



**EARTH CUBE**  
TRANSFORMING GEOSCIENCES RESEARCH



# Argovis: A Next Generation Platform for co-located Oceanic and Atmospheric Data to Accelerate Climate Science Workflows

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University of Colorado  
Boulder

# Outline

- What is Argovis?
- Argovis modules
  - Visualize Argo data by location and time
  - Co-locate Argo with weather events beta
  - Display and compare gridded products beta
- Argovis API: examples for BGC Argo
- Summary and future directions

## Argovis is a web app and database

The **goal**: make it easy for anyone (both scientists and non-scientists) to visualize and access co-located datasets using a browser or not



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## Datasets available:

- Argo profiles\*, curated set
- RG2009 climatology (in progress)
- Atmospheric Rivers Climatology by GW2015 (in progress)
- Float trajectory forecasts by Chamberlain et al.



\*<http://doi.org/10.17882/42182>

RG2009: Roemmich and Gilson, 2009

GW2015: Guan and Waliser, 2015

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Stay tuned for more gridded products (e.g. B-SOSE, SST, SSH, precipitation, winds, sea ice coverage, WOA18, ...), weather events (e.g. tropical cyclones), ...  
**Take a survey (on the website) and make your request!**

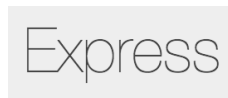
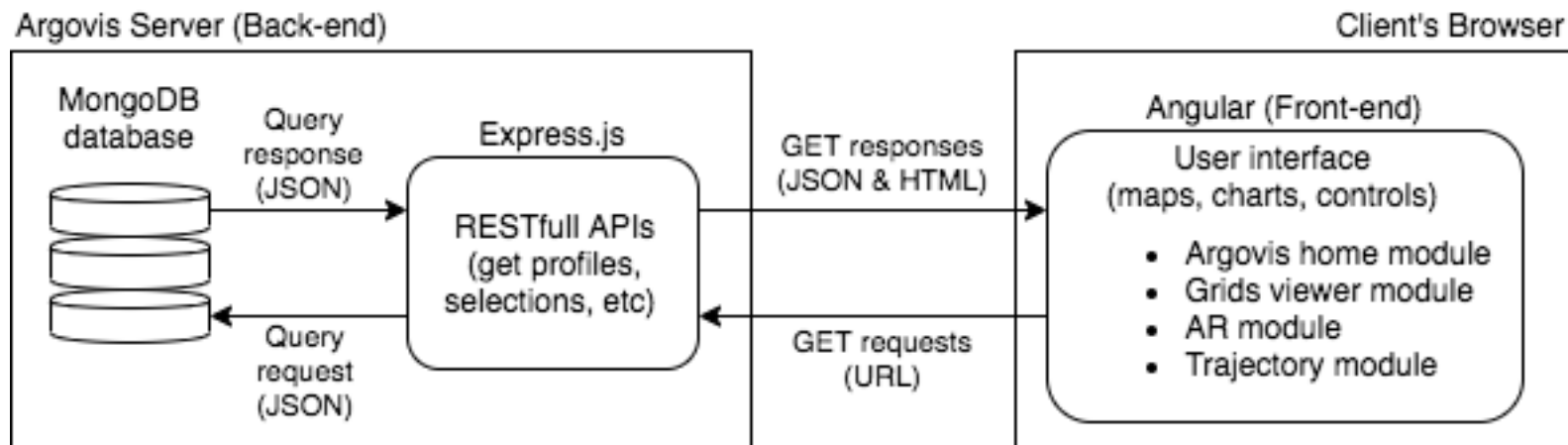
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RG2009: Roemmich and Gilson, 2009

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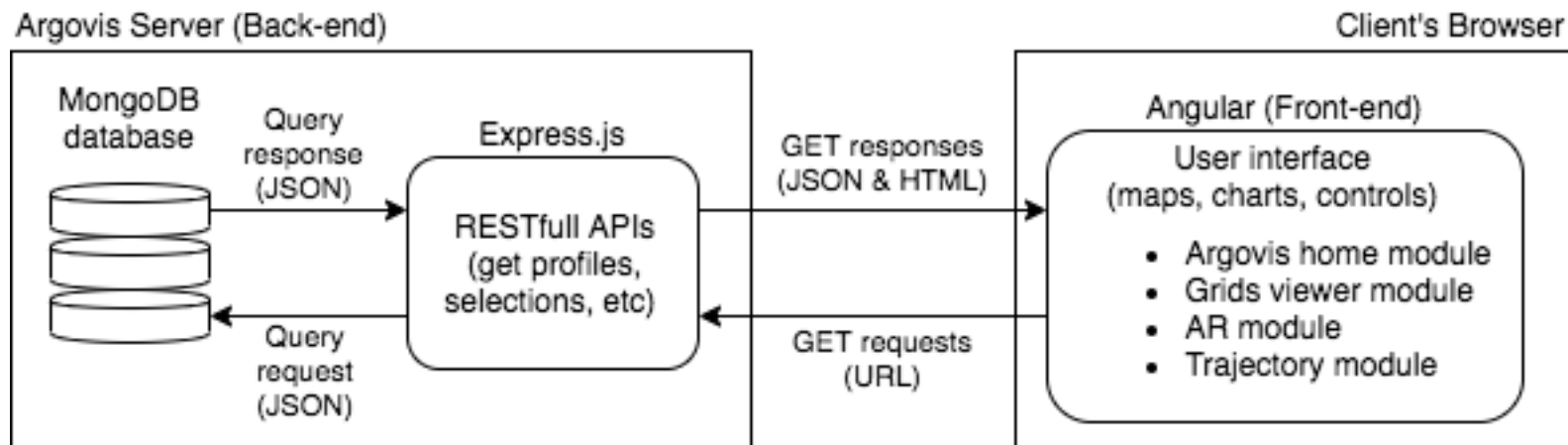
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# Argovis is a web app and database

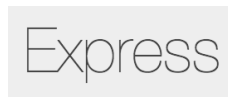
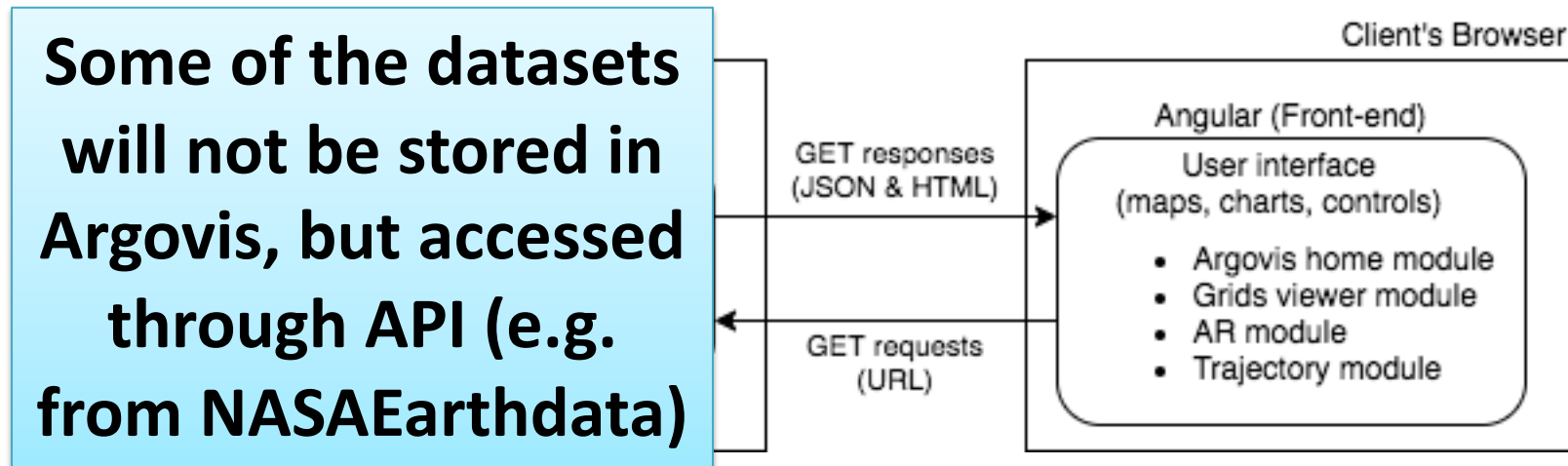
The **goal**: make it easy for anyone (both scientists and non-scientists) to visualize and access co-located datasets using a browser or not



Tucker, T., D. Giglio, M. Scanderbeg, and S.S. Shen, 2020: *Argovis: A Web Application for Fast Delivery, Visualization, and Analysis of Argo Data*. J. Atmos. Oceanic Technol., 37, 401–416, <https://doi.org/10.1175/JTECH-D-19-0041.1>

# Argovis is a web app and database

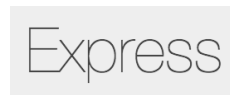
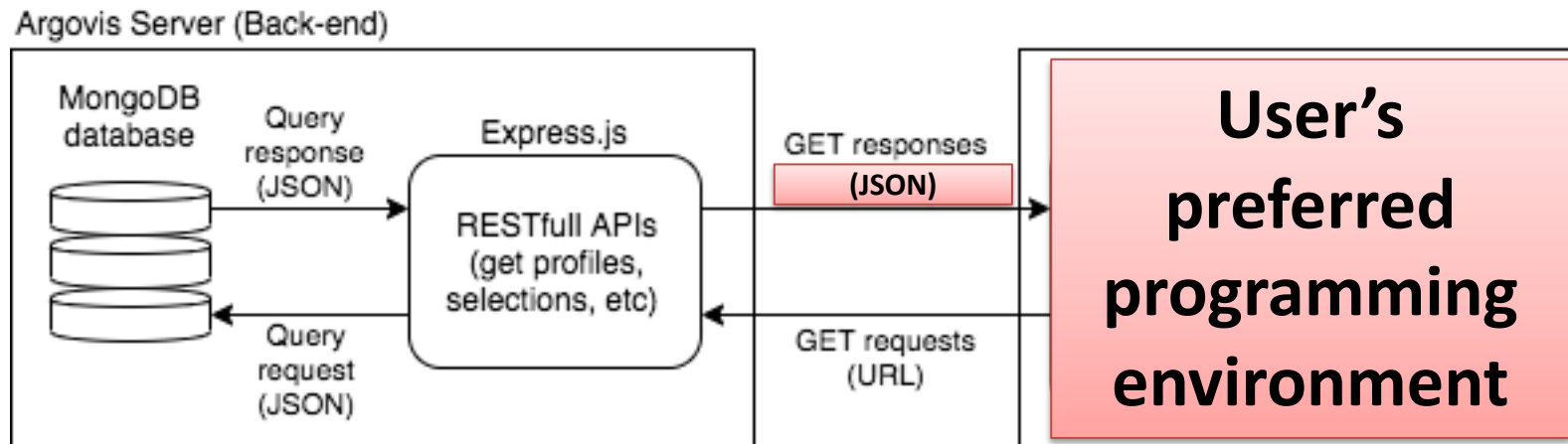
The **goal**: make it easy for anyone (both scientists and non-scientists) to visualize and access co-located datasets using a browser or not





# Argovis is a web app and database

The **goal**: make it easy for anyone (both scientists and non-scientists) to visualize and access co-located datasets using a browser or not



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# Profiles globally: a 3-day window



[Home](#) [About Argovis](#) [Tutorials](#) [FAQ](#) [Argovis Module Menu](#) [Take a Survey](#)



**Display options:**

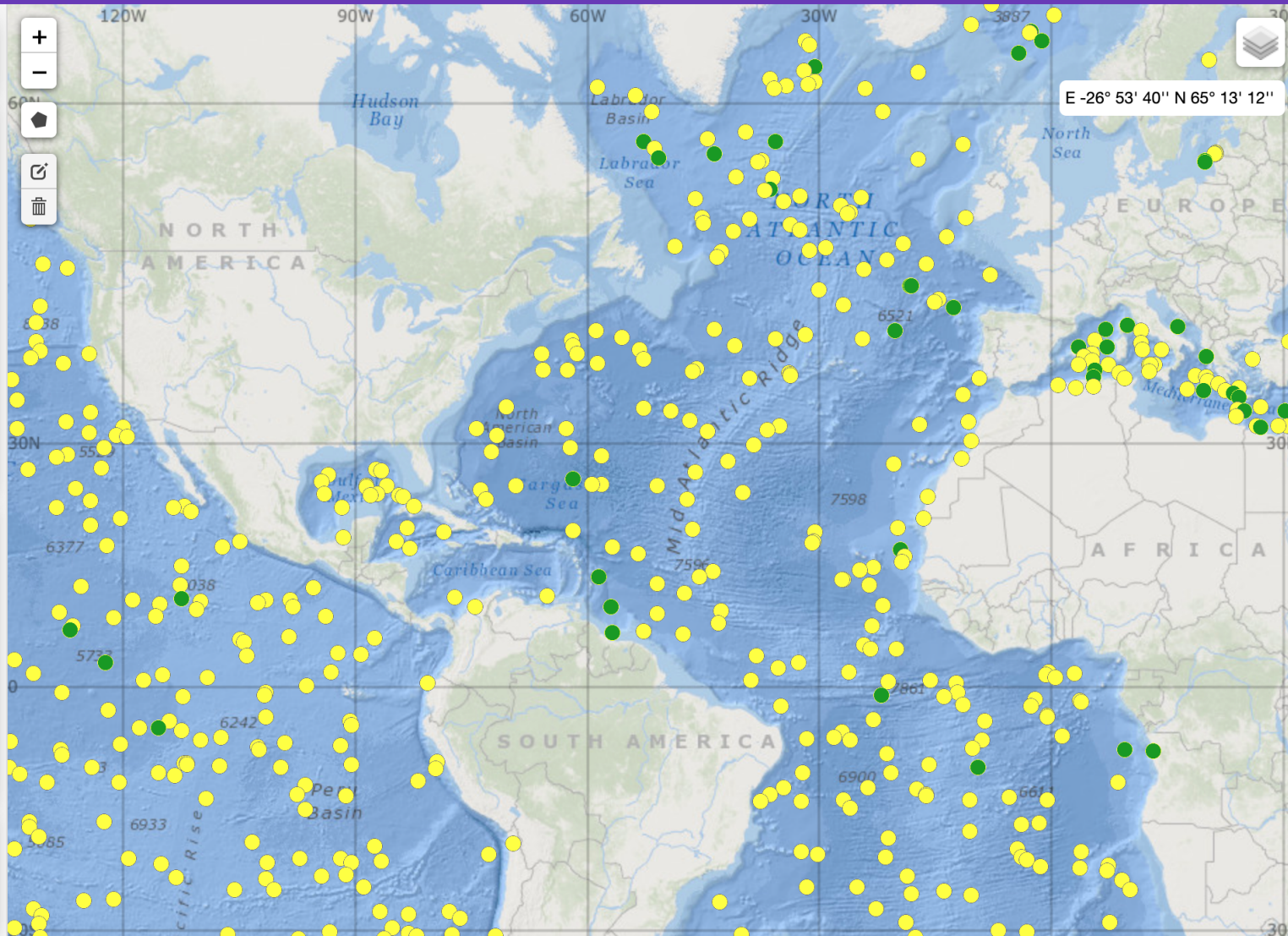
Choose Projection  
Web mercator

Profiles in 3 days, globally  
3 day window end date  
5/20/2020

Include realtime  
 Show only BGC  
 Show only Deep

**Box selection:**  
Selection Date Range:  
05/08/2020 - 05/22/2020  
Pressure range [dbar]:  
min pres: 0 max pres: 2000

Search platform #



Toggle to show/hide profiles in a 3-day window, globally.

Select end date for the 3-day window.

**Display options:**

Choose Projection  
Web mercator

Profiles in 3 days, globally  
3 day window end date  
5/20/2020

Include realtime  
 Show only BGC  
 Show only Deep

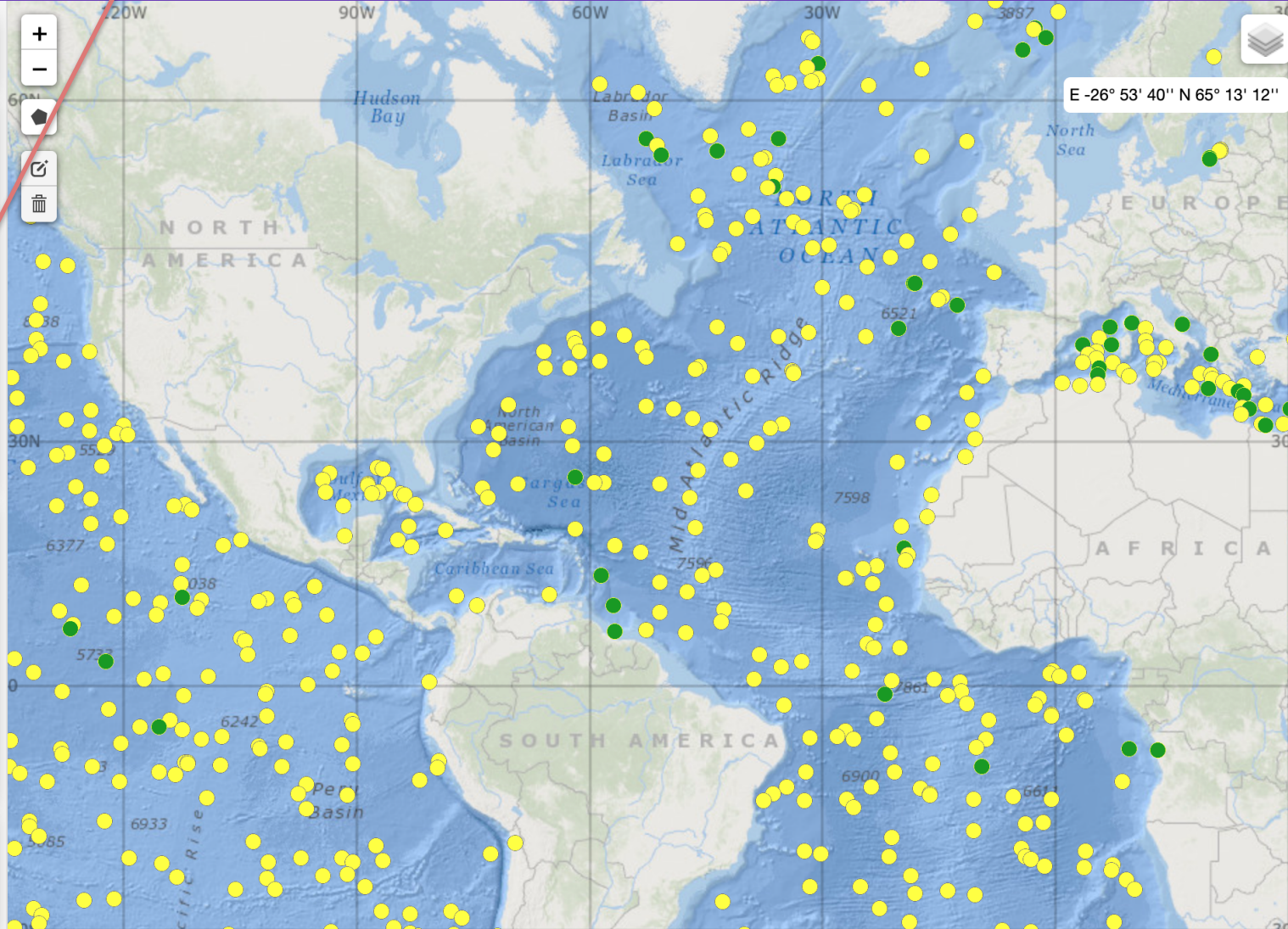
**Box selection:**

Selection Date Range:  
05/08/2020 - 05/22/2020

Pressure range [dbar]:

min pres: 0 max pres: 2000

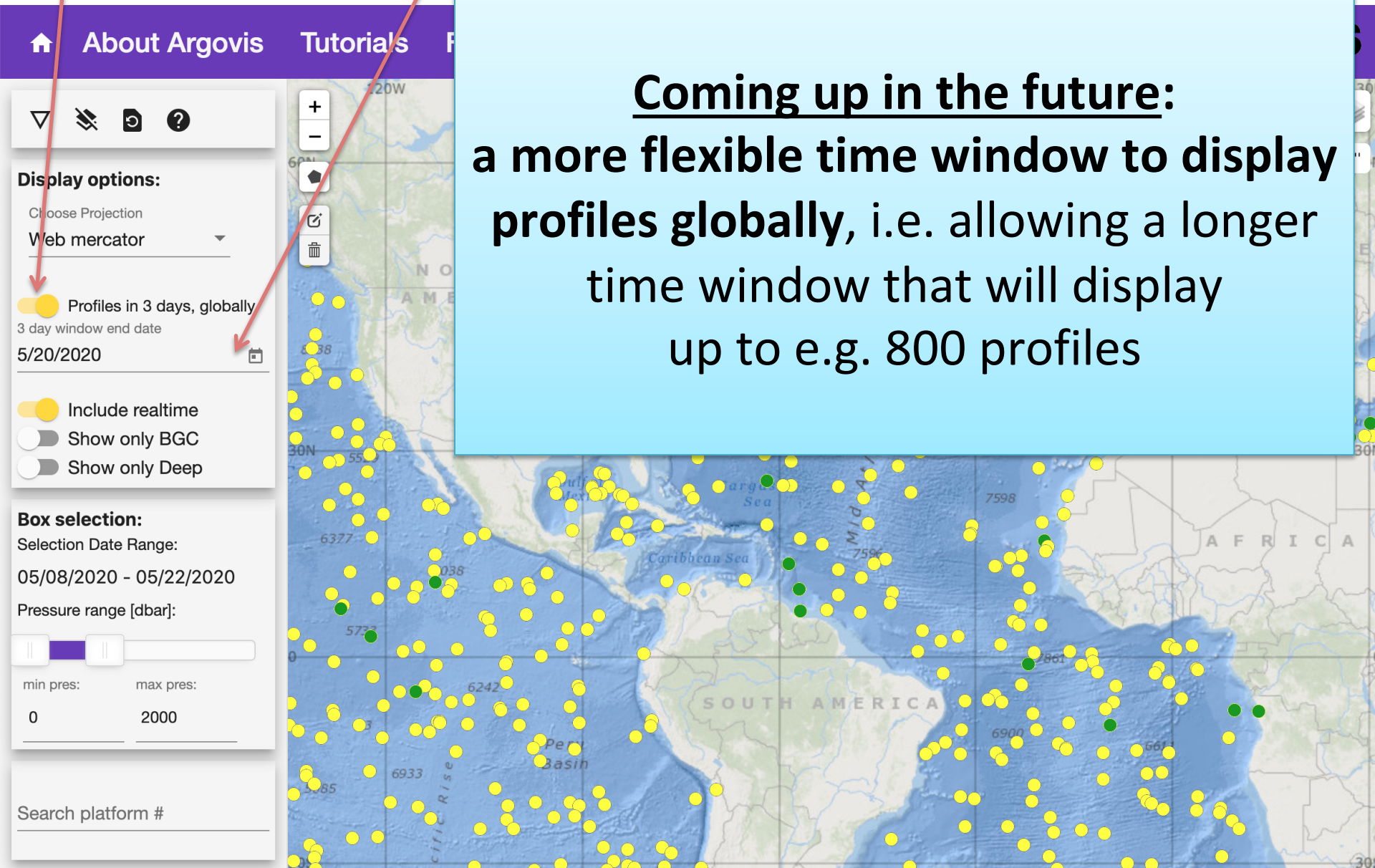
Search platform #



Toggle to show/hide profiles in a 3-day window, globally.

Select end date for the 3-day window.

