Measurements of solar radiation, temperature, and phytoplankton biomass in upper Arctic Ocean waters via autonomous buoys.

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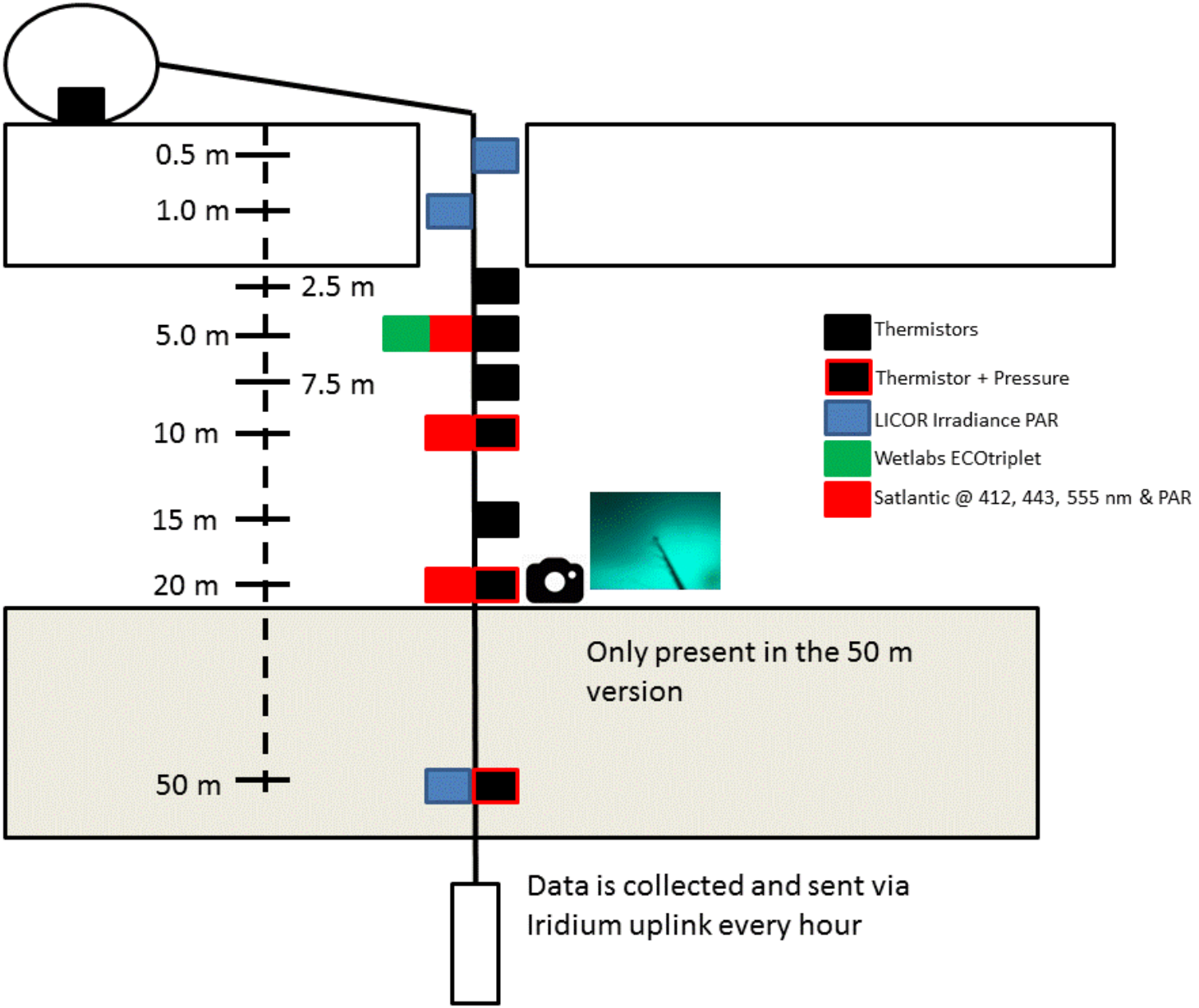
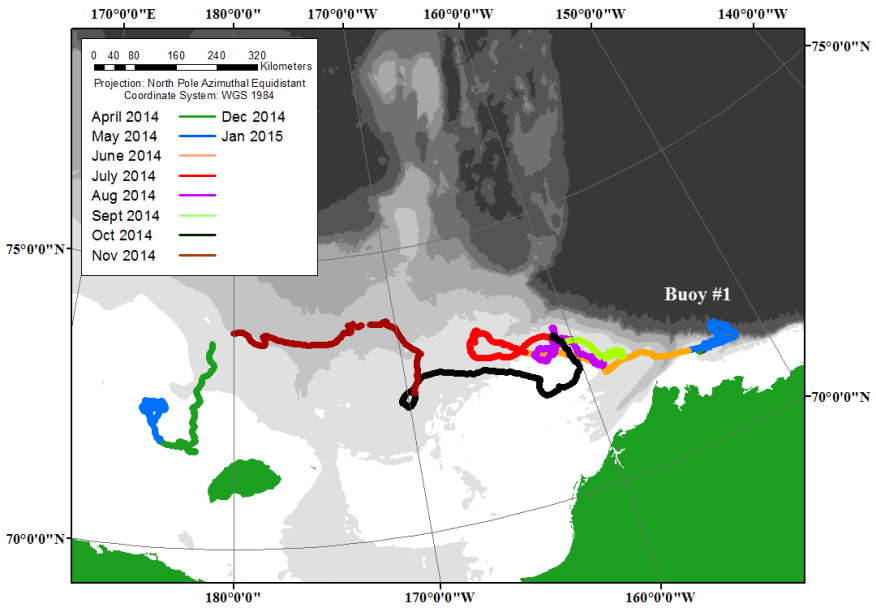
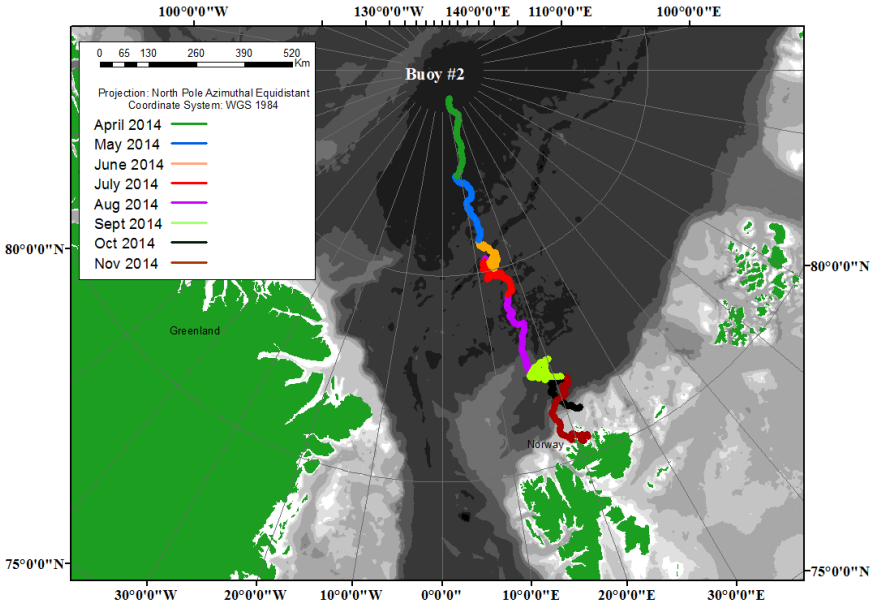
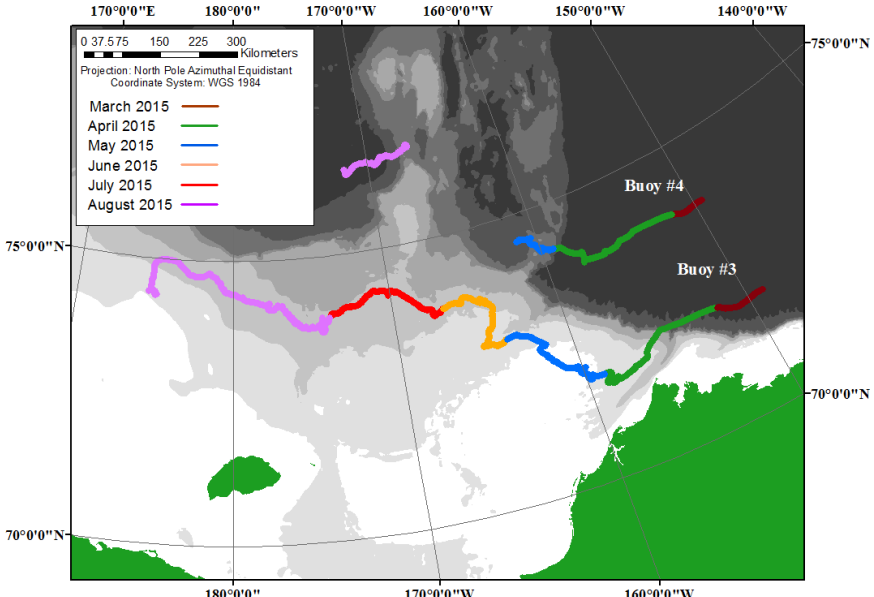
Combination of temp, light and biological sensors



