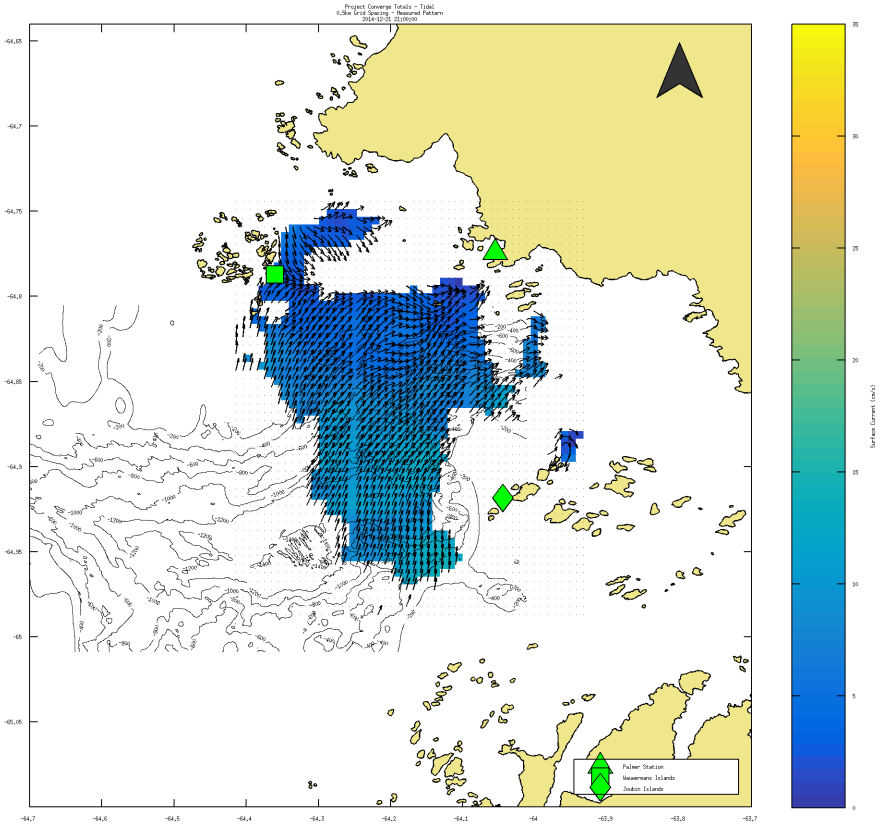

k. vorticity/ (by each month) - This is an estimate the rotation a particle would feel if it were moving through the Raw Vectors CODAR data current map. Positive values indicate that the currents are causing a particle to spin in the clockwise direction. Negative values indicate that the currents are causing a particle to spin in the clockwise direction. Scientists calculate vorticity because it helps them identify regions of spinning water, which allows us to identify regions where currents slide past each other (shear) and/or currents form circular patterns (eddies) that might be important for aggregations of krill and phytoplankton. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM- vorticity.png.