**Coming up in the future:**  
**a more flexible time window to display profiles globally, i.e. allowing a longer time window that will display up to e.g. 800 profiles**

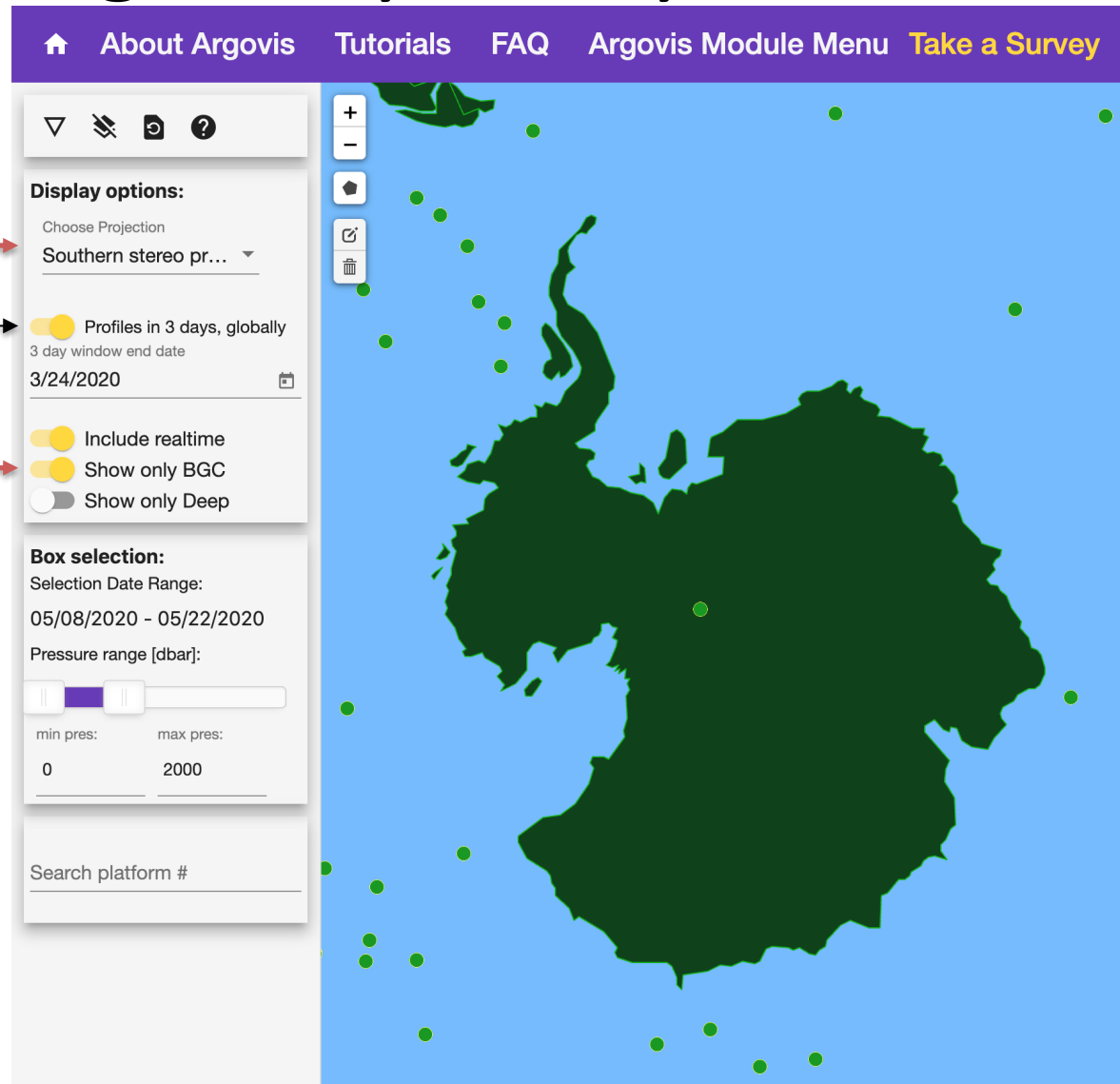


# Visualize profiles globally: 3-day window

Select projection.

Toggle to show/hide profiles in a 3-day window, globally.

Toggle to show only BGC Argo.



Home About Argovis Tutorials FAQ Argovis Module Menu Take a Survey

Display options:

Choose Projection  
Southern stereo pr...

Profiles in 3 days, globally  
3 day window end date  
3/24/2020

Include realtime  
 Show only BGC  
 Show only Deep

Box selection:

Selection Date Range:  
05/08/2020 - 05/22/2020

Pressure range [dbar]:

min pres: 0 max pres: 2000

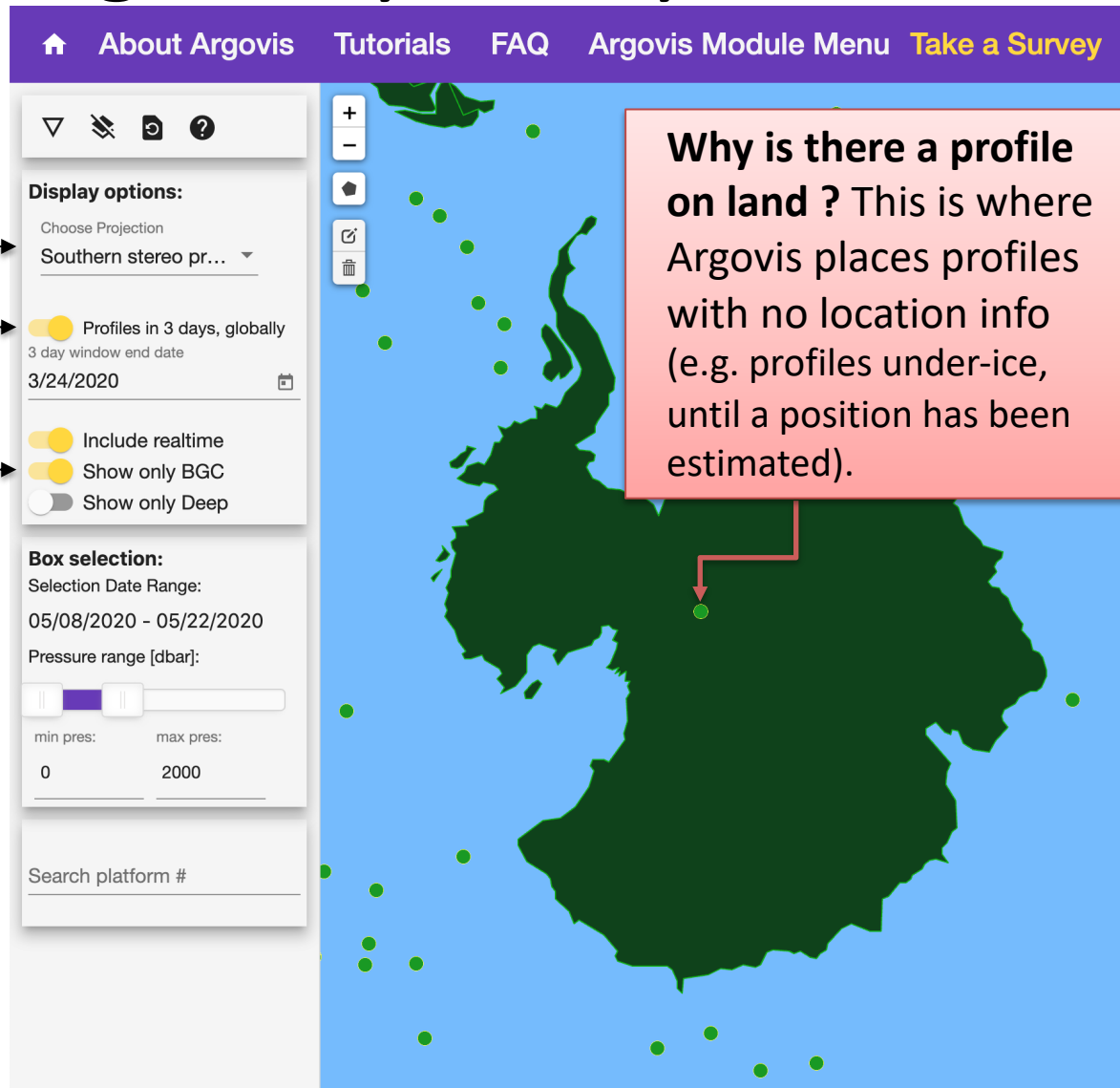
Search platform #

# Visualize profiles globally: 3-day window

Select projection.

Toggle to show/hide profiles in a 3-day window, globally.

Toggle to show only BGC Argo.



Home About Argovis Tutorials FAQ Argovis Module Menu Take a Survey

Display options:  
Choose Projection  
Southern stereo pr...  
Profiles in 3 days, globally  
3 day window end date  
3/24/2020  
Include realtime  
Show only BGC  
Show only Deep

Box selection:  
Selection Date Range:  
05/08/2020 - 05/22/2020  
Pressure range [dbar]:  
min pres: 0 max pres: 2000  
Search platform #

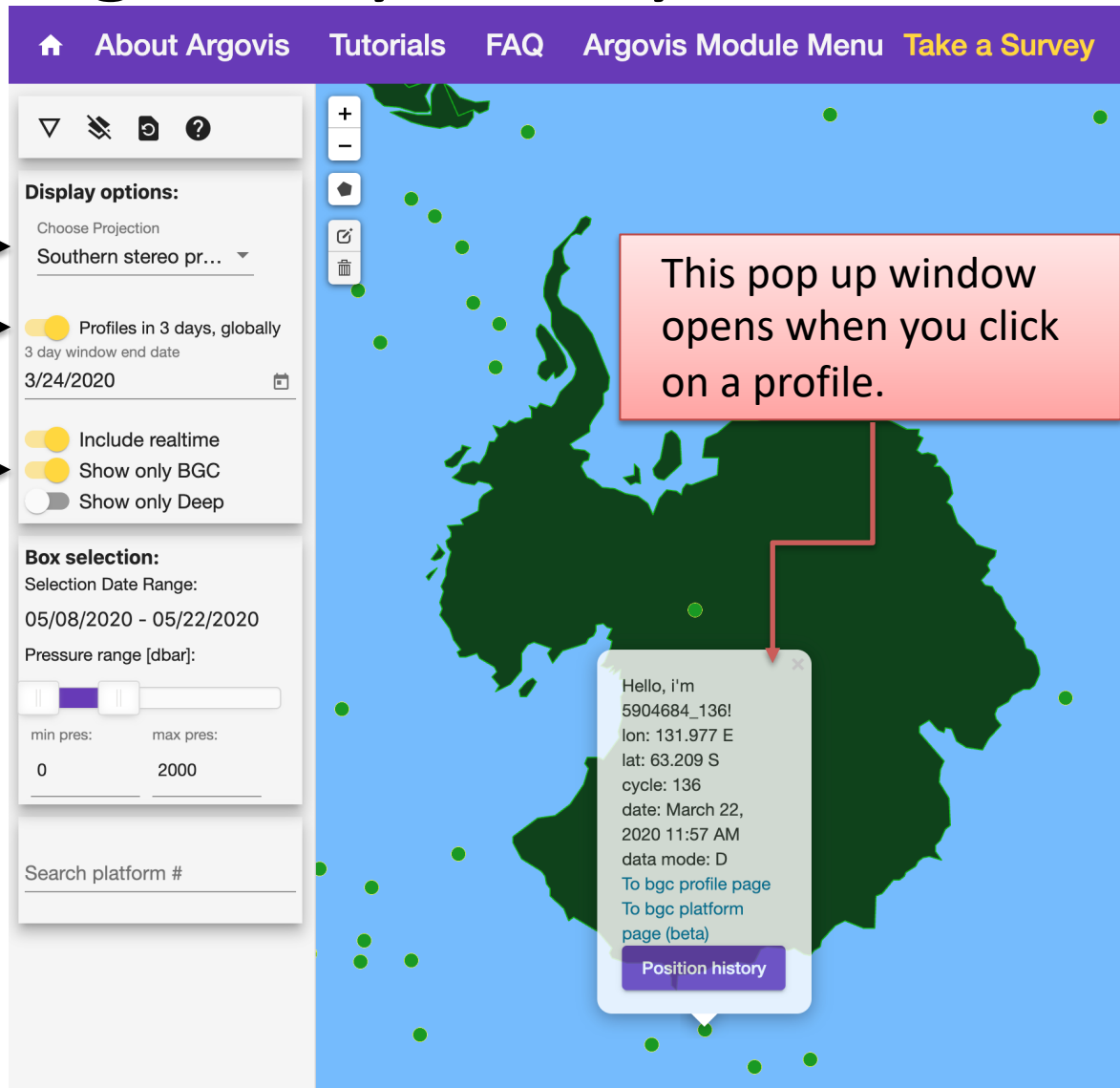
Why is there a profile on land? This is where Argovis places profiles with no location info (e.g. profiles under-ice, until a position has been estimated).

# Visualize profiles globally: 3-day window

Select projection.

Toggle to show/hide profiles in a 3-day window, globally.

Toggle to show only BGC Argo.



The screenshot shows the Argovis web application interface. At the top is a purple navigation bar with links: Home, About Argovis, Tutorials, FAQ, Argovis Module Menu, and Take a Survey. Below the navigation bar is a control panel on the left and a global map on the right. The control panel includes a 'Display options' section with a 'Choose Projection' dropdown set to 'Southern stereo pr...', a 'Profiles in 3 days, globally' toggle (checked), a '3 day window end date' of '3/24/2020', and three other toggles: 'Include realtime' (checked), 'Show only BGC' (checked), and 'Show only Deep' (unchecked). Below this is a 'Box selection' section with a 'Selection Date Range' of '05/08/2020 - 05/22/2020' and a 'Pressure range [dbar]' slider set from 0 to 2000. At the bottom of the control panel is a 'Search platform #' input field. The map on the right shows a global view with green dots representing profiles. A red arrow points from a text box to a profile dot, which has opened a pop-up window. The pop-up window contains the following text: 'Hello, i'm 5904684\_136!', 'lon: 131.977 E', 'lat: 63.209 S', 'cycle: 136', 'date: March 22, 2020 11:57 AM', 'data mode: D', and two links: 'To bgc profile page' and 'To bgc platform page (beta)'. A purple button labeled 'Position history' is at the bottom of the pop-up window.

This pop up window opens when you click on a profile.

Hello, i'm  
5904684\_136!  
lon: 131.977 E  
lat: 63.209 S  
cycle: 136  
date: March 22,  
2020 11:57 AM  
data mode: D  
[To bgc profile page](#)  
[To bgc platform page \(beta\)](#)  
[Position history](#)

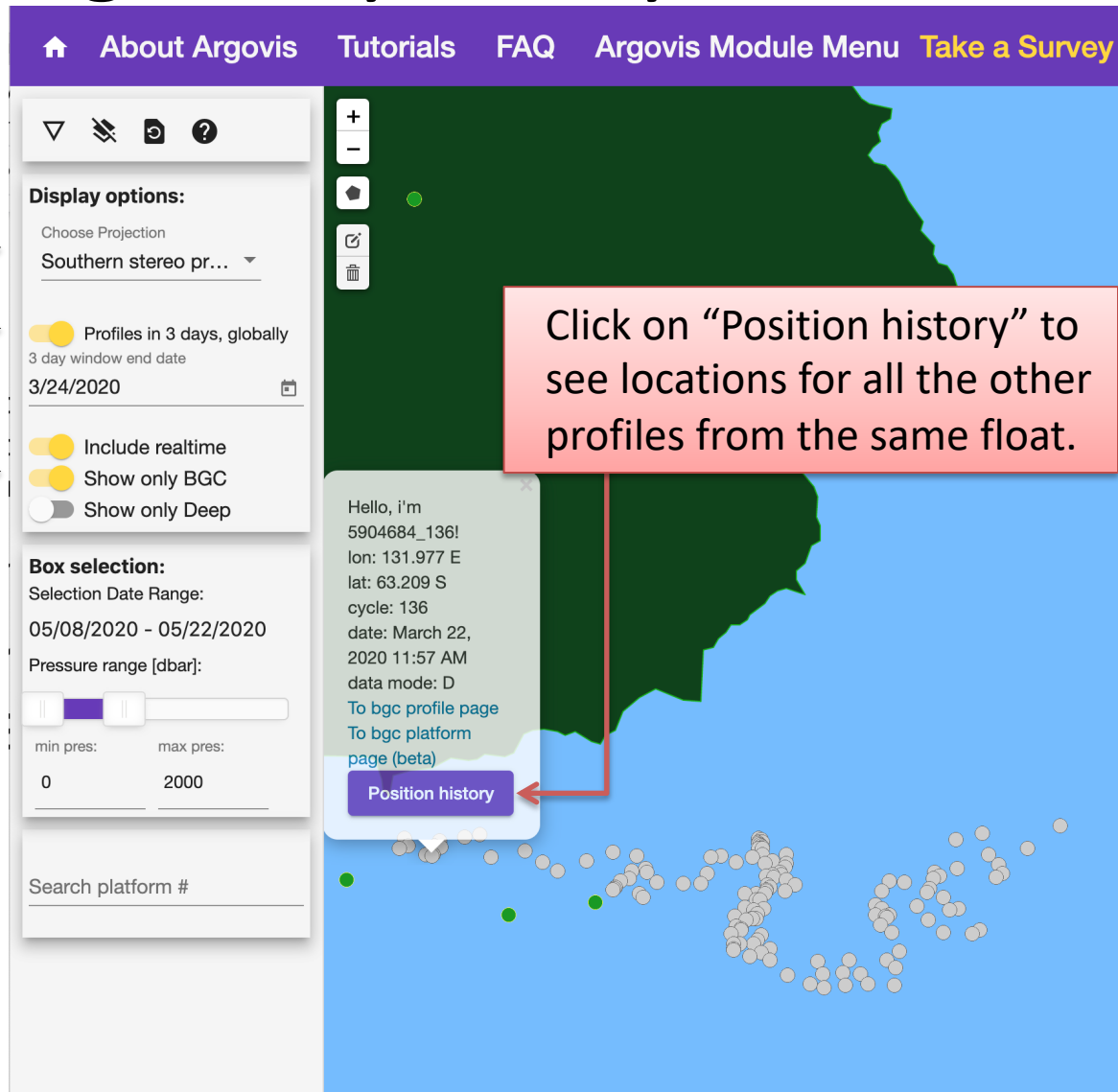


# Visualize profiles globally: 3-day window

Select projection.

Toggle to show/hide profiles in a 3-day window, globally.

Toggle to show only BGC Argo.



The screenshot shows the Argovis web interface. At the top is a purple navigation bar with links: Home, About Argovis, Tutorials, FAQ, Argovis Module Menu, and Take a Survey. Below the navigation bar is a control panel with several sections:

- Display options:** Includes a "Choose Projection" dropdown menu currently set to "Southern stereo pr...".
- Global Profile Toggle:** A yellow toggle switch is turned on, labeled "Profiles in 3 days, globally". Below it is a "3 day window end date" field set to "3/24/2020".
- Filtering Options:** Three toggle switches: "Include realtime" (on), "Show only BGC" (on), and "Show only Deep" (off).
- Box selection:** A "Selection Date Range" field is set to "05/08/2020 - 05/22/2020". Below it is a "Pressure range [dbar]" slider with "min pres:" at 0 and "max pres:" at 2000.
- Search:** A "Search platform #" input field.

On the right side of the control panel is a map of the Southern Ocean. A profile is displayed as a vertical line with a green dot at the top. A tooltip is visible over the profile, containing the following text:

Hello, i'm  
5904684\_136!  
lon: 131.977 E  
lat: 63.209 S  
cycle: 136  
date: March 22,  
2020 11:57 AM  
data mode: D  
[To bgc profile page](#)  
[To bgc platform page \(beta\)](#)  
[Position history](#)

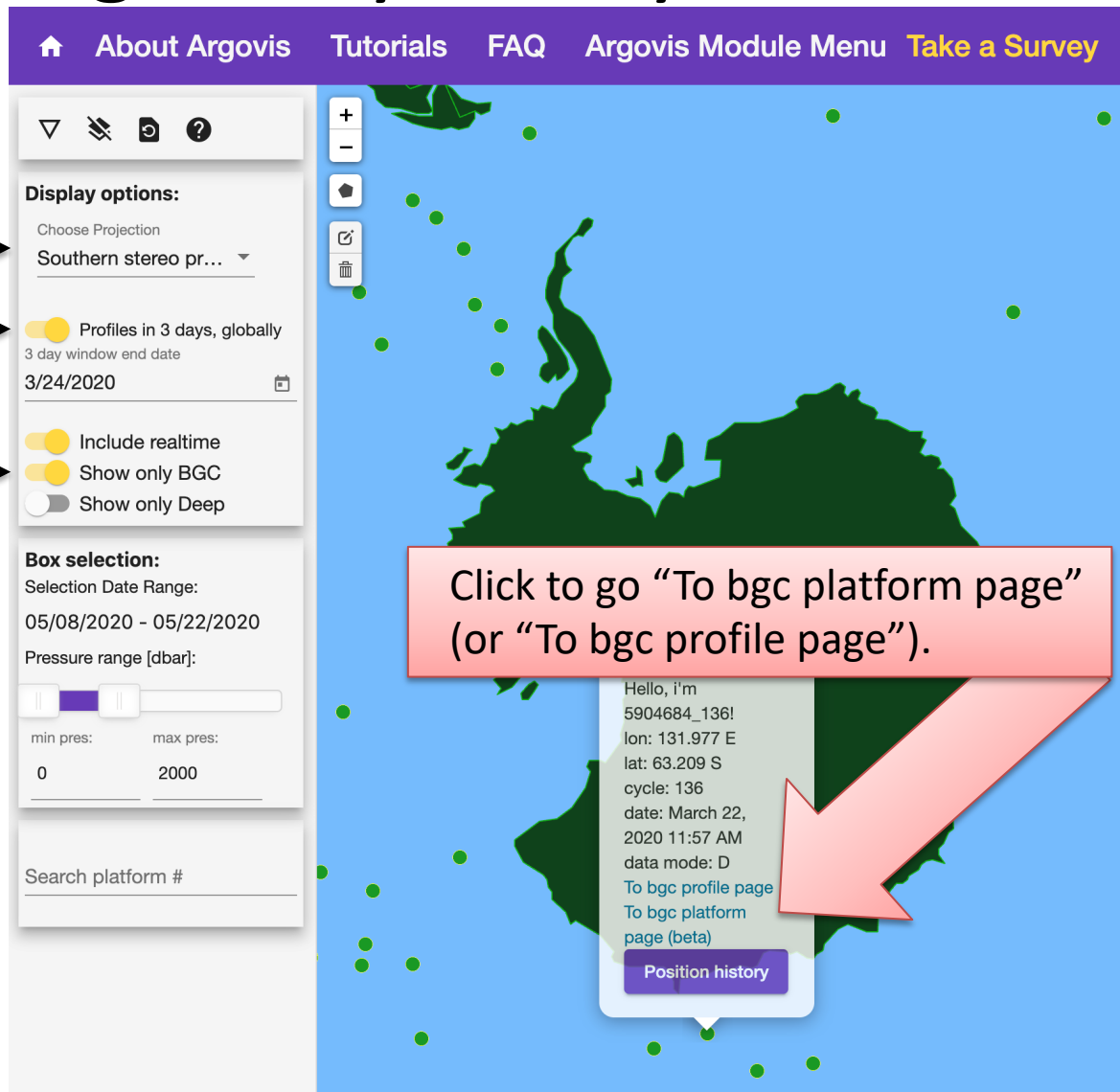
A red arrow points from a pink callout box to the "Position history" link in the tooltip. The callout box contains the text: "Click on 'Position history' to see locations for all the other profiles from the same float." The map shows a large number of grey circular markers representing other profiles from the same float, forming a track across the ocean.

# Visualize profiles globally: 3-day window

Select projection.

Toggle to show/hide profiles in a 3-day window, globally.

Toggle to show only BGC Argo.



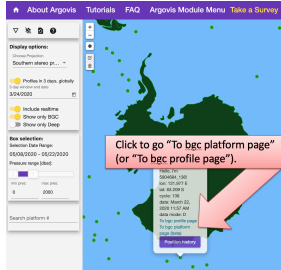
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Click to go "To bgc platform page" (or "To bgc profile page").

Hello, i'm  
5904684\_136!  
lon: 131.977 E  
lat: 63.209 S  
cycle: 136  
date: March 22,  
2020 11:57 AM  
data mode: D  
[To bgc profile page](#)  
[To bgc platform  
page \(beta\)](#)  
[Position history](#)

Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



BGC platform page

[Home](#)
[About Argovis](#)
[Tutorials](#)
[FAQ](#)
[Argovis Module Menu](#)
[Take a Survey](#)

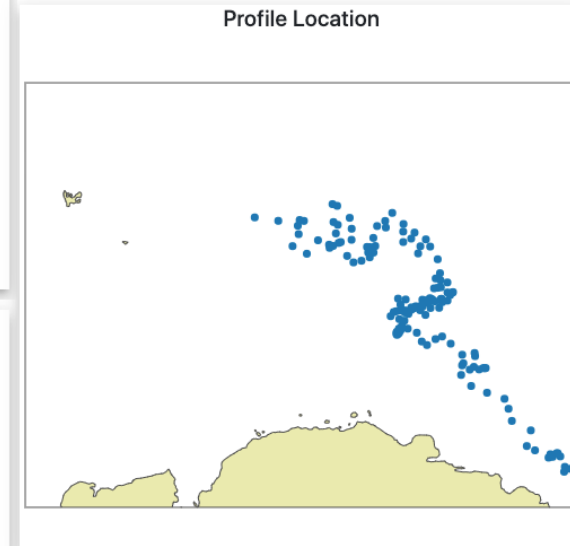
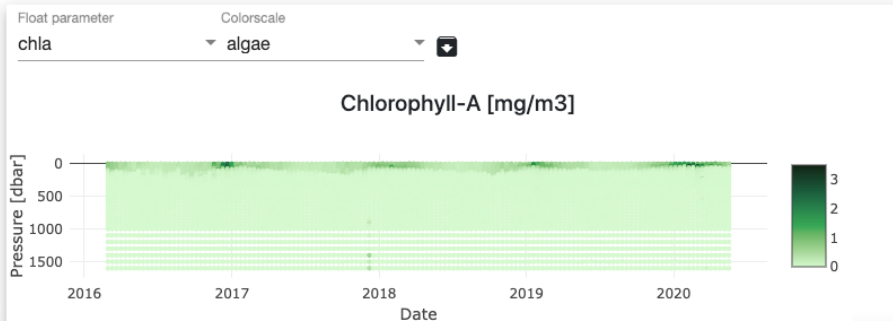
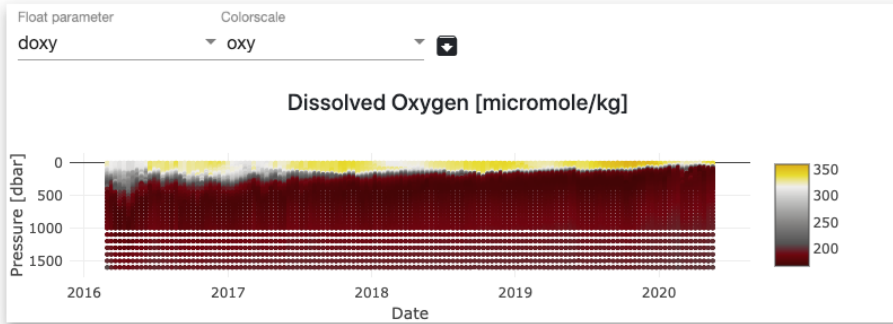


Beta Product: Still in development!