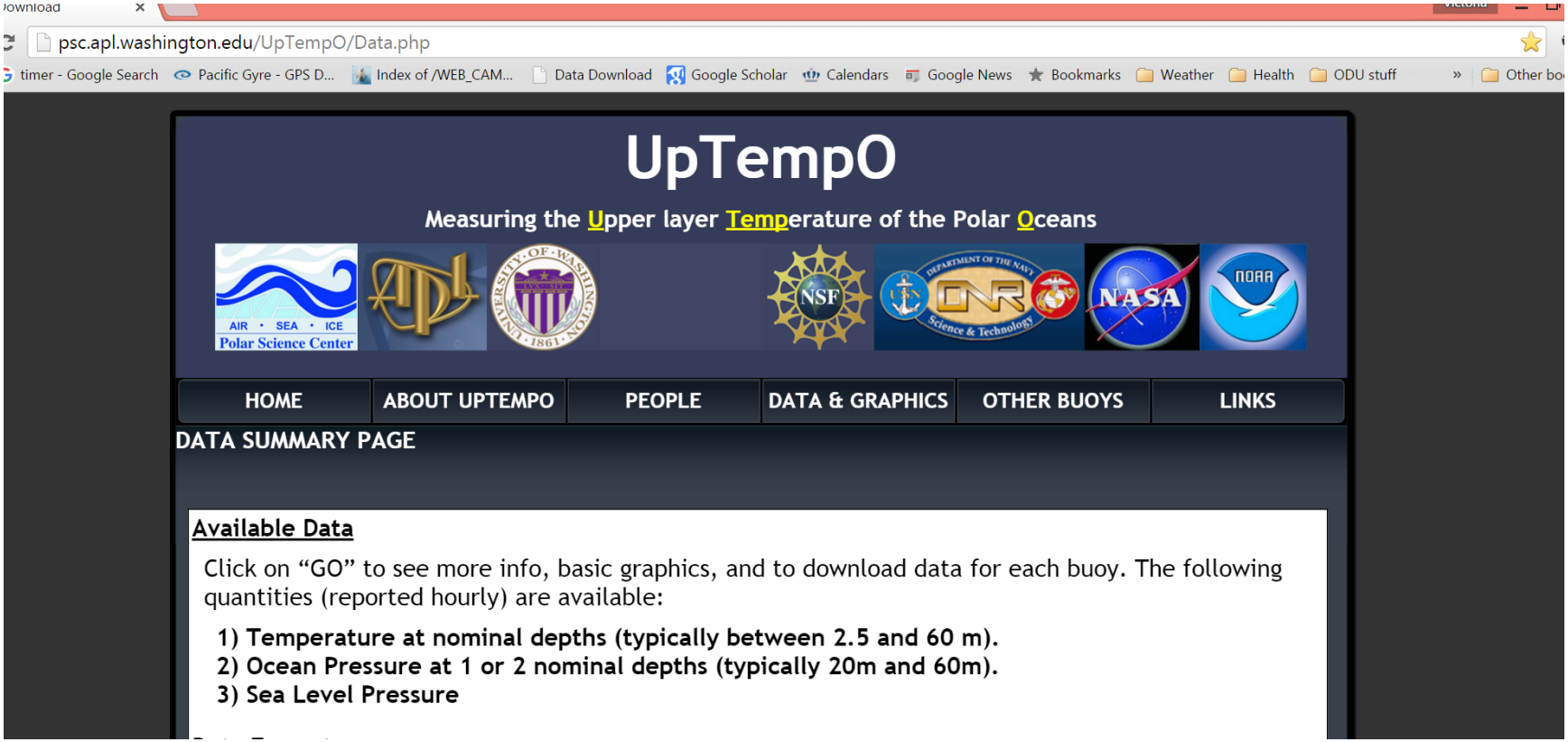
Four buoys deployed, over 1000 days of observations.







