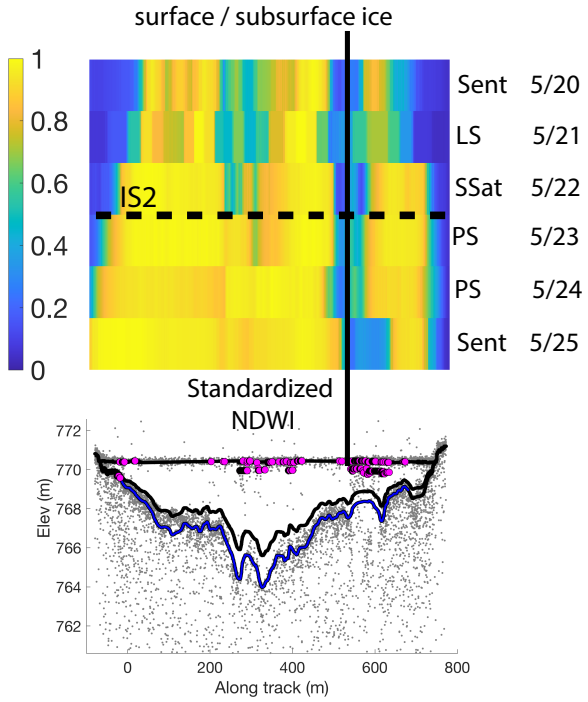
Supplemental Tables and Figures.

Lakes Over Sermeq Kujalleq

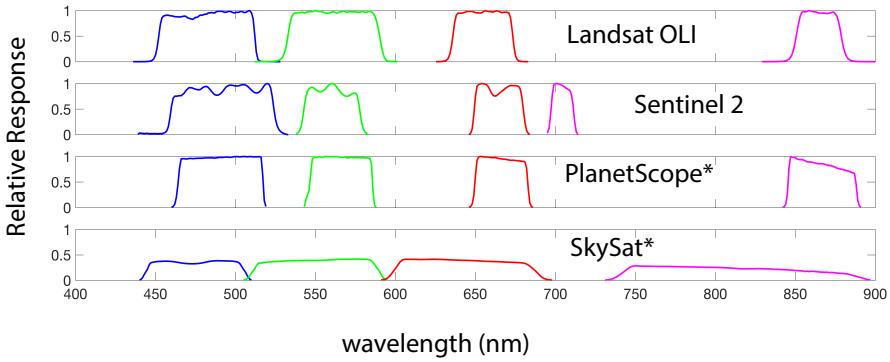
Designation	**Max Lake Surface Area from imagery (m^2)**	**ICESat-2 track length (m)**	**ICESat-2 track Max depth**
RGT 727 May 15th, 2019			
1	160800	2754.44	3.95
RGT 841 May 23rd			
1	357900	2398.82	1.31
2	880300	3092.19	4.50
3	804873	2786.51	3.03
4	880300	3372.80	4.82
5	625127	2608.30	1.81
RGT 1108 June 9th, 2019			
1	574200	3350.97	2.99
2	574200	3123.05	1.51
3	596931	3026.49	2.99
4	956190	3360.29	2.18
5	772089	2746.55	1.95
6	54167	2665.72	1.51
7	987300	3165.52	3.04
8	738000	3172.79	3.52
9	1165500	2691.53	0.81
10	987300	2968.48	2.42
11	738000	3228.69	3.22
RGT 1169 June 13th, 2019			
1	158400	2885.59	1.64
2	513200	2455.54	2.58
3	224100	2396.62	1.33
4	478100	3307.89	1.50
5	904600	2817.40	4.39
6	904600	2720.19	5.28
7	1113500	3698.78	2.40
8	1113500	2401.77	1.34
9	1113500	2612.26	1.63

RGT 1222 June 17th, 2019			
1	2060100	3134.91	3.62
2	48600	2618.15	1.70
3	1635300	4089.09	8.93
4	255600	2718.01	1.23
5	1635300	4129.21	10.62
6	1692900	2679.53	1.50
7	2225700	3181.78	3.89
8	1611900	4443.29	11.43
9	998574	2541.70	2.14
10	998574	2802.32	1.70
11	1025100	3193.46	2.86
12	1611900	4210.25	11.55
13	1025100	3860.27	1.59
14	4101300	4774.88	11.49
15	2060100	3842.27	3.08
16	998574	2562.81	0.35
17	4101300	4602.40	10.64
18	5656500	4005.92	6.13
19	2982600	2899.97	1.70

Table 1: Lakes used in this study with maximum surface area of the lake detected from imagery and the length of the ICESat-2 pass over the lake. Lake numbers correspond to profiles shown in Supplemental Figure 3.



(a) Lake Amitav NDWI



(b) Spectral Response

Figure 1: (a) Watta calculated profile of depth, depth corrected for refraction and subsurface ice over Lake Amitav (bottom) with NDWI values co-registered to the ICESat-2 track (top) (b) Spectral Response curve for imagery sources used in main text. Note that PlanetScope and SkySat data are shown for the satellite used in imagery collected over Lake Amitav and are not representative of the entire constellation. Landsat OLI source (Barsi et al., 2014)., Sentinel-2 source (https://earth.esa.int/web/sentinel/user-guides/sentinel-2-msi), Planet Labs SkySat and PlanetScope (see: support.planet.com)

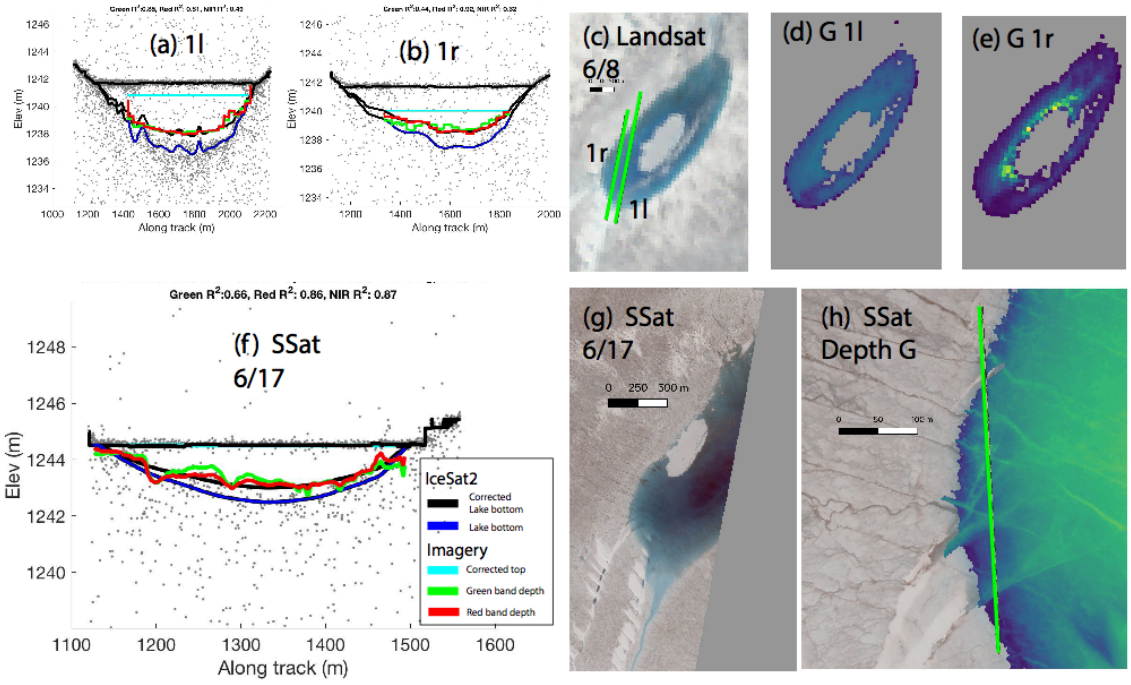


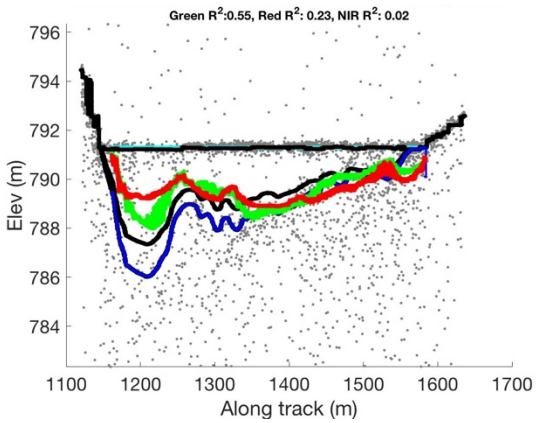
Figure S2: Watta-calculated depth, corrected depth and lake surface profiles for (top) RGT 1108 Lake 1 on June 9th, 2019, with gt1l (a,d) and gt1r (b,e). Landsat imagery collected on June 8th, 2019. (bottom) The same lake, also RGT 1222 Lake 6 on June 17th, 2019 (f-h), with SkySat imagery collected on June 17th, 2019.