<b>Platform Number: 5904684</b>	Updated on: May 19th 2020	Number of profiles: 141 See table below for profile information. <a href="#">link to JCOMMOPS</a>
PI: STEPHEN RISER, KENNETH JOHNSON	Dac: aoml	Positioning System: GPS <a href="#">link to Fleet Monitor</a>
Station Parameters: nitrate, chla, temp, psal, ph_in_situ_total, doxy		

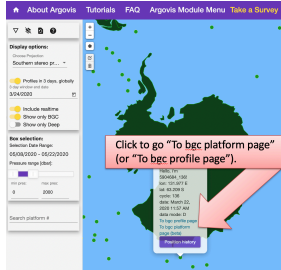
Metadata & links

Select parameter and color-scale



Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



BGC platform page

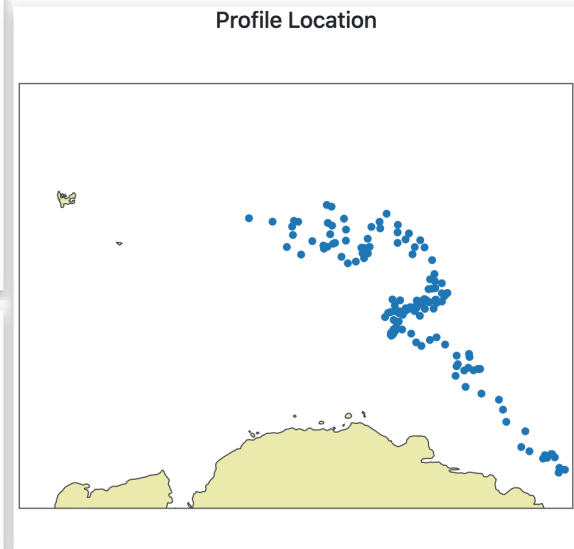
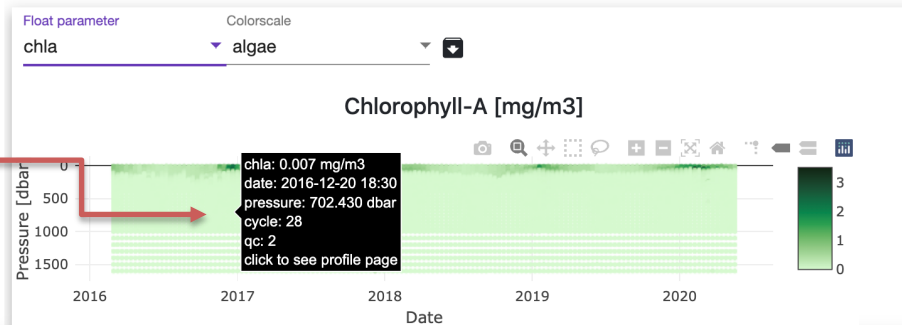
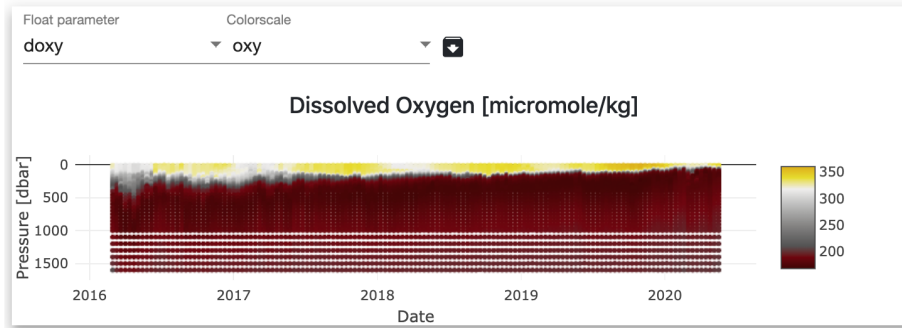
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Station Parameters: nitrate, chla, temp, psal, ph_in_situ_total, doxy		

Metadata & links

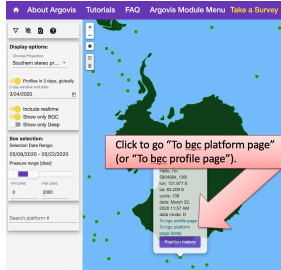
Select parameter and color-scale

Hover on a point to see qc flag



Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



BGC platform page

[About Argovis](#)
[Tutorials](#)
[FAQ](#)
[Argovis Module Menu](#)
[Take a Survey](#)

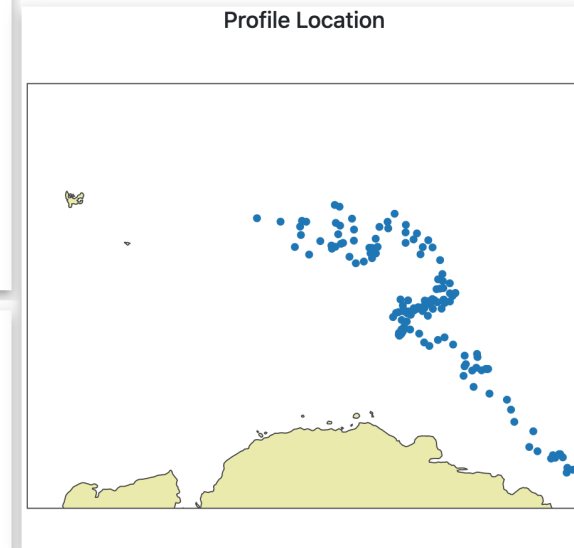
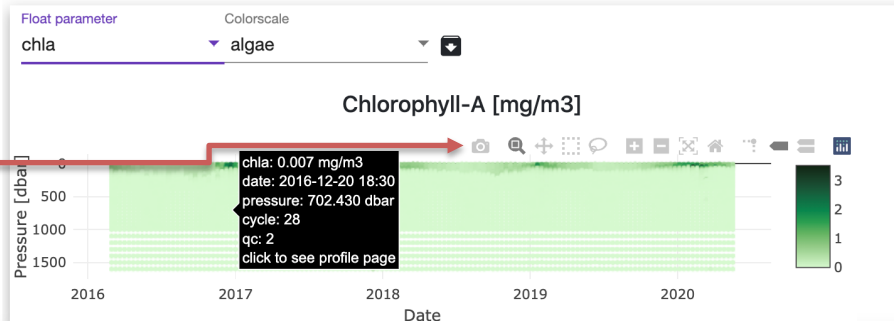
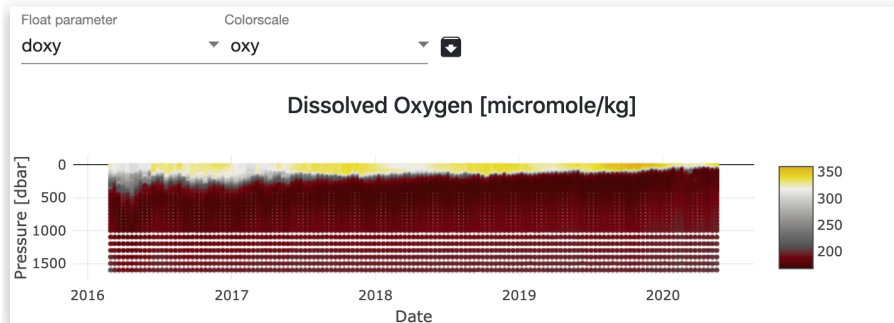
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<b>Platform Number: 5904684</b>	Updated on: May 19th 2020	Number of profiles: 141 See table below for profile information. <a href="#">link to JCOMMOPS</a>
PI: STEPHEN RISER, KENNETH JOHNSON	Dac: aoml	Positioning System: GPS <a href="#">link to Fleet Monitor</a>
Station Parameters: nitrate, chla, temp, psal, ph_in_situ_total, doxy		

Metadata & links

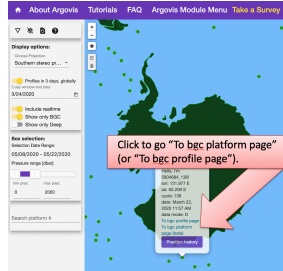
Select parameter and color-scale

Click here to download the figure.



Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



BGC platform page

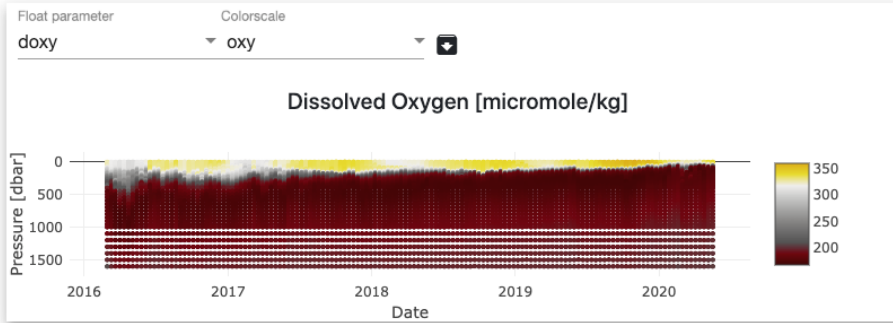
[Home](#)
[About Argovis](#)
[Tutorials](#)
[FAQ](#)
[Argovis Module Menu](#)
[Take a Survey](#)



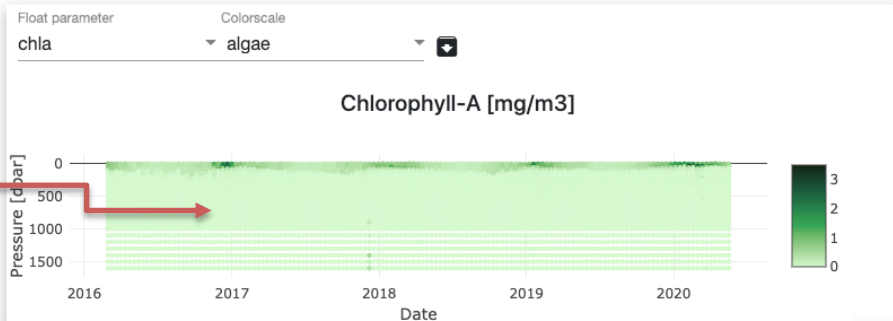
Beta Product: Still in development!

<b>Platform Number: 5904684</b>	Updated on: May 19th 2020	Number of profiles: 141 See table below for profile information. <a href="#">link to JCOMMOPS</a>
PI: STEPHEN RISER, KENNETH JOHNSON	Dac: aoml	Positioning System: GPS <a href="#">link to Fleet Monitor</a>
Station Parameters: nitrate, chla, temp, psal, ph_in_situ_total, doxy		

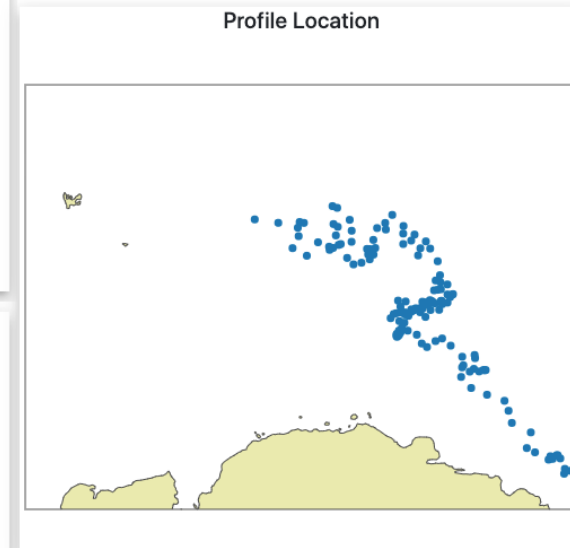
Metadata & links



Select parameter and color-scale

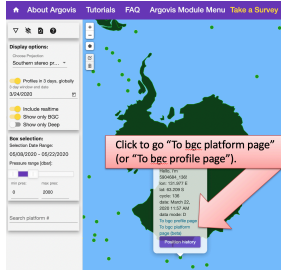


Click on any profile to go to the profile page



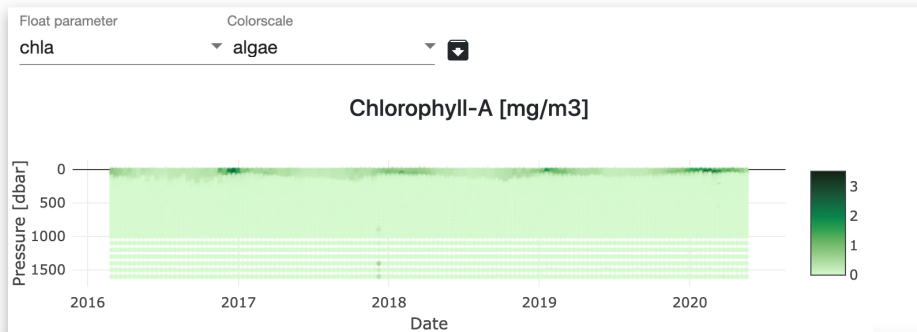
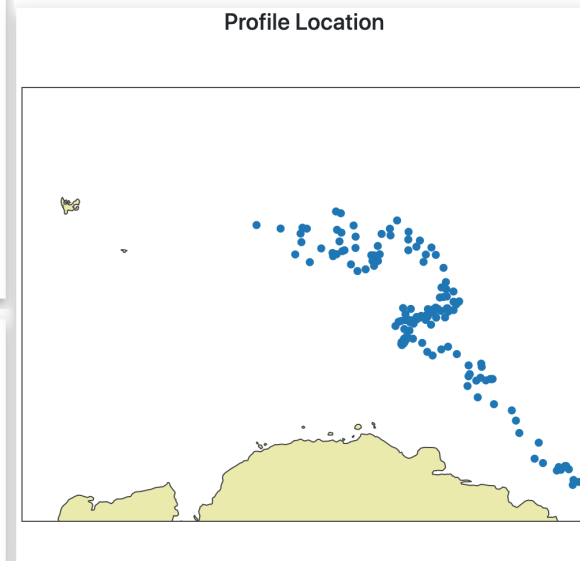
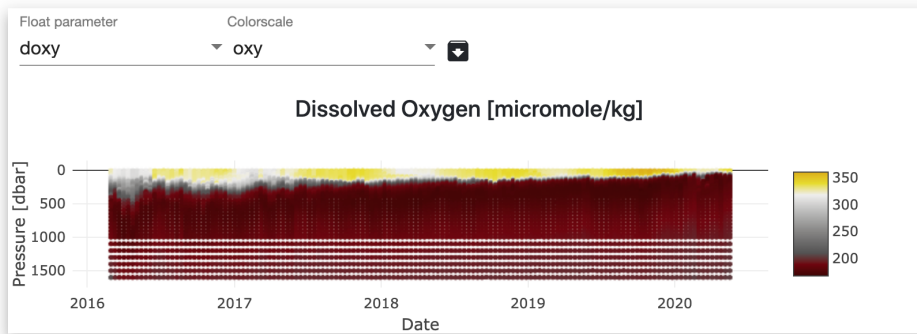
Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



BGC platform page

Click to go "To bgc platform page" (or "To bgc profile page").



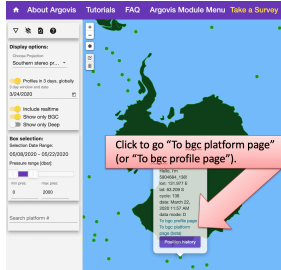
Metadata table at the end of the page: filter, sort by column or download (e.g. .xlsx, .csv, .json, .txt)

Filter

Cycle number	Link to GDAC data	Dac	Date reported	Lat	Lon	Core Data Mode
141	<a href="#">5904684_141</a>	aoml	2020-5-16	63.924 S	134.420 N	A
140	<a href="#">5904684_140</a>	aoml	2020-5-5	63.650 S	134.062 N	A
139	<a href="#">5904684_139</a>	aoml	2020-4-24	63.535 S	134.921 N	A

Beta (recently upgraded page, currently only available for BGC floats)

# Visualize Argo profiles for a platform



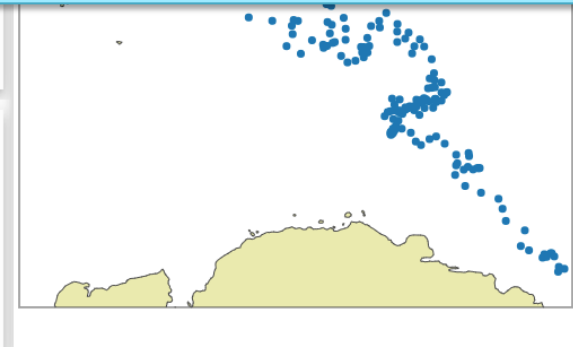
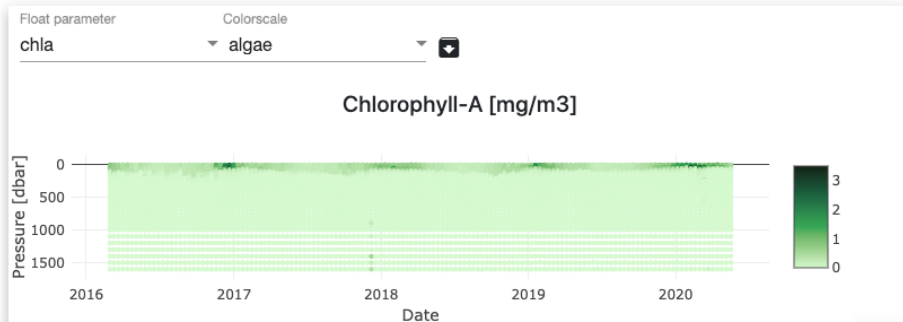
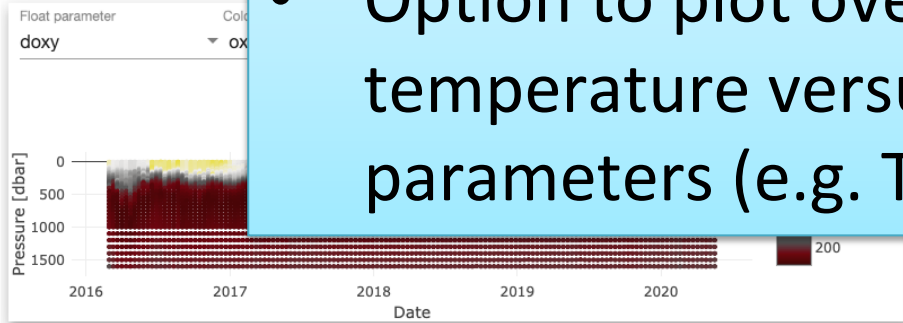
BGC platform page

About Argovis  
Beta Product: Still in development

Platform Number: 59046  
PI: STEPHEN RISER, KENNETH JOHNSON  
Station Parameters: nitrate,

## Coming up in the future:

- Option to change colorbar limits
- Option to plot overlaid profiles and temperature versus other parameters (e.g. TS diagrams)





# Visualize Argo profiles for a platform

This option is currently available for platform pages for Argo core variables (T, S, p). Note: separate pages for Argo core variables are available also for bgc floats as they include a selection criteria based on QC.

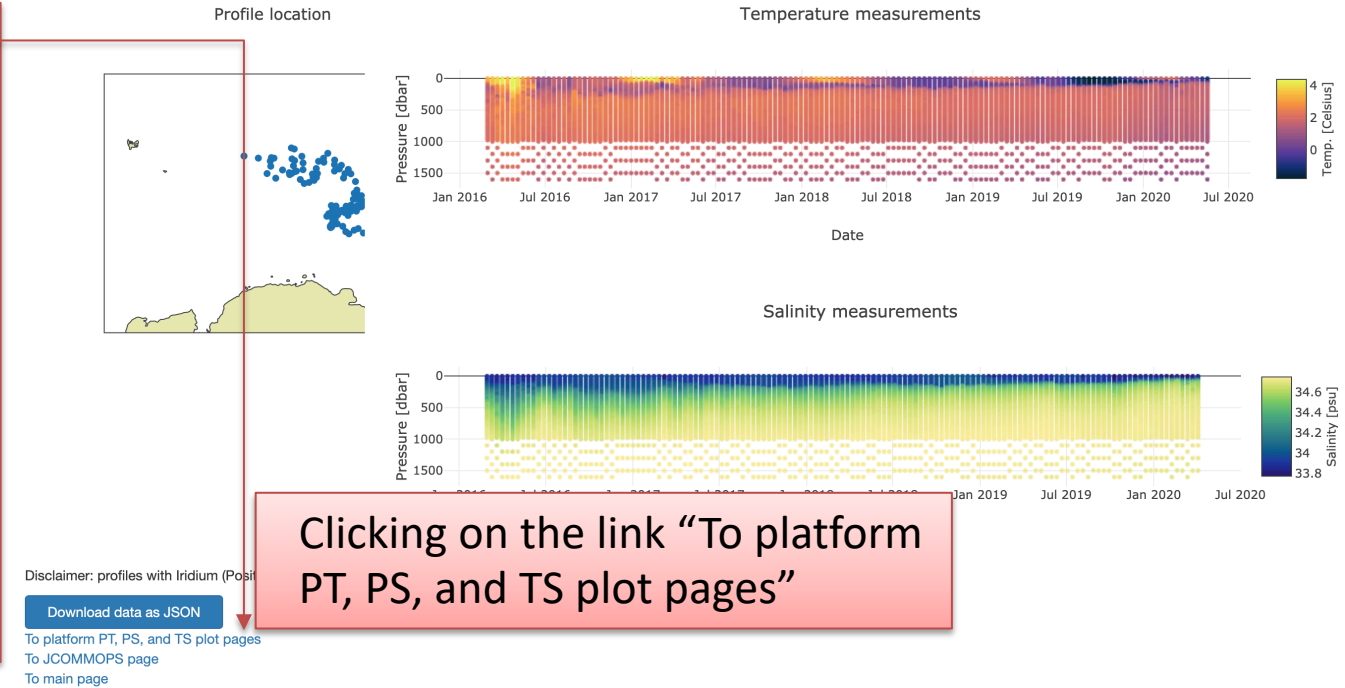
## Coming up in the future:

- Option to change colorbar limits
- **Option to plot overlaid profiles and temperature versus other parameters (e.g. TS diagrams)**

# Visualize Argo profiles for a platform

Core Argo platform page

This option is currently available for platform pages for Argo core variables (T, S, p). Note: separate pages for Argo core variables are available also for bgc floats as they include a selection criteria based on QC.