The data is available in near real-time



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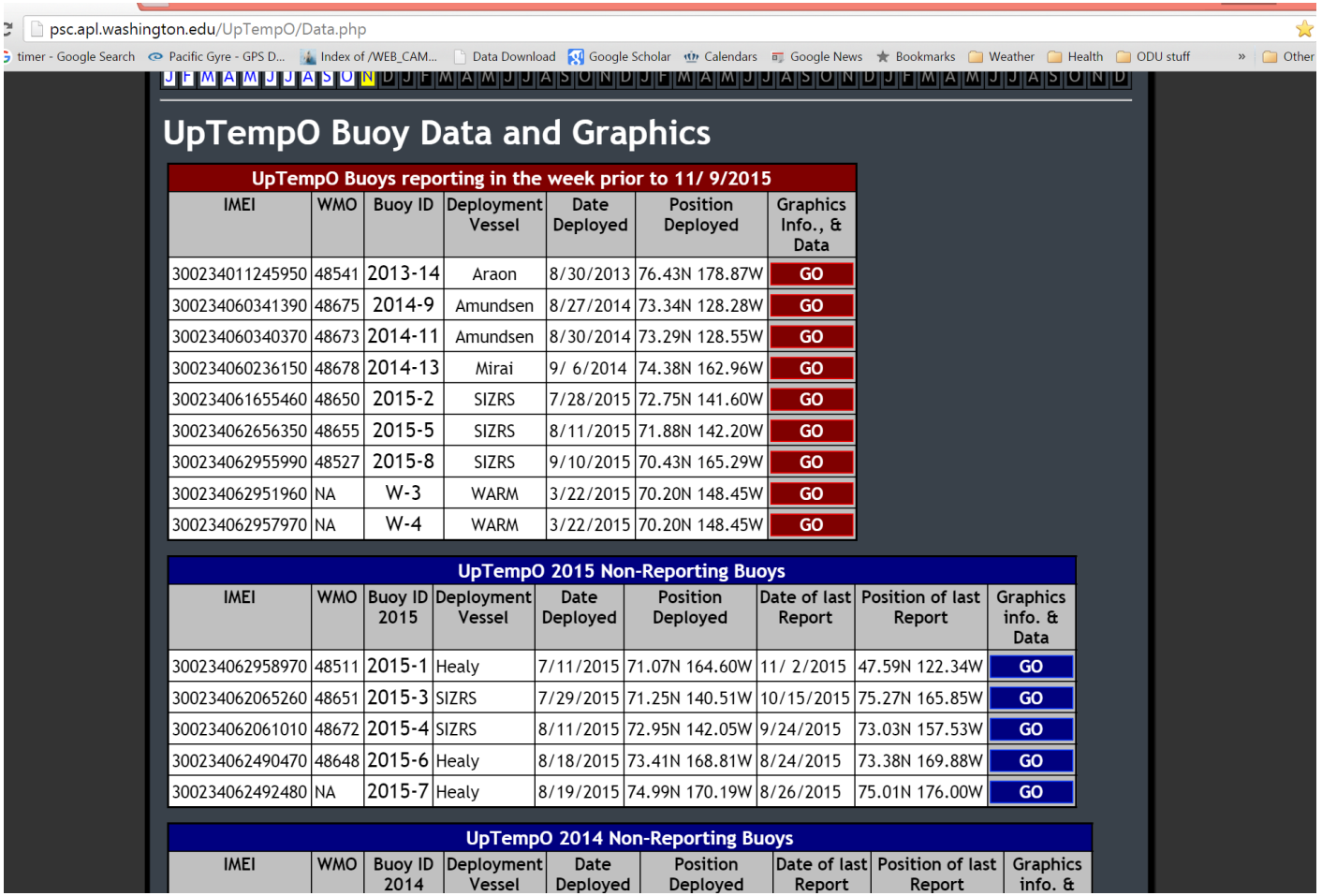
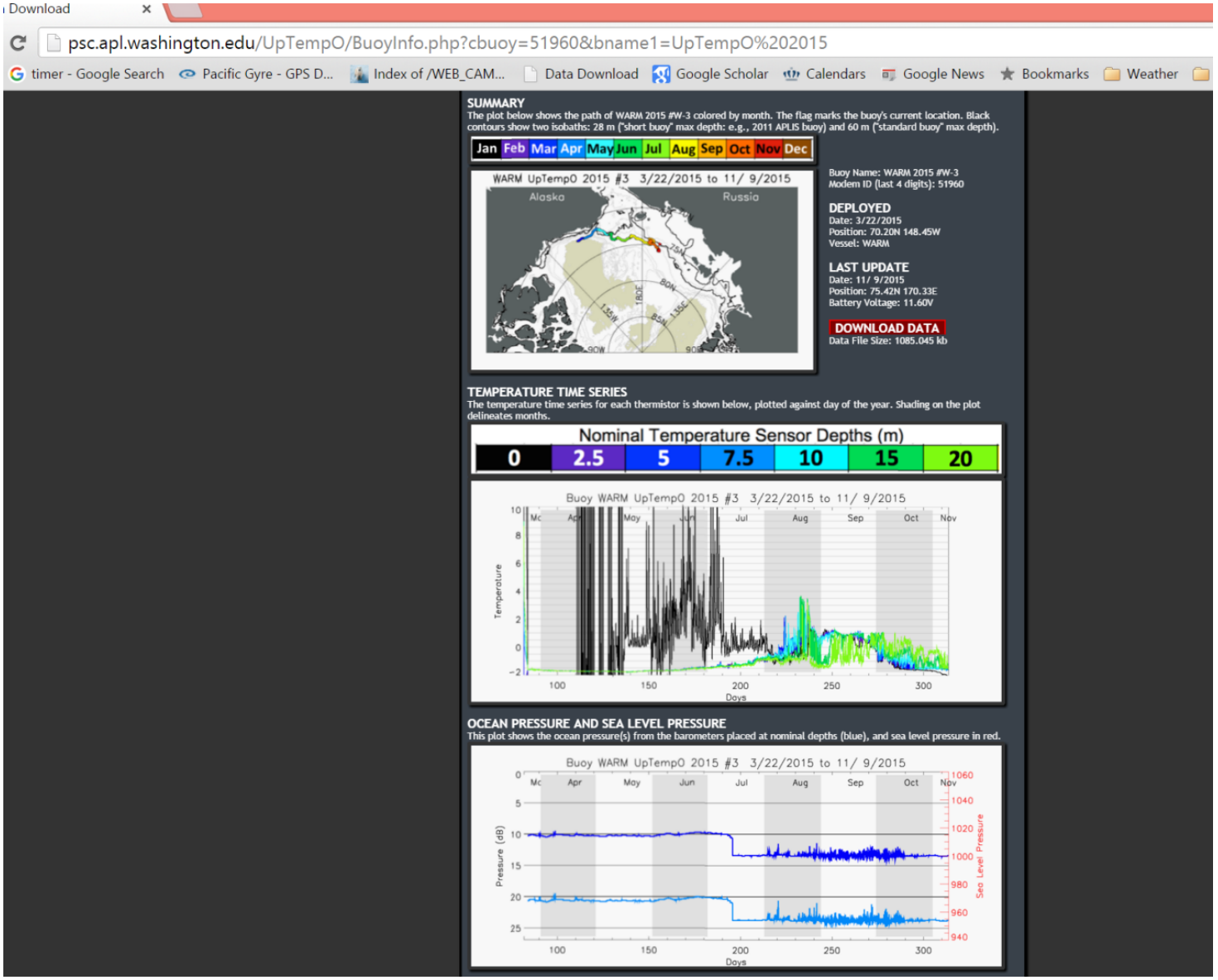


The data is available in near real-time



QC/QA data from 2014 is on ACADIS
2015 data is ready to be submitted

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Dataset

Warming and irradiance measurements in the Arctic: Determining the link between solar energy absorption and surface warming through long term observations

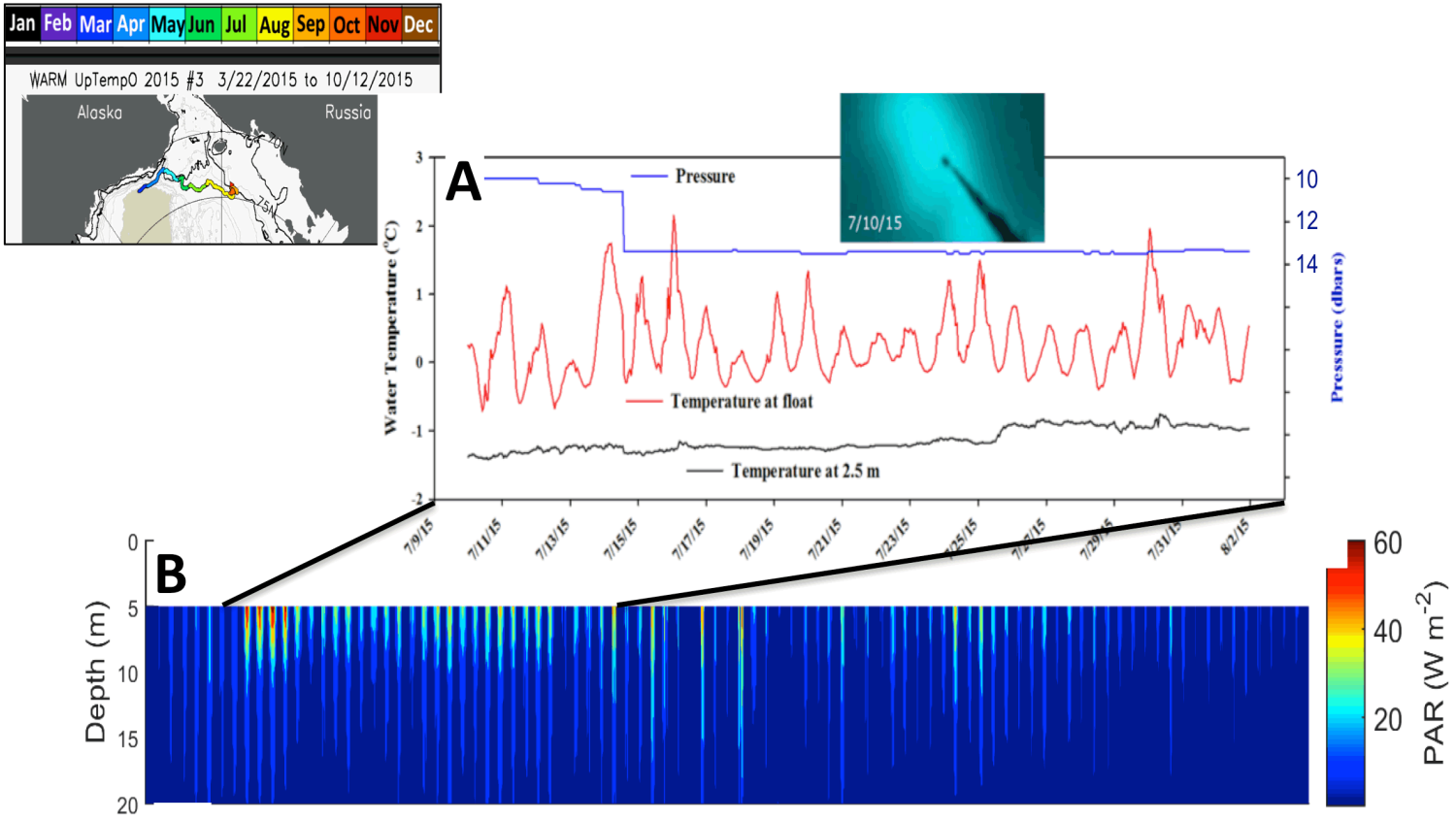
Light and temperature measurements - WARM buoy #1