Figure: S3. Lake Depth Profiles (corresponding to Table S1)

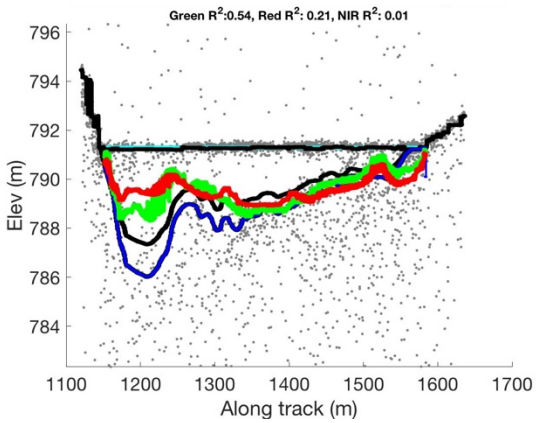
RGT 727 **May 15th, 2019**

Lake 1:

Sentinel-2: May 12th, 2019



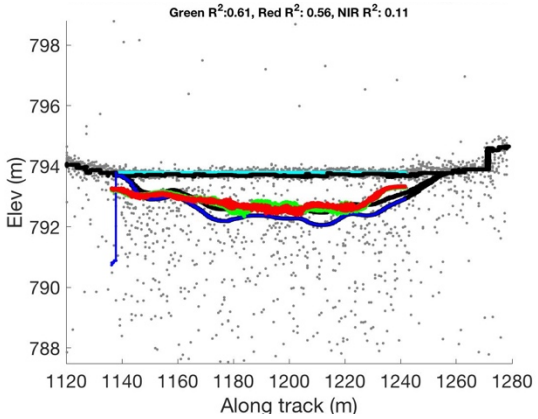
Sentinel-2: May 14th, 2019



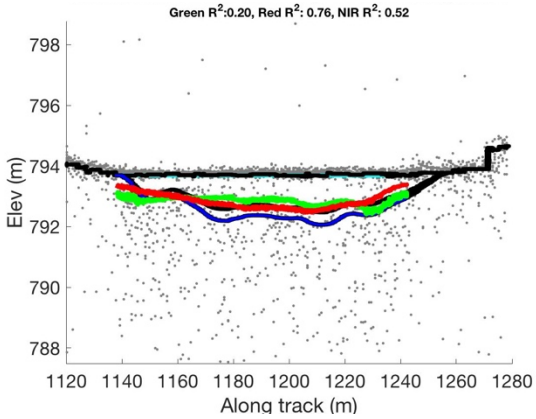
RGT 841 **May 23rd, 2019**

Lake 1

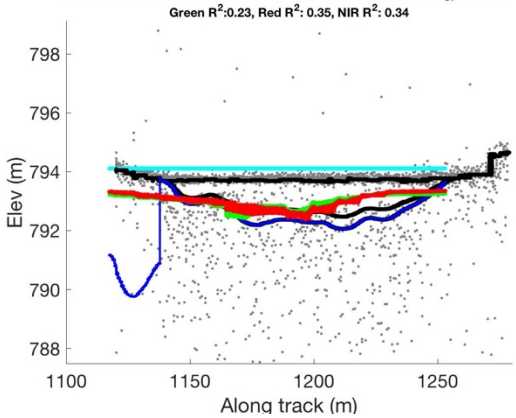
SkySat May 22nd, 2018



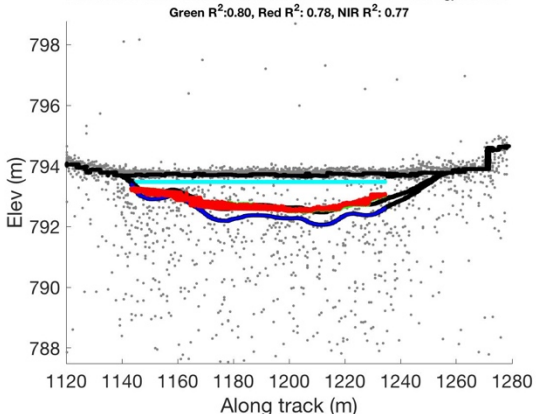
SkySat: May 23rd, 2019



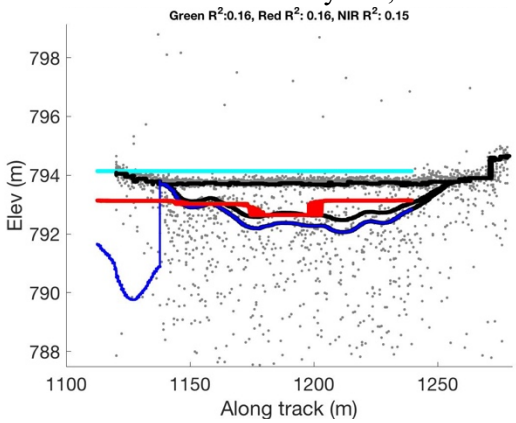
Sentinel-2 : May 25th, 2019



Sentinel-2 : May 20th, 2019

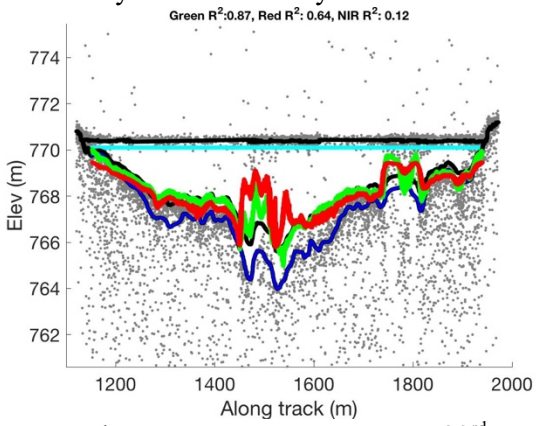


Landsat :May 21st, 2019

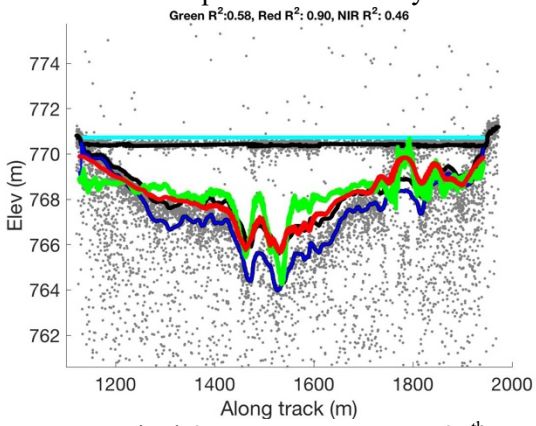


Lake 2:

