Education and Research: Testing Hypotheses

32 Shades of Water

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Teacher resource for Final Assessment

FloatViz 6.0 Tutorial and Example Graphs

http://www.mbari.org/science/upper-ocean-systems/chemical-sensor-group/floatviz/

Screen shot of link to website

FloatViz 6.0 - Apex/ISUS Data Visualization

ISUS nitrate sensors and Deep-Sea DuraFET pH sensors in Webb Research Apex profiling floats

What's new? Two float (9274 and 9265) have been deployed in Monterey Bay on June 4, 2015 for a test of a new sensor controller. The floats will be recovered after the test. Three new floats with pH, nitrate and oxygen were deployed SW of Chile. These floats are part of the SOCCOM project. This project is supported by the US NSF Polar Programs with some floats contributed by NOAA through the US Argo Program.

Quick Instructions | Float list and link to complete Ascii data files | Data Adjustments | Map of float tracks | Apex/ISUS description page

Select Output Type and Send Request:

Plot / Text File — SEND

Raw Data or Adjusted Data:

Raw / Adjusted

Data Quality Flag:

All Data / Good and Quest. / Good Only

What dates?

All Dates available / Week Ending on End Date / Month Ending on End Date / Specify Start/End Date

Change dates: (MM/DD/YYYY)

Start Date 06/1/2014

End Date 06/1/2016

Select Float (ctrl click for more than one)

7674Kuroshio.....N/O
7546Kuroshio.....N/O
7619SoOcn.....N/O/FL
7620SoOcn.....N/O/FL
8486Hawaii.....pH/N/O/FL
7641StnP.....N/O
7642NoPacific.....N/O
7698NoPacific.....N/O
7618CalCurrent.....N/O
7615CalCurrent.....N/O
8514Hawaii.....pH/N/O/FL/r
0276NoAtlantic.....N/O6/FLM
6091SoOcn.....O/FL
7557SoOcn.....N/O/FL/d
7567SoOcn.....O/FL/d
7613SoOcn.....N/O/FL
7614SoOcn.....N/O/FL
9091SoOcn.....pH/N/O/FL
9092SoOcn.....pH/N/O/FL
9031SoOcn.....pH/N/O/FL
9018SoOcn.....pH/O
9095SoOcn.....pH/N/O/FL
9101SoOcn.....pH/O
9254SoOcn.....pH/N/O/FL
0412Hawaii.....pH/O6/FLM
0037SoOcn.....N/O6/FLM/d
0508SoOcn.....N/O6/FLM/d
9313SoOcn.....pH/N/O/FL
9096SoOcn.....pH/N/O/FL
0509SoOcn.....pH/N/O6/FLM/d

Select One X Variable

Nitrate[µmol/kg]
Depth[m]
Pressure[dbar]
Date
Salinity[pss]
Temperature[°C]
Sigma_theta[kg/m^3]
Oxygen[µmol/kg]
OxygenSat[%]
Chl_a[µg/l]
b_bp700[1/m]
CDOM[ppb]
pHinsitu[Total]
pH25C[Total]
TALK_LIAR[µmol/kg]
DIC_LIAR[µmol/kg]
pCO2_LIAR[µatm]
Chl_a_corr[mg/m^3]
b_bp_corr[1/m]
POC[mmol/m^3]

Select Y Variables (ctrl click >1)

Nitrate[µmol/kg]
Depth[m]
Pressure[dbar]
Date
Salinity[pss]
Temperature[°C]
Sigma_theta[kg/m^3]
Oxygen[µmol/kg]
OxygenSat[%]
Chl_a[µg/l]
b_bp700[1/m]
CDOM[ppb]
pHinsitu[Total]
pH25C[Total]
TALK_LIAR[µmol/kg]
DIC_LIAR[µmol/kg]
pCO2_LIAR[µatm]
Chl_a_corr[mg/m^3]
b_bp_corr[1/m]
POC[mmol/m^3]

Autoscale X & Y axis : On / Off

Enter Ranges if Autoscale is Off
(Min & max ranges default to 0 and 200 if Autoscale off and box is empty. Depth ranges are entered as negative values on Y axis and as positive values on X axis.)