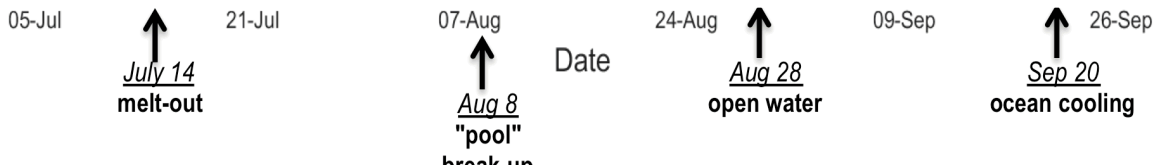
Metadata | *Download Data*

Principal Investigator:	Victoria Hill
Description:	Data collected at hourly intervals from an ice tethered buoy. Sensors placed at discrete depths collect irradiance, temperature, chlorophyll conce fluorescence, dissolved organic material via fluorescence, and backscatter at 532 nm. Buoy deployed in 2 m thick ice on 9th March 2014, transm terminated on 4th January 2015.
Progress:	Completed - Dataset fully collected/analyzed.
Time Coverage:	Mar 9, 2014 - Jan 4, 2015
Northernmost Latitude:	73.827
Southernmost Latitude:	71.507
Westernmost Longitude:	-179.987
Easternmost Longitude:	-153.071

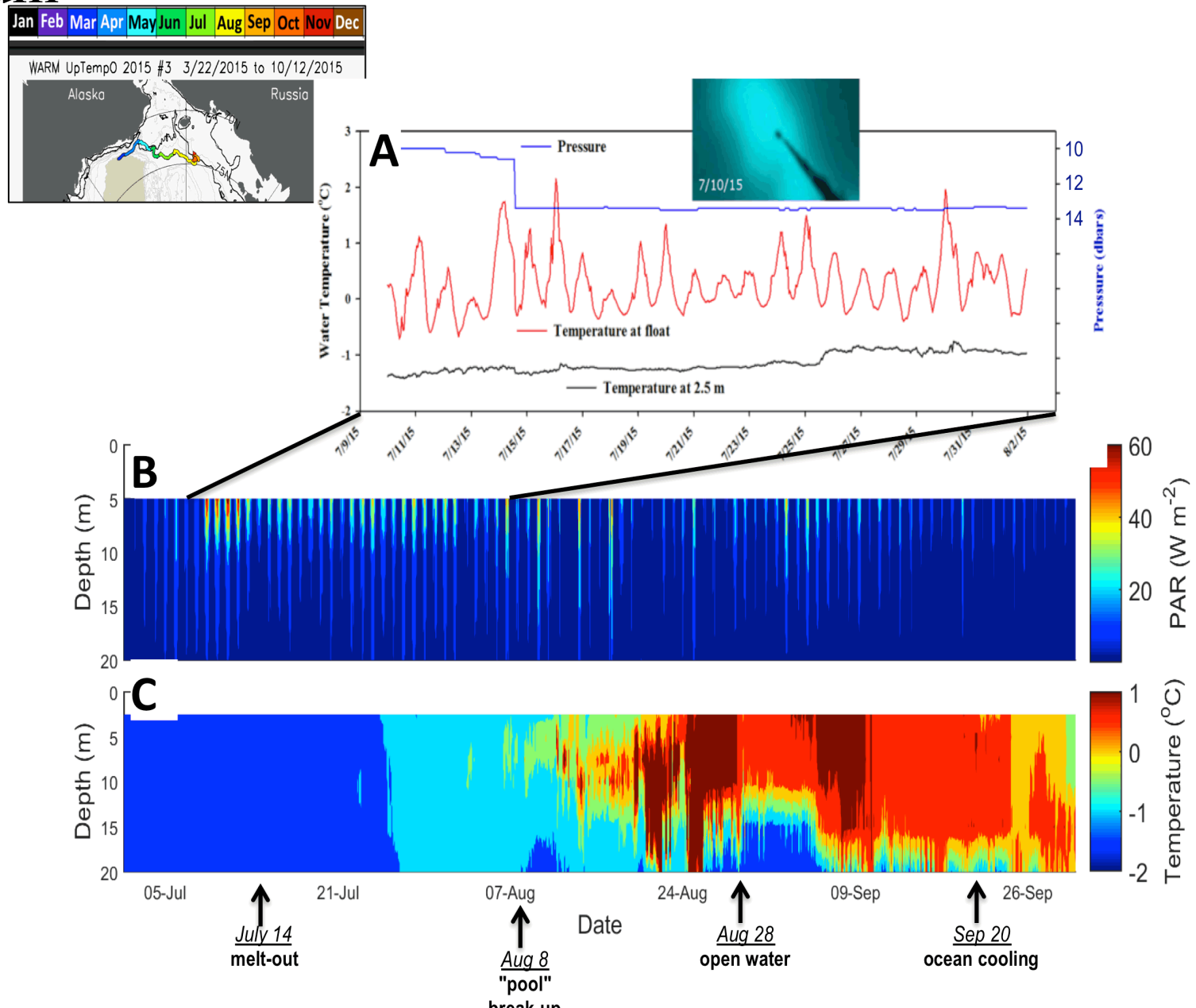
Award Numbers:	1203784 1203440
Science Keywords:	Oceans > Ocean Circulation > Ocean Mixed Layer Oceans > Sea Ice Oceans > Ocean Optics > Attenuation/Transmission