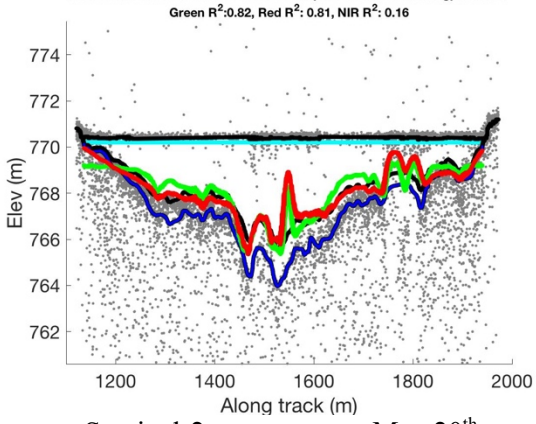
SkySat: May 22nd



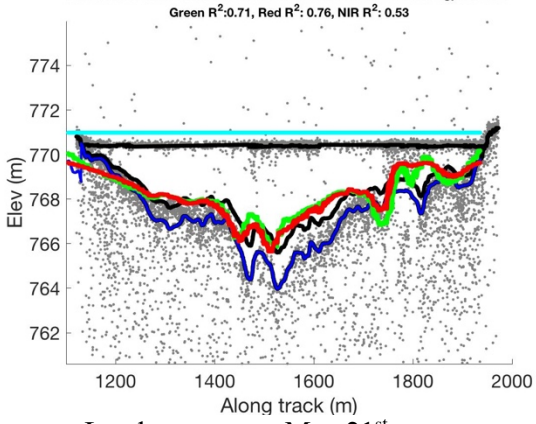
PlanetScope: May 24th



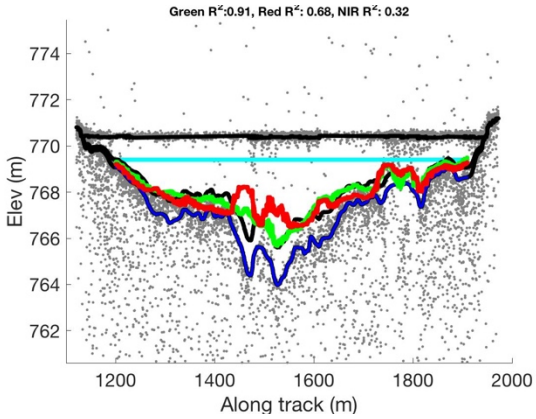
PlanetScope :May 23rd



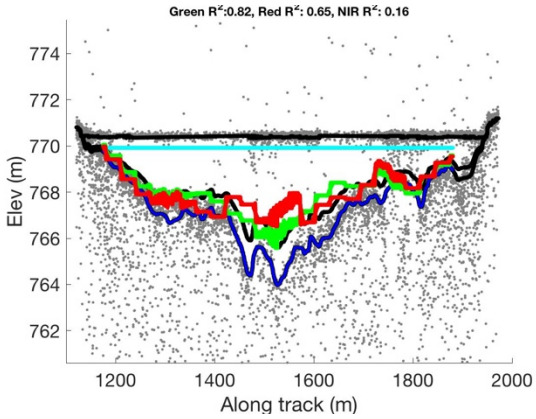
Sentinel-2 :May 25th



Sentinel-2 May 20th

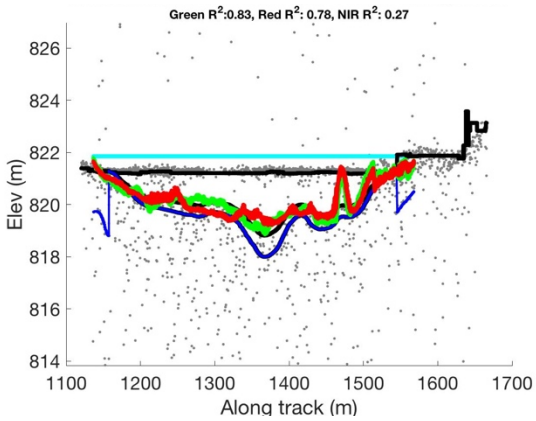


Landsat :May 21st

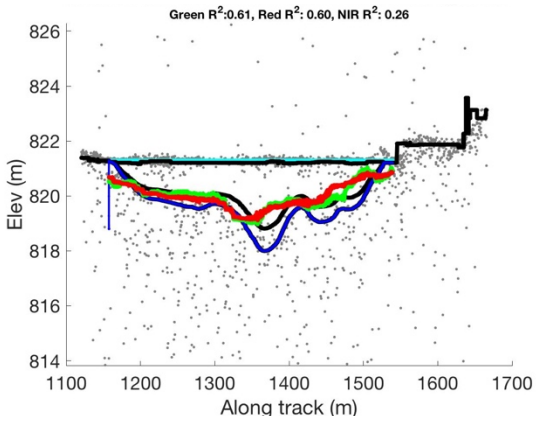


Lake 3:

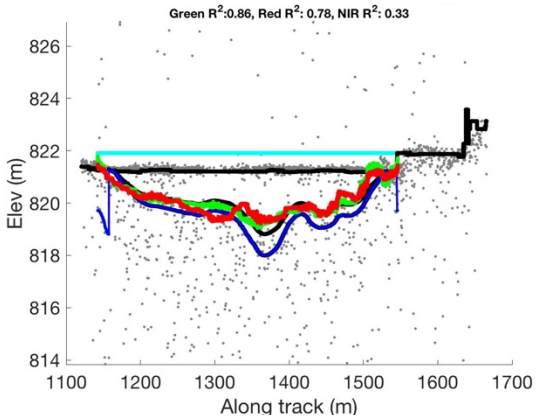
SkySat: May 22nd



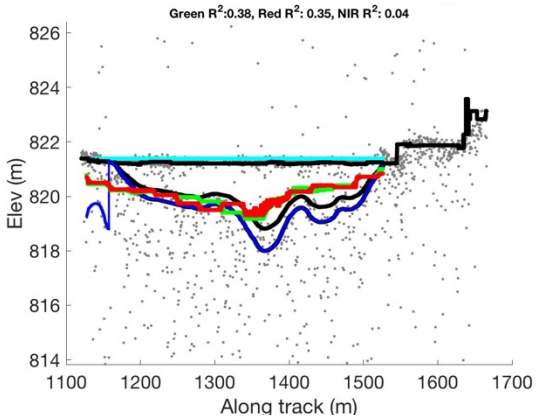
Sentinel-2 May 25th



Sentinel-2 May 20th

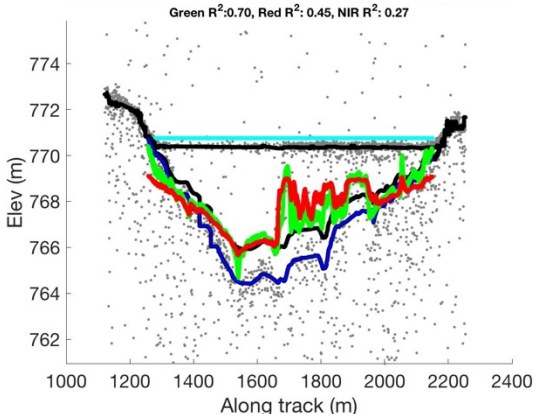


Landsat May 21st

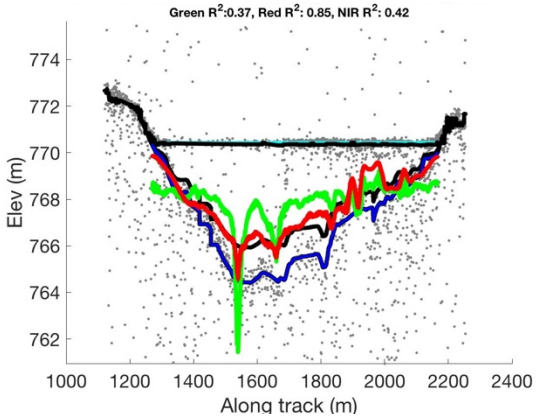


Lake 4:

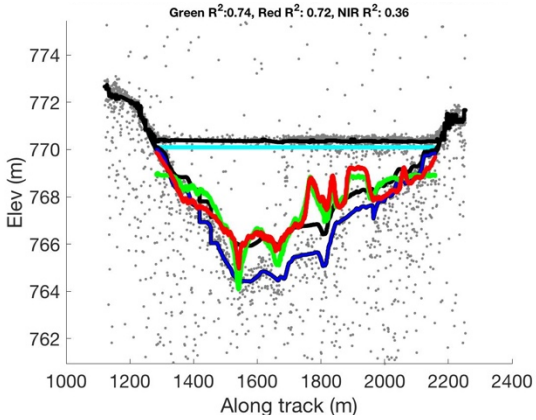
SkySat May 22nd



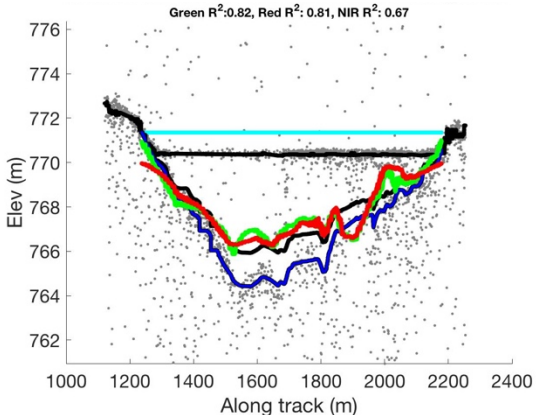
PlanetScope May 24th



PlanetScope May 23rd

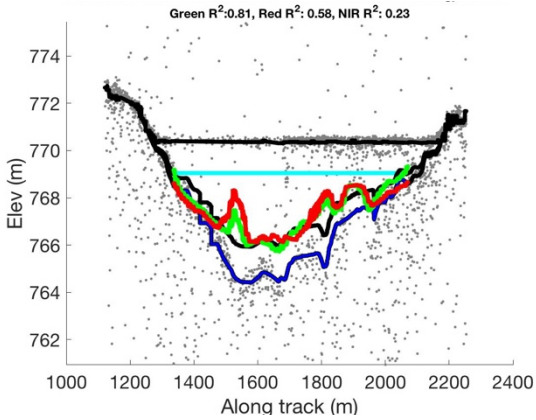


Sentinel-2 May 25th

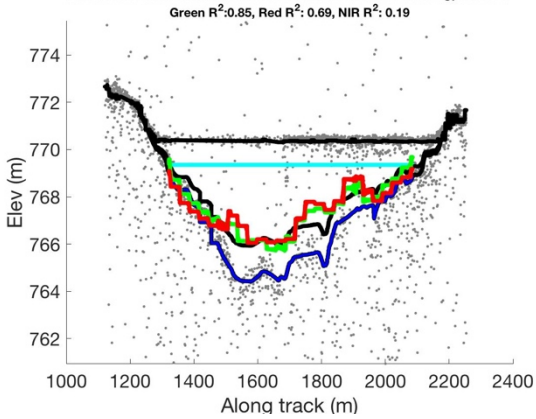


s

Sentinel-2 May 20th

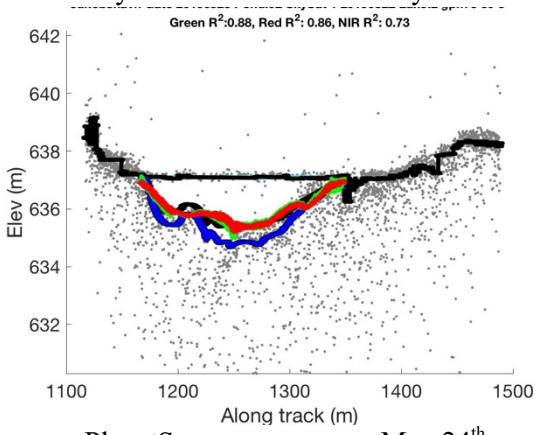


Landsat May 21st

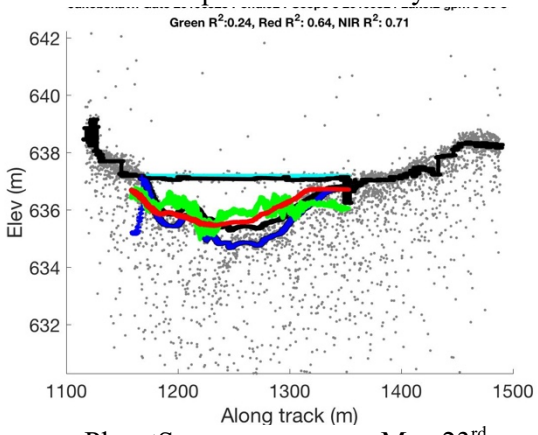


Lake 5:

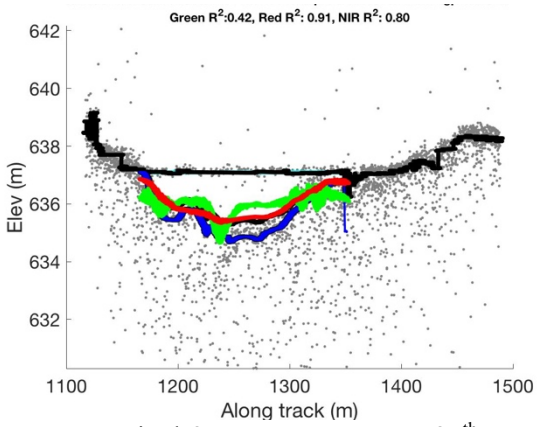
SkySat May 22nd



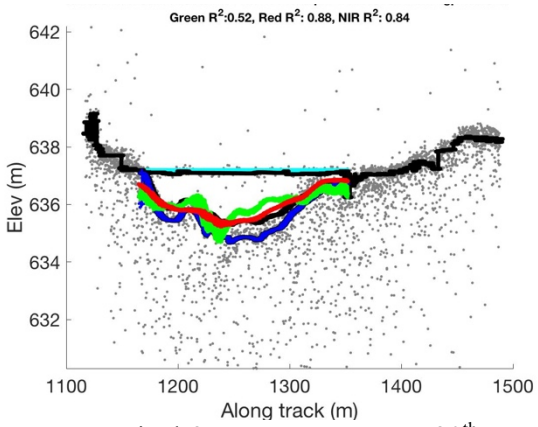
PlanetScope May 24th



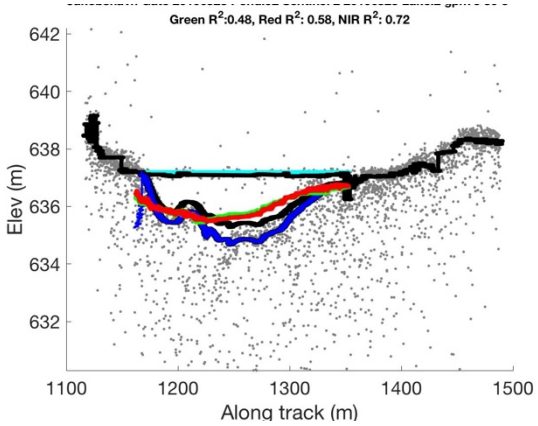
PlanetScope :May 24th



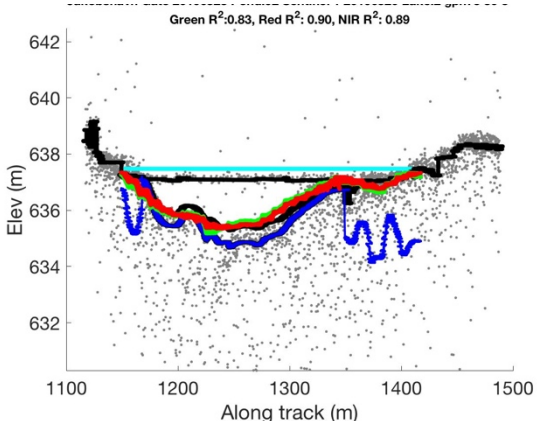
PlanetScope :May 23rd



Sentinel-2 May 25th

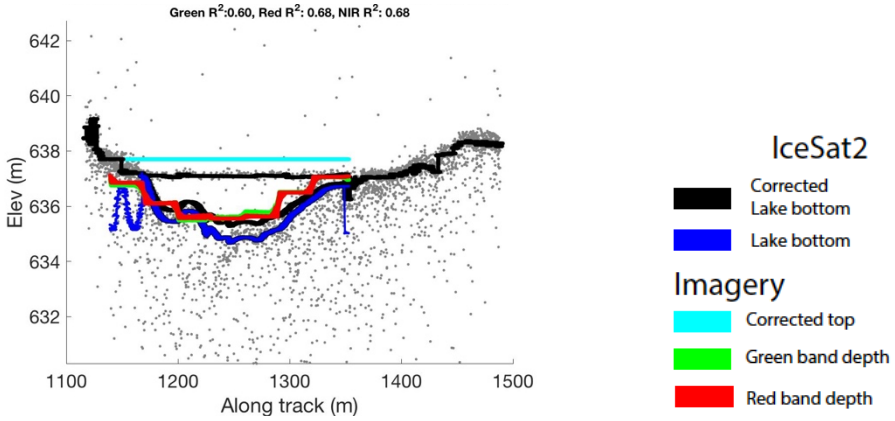


Sentinel-2 May 20th



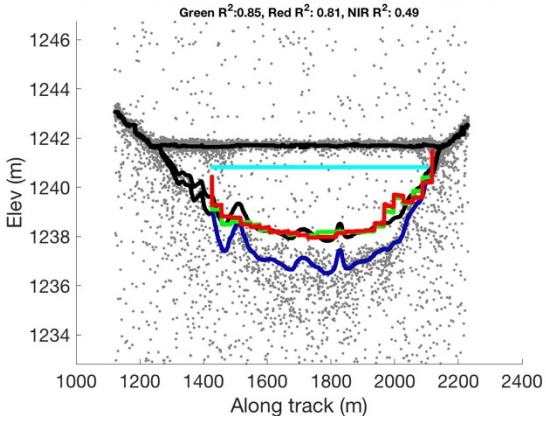
Lake 5 **cont…**

Landsat May 23rd



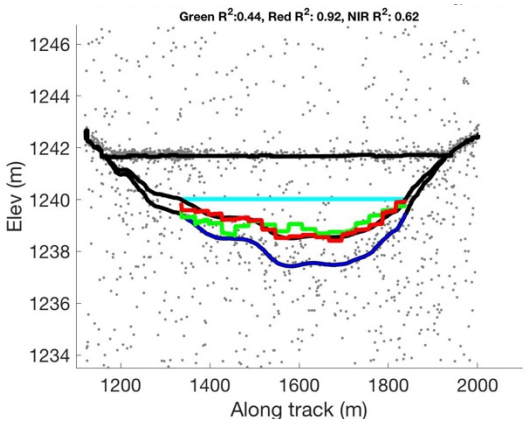
Lake 1

Landsat June 8th



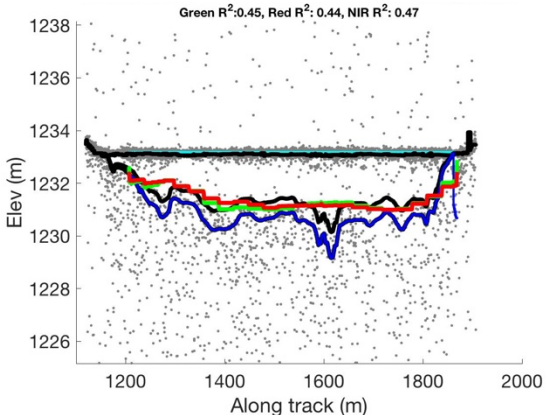
Lake 2:

Landsat June 8th

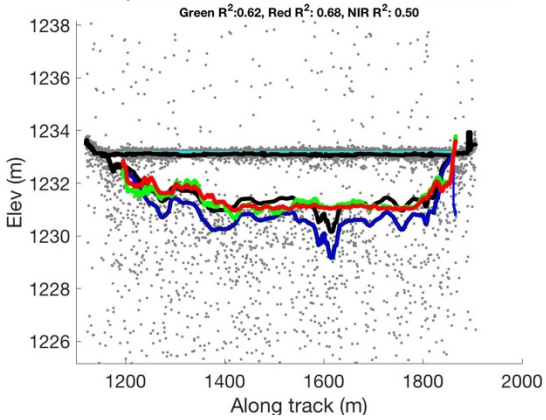


Lake 3:

Landsat June 8th



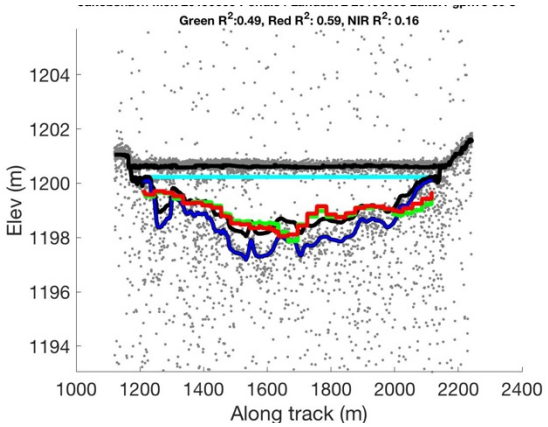
SkySat June 8th



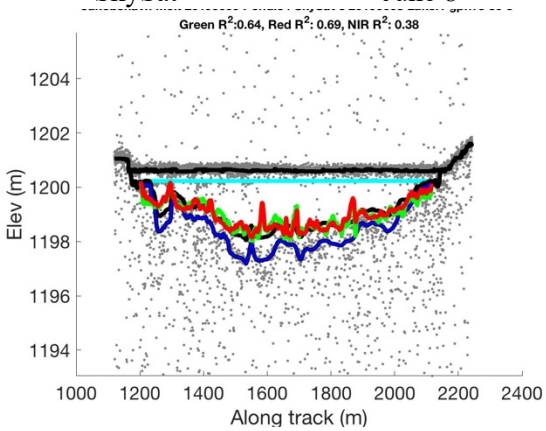
RGT 1108 **June 9th, 2019**

Lake 4

Landsat June 8th

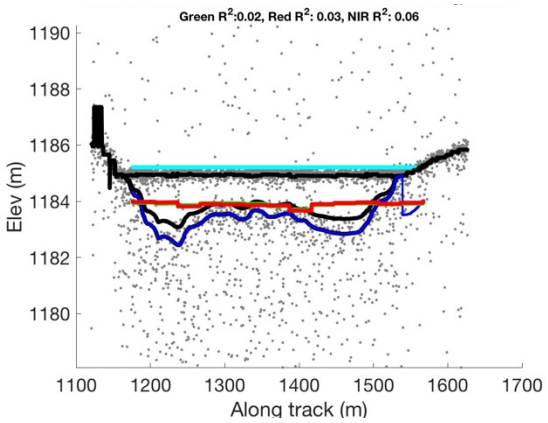


SkySat June 8th

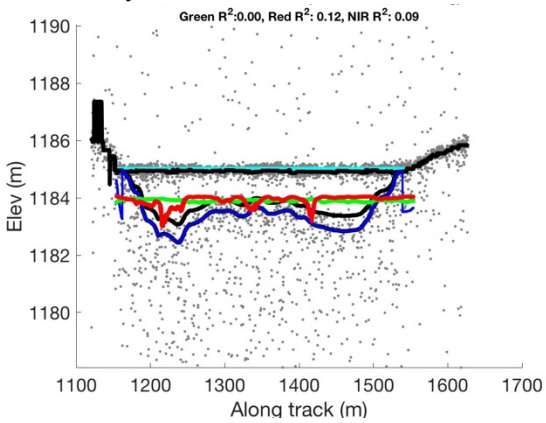


Lake 5

Landsat June 8th

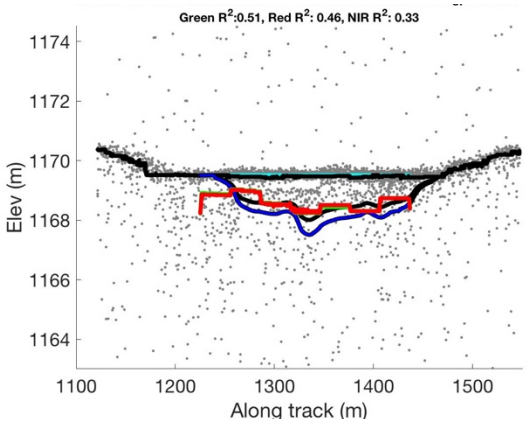


SkySat June 8th

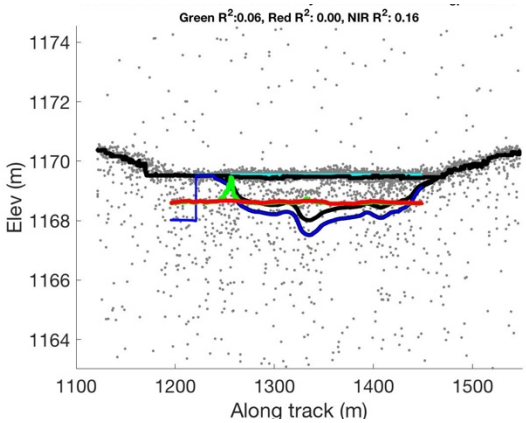


Lake 6

Landsat June 8th

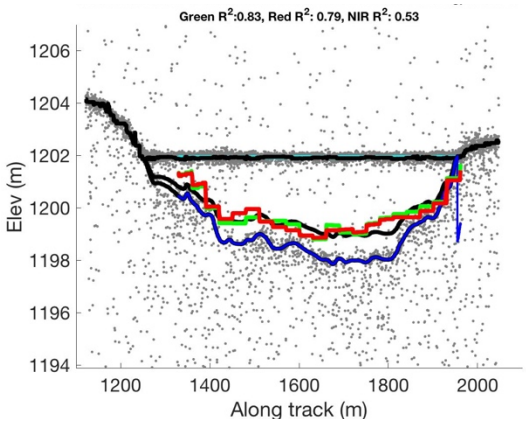


SkySat June 8th

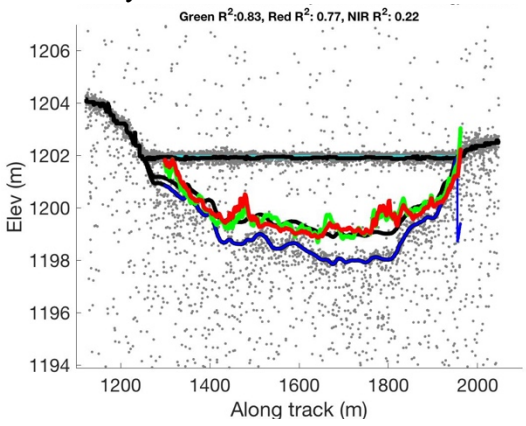


Lake 7

Landsat June 8th

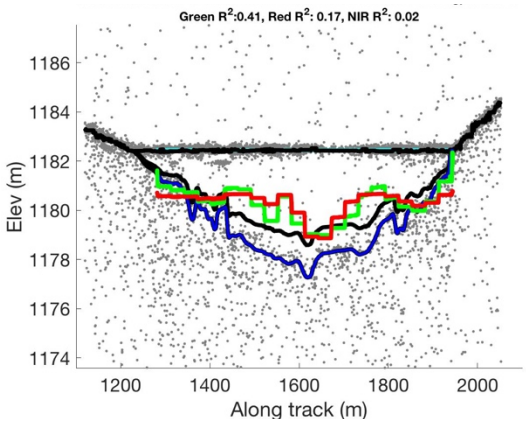


SkySat June 8th



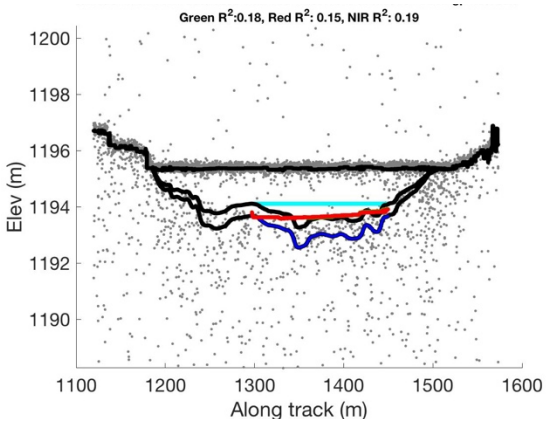
Lake 8

Landsat June 8th

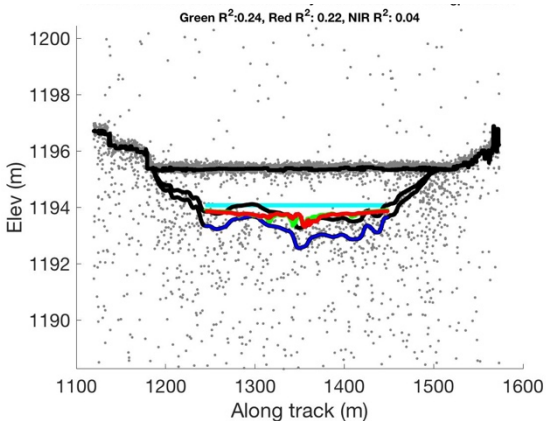


Lake 9

Landsat June 8th

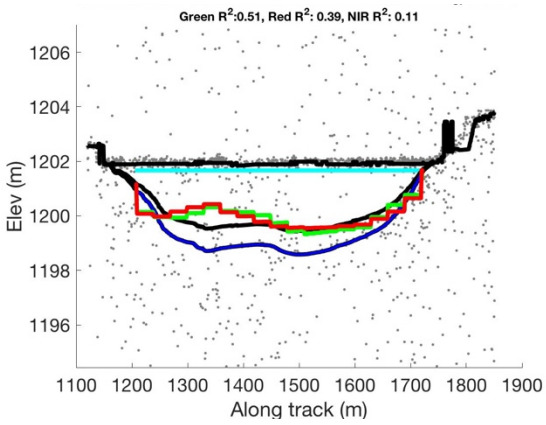