X Min: X Max:

Y Min: Y Max:

Y Stack: (In a single graph, multiple Y variables or multiple stations are stacked vertically if it is On) On / Off

Enter Min and Max Depth range for data used in Time Series Plot (X Var = Date)

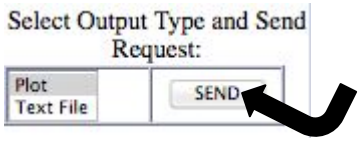
Min Depth: 0

Max Depth: 30

N These floats have an ISUS or SUNA nitrate sensor.
O These floats have an Aanderaa Optode oxygen sensor.
O6 These floats have a Sea-Bird SBE63 optical oxygen sensor.
pH These floats have a Deep-Sea DuraFET pH sensor and pH is reported on the total proton scale.
FL These floats have FLBB biooptical sensors for chlorophyll (470/695 nm Ex/Em) and backscatter (700 nm, 140 degree scattering angle).

Procedure to create your own graphs and suggested parameters

1) After going to the FloatViz 6.0 website, select your variables.
2) Select output type: *PLOT*
3) Select data type: *ADJUSTED*
4) Select dates: *SPECIFY START/END DATE*
5) Change dates: select at least two years of data- EX: START: *06/1/2014* END: *06/1/2016*
6) Select float: (select a float that has N, FL) EX floats:
-Float 9096SoOcn- Southern Ocean
-Float 0276NoAtlantic- North Atlantic Ocean
-Float 8486Hawaii- Pacific Ocean Hawaii
-Float 7647CalCurrent
7) Select one X variable: *DATE*
8) Select Y variables: (these variables are used because they are good indicators of algal growth, feel free to experiment with other variables) *Nitrate, Temperature, Chl*
9) Autoscale X&Y axis: *ON*
10) Select Y stack: *ON*
11) Select MAX depth: 30
12) Once your variables are selected press send to generate a graph



If you followed these instructions, your FloatVIZ plot page should look like this using *9096SoOcn* as your float