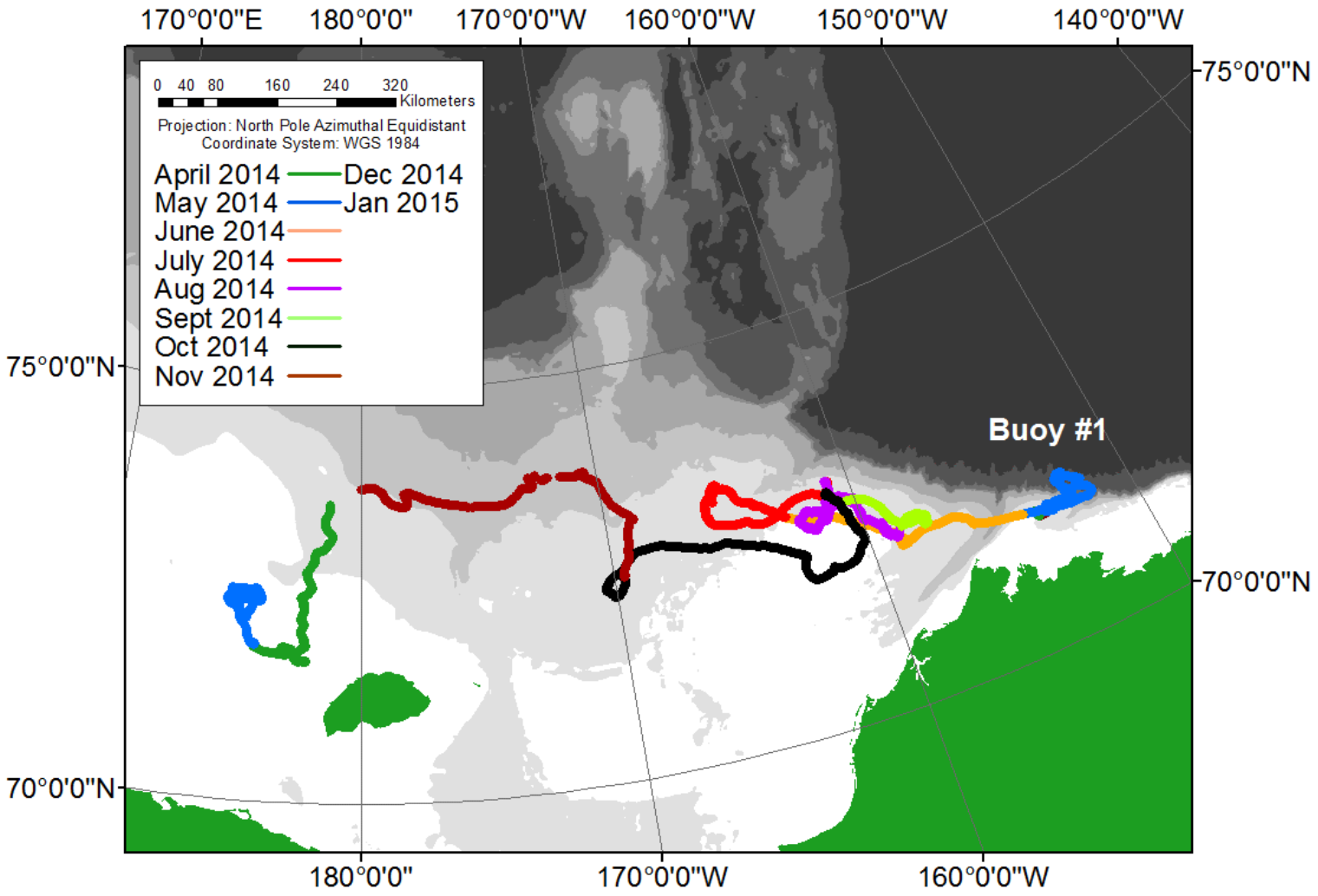
Captured daily warming in melt ponds.

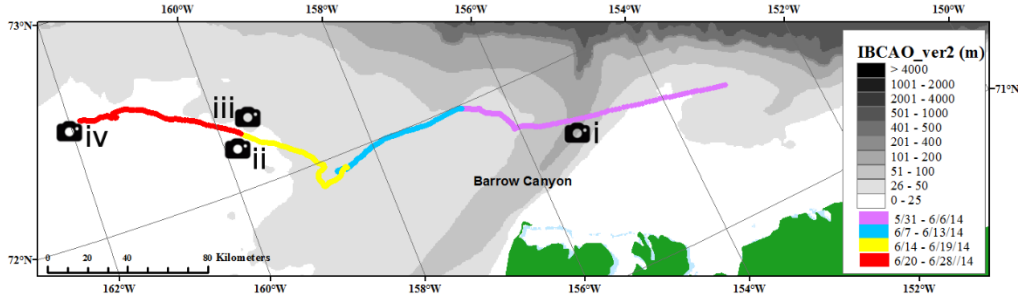




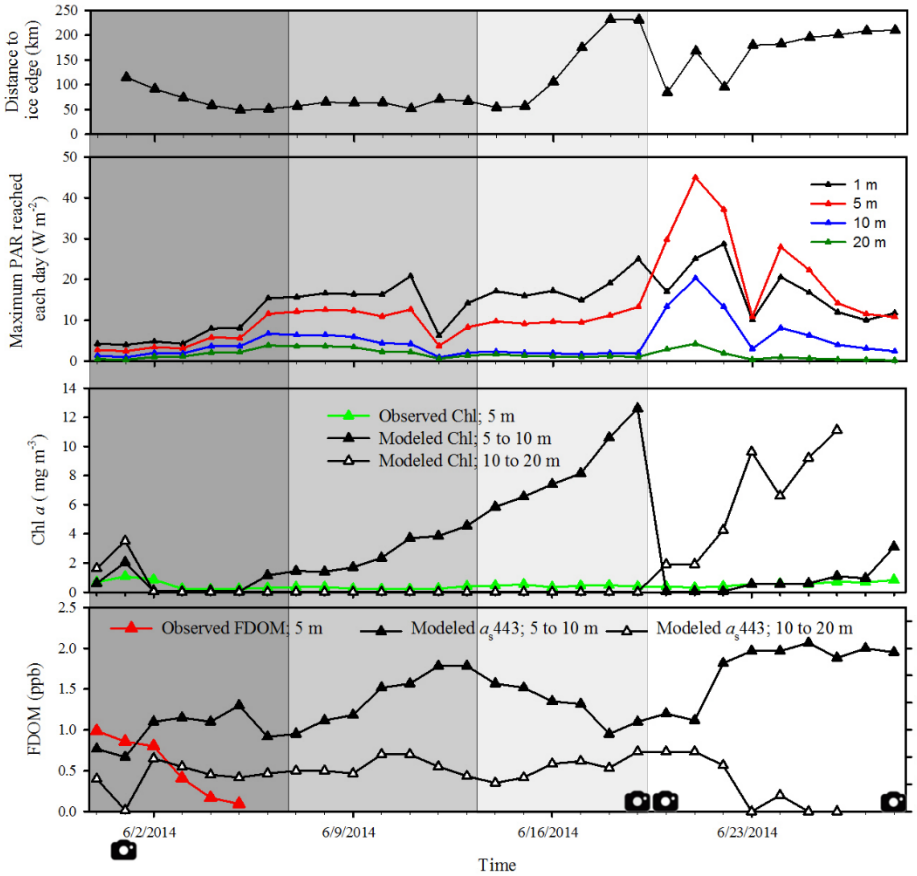
Formation of the near surface temperature maximum

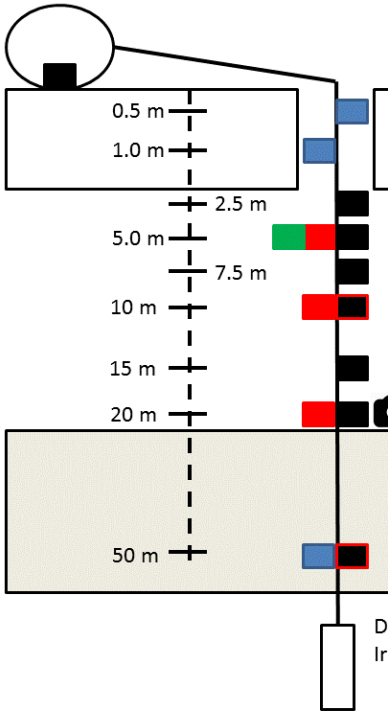



170°0'0"E
180°0'0"
170°0'0"W
160°0'0"W
150°0'0"W
140°0'0"W
75°0'0"N
70°0'0"N
0 40 80 160 240 320
Kilometers
Projection: North Pole Azimuthal Equidistant
Coordinate System: WGS 1984
April 2014
May 2014
June 2014
July 2014
Aug 2014
Sept 2014
Oct 2014
Nov 2014
Dec 2014
Jan 2015
Buoy #1