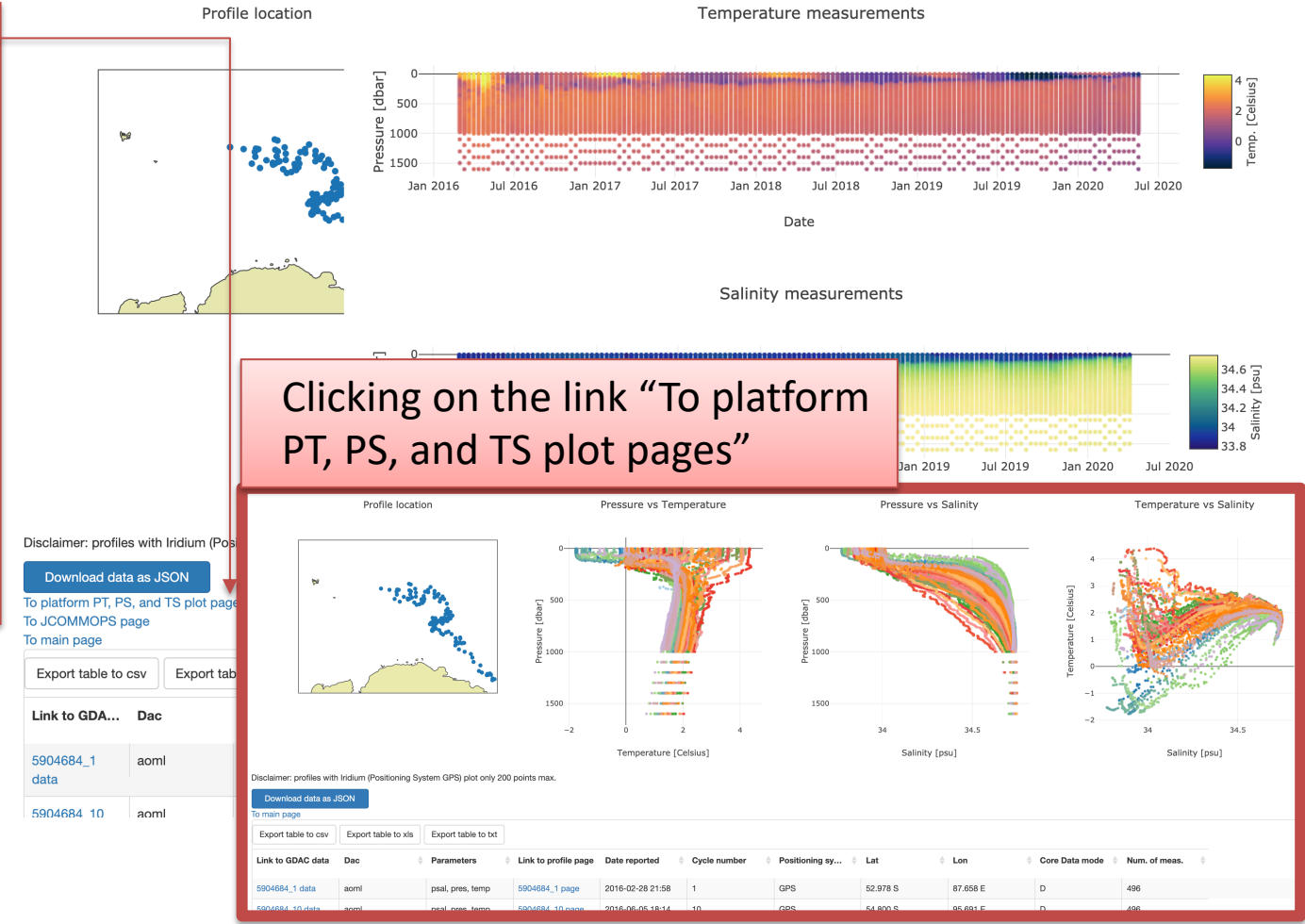
Clicking on the link "To platform PT, PS, and TS plot pages"

Link to GDA...	Dac	Parameters	Positioning ...	Lat	Lon	Link to profi...	Date rep...	Cycle nu...	Core Da...	Num. of ...
<a href="#">5904684_1 data</a>	aoml	psal, pres, temp	GPS	52.978 S	87.658 E	<a href="#">5904684_1 page</a>	2016-02-28 21:58	1	D	496
<a href="#">5904684 10</a>	aoml	psal, pres.	GPS	54.800 S	95.691 E	<a href="#">5904684 10</a>	2016-06-05	10	D	496

# Visualize Argo profiles for a platform

Core Argo platform page

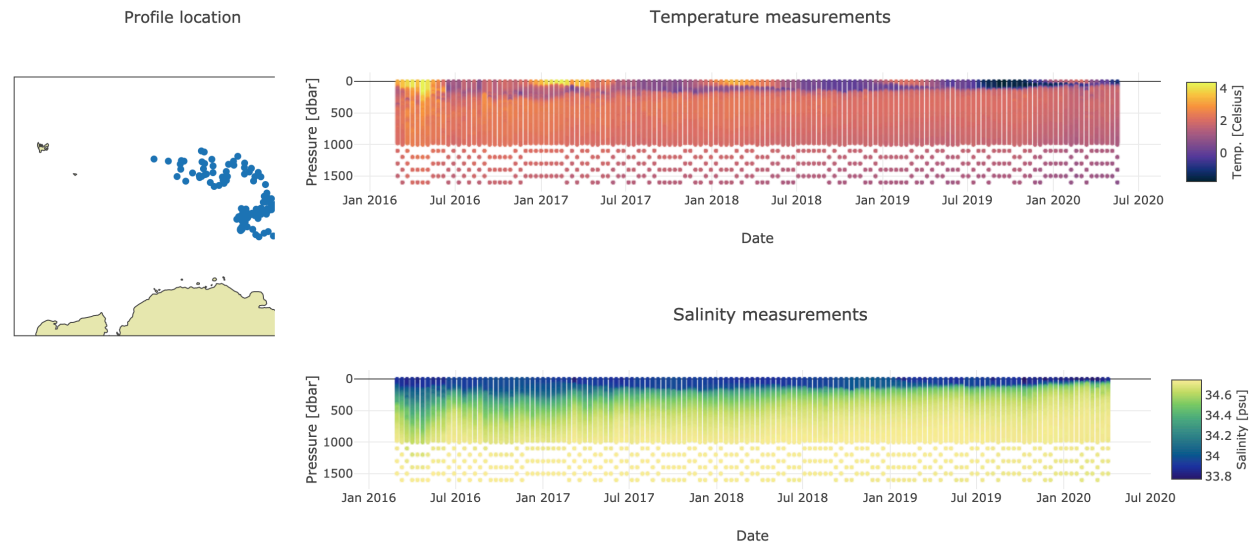
This option is currently available for platform pages for Argo core variables (T, S, p). Note: separate pages for Argo core variables are available also for bgc floats as they include a selection criteria based on QC.



# Visualize Argo profiles for a platform

The current platform page for core Argo will be upgraded to a similar format as the new bgc platform page.

## Core Argo platform page



Disclaimer: profiles with Iridium (Positioning System GPS) plot only 200 points max.

[Download data as JSON](#)

[To platform PT, PS, and TS plot pages](#)

[To JCOMMOPS page](#)

[To main page](#)

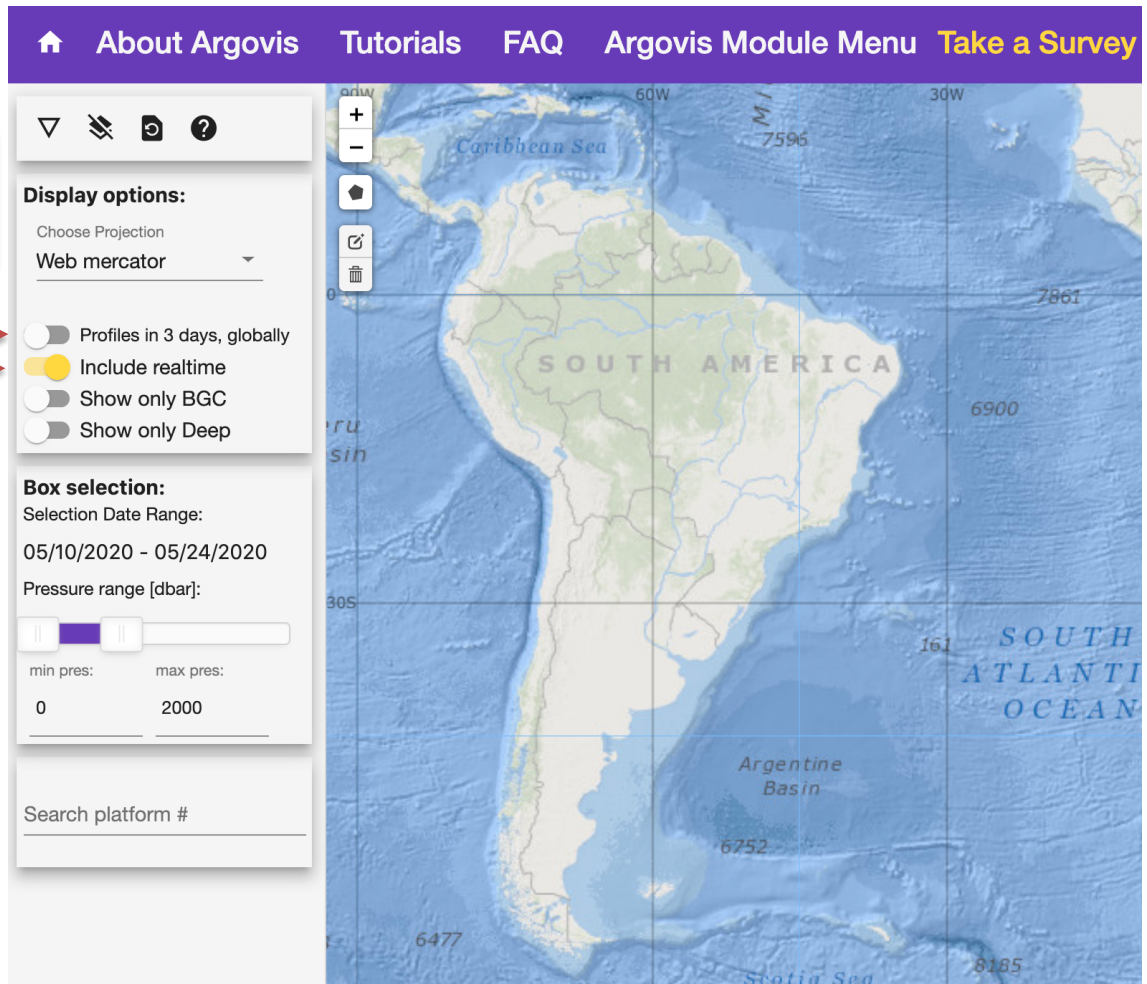
Export table to csv    Export table to xls    Export table to txt

Link to GDA...	Dac	Parameters	Positioning ...	Lat	Lon	Link to profi...	Date rep...	Cycle nu...	Core Da...	Num. of ...
<a href="#">5904684_1 data</a>	aoml	psal, pres, temp	GPS	52.978 S	87.658 E	<a href="#">5904684_1 page</a>	2016-02-28 21:58	1	D	496
<a href="#">5904684_10</a>	aoml	psal, pres.	GPS	54.800 S	95.691 E	<a href="#">5904684_10</a>	2016-06-05	10	D	496

# Visualize Argo data by location and time

Toggle to show/hide profiles in 3 days globally.

Toggle to include realtime profiles.

A screenshot of the Argovis web application interface. The top navigation bar is purple and contains links for "About Argovis", "Tutorials", "FAQ", "Argovis Module Menu", and "Take a Survey". Below the navigation bar is a control panel with several sections: "Display options:" with a "Choose Projection" dropdown set to "Web mercator"; a list of four toggle switches: "Profiles in 3 days, globally" (checked), "Include realtime" (checked), "Show only BGC" (unchecked), and "Show only Deep" (unchecked); "Box selection:" with a "Selection Date Range" of "05/10/2020 - 05/24/2020" and a "Pressure range [dbar]" slider set from 0 to 2000; and a "Search platform #" input field. To the right of the control panel is a map of South America and the surrounding oceans (Caribbean Sea, South Atlantic Ocean, Scotia Sea, Argentine Basin). The map shows bathymetry and a grid of latitude and longitude lines. The text "SOUTH AMERICA" is overlaid on the continent.

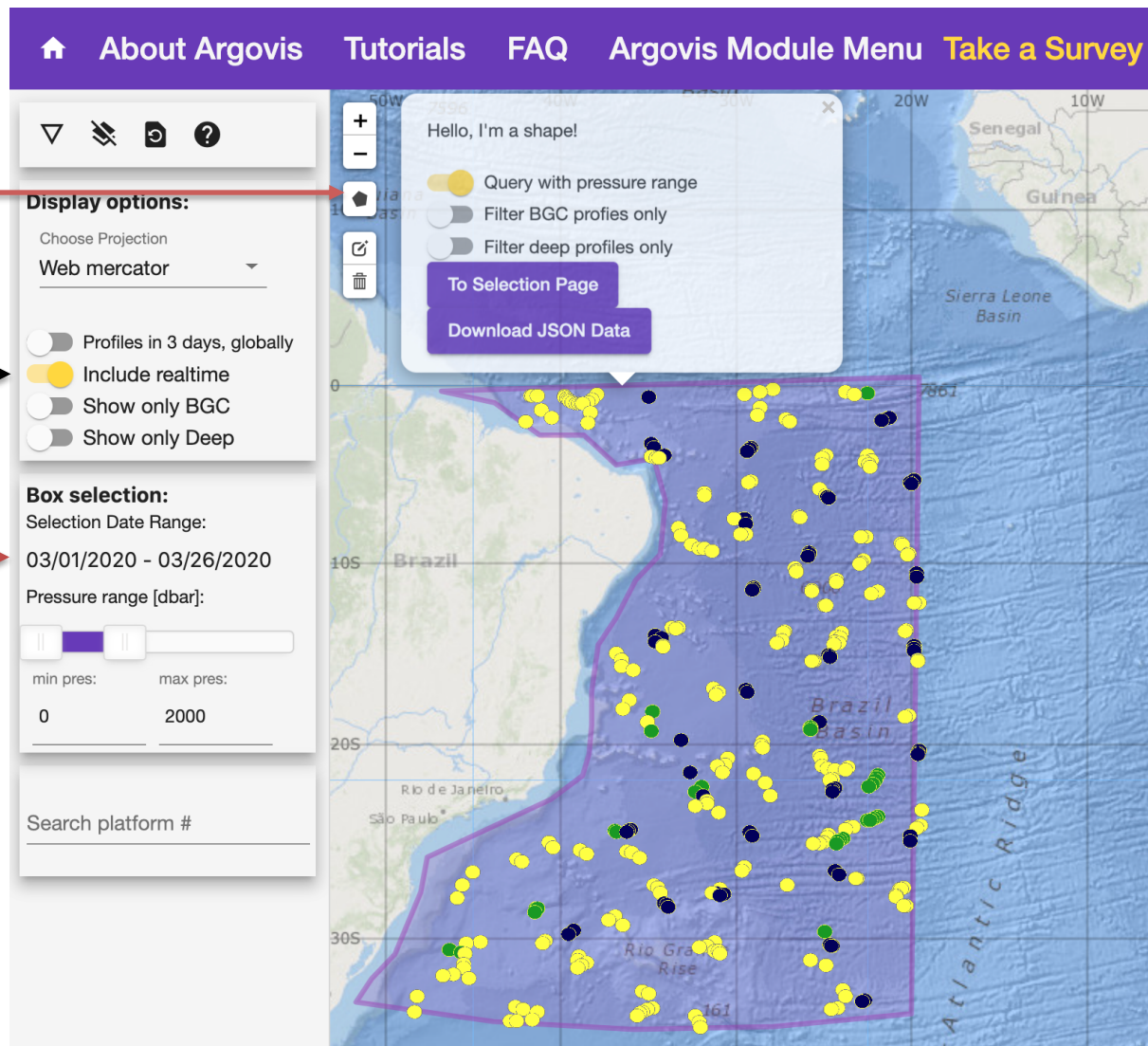
# Visualize Argo data by location and time

Draw *any* shape of interest.

Toggle to include realtime profiles.

Select time period.

NOTE: If space/time query is too large, the system will send a warning.



The screenshot shows the Argovis web interface. At the top is a navigation menu with links: [Home](#), [About Argovis](#), [Tutorials](#), [FAQ](#), [Argovis Module Menu](#), and [Take a Survey](#). Below the menu is a toolbar with icons for zooming, pan, and help. A control panel on the left contains the following sections:

- Display options:**
  - Choose Projection: Web mercator
  - Profiles in 3 days, globally:
  - Include realtime:
  - Show only BGC:
  - Show only Deep:
- Box selection:**
  - Selection Date Range: 03/01/2020 - 03/26/2020
  - Pressure range [dbar]:  (min pres: 0, max pres: 2000)
  - Search platform #:

A map of the Atlantic Ocean is displayed, showing a purple selection box around the Brazil Basin. A pop-up window titled "Hello, I'm a shape!" is overlaid on the map, containing the following options:

- Query with pressure range
- Filter BGC profiles only
- Filter deep profiles only
- [To Selection Page](#)
- [Download JSON Data](#)

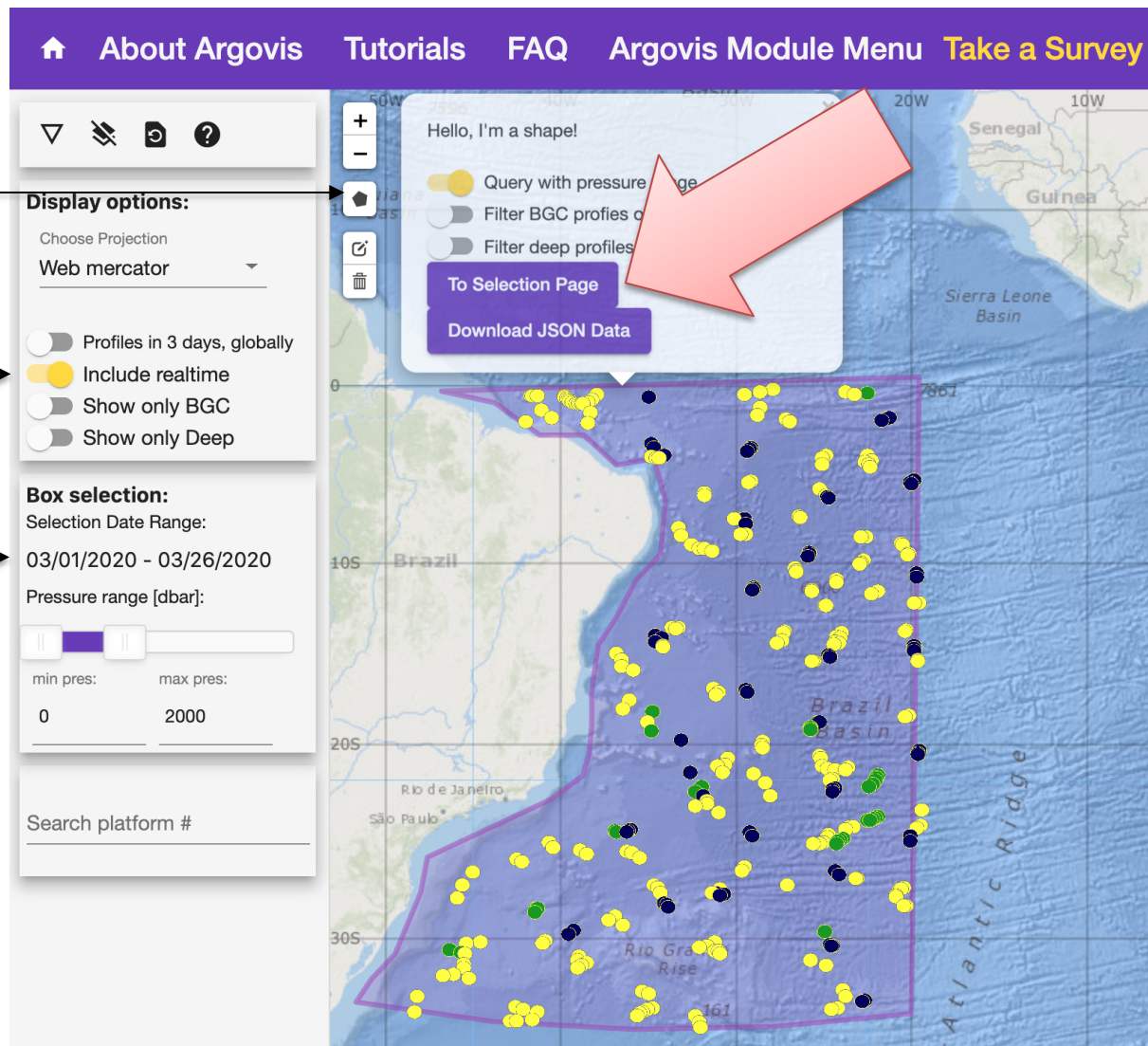
# Visualize Argo data by location and time

Draw *any* shape of interest.

Toggle to include realtime profiles.

Select time period.

NOTE: If space/time query is too large, the system will send a warning.



# Visualize Argo data by location and time

Selection Page

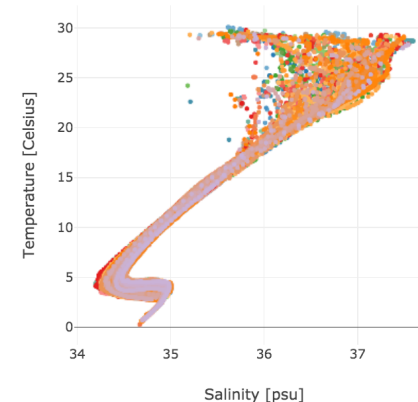
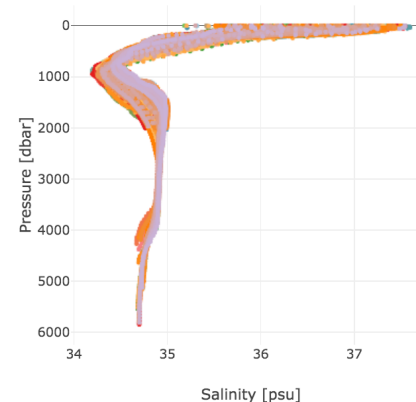
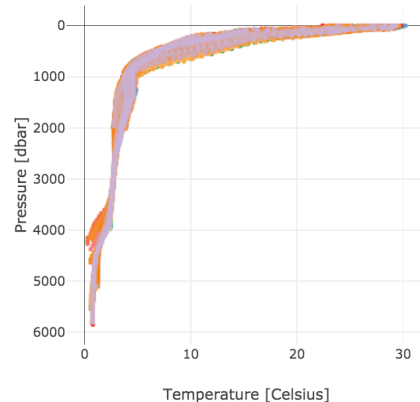
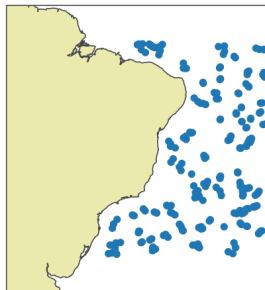
(work in progress for BGC variables)

Profile location

Pressure vs Temperature

Pressure vs Salinity

Temperature vs Salinity



Disclaimer: profiles with Iridium (Positioning System GPS) plot only 200 points max.

Download data as JSON

[To main page](#)

Export table to csv    Export table to xls    Export table to txt

Link to GDAC data	Dac	Parameters	Link to profile p...	Date reported	Cycle number	Positioning s...	Lat	Lon	Core Data M...	Num. of meas.
<a href="#">3902399_14 data</a>	bodc	temp, pres, psal	<a href="#">3902399_14 page</a>	2020-03-25 20:53	14	ARGOS	24.746 S	25.490 W	R	100
<a href="#">3902169_23 data</a>	aoml	pres, psal, temp	<a href="#">3902169_23 page</a>	2020-03-25 20:10	23	GPS	0.069 S	38.418 W	R	1013
<a href="#">3902167_48 data</a>	aoml	temp, pres	<a href="#">3902167_48 page</a>	2020-03-25 19:04	48	GPS	0.137 S	42.142 W	R	1093
<a href="#">3901956_90 data</a>	bodc	temp, pres	<a href="#">3901956_90 page</a>	2020-03-25 17:56	90	GPS	9.634 S	23.420 W	R	556
<a href="#">5905981_53 data</a>	aoml	psal, temp, pres	<a href="#">5905981_53 page</a>	2020-03-25 08:39	53	GPS	28.337 S	41.955 W	A	109
<a href="#">6902984_3 data</a>	coriolis	pres, pres_qc, psal, psal_cc, temp.	<a href="#">6902984_3 page</a>	2020-03-25 07:03	3	GPS	0.005 S	22.974 W	R	957

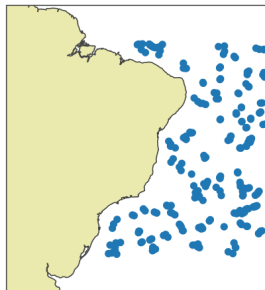


# Visualize Argo data by location and time

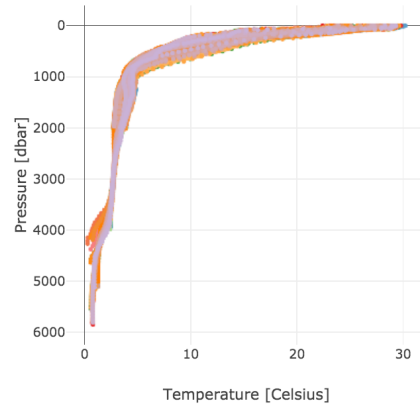
Selection Page

(work in progress for BGC variables)

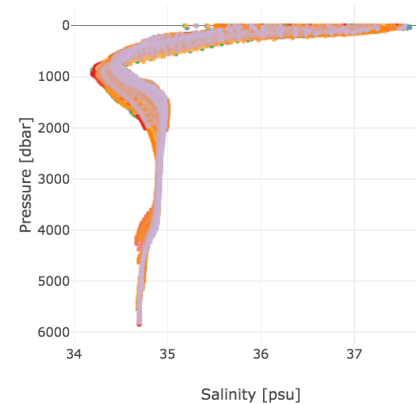
Profile location



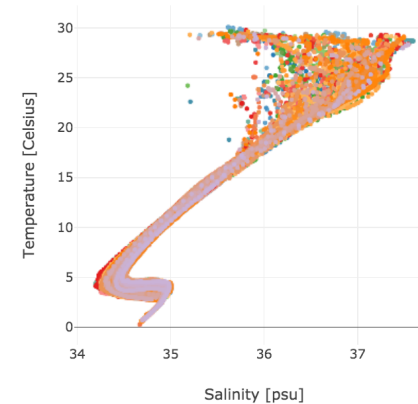
Pressure vs Temperature



Pressure vs Salinity



Temperature vs Salinity



Disclaimer: profiles with Iridium (Positioning System GPS) plot only 200 points max.