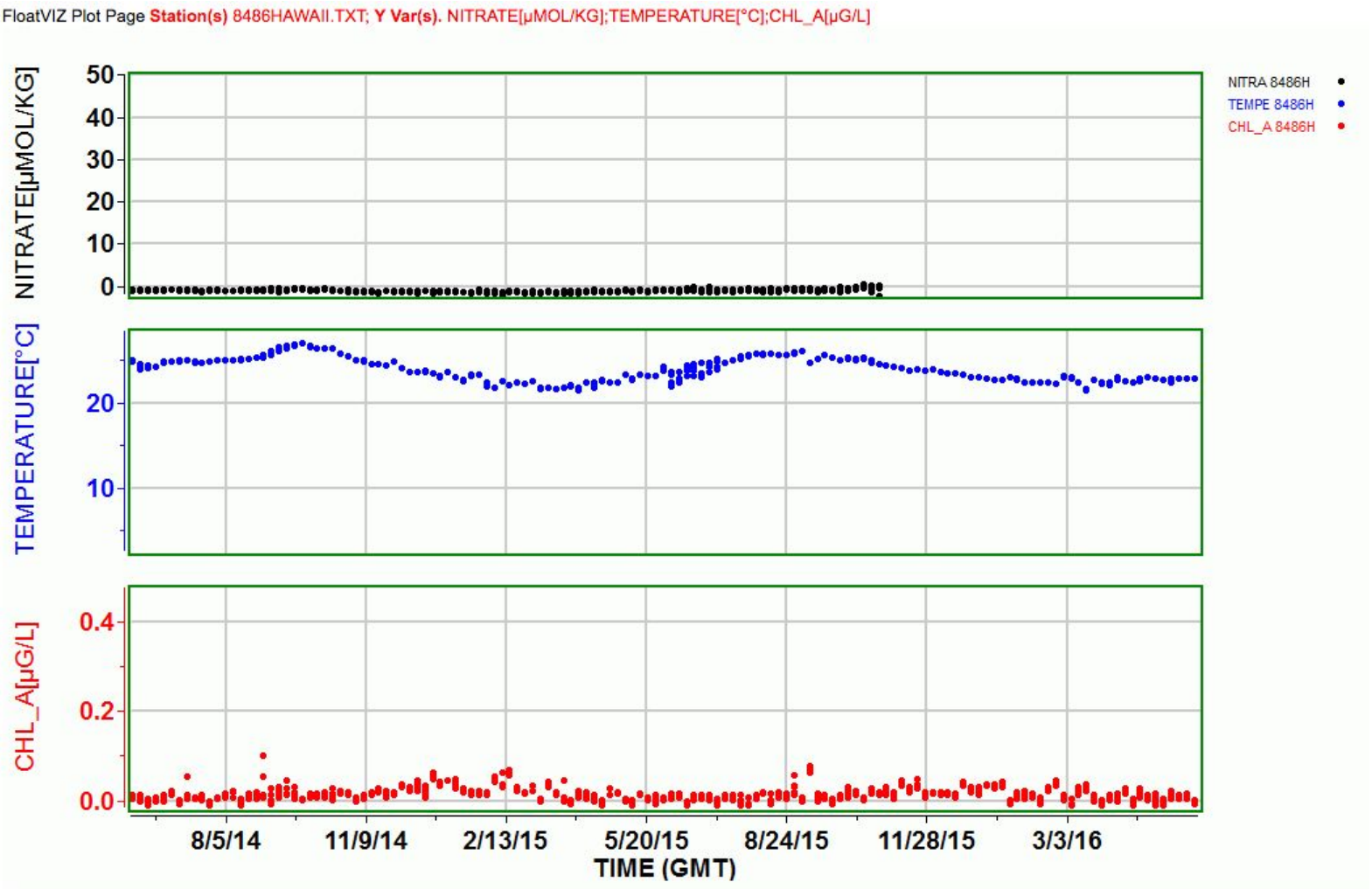
Use the graphs on the following pages for the student assessment in the Evaluate section of the 32 shades of water lesson plan. Feel free to change any of the variables or select different floats to analyze and make different graphs for the student sheet. The variables for each graph are the same as the ones listed and used for the tutorial on page 3, only the float selected is different.

For more information on how float data can help us answer questions about phytoplankton communities:
http://biogeochemical-argo.org/scientific-questions-phytoplankton-communities.php
For more information on float variables:
Nitrate: http://biogeochemical-argo.org/measured-variables-nitrate.php
Cholorphyll: http://biogeochemical-argo.org/measured-variables-chlorophyll-a.php