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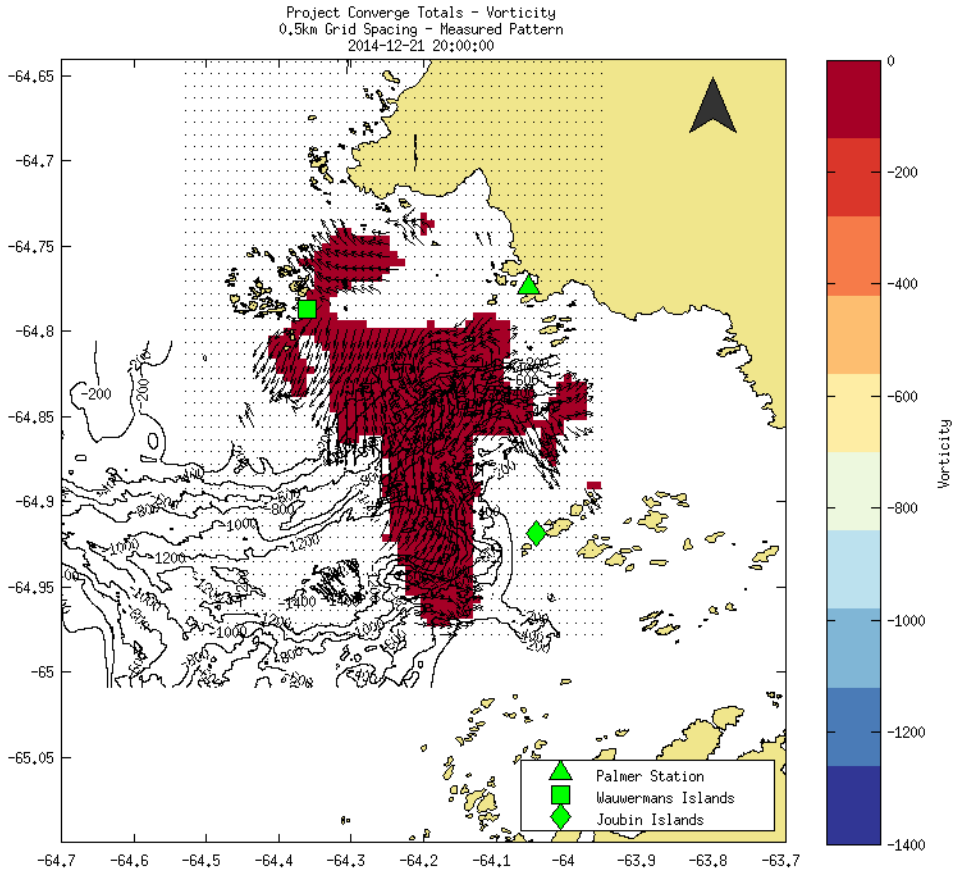

l. vorticityZoom/ (by each month) - This is the zoomed in image of the Vorticity CODAR data around Palmer Station. The files are labeled as: OI_PLDP_YYYY_MM_DD_HHMM- vorticityZoom.png.

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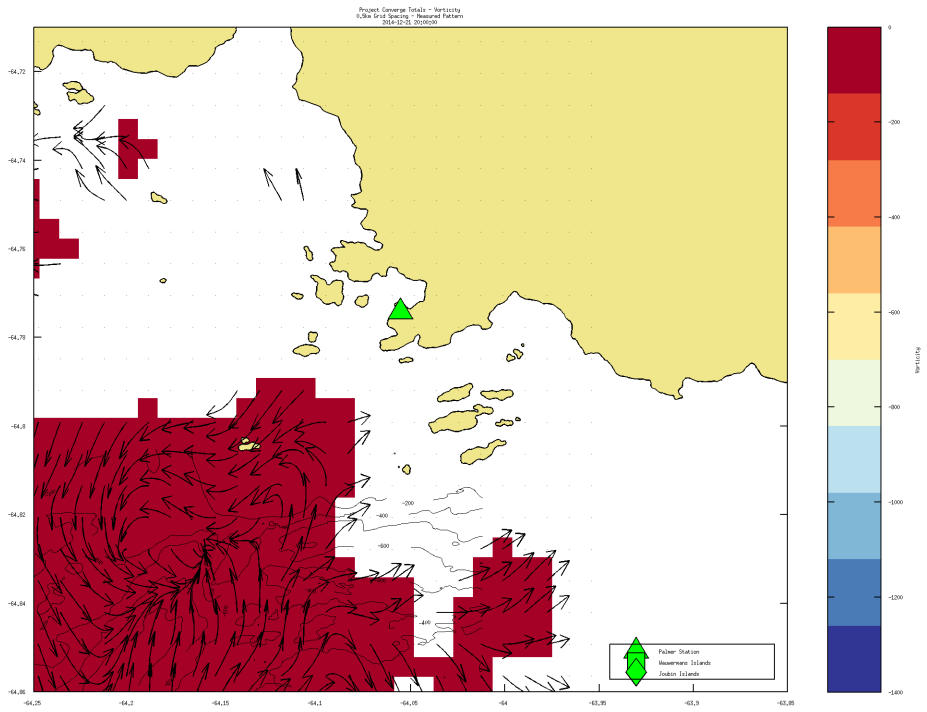

- *24 Hour Average Currents* – This map represents that average surface currents speed and direction over the past 25 hours. The date and time range of the map is listed in the title. The color of the arrows indicates the speed (cm/s) the surface current was traveling, so blue arrows indicate slower speeds and yellow arrows indicate faster speeds. The three black triangles denote the location of the three CODAR stations. North is up on these maps. The "NOTE: Data outside color range will be saturated" means that if the surface current speed was lower or higher than the scale bar of 0-30 cm/s then that data would not be included in the figure.