Download data as JSON

To main page

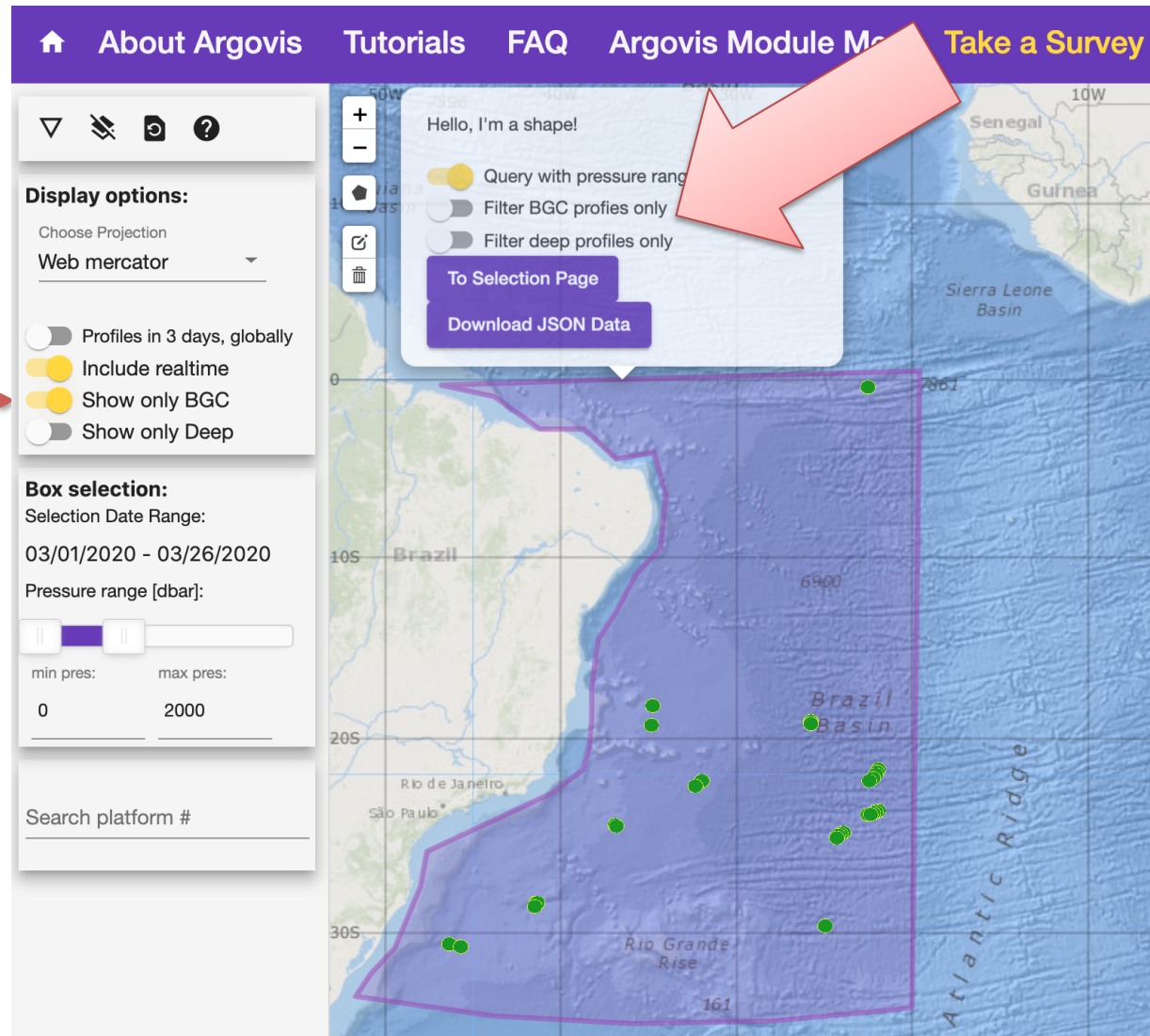
Export table to csv    Export table to xls    Export table to txt

This table can be exported as csv, xls, txt.

Link to GDAC data	Dac	Parameters	Link to profile p...	Date reported	Cycle number	Positioning s...	Lat	Lon	Core Data M...	Num. of meas.
<a href="#">3902399_14 data</a>	bodc	temp, pres, psal	<a href="#">3902399_14 page</a>	2020-03-25 20:53	14	ARGOS	24.746 S	25.490 W	R	100
<a href="#">3902169_23 data</a>	aoml	pres, psal, temp	<a href="#">3902169_23 page</a>	2020-03-25 20:10	23	GPS	0.069 S	38.418 W	R	1013
<a href="#">3902167_48 data</a>	aoml	temp, pres	<a href="#">3902167_48 page</a>	2020-03-25 19:04	48	GPS	0.137 S	42.142 W	R	1093
<a href="#">3901956_90 data</a>	bodc	temp, pres	<a href="#">3901956_90 page</a>	2020-03-25 17:56	90	GPS	9.634 S	23.420 W	R	556
<a href="#">5905981_53 data</a>	aoml	psal, temp, pres	<a href="#">5905981_53 page</a>	2020-03-25 08:39	53	GPS	28.337 S	41.955 W	A	109
<a href="#">6902984_3 data</a>	coriolis	pres, pres_qc, psal, psal_cc, temp.	<a href="#">6902984_3 page</a>	2020-03-25 07:03	3	GPS	0.005 S	22.974 W	R	957

# Visualize Argo data by location and time

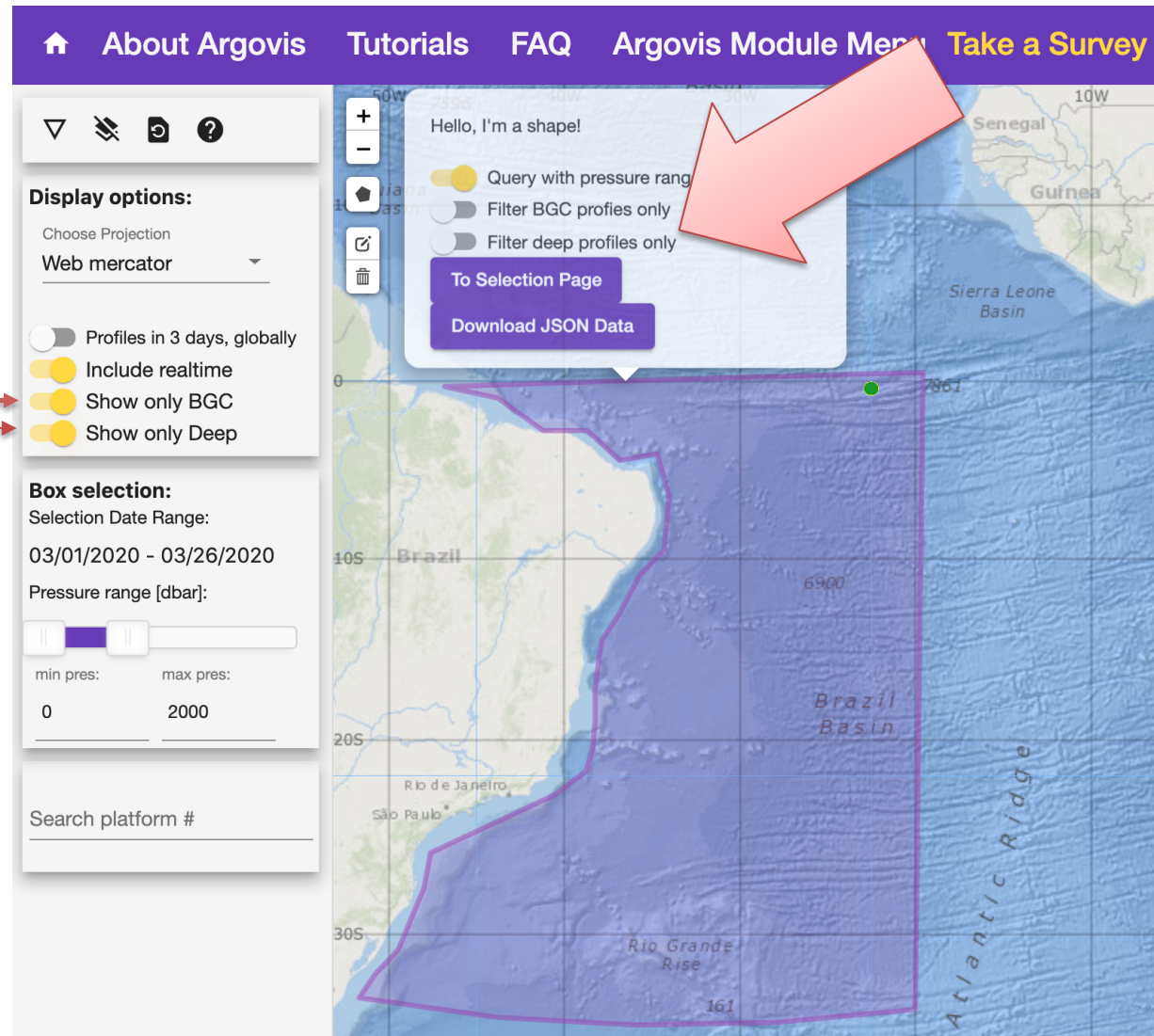
Toggle to show only BGC Argo.



# Visualize Argo data by location and time

Toggle to show only BGC Argo.

Toggle to show only Deep Argo.



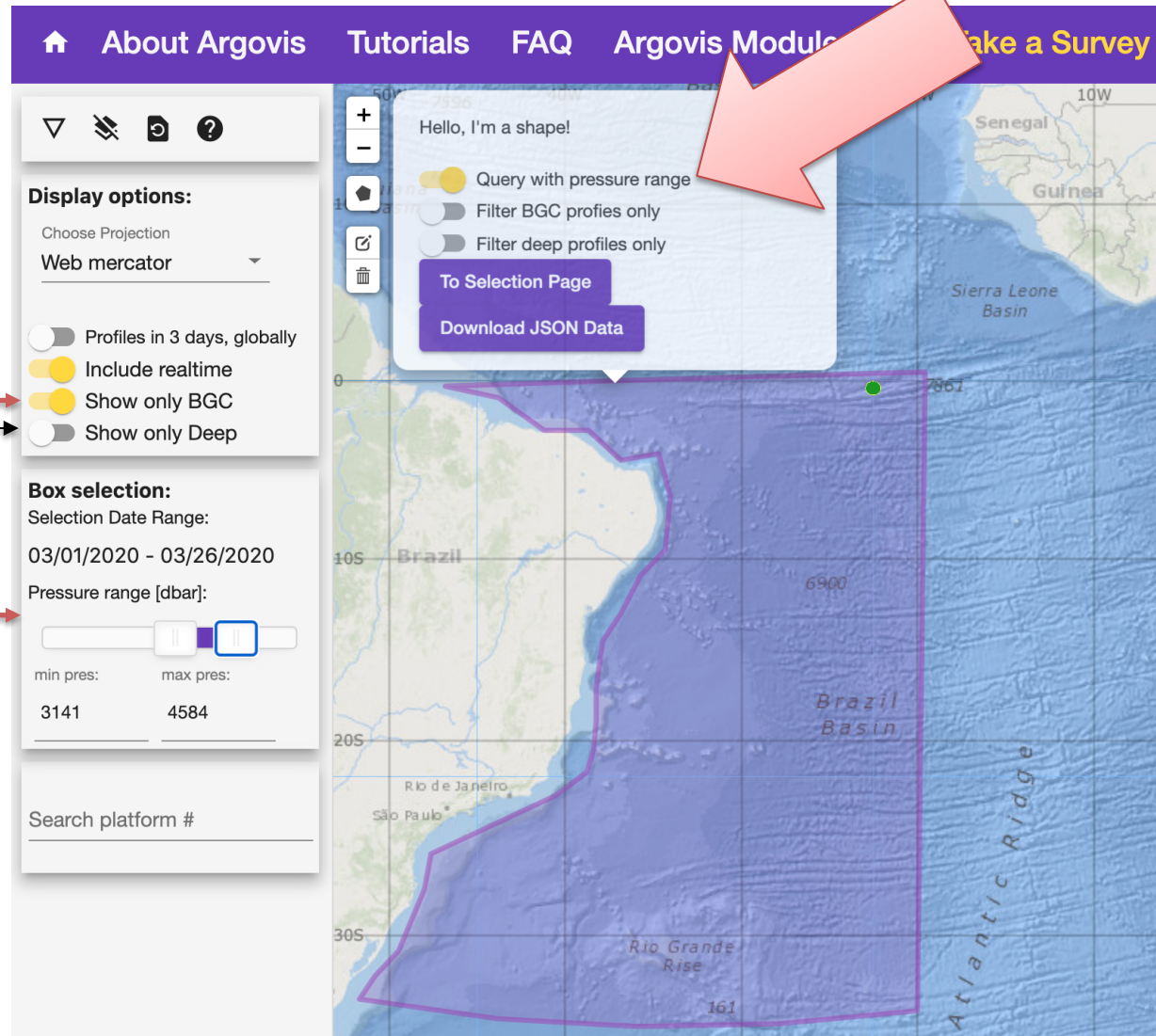
The screenshot displays the Argovis web application interface. At the top, there is a navigation bar with links for 'About Argovis', 'Tutorials', 'FAQ', 'Argovis Module Menu', and 'Take a Survey'. Below the navigation bar is a search and filter panel. The 'Display options' section includes a 'Choose Projection' dropdown set to 'Web mercator', and three toggle switches: 'Profiles in 3 days, globally' (off), 'Include realtime' (on), 'Show only BGC' (on), and 'Show only Deep' (on). The 'Box selection' section shows a 'Selection Date Range' of '03/01/2020 - 03/26/2020' and a 'Pressure range [dbar]' slider set from 0 to 2000. A 'Search platform #' field is also present. The main map area shows a bathymetric map of the Atlantic Ocean with a purple selection box around the Brazil Basin. A tooltip is visible over the map with the text 'Hello, I'm a shape!' and three toggle switches: 'Query with pressure range' (on), 'Filter BGC profiles only' (off), and 'Filter deep profiles only' (off). Below the tooltip are two buttons: 'To Selection Page' and 'Download JSON Data'. A large red arrow points from the 'Show only BGC' and 'Show only Deep' toggles in the 'Display options' panel to the tooltip.

# Visualize Argo data by location and time

Toggle to show only BGC Argo.

Toggle to show only Deep Argo.

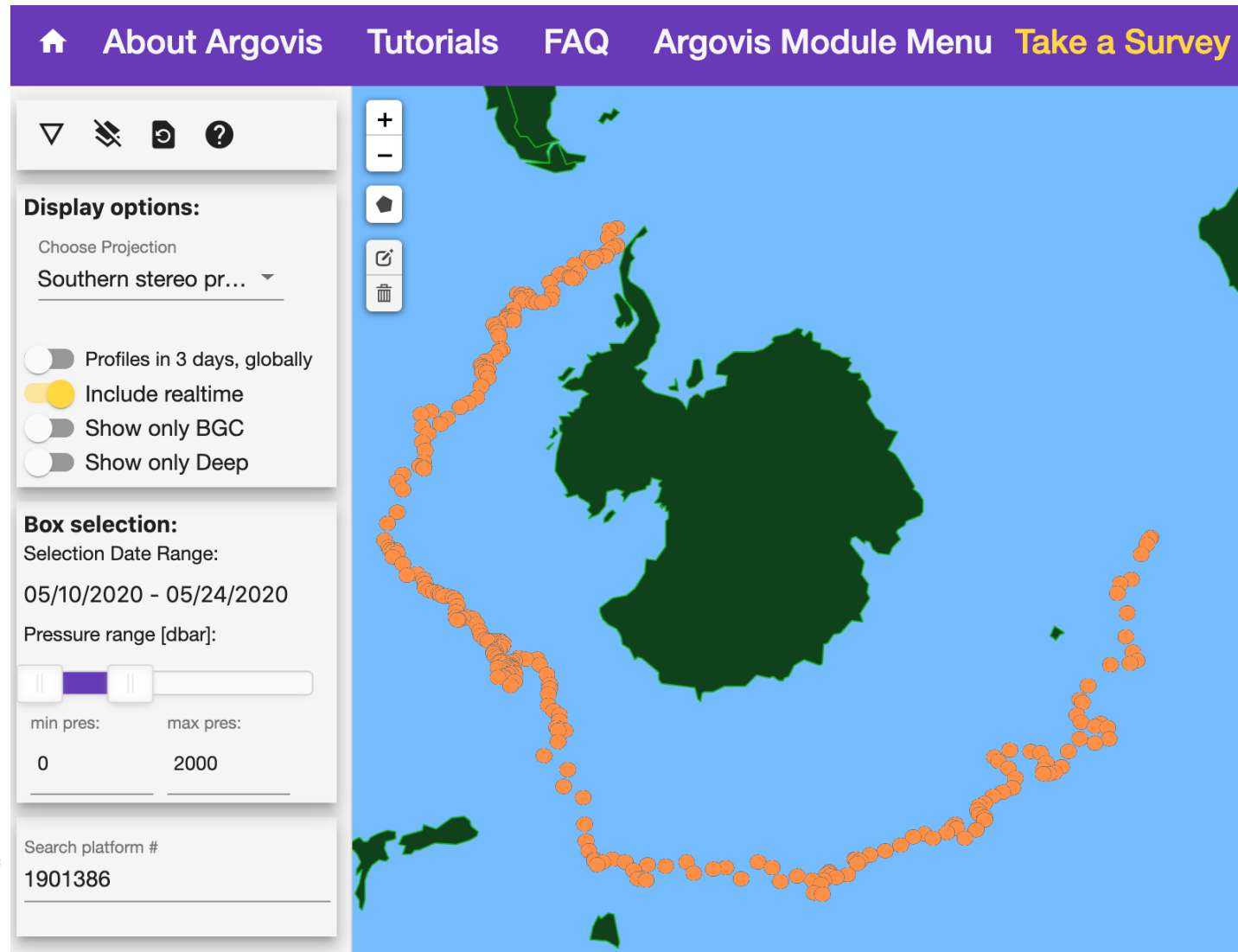
Query for pressure range of interest.



The screenshot shows the Argovis web interface. At the top is a purple navigation bar with links for 'About Argovis', 'Tutorials', 'FAQ', 'Argovis Modules', and 'Take a Survey'. Below the navigation bar is a control panel with several sections:

- Display options:** Includes a 'Choose Projection' dropdown set to 'Web mercator'. There are three toggle switches: 'Profiles in 3 days, globally' (off), 'Include realtime' (on), and 'Show only BGC' (on). Below these are two more toggle switches: 'Show only Deep' (off).
- Box selection:** Includes a 'Selection Date Range' field set to '03/01/2020 - 03/26/2020'. Below it is a 'Pressure range [dbar]' slider with 'min pres:' set to 3141 and 'max pres:' set to 4584. At the bottom of this section is a 'Search platform #' input field.
- Map:** A bathymetric map of the Atlantic Ocean with a purple box selection. A green dot is visible on the map. A tooltip is open over the map with the text 'Hello, I'm a shape!' and three toggle switches: 'Query with pressure range' (on), 'Filter BGC profiles only' (off), and 'Filter deep profiles only' (off). Below the tooltip are two buttons: 'To Selection Page' and 'Download JSON Data'. A large red arrow points from the top right towards the tooltip.

# Locate Argo profiles for a platform

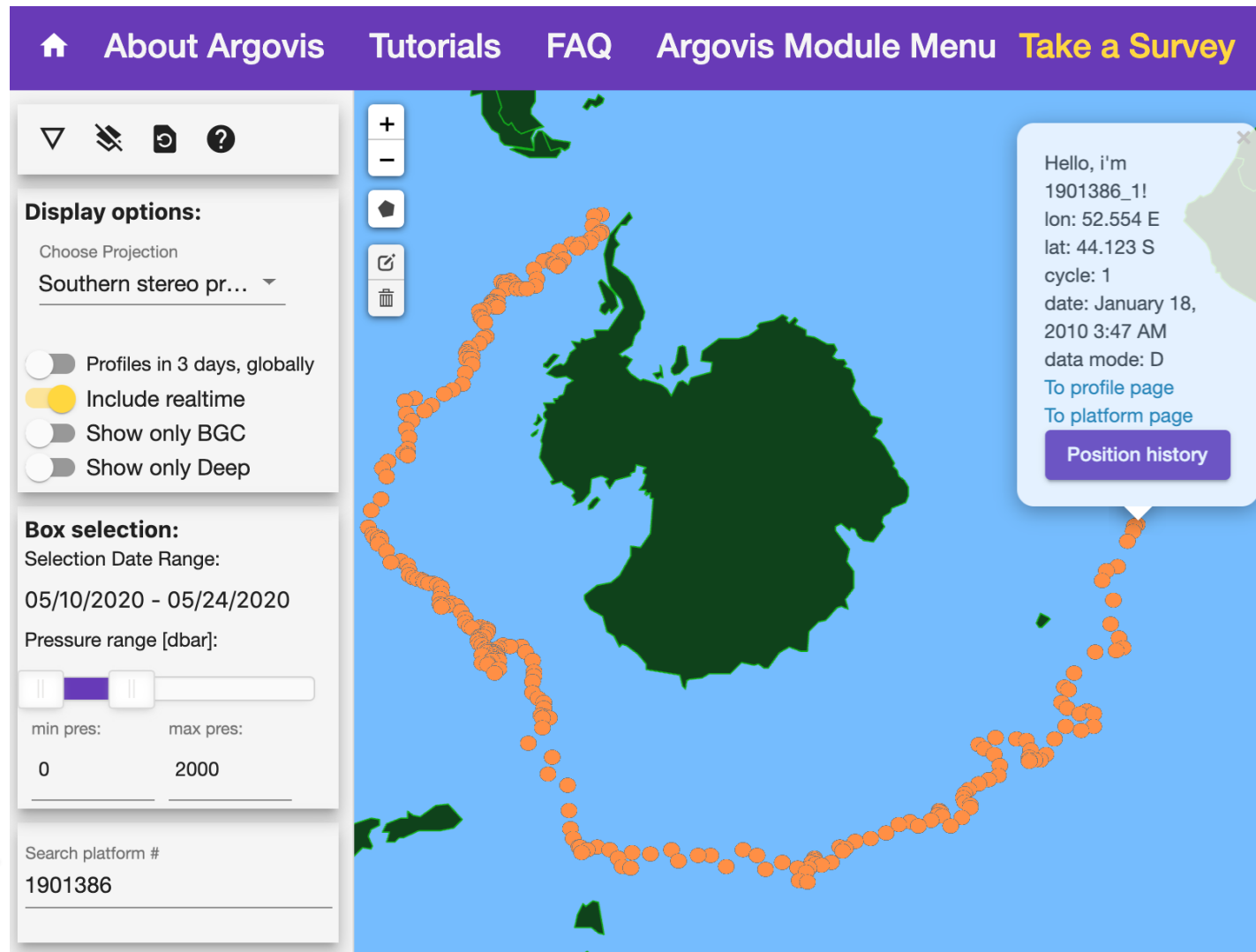
The screenshot shows the Argovis web interface. At the top is a purple navigation bar with links: "About Argovis", "Tutorials", "FAQ", "Argovis Module Menu", and "Take a Survey". Below the navigation bar is a search panel on the left with various filters. The "Display options" section includes a "Choose Projection" dropdown set to "Southern stereo pr...", and four toggle switches: "Profiles in 3 days, globally" (off), "Include realtime" (on), "Show only BGC" (off), and "Show only Deep" (off). The "Box selection" section shows a "Selection Date Range" of "05/10/2020 - 05/24/2020" and a "Pressure range [dbar]" slider set from "0" to "2000". At the bottom of the search panel, the "Search platform #" field contains the number "1901386". To the right of the search panel is a map of the Southern Ocean with a dark green landmass (Antarctica) and orange circular markers representing Argo profiles. A red arrow points from a text box on the left to the search platform number field.

Search platform #.

Search platform #

1901386

# Locate Argo profiles for a platform

The screenshot shows the Argovis web interface. At the top is a purple navigation bar with links: "About Argovis", "Tutorials", "FAQ", "Argovis Module Menu", and "Take a Survey". Below the navigation bar is a search panel on the left with various filters. The main area is a map of the Southern Ocean with orange dots representing Argo profiles. A tooltip on the right provides details for a specific profile.