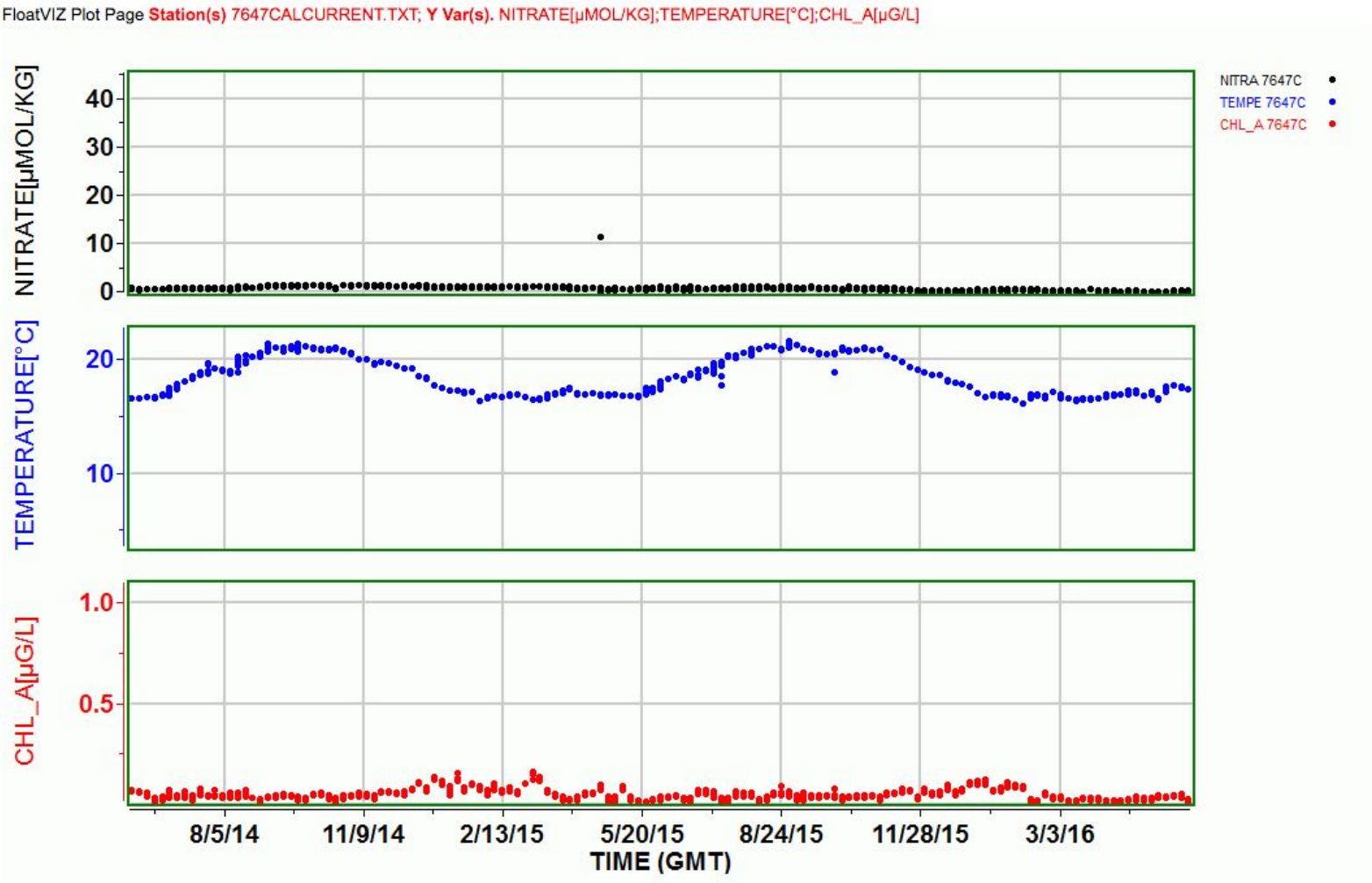
Float 9096SoOcn- Southern Ocean

Float 0276NoAtlantic- North Atlantic Ocean

Float 8486Hawaii- Pacific Ocean Hawaii



Float 7647CalCurrent- Central California



Teacher answer guide: possible answers your students could come up with, though there is no right or wrong answer.

Remember that in the Southern Ocean, the months that we typically consider winter months (December to March) are the Southern Ocean summer months. What you expect to see is that as the temperature warms up, nitrates will be used by phytoplankton, so as nitrate levels go down, chlorophyll levels should go up. There is high productivity in the Southern Oceans because of upwelling. These variations reflect seasonal changes in the oceans. When chlorophyll levels are at zero but there are also low nitrate levels, it doesn't mean all of the phytoplankton have died or stopped photosynthesizing. The phytoplankton use photoreceptors as sort of “sunscreen” to protect themselves from too much exposure to light so chlorophyll levels would appear low but the color of the water would still be green. In Hawaii and the California Current, low nitrate levels and low chlorophyll production are indicative of more blue waters as overall phytoplankton productivity in these areas are generally low. Seasonal variation in these areas is also minimal. The North Atlantic Ocean, is more akin to the green waters seen in the Southern Ocean with high phytoplankton productivity and it varies seasonally with blooms seen during spring and summer months, opposite of the Southern Ocean.