SkySat June 8th

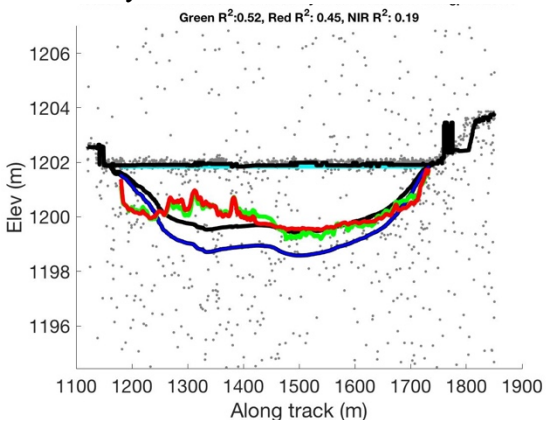


Lake 10

Landsat June 8th

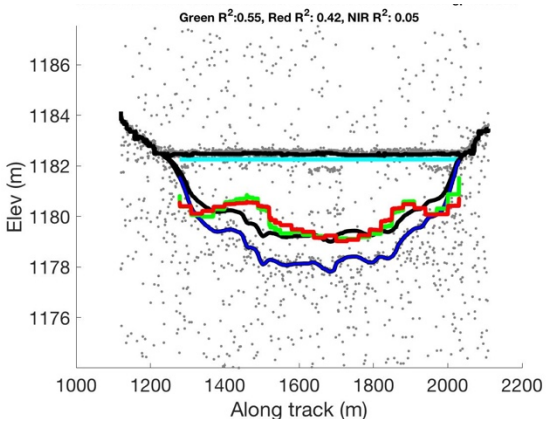


SkySat June 8th



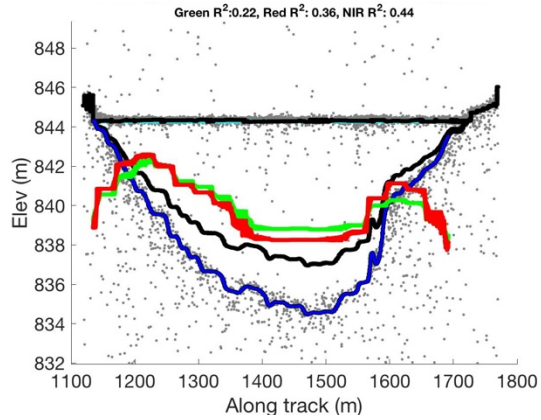
Lake 11

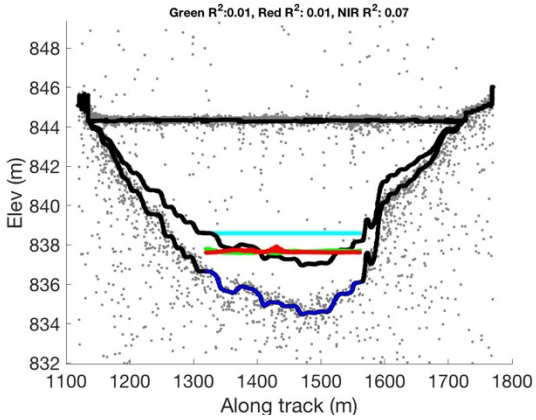
Landsat June 8th



Lake 1

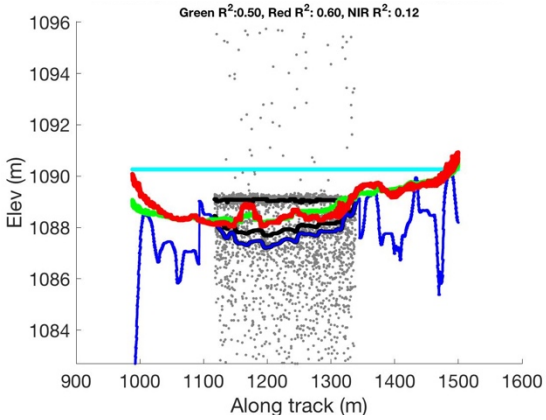
Landsat June 8th Sentinel-2 June 16th





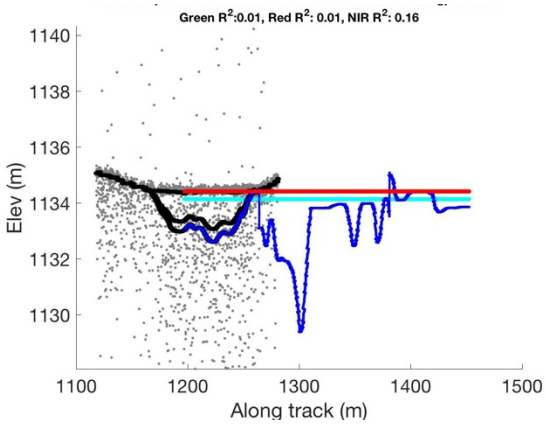
Lake 2

Sentinel-2 June 16th

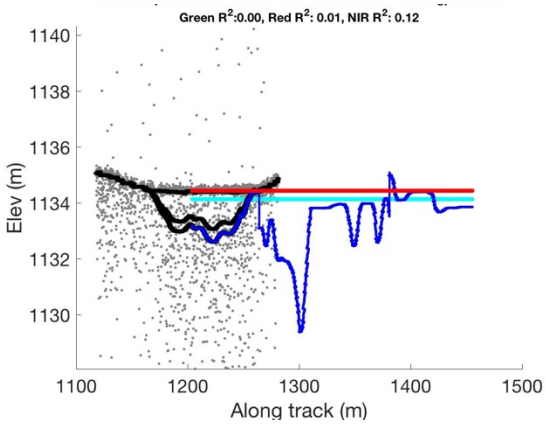


Lake 3

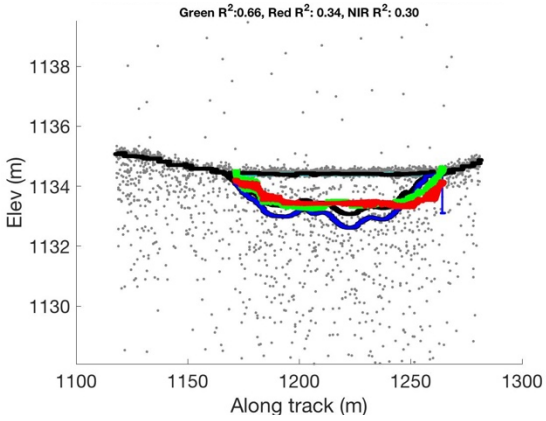
Landsat June 8th



Landsat June 8th

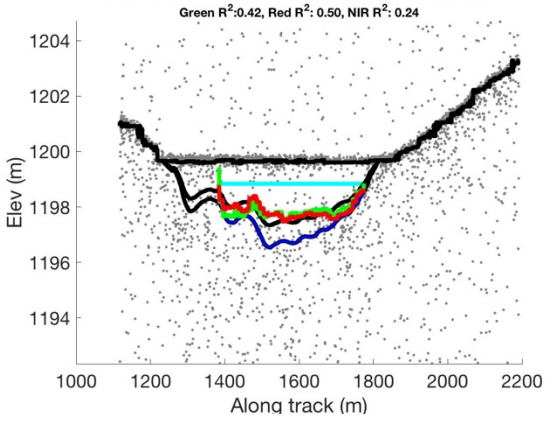


Sentinel June 16th



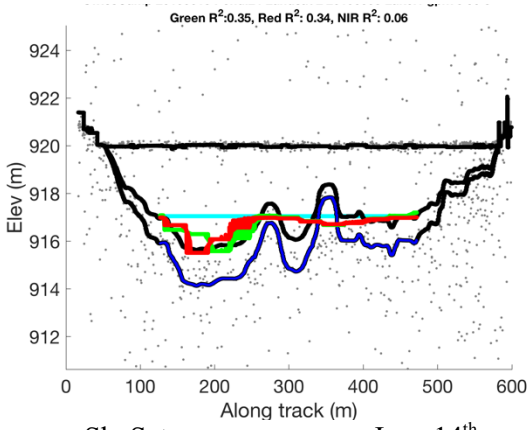
Lake 4

Sentinel-2 June 16th

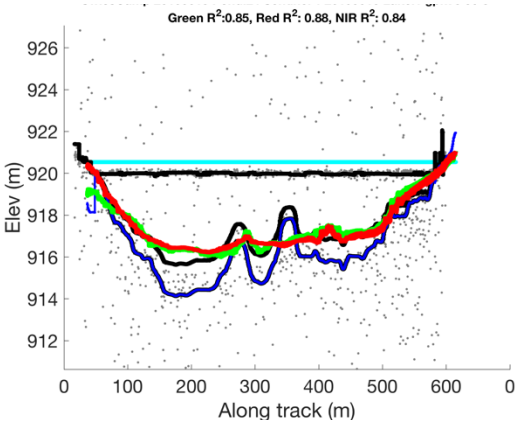


Lake 5

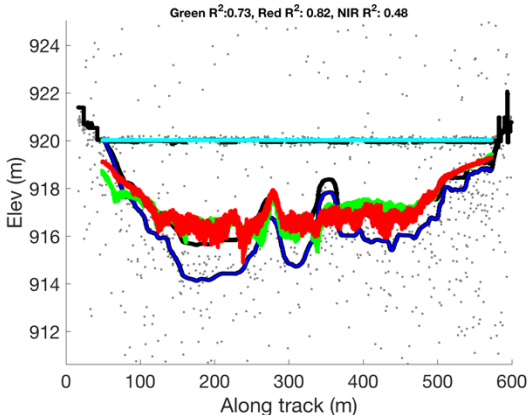