Home About Argovis Tutorials FAQ Argovis Module Menu Take a Survey

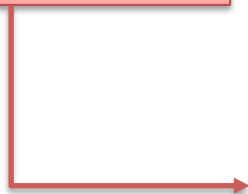
Display options:  
Choose Projection  
Southern stereo pr...  
 Profiles in 3 days, globally  
 Include realtime  
 Show only BGC  
 Show only Deep

Box selection:  
Selection Date Range:  
05/10/2020 - 05/24/2020  
Pressure range [dbar]:  
min pres: 0 max pres: 2000

Search platform #  
1901386

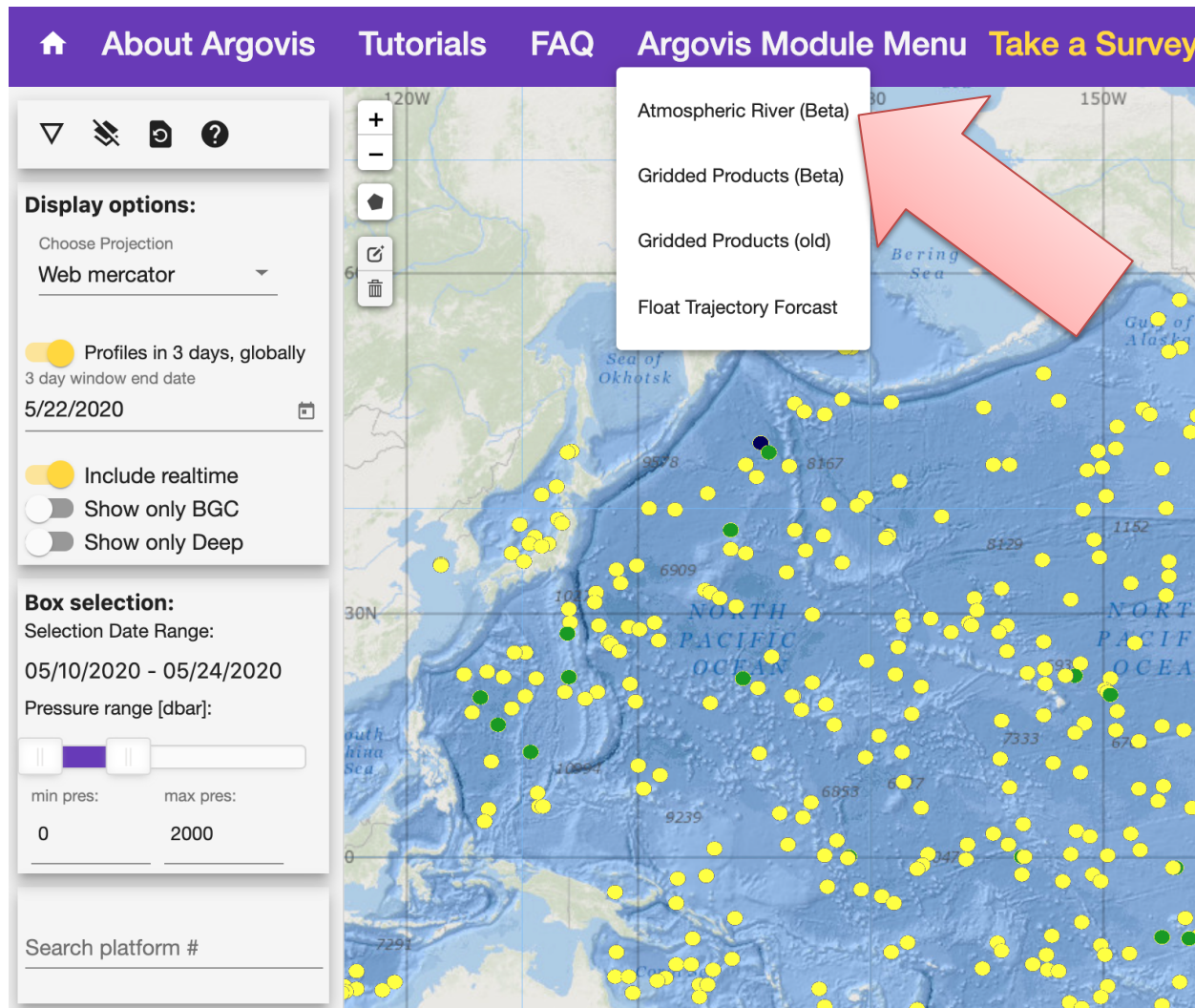
Hello, i'm 1901386\_1!  
lon: 52.554 E  
lat: 44.123 S  
cycle: 1  
date: January 18, 2010 3:47 AM  
data mode: D  
[To profile page](#)  
[To platform page](#)  
[Position history](#)

Search platform #.



beta

# Co-locate Argo with weather events



The screenshot displays the Argovis web application interface. At the top, a purple navigation bar contains links for 'About Argovis', 'Tutorials', 'FAQ', 'Argovis Module Menu', and 'Take a Survey'. On the left side, there is a control panel with the following sections:

- Display options:**
  - Choose Projection: Web mercator
  - Profiles in 3 days, globally (3 day window end date: 5/22/2020)
  - Include realtime
  - Show only BGC
  - Show only Deep
- Box selection:**
  - Selection Date Range: 05/10/2020 - 05/24/2020
  - Pressure range [dbar]: 0 to 2000
- Search platform #

The main map area shows the North Pacific Ocean with numerous yellow dots representing Argo floats. A white menu overlay is positioned over the map, listing the following options:

- Atmospheric River (Beta)
- Gridded Products (Beta)
- Gridded Products (old)
- Float Trajectory Forecast

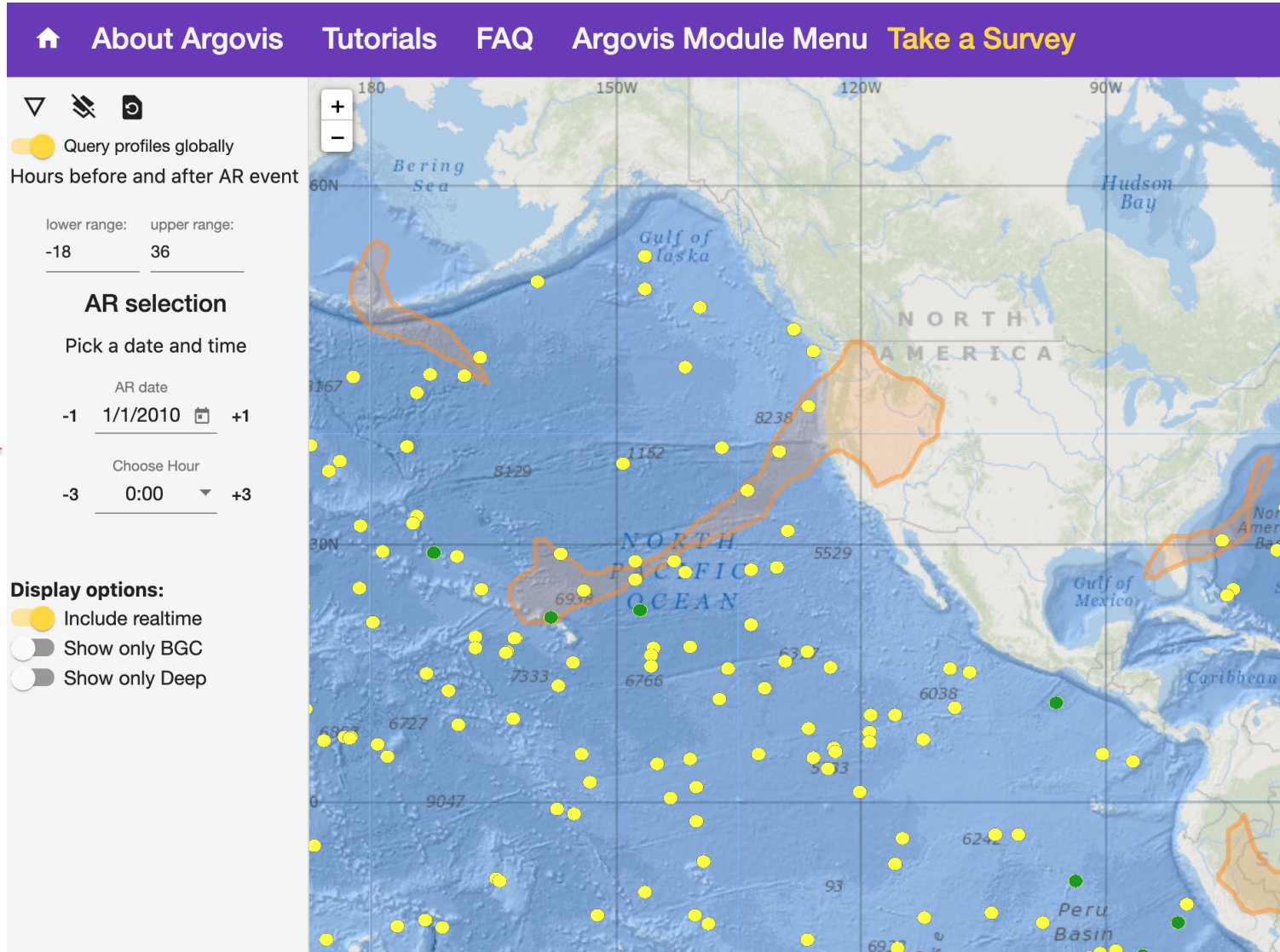
A large red arrow points from the 'Atmospheric River (Beta)' option towards the map area.

beta

# Co-locate Argo with weather events

Overlay profiles globally in a time window around the event time (i.e. select co-location strategy)

Display weather events (e.g. Atmospheric Rivers by GW2015) globally for the time of interest.





beta

# Co-locate Argo with weather events

[Home](#) [About Argovis](#) [Tutorials](#) [FAQ](#) [Argovis Module Menu](#) [Take a Survey](#)

Query profiles globally

Hours before and after AR event

lower range: upper range:  
-18 36

### AR selection

Pick a date and time

AR date  
-1 1/1/2010 +1

Choose Hour  
-3 0:00 +3

**Display options:**

- Include realtime
- Show only BGC
- Show only Deep

Bring the shape of the event of interest to the main page to access co-located profiles (in the selected time window or *any* other).

Hello, I'm a atmospheric river shape!

- Filter BGC profiles only
- Filter deep profiles only

[To Selection Page](#)

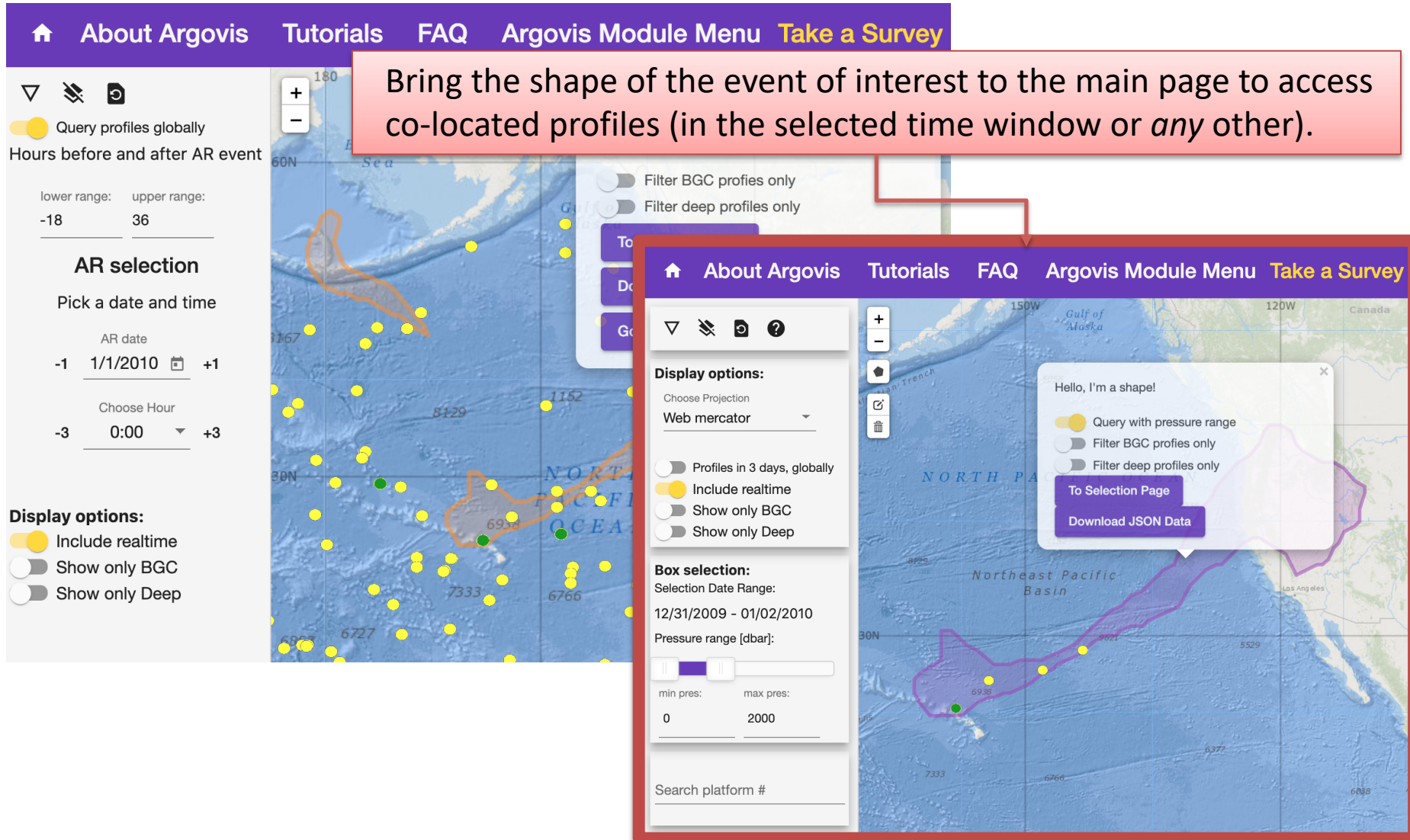
[Download JSON Data](#)

[Go to home page with this shape](#)

beta

# Co-locate Argo with weather events

Bring the shape of the event of interest to the main page to access co-located profiles (in the selected time window or *any* other).



The screenshot displays the Argovis web application interface. At the top, a purple navigation bar contains links for 'About Argovis', 'Tutorials', 'FAQ', 'Argovis Module Menu', and 'Take a Survey'. The main content area is divided into several sections:

- Left Panel:** Contains search filters. It includes a 'Query profiles globally' toggle, 'Hours before and after AR event' (lower range: -18, upper range: 36), an 'AR selection' section with a date picker (1/1/2010) and a 'Choose Hour' dropdown (0:00), and 'Display options' for including realtime data and filtering by BGC or Deep profiles.
- Map:** A bathymetric map of the North Pacific Ocean showing Argo profiles as yellow dots. A red shape is overlaid on the map, representing a weather event of interest.
- Right Panel (Detailed Selection Panel):** A purple-bordered panel that provides more search options. It includes 'Display options' (Choose Projection: Web mercator, Profiles in 3 days globally, Include realtime, Show only BGC, Show only Deep) and 'Box selection' (Selection Date Range: 12/31/2009 - 01/02/2010, Pressure range [dbar]: 0 to 2000). A search box for 'Search platform #' is at the bottom. A white tooltip box with a purple border is overlaid on the map, containing the text 'Hello, I'm a shape!' and buttons for 'To Selection Page' and 'Download JSON Data'.

beta

# Co-locate Argo with weather events

Bring the shape of the event of interest to the main page to access co-located profiles (in the selected time window or *any* other).

Query profiles globally  
Hours before and after AR event

lower range: -18  
upper range: 36

### AR selection

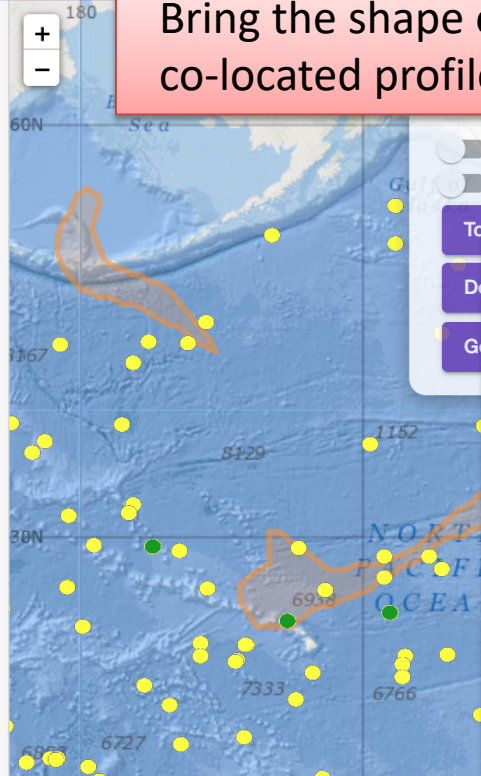
Pick a date and time

AR date: -1 1/1/2010 +1

Choose Hour: -3 0:00 +3

### Display options:

- Include realtime
- Show only BGC
- Show only Deep



Filter BGC profiles only  
Filter deep profiles only

### Display options:

Choose Projection: Web mercator

- Profiles in 3 days, globally
- Include realtime
- Show only BGC
- Show only Deep

### Box selection:

Selection Date Range: 12/31/2009 - 01/02/2010

Pressure range [dbar]: 0 to 2000

Search platform #

Go to "Selection Page" to see profiles

Home About Argovis Tutorials FAQ Argovis Module Menu Take a Survey

Display options: Web mercator

Profiles in 3 days, globally

Include realtime

Show only BGC

Show only Deep

Box selection: Selection Date Range: 12/31/2009 - 01/02/2010

Pressure range [dbar]: 0 to 2000

Search platform #

Hello, I'm a shape

- Query with profiles
- Filter BGC profiles only
- Filter deep profiles only

To Selection Page

Download JSON Data

beta

# Co-locate Argo with weather events

Query profiles globally

Hours before and after AR event

lower range: -18    upper range: 36

**AR selection**

Pick a date and time

AR date: -1 1/1/2010 +1

Choose Hour: -3 0:00 +3

**Display options:**

- Include realtime
- Show only BGC
- Show only Deep

Map showing Bering Sea, North Pacific Ocean, and Argo profiles (yellow dots). An orange shape highlights an atmospheric river event.

Display options:

- Choose Projection: Web mercator
- Profiles in 3 days, globally
- Include realtime
- Show only BGC
- Show only Deep

Box selection:

Selection Date Range: 12/31/2009 - 01/02/2010

Pressure range [dbar]: 0 to 2000

Search platform #

Stay tuned for more weather events

Hello, I'm a atmospheric river shape!

Filter BGC profiles only

Map showing Gulf of Alaska, Northeast Pacific Basin, and Argo profiles (yellow dots). A purple shape highlights a region of interest.

Display options:

- Query with pressure range
- Filter BGC profiles only
- Filter deep profiles only

[To Selection Page](#)

[Download JSON Data](#)

Hello, I'm a shape!

Query with pressure range

Filter BGC profiles only

Filter deep profiles only

[To Selection Page](#)

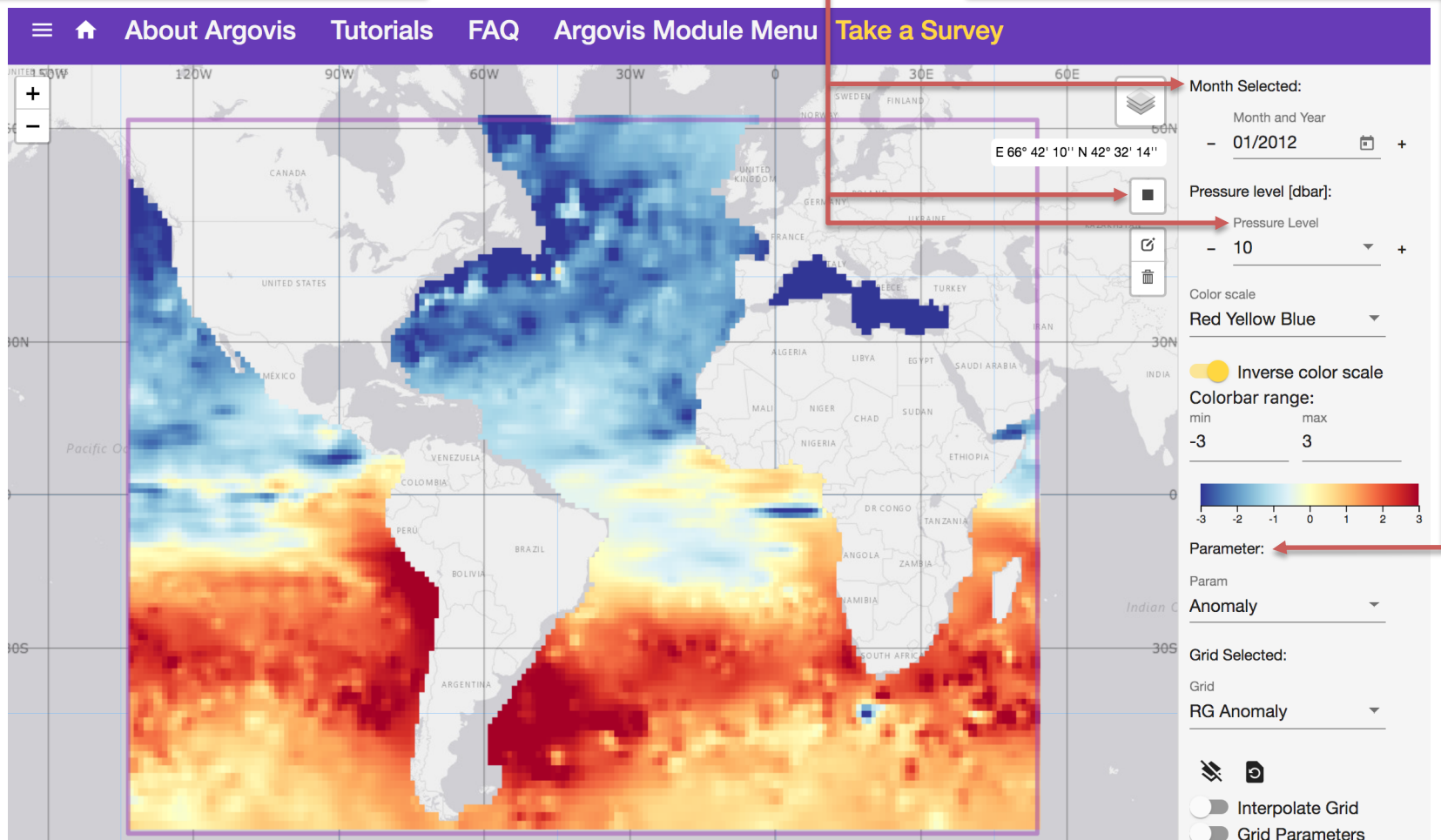
[Download JSON Data](#)

beta

# Display and compare gridded data

Display a selection.

Choose product.

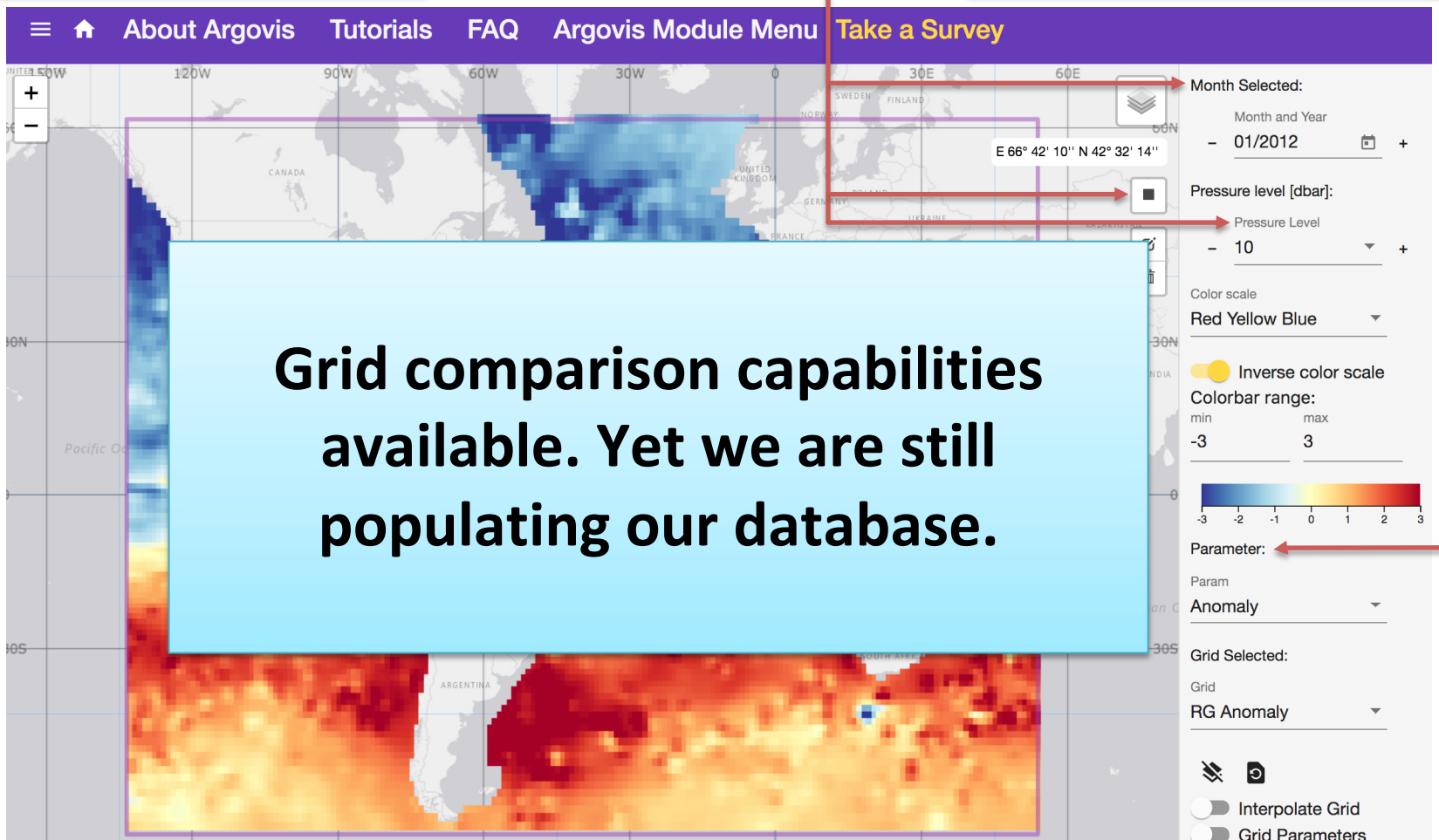


beta

# Display and compare gridded data

Display a selection.