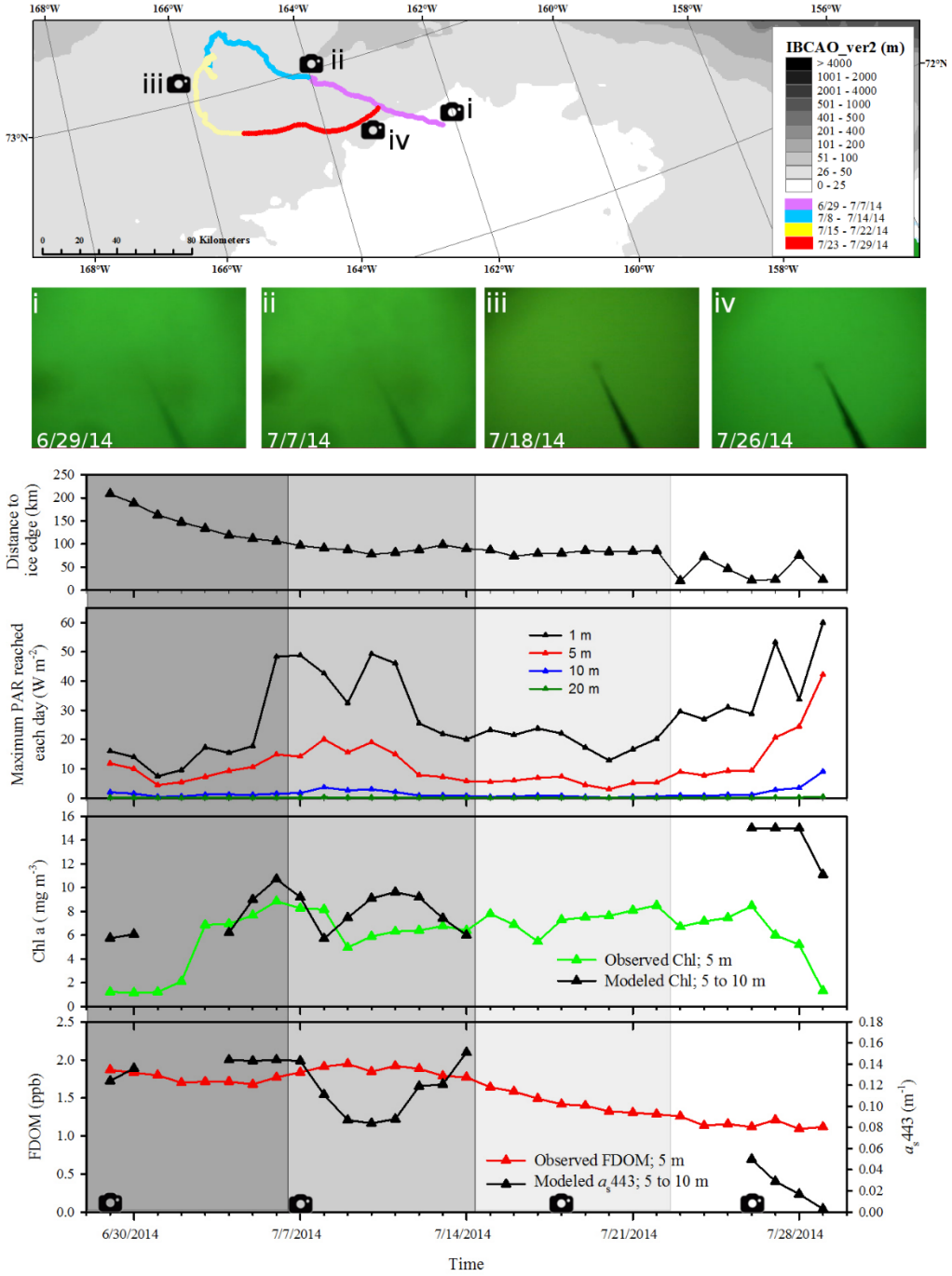

IBCAO_ver2 (m)
> 4000
1001 - 2000
2001 - 4000
501 - 1000
401 - 500
201 - 400
101 - 200
51 - 100
26 - 50
0 - 25
5/31 - 6/6/14
6/7 - 6/13/14
6/14 - 6/19/14
6/20 - 6/28//14
Barrow Canyon
i
ii
iii
iv
Kilometers


i
6/1/14
ii
6/19/14
iii
6/20/14
iv
6/28/14

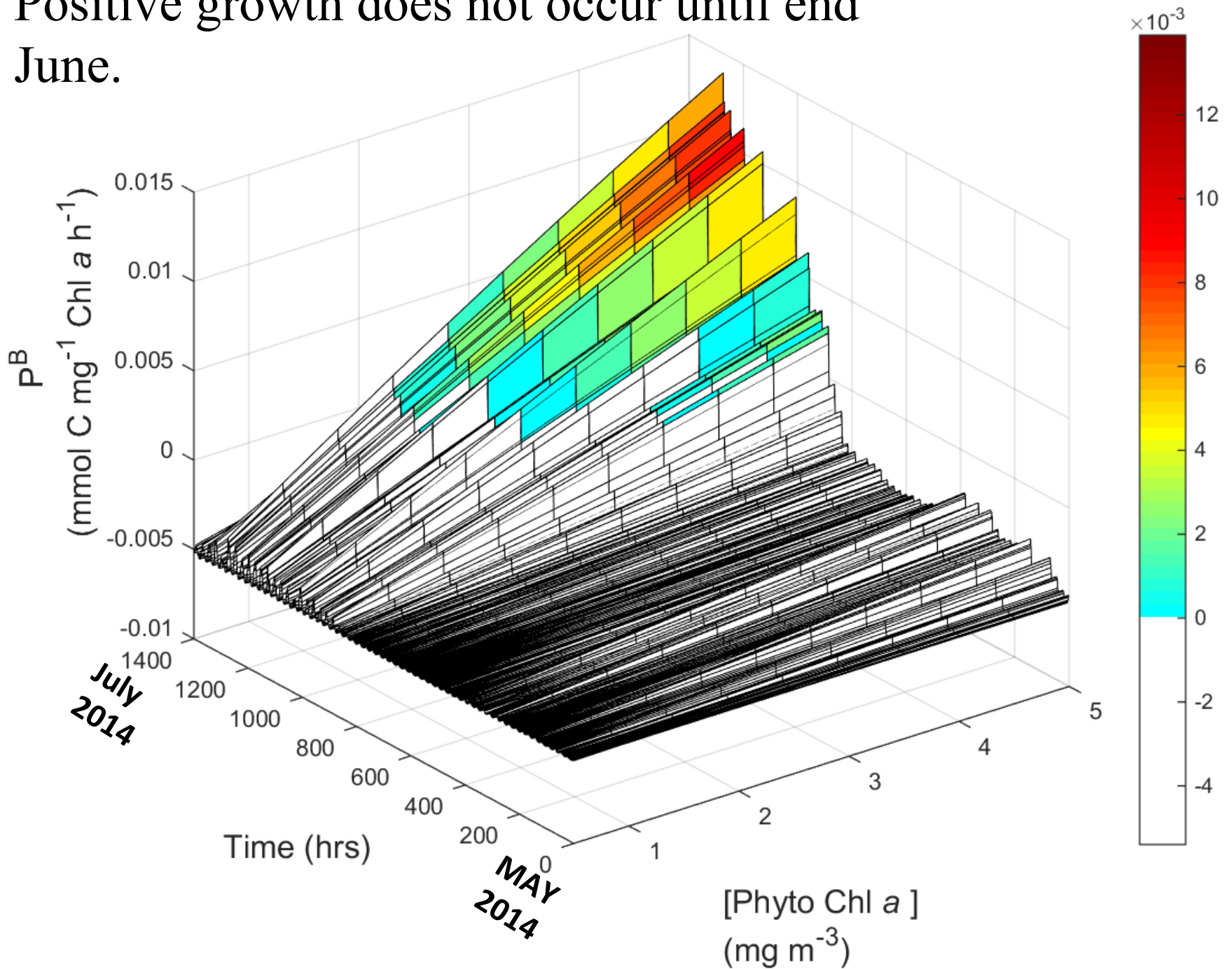

Distance to ice edge (km)
Maximum PAR reached each day (W m-2)
1 m
5 m
10 m
20 m
Chl a (mg m-3)
Observed Chl; 5 m
Modeled Chl; 5 to 10 m
Modeled Chl; 10 to 20 m
FDOM (ppb)
Observed FDOM; 5 m
Modeled as443; 5 to 10 m
Modeled as443; 10 to 20 m
as443 (m-1)
6/2/2014
6/9/2014
6/16/2014
6/23/2014
Time