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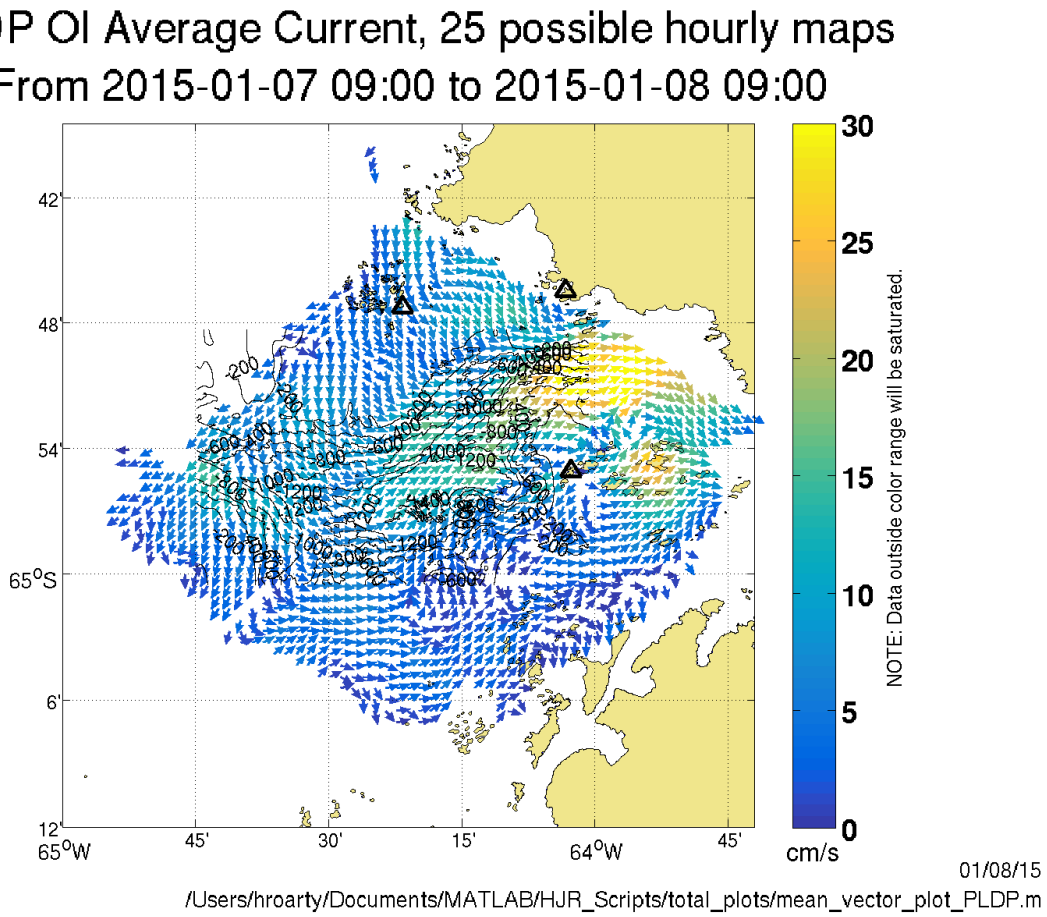

- *Animation of Simulated Drifter Trajectories* – This link shows a daily estimate of the movement of virtual particles released in the Raw Vectors CODAR data current maps. The red triangle labeled PALM is at the Palmer CODAR station, the red triangle labeled JOUB is at Joubin Island, and the red triangle labeled WAUW is at the Wauwermans Island. The red dots are the locations of the drifters. If they move outside the range of our data coverage they turn blue and stop moving. The black line trailing behind the dots indicates the path the virtual drifter took since its release. The scientists create these simulations because they show them what a drifter might do if acted upon by the surface currents over 24 hours. This is useful if scientists want to know what a drifting particle (like a krill or phytoplankton patch) might experience. It is also very useful for understanding why certain gliders might drift in certain directions over time.