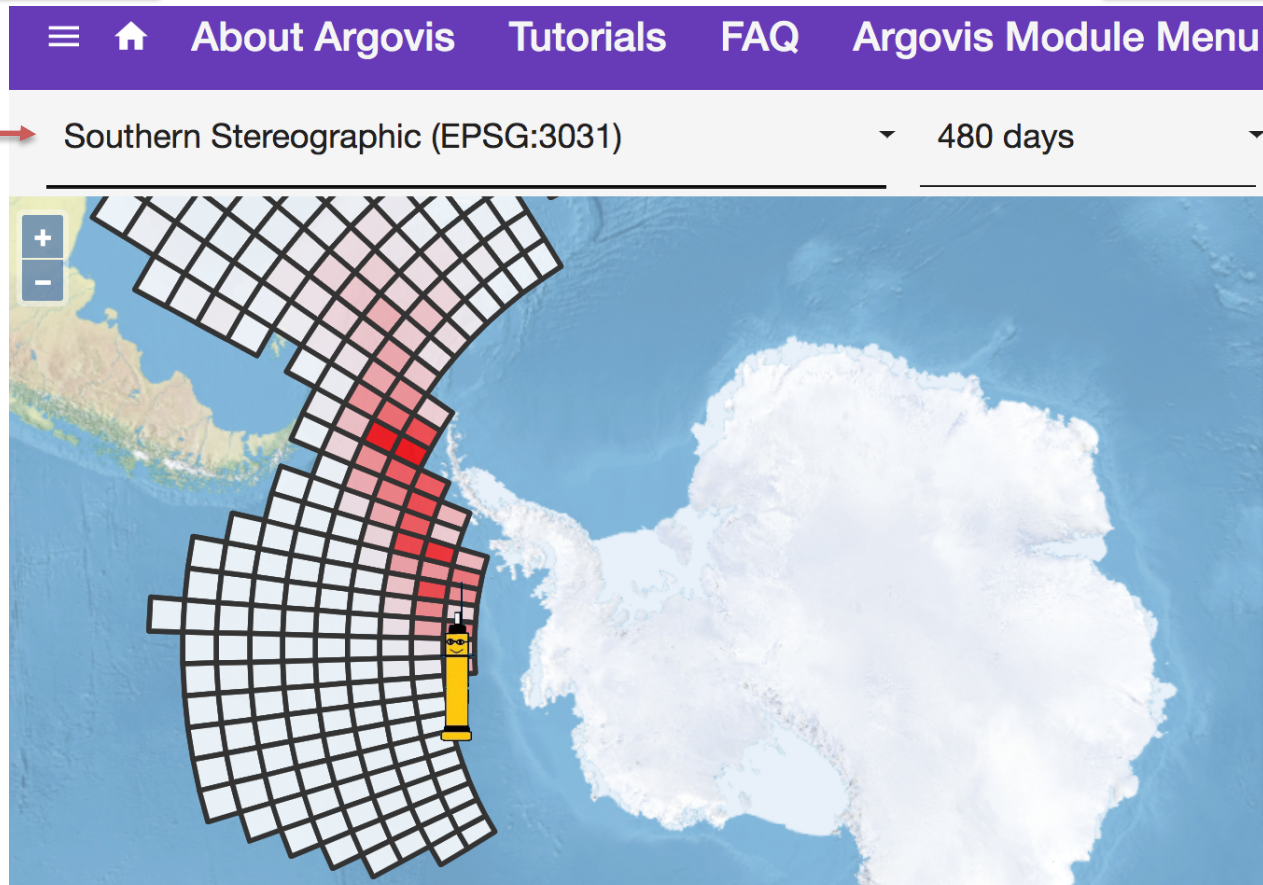
Choose product.



# Display float trajectory forecast.

Select projection.

Select time period.



White to red colors as the float is more and more likely to end up at that location in the time period of interest.

Float trajectory forecasts data by Chamberlain et al. (*in prep*)

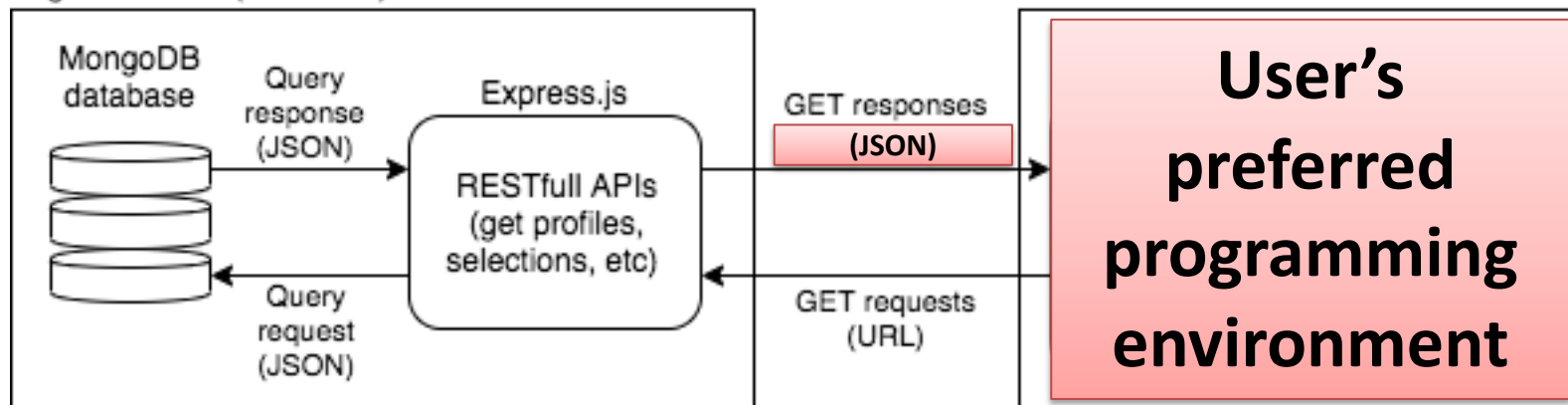
# Outline

- ✓ What is Argovis?
- ✓ Argovis modules
  - ✓ Visualize Argo data by location and time
  - ✓ Co-locate Argo with weather events beta
  - ✓ Display and compare gridded products beta
- Argovis API: examples for BGC Argo
- Summary and future directions



# Argovis is a web app and database

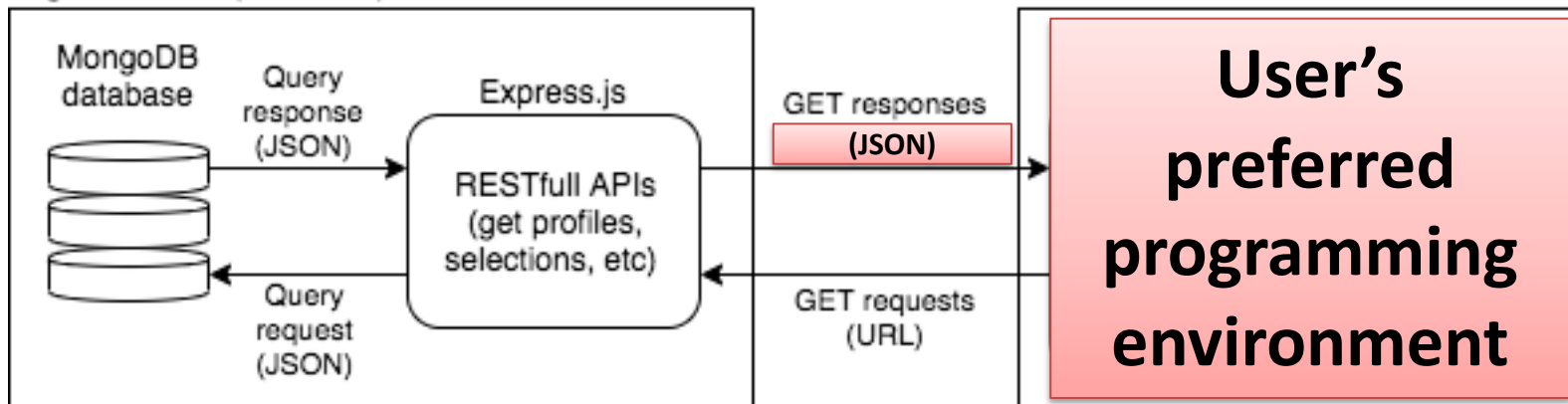
Argovis Server (Back-end)



**Example scripts are available on the website in Matlab, Python, R.**

# Argovis is a web app and database

Argovis Server (Back-end)

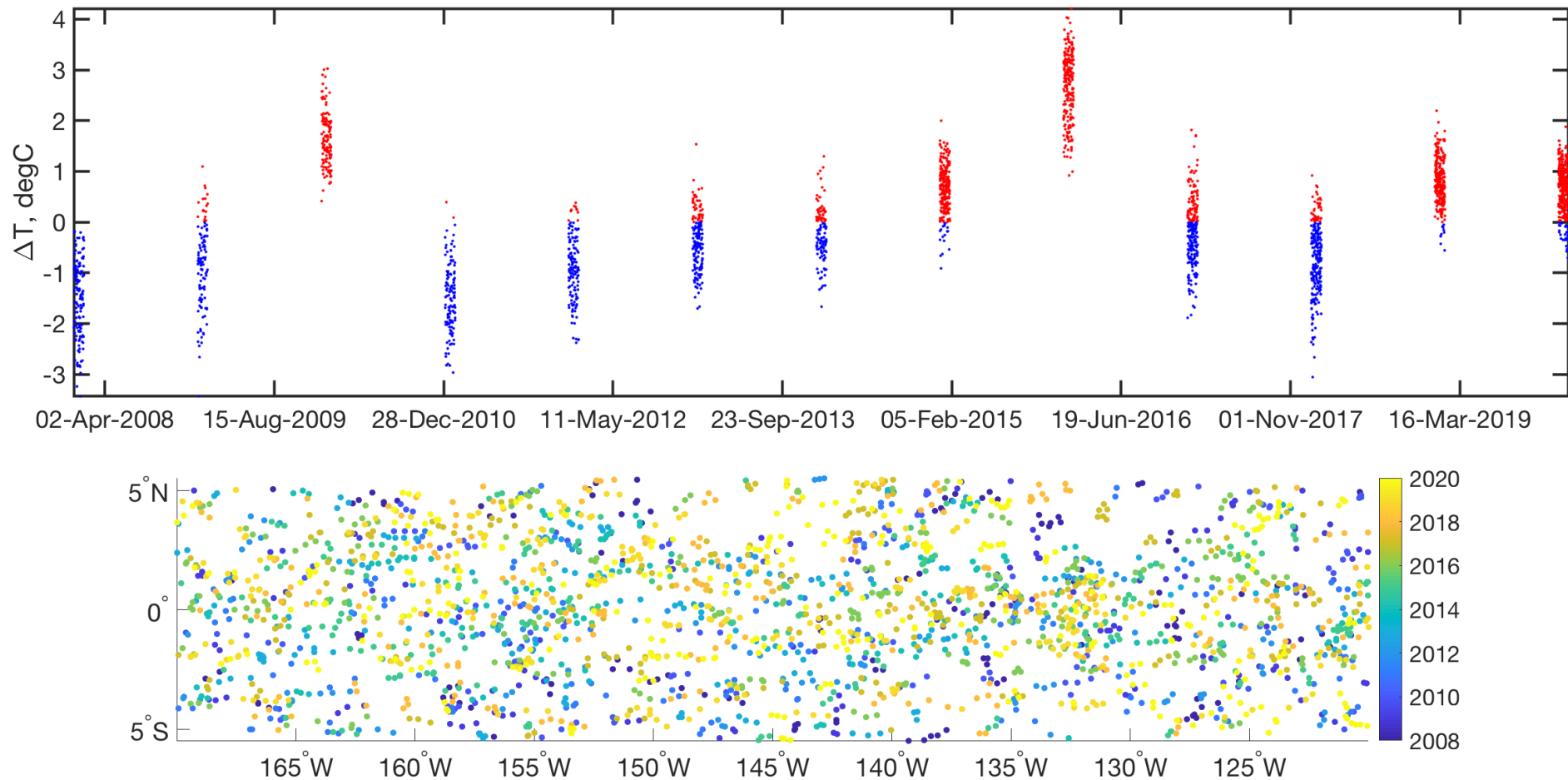


**Let's see few examples...**

Currently possible using Argovis API.



# Profiles minus RG2009 climatology: example in Nino 3.4 region in January



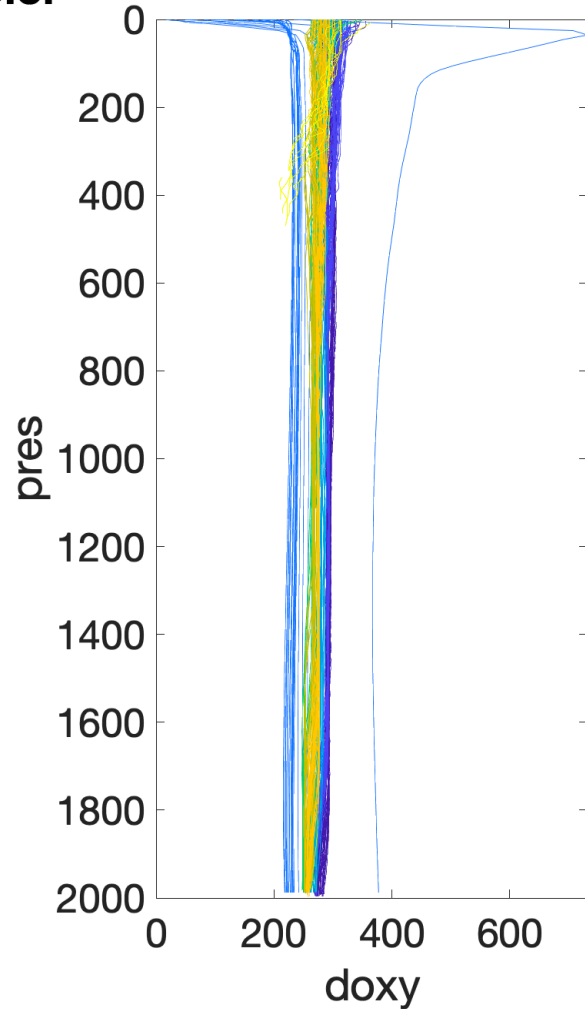
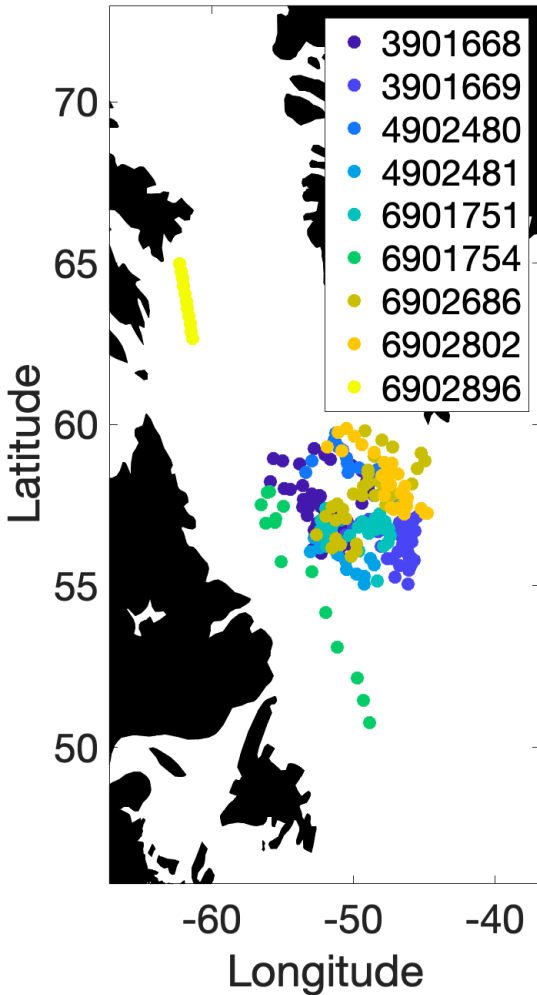
RG2009: Roemmich and Gilson, 2009

Currently possible using Argovis API.

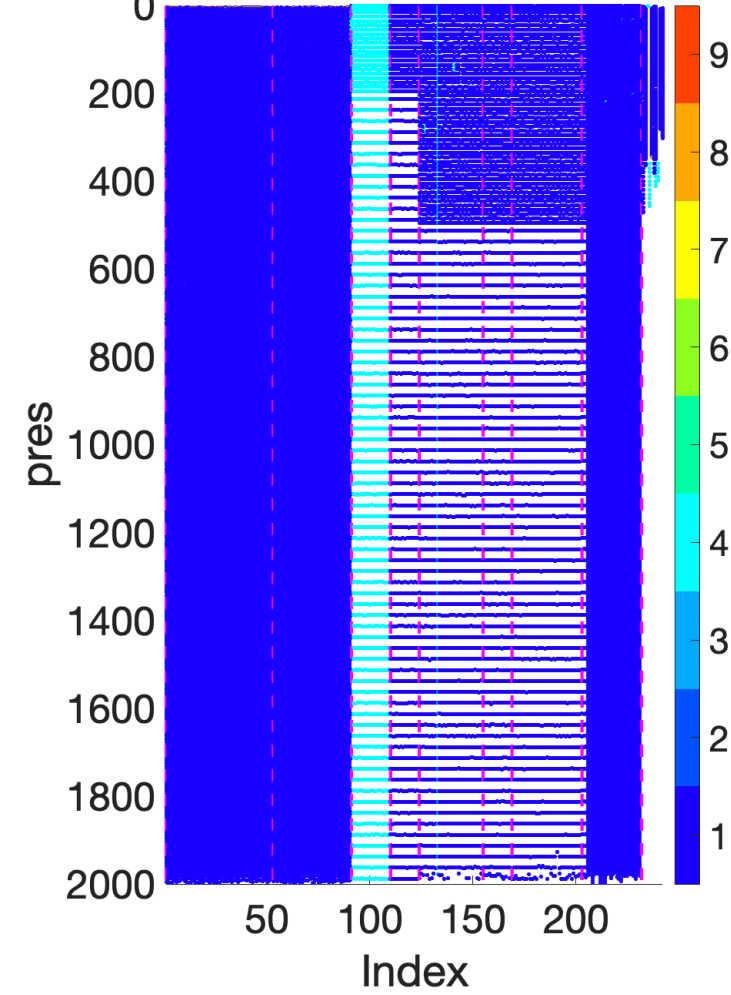


# Query BGC variables in a region

doxy profiles, WMO# in color



doxy QC in color

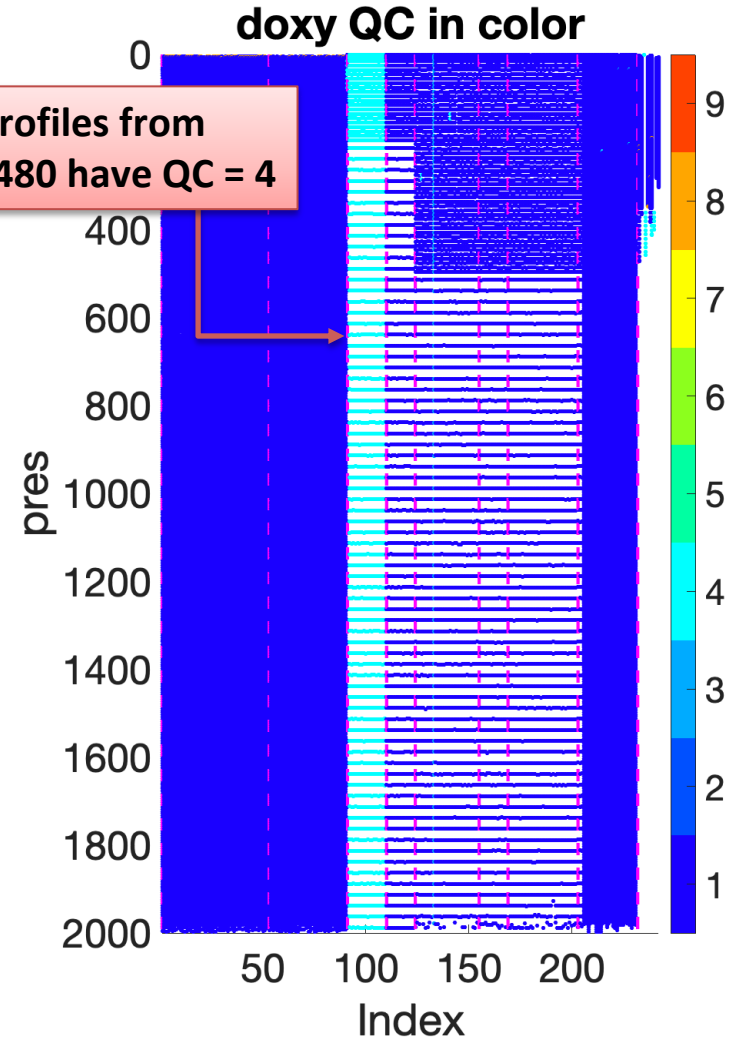
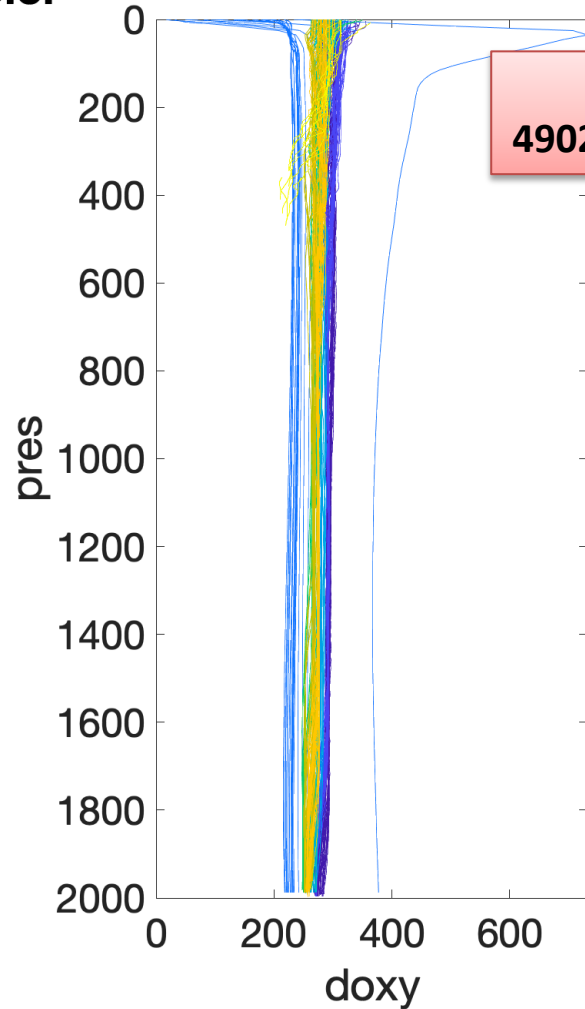
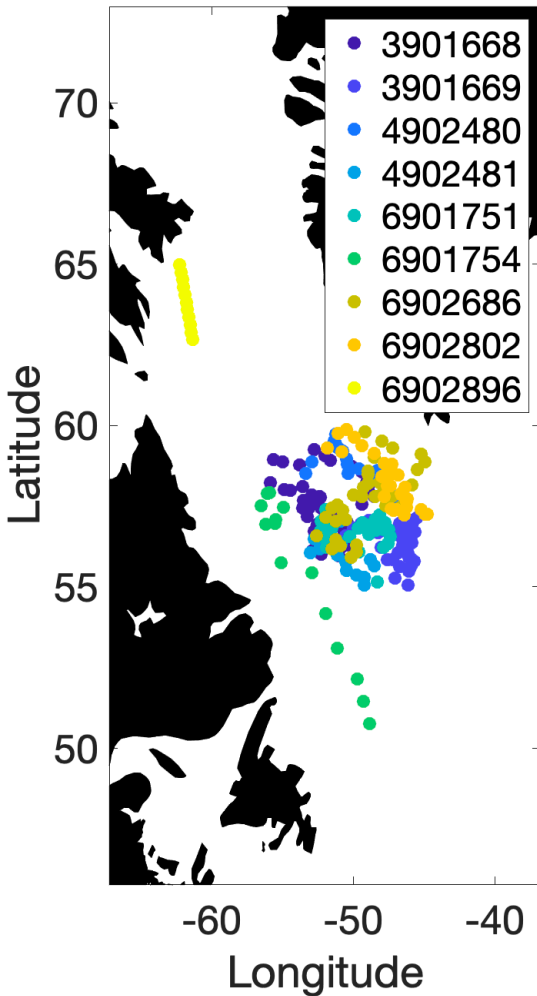


Currently possible using Argovis API.