0.5 m
1.0 m
2.5 m
5.0 m
7.5 m
10 m
15 m
20 m
50 m

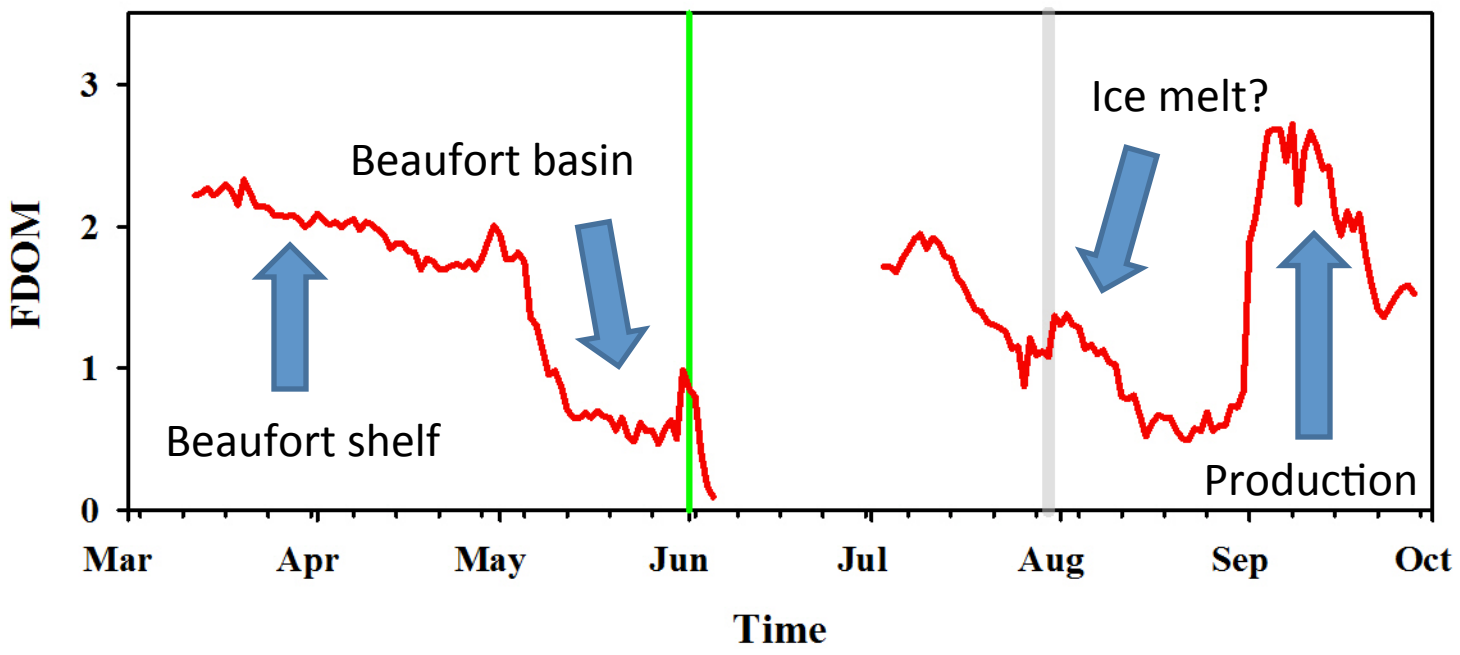
All this biomass is invisible to remote sensing



Positive growth does not occur until end June.



Large seasonal and spatial differences in FDOM are observed.



Measurements of solar radiation, temperature, and phytoplankton biomass in upper Arctic Ocean waters via autonomous buoys.

1. High temporal resolution measurements of light, temperature and bio-optics, in first year ice.

    Link to moorings, cruises, models.

2. Observed warming and formation of a NSTM with accompanying light measurements.

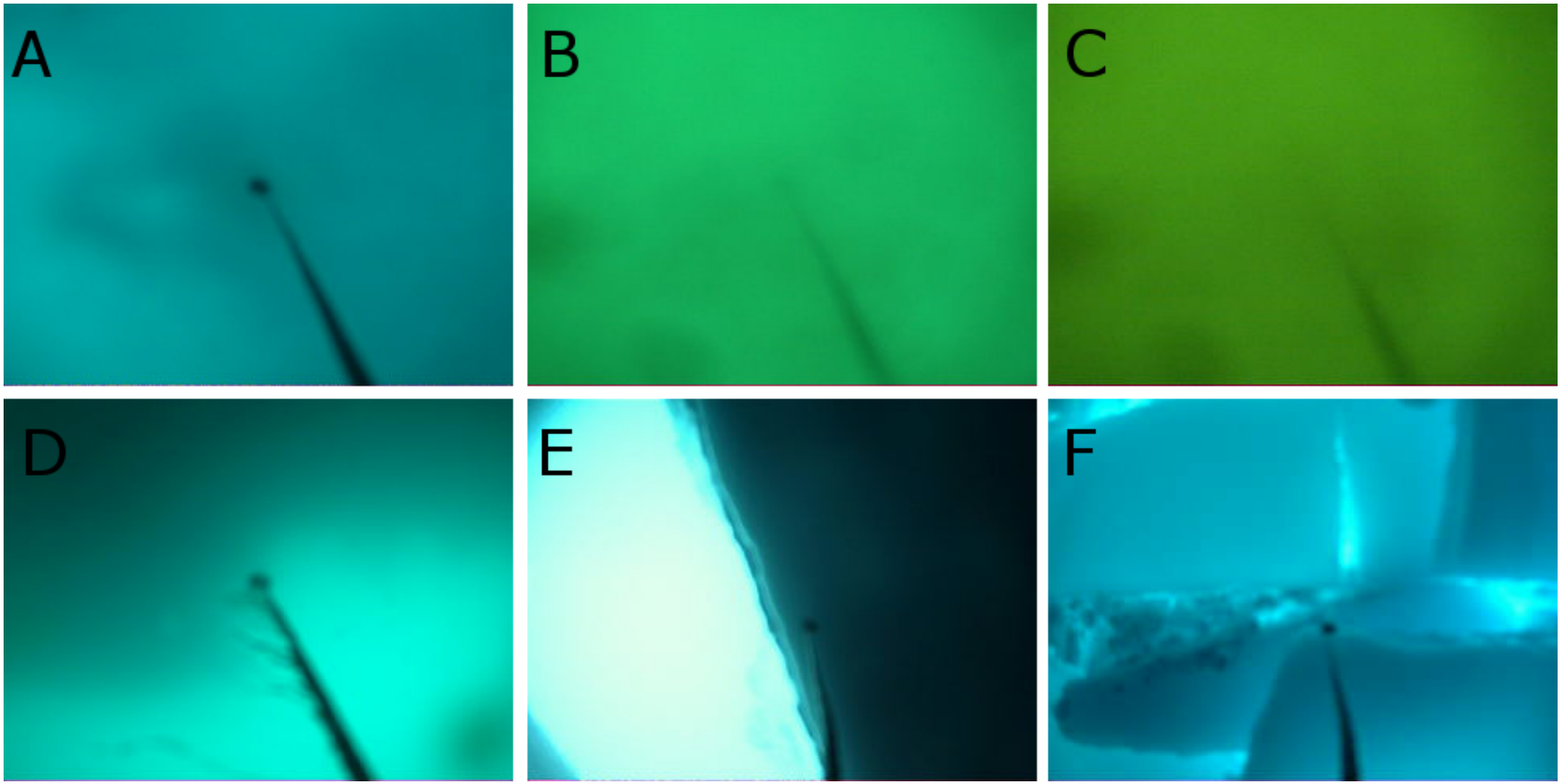
3. Observed high Chl a under the ice, and used the light field to estimate potential phytoplankton growth.