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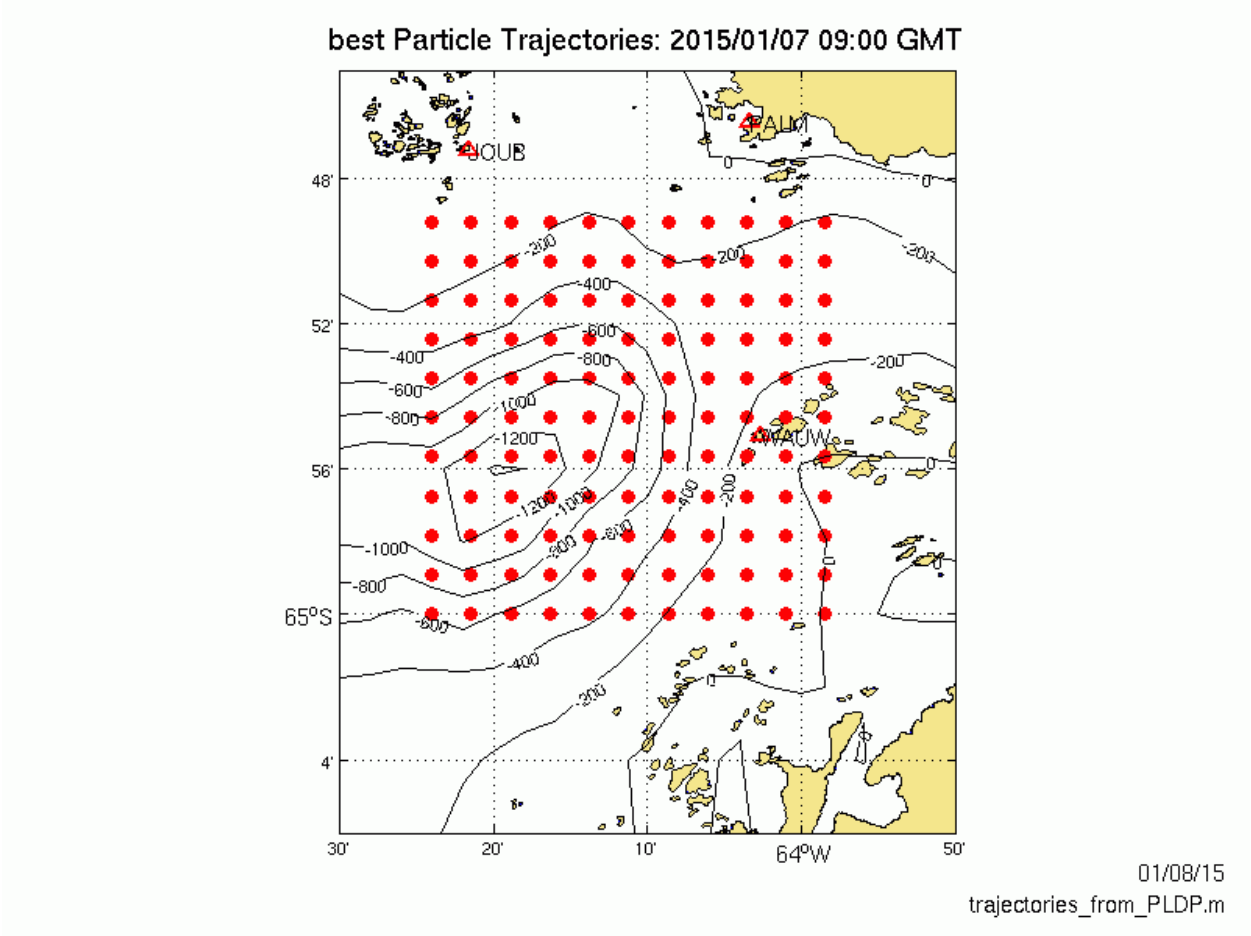

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