# Query BGC variables in a region

doxy profiles, WMO# in color



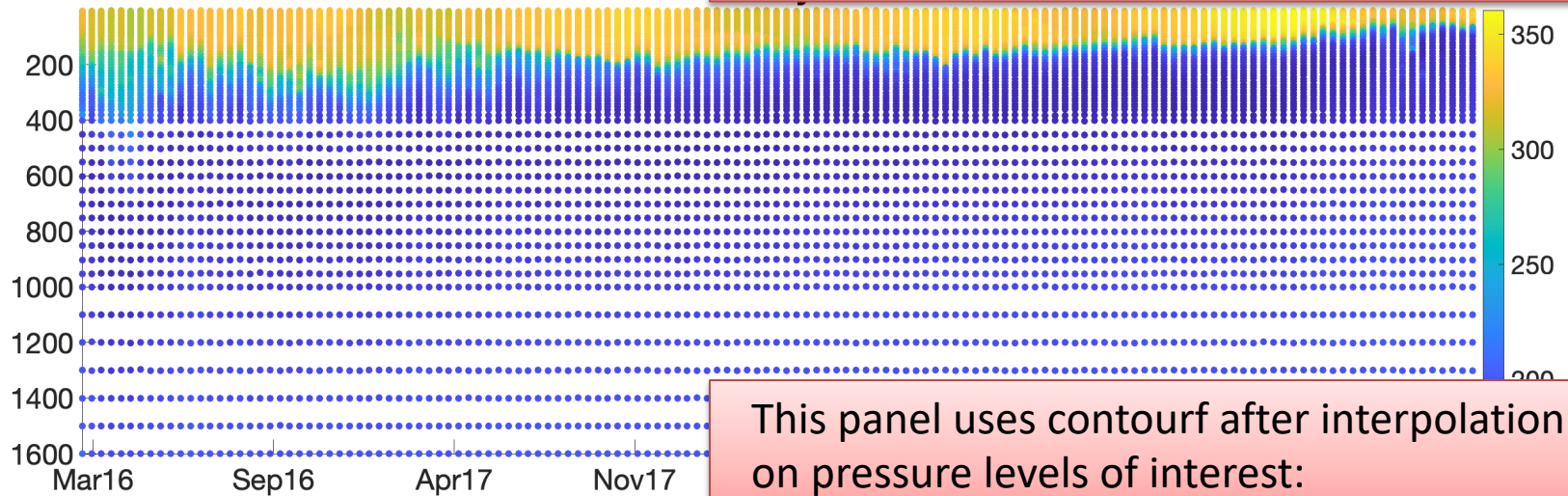
Currently possible using Argovis API.



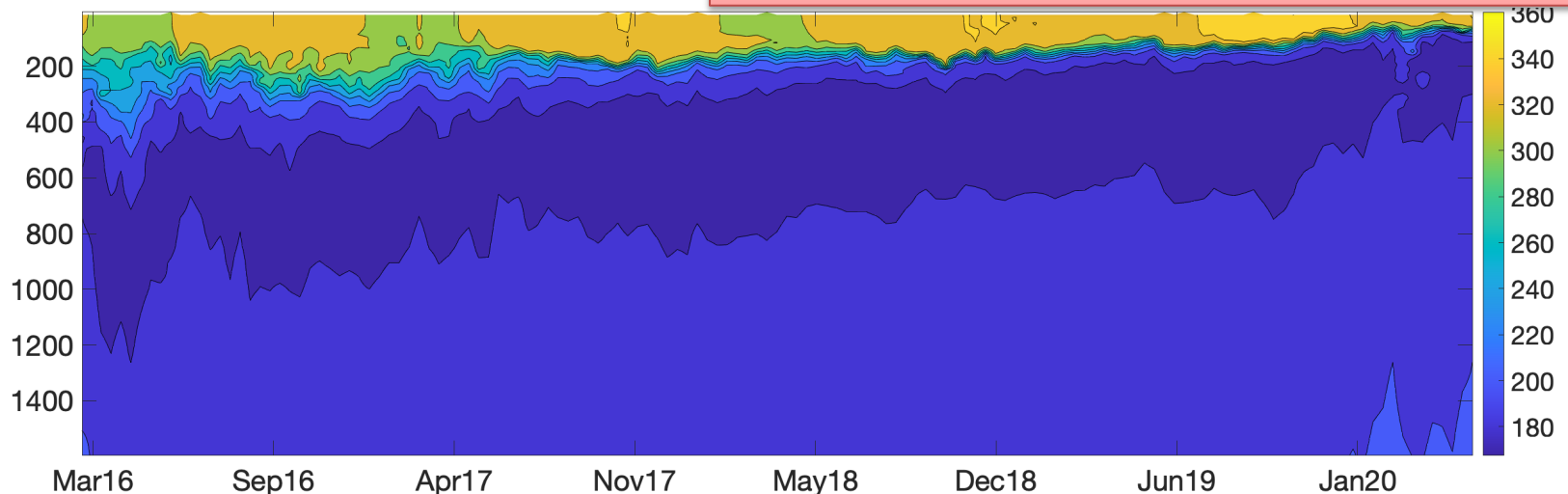
# Access and plot bgc platform data.

An example for oxygen [ $\mu\text{mol}/\text{kg}$ ]

This panel is similar to that on the browser:



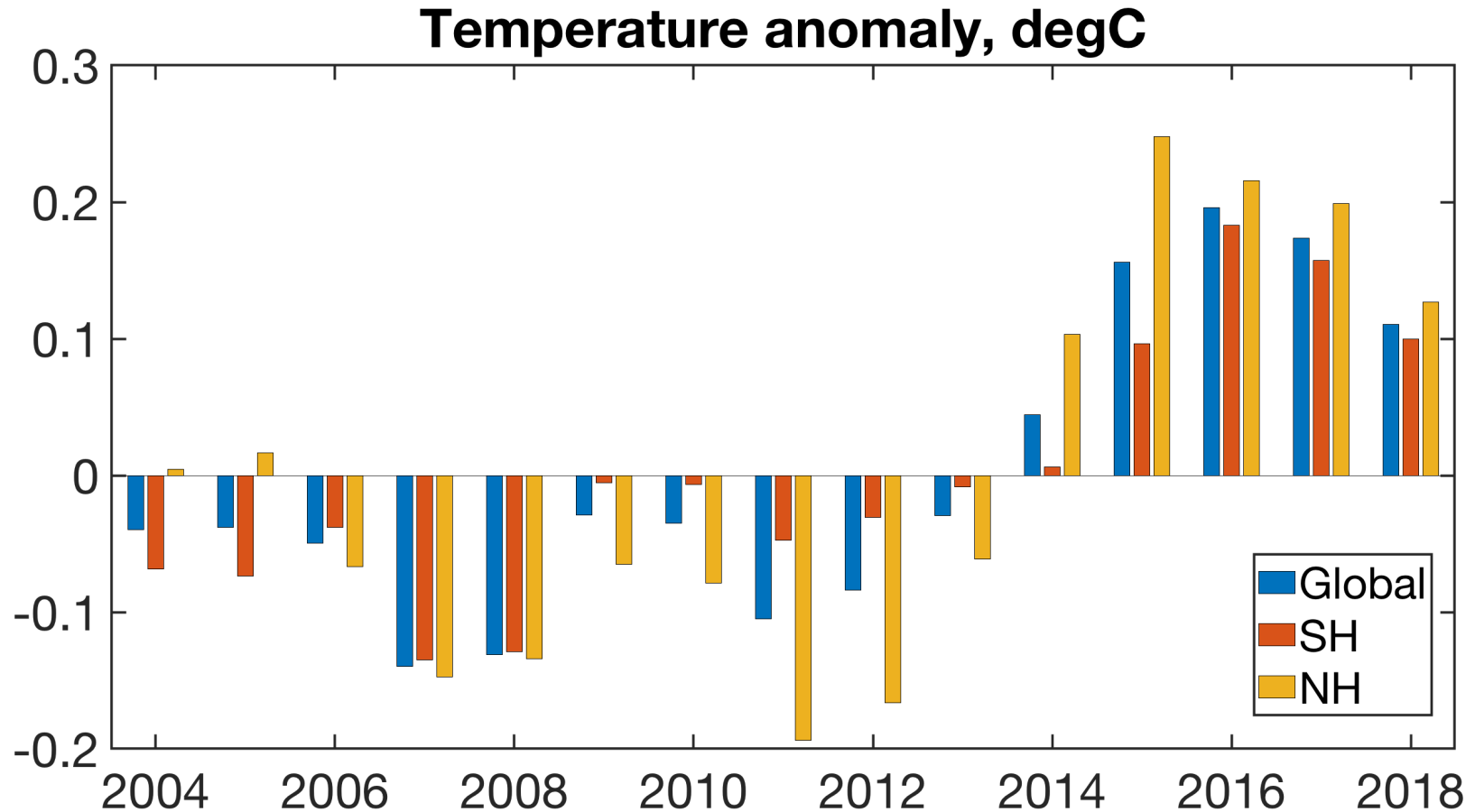
This panel uses contourf after interpolation on pressure levels of interest:



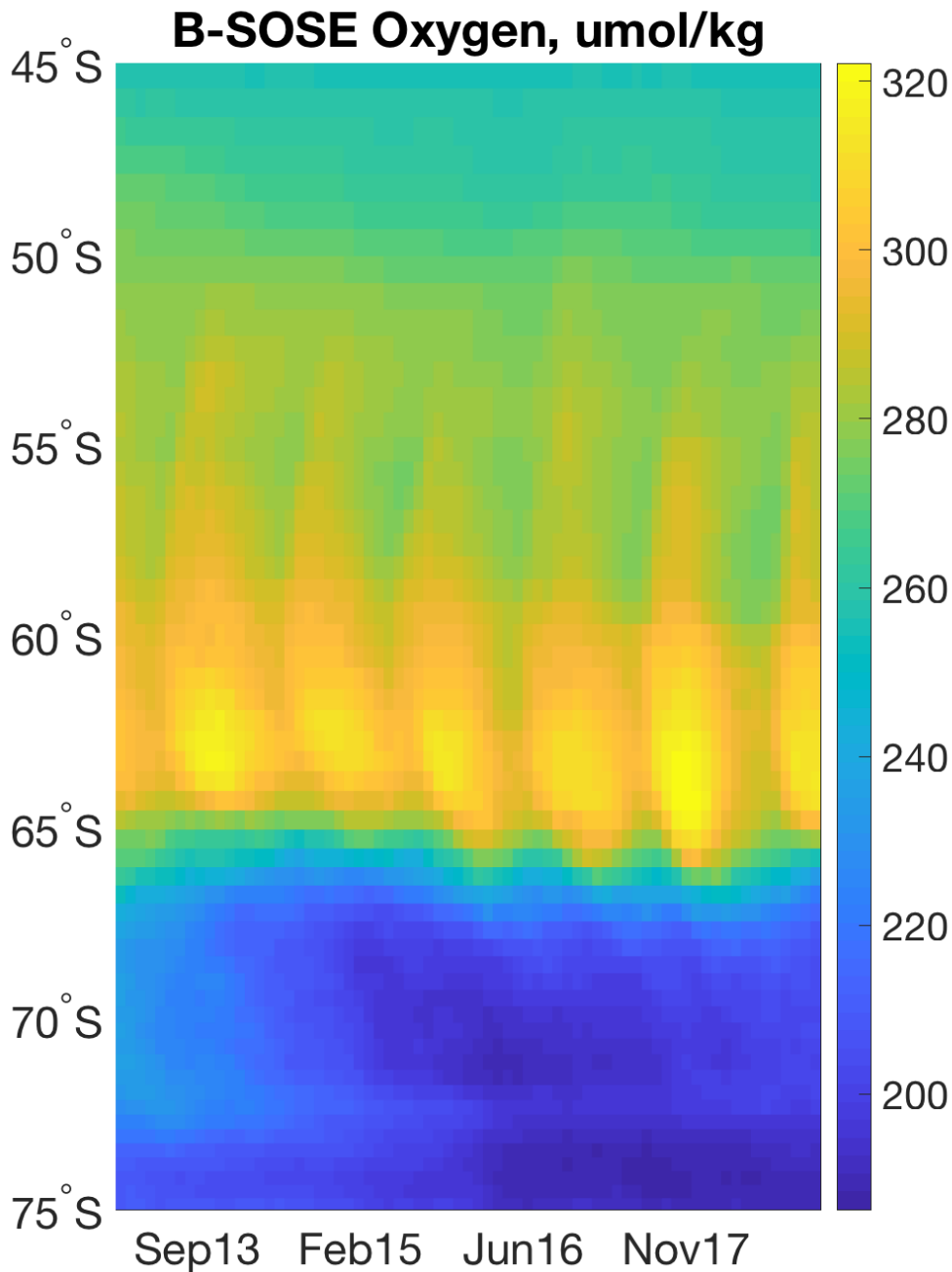
Currently possible using Argovis API.



# Region average from gridded product



RG2009: Roemmich and Gilson, 2009



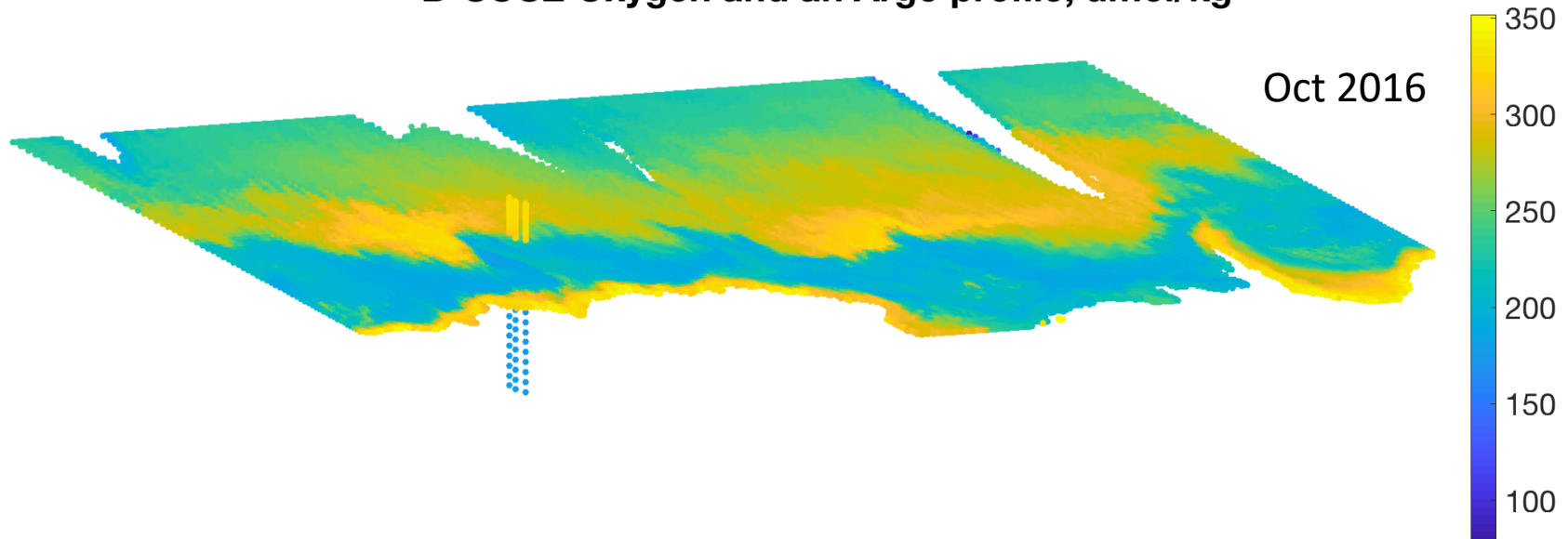
Hovmöller diagram  
from gridded  
product

**The addition of B-SOSE to  
Argovis is in progress.**



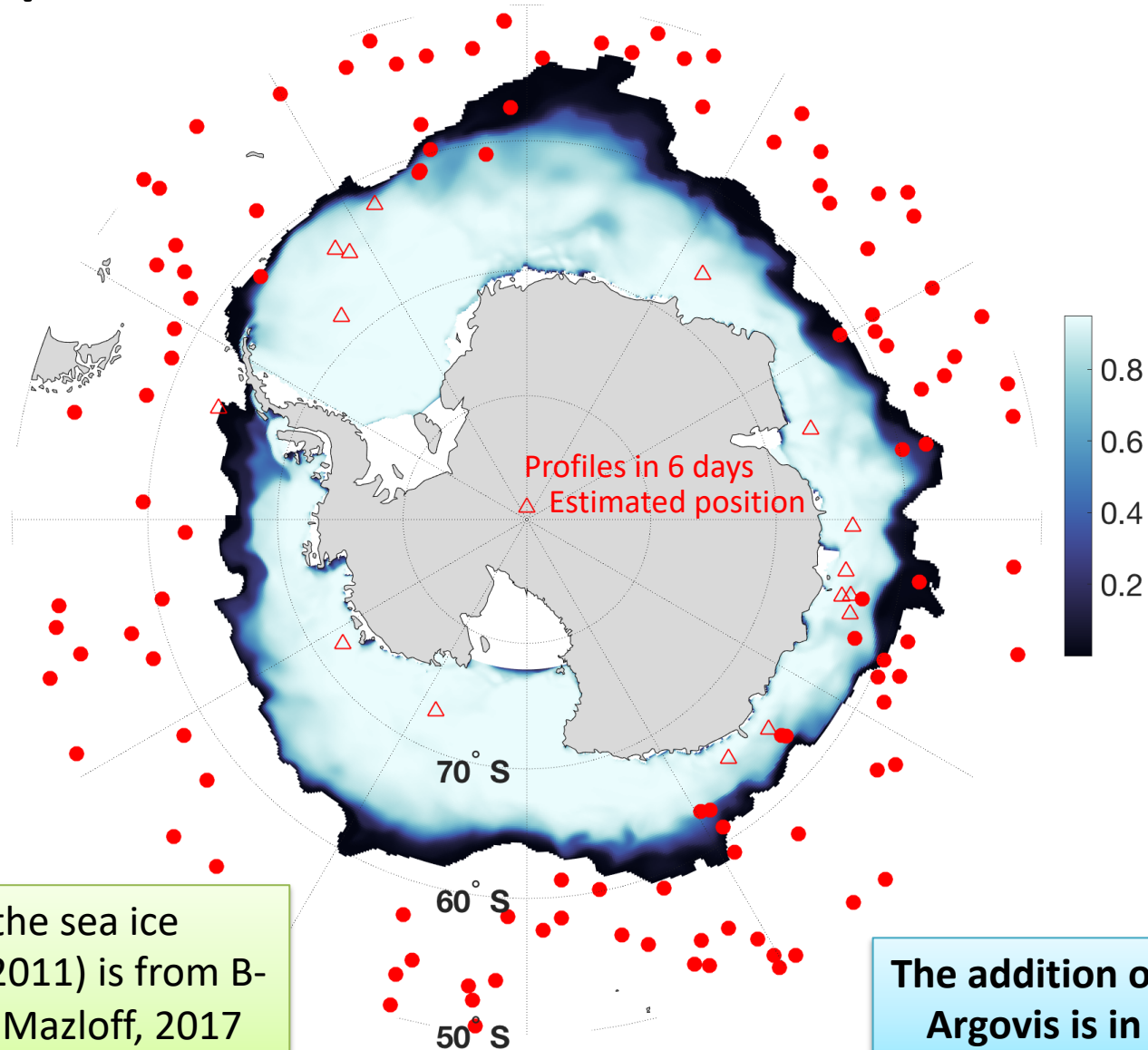
Provide context for profile data.  
Also useful for B-SOSE validation.

B-SOSE Oxygen and an Argo profile,  $\mu\text{mol/kg}$



**The addition of B-SOSE to  
Argovis is in progress.**

# Where are Argo profiles with respect to sea ice?



In this example, the sea ice coverage (1 Jun 2011) is from B-SOSE: Verdy and Mazloff, 2017

The addition of B-SOSE to Argovis is in progress.

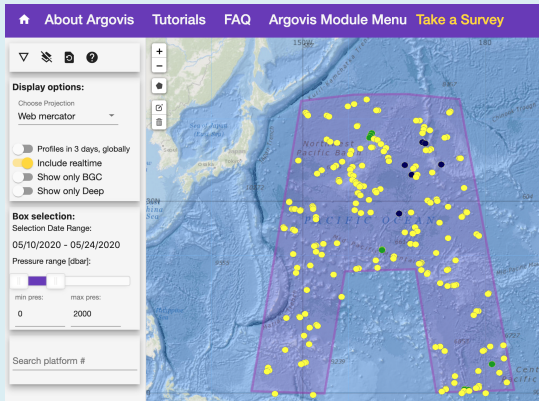


**EARTH CUBE**  
TRANSFORMING GEOSCIENCES RESEARCH

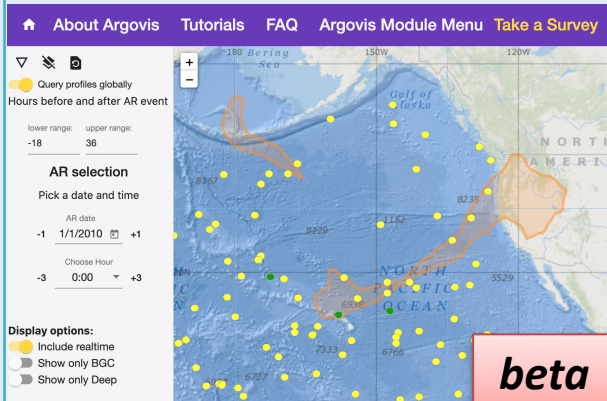


# Argovis: A Next Generation Platform for co-located Oceanic and Atmospheric Data to Accelerate Climate Science Workflows

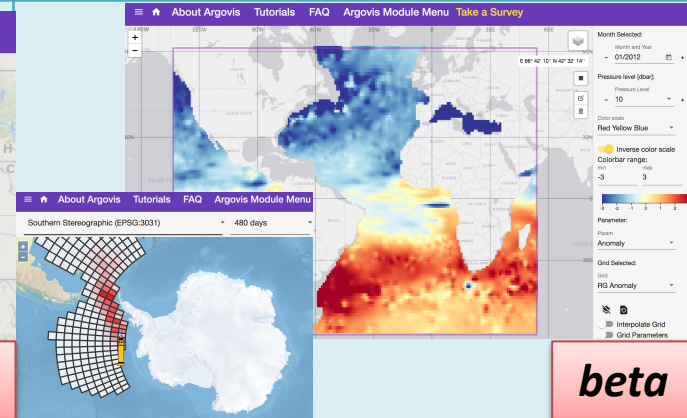
## Visualize Argo data by location and time



## Co-locate Argo with weather events, satellite data, and more



## Display and compare gridded data



**Import data of interest in programming environment of choice through API.**  
*For both scientists and non-scientists!*



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University of Colorado  
Boulder

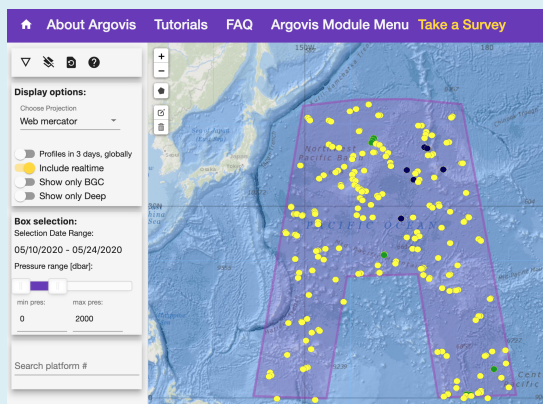


**EARTH CUBE**  
TRANSFORMING GEOSCIENCES RESEARCH

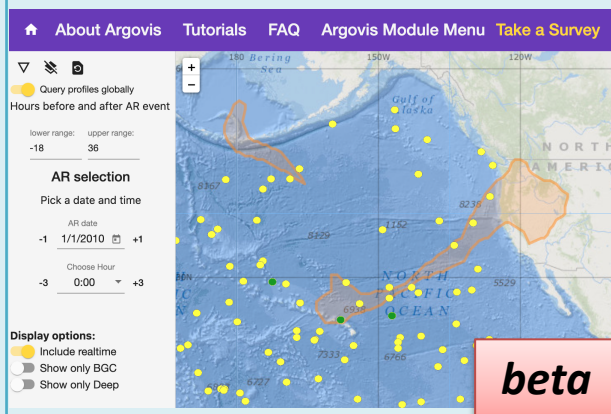


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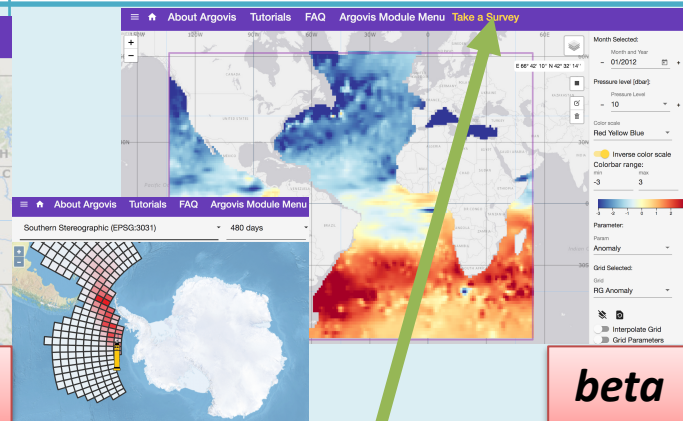
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Import data of interest in programming environment of choice through API.  
*For both scientists and non-scientists!*

Stay tuned for more gridded products (e.g. B-SOSE, SST, SSH, precipitation, winds, sea ice coverage, WOA18, ...), weather events (e.g. tropical cyclones), ...

**Take a survey and make your request!**

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