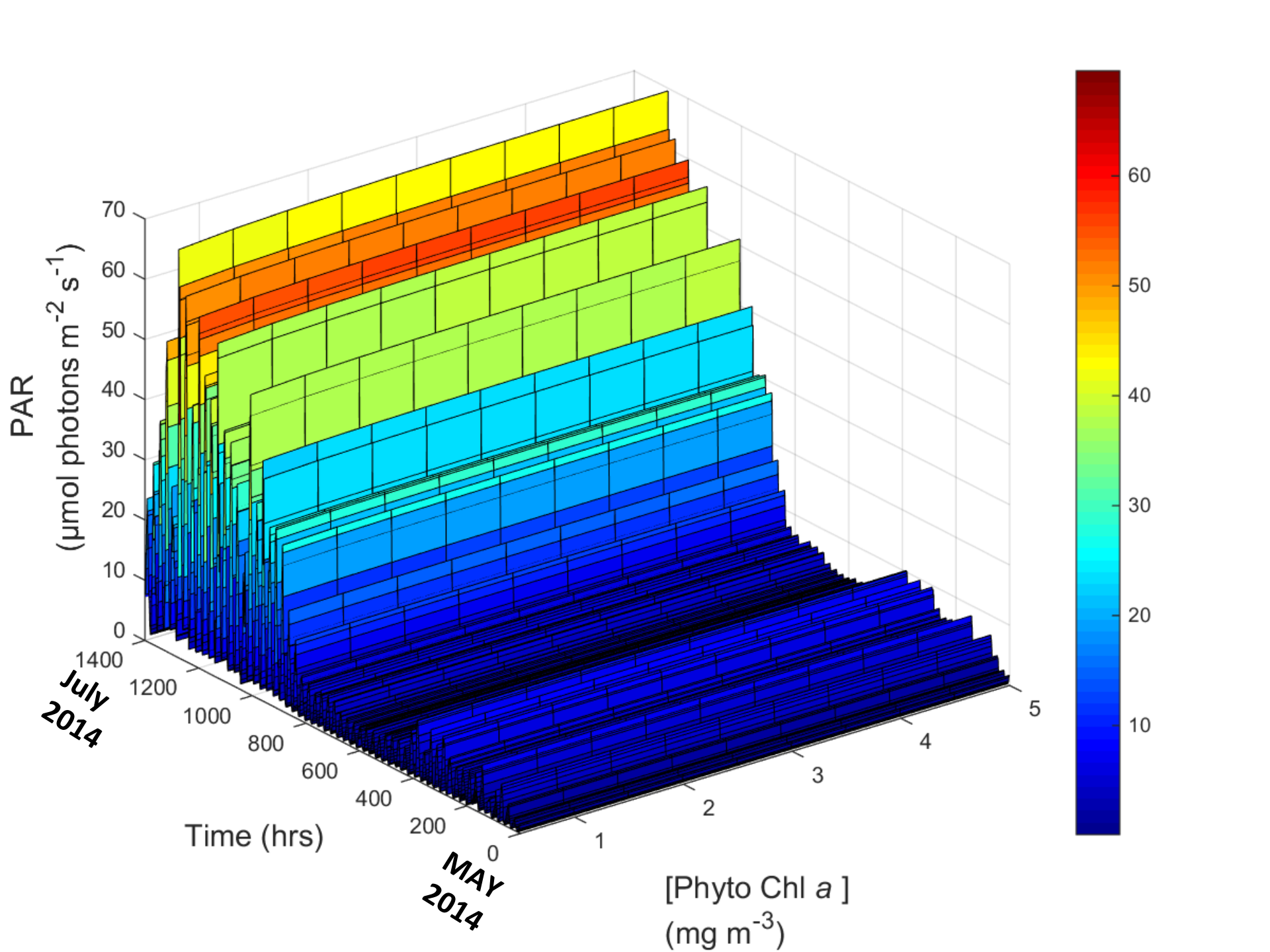
    *Invisible to remote sensing.

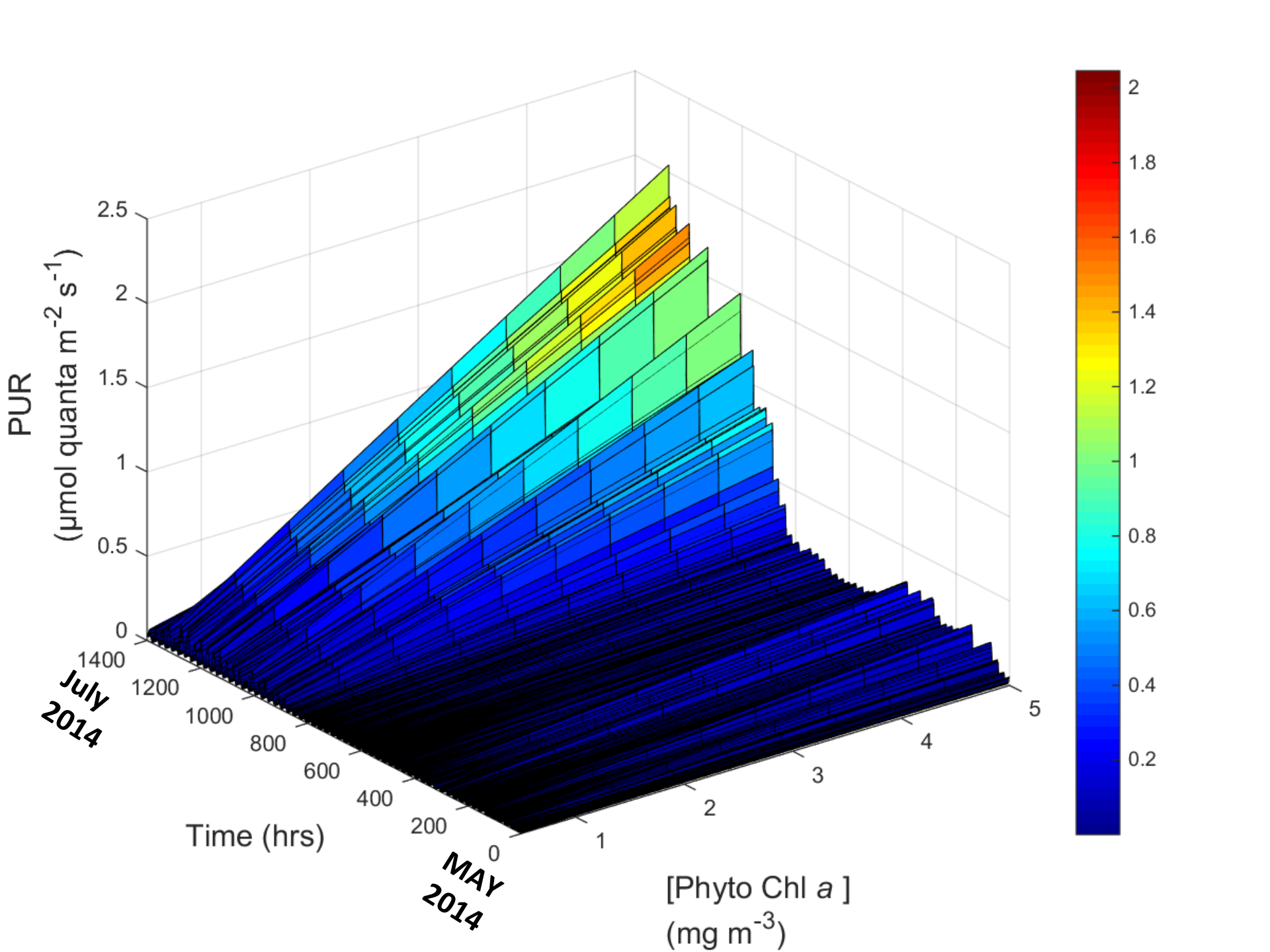
    Determine the impacts of under ice PP on open water PP.

4. Seasonal patterns of DOC were observed on the shelf, removal of material through photo-oxidation can be estimated.

Capable of surviving ice melt, providing observations throughout the year.




PAR
(µmol photons m-2 s-1)
70
60
50
40
30
20
10
0
1400
1200
1000
800
600
400
200
0
Time (hrs)
July
2014
MAY
2014
1
2
3
4
5
[Phyto Chl a]
(mg m-3)
60
50
40
30
20
10


PUR
(µmol quanta m-2 s-1)
2.5
2
1.5
1
0.5
0
1400
1200
1000
800
600
400
200
0
July
2014
Time (hrs)
MAY
2014
1
2
3
4
5
[Phyto Chl a]
(mg m-3)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2