Landsat June 8th



Sentinel-2 June 16th

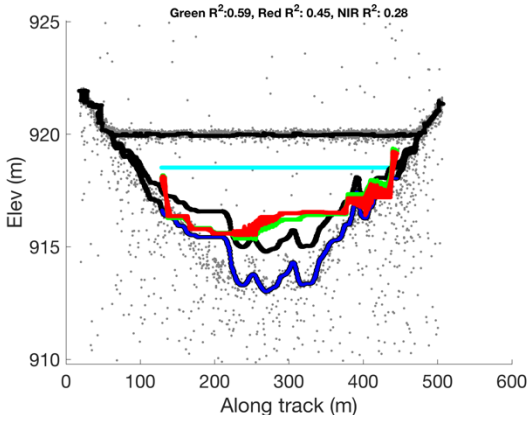


SkySat: June 14th

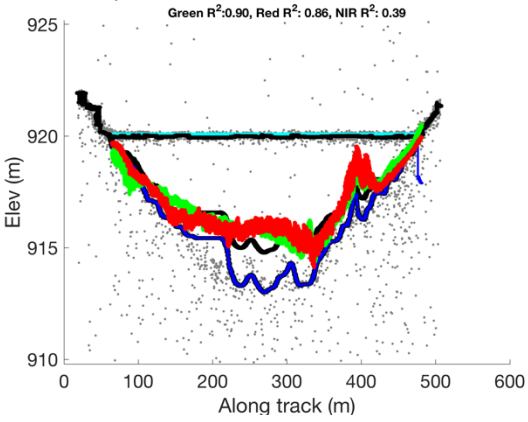


Lake 6

Landsat June 8th

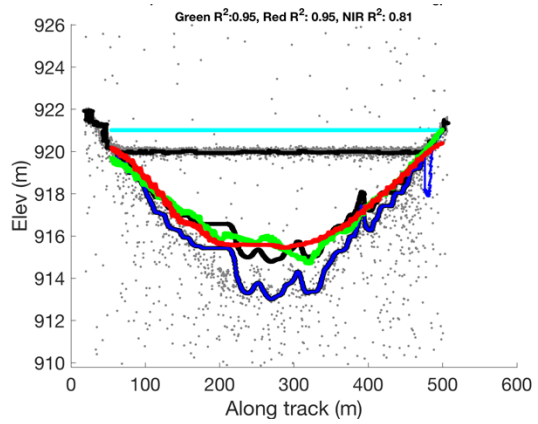


SkySat June 14th



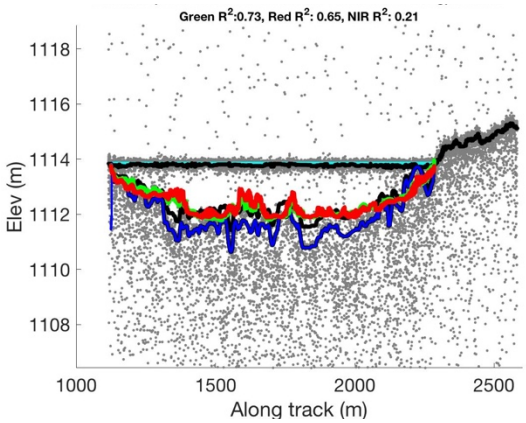
Lake 6 cont…

Sentinel-2 June 16th



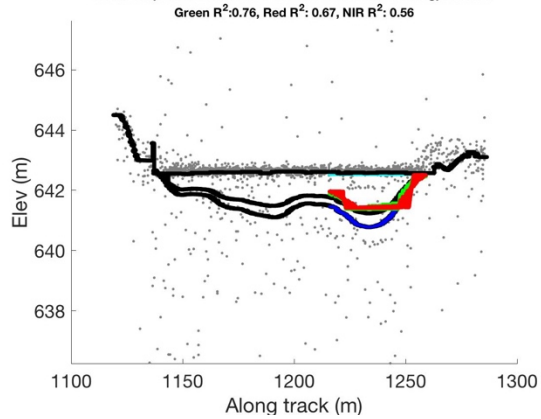
Lake 7

Sentinel-2 June 16th

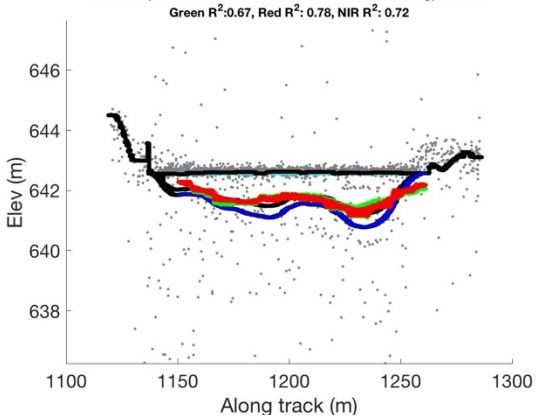


Lake 8

Landsat: June 8th

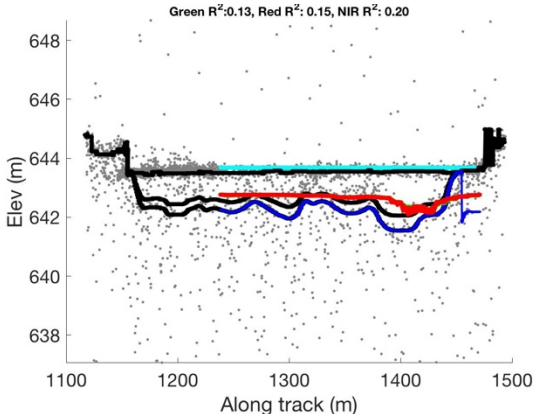


Sentinel-2 June 19th



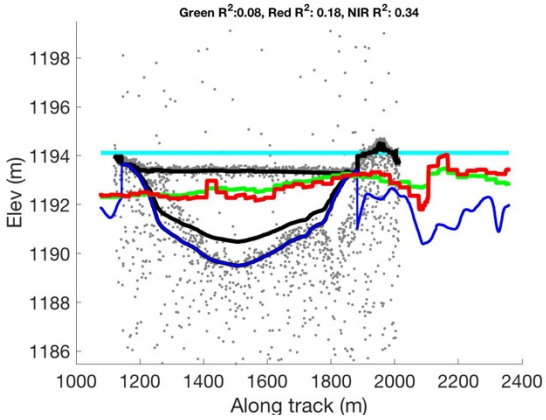
Lake 9

Sentinel-2 June 19th



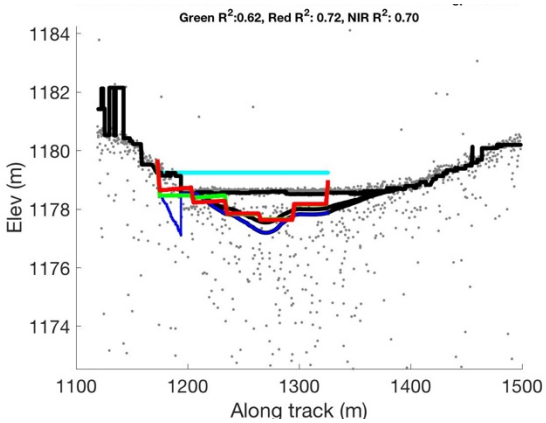
Lake 1

Landsat June 17th



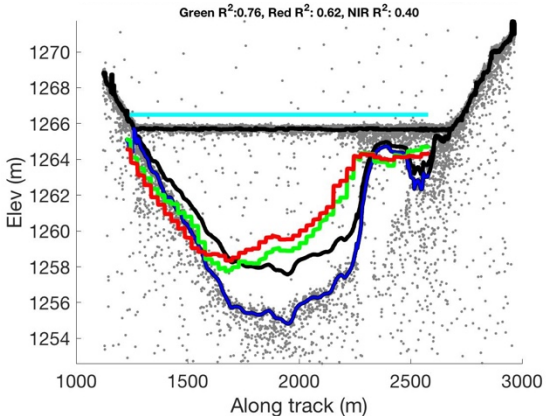
Lake 2

Landsat June 17th



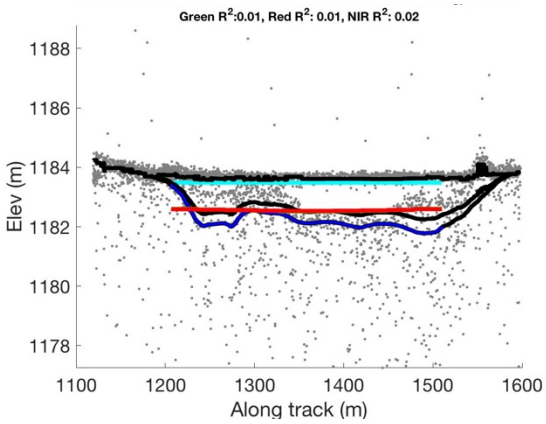
Lake 3

Landsat June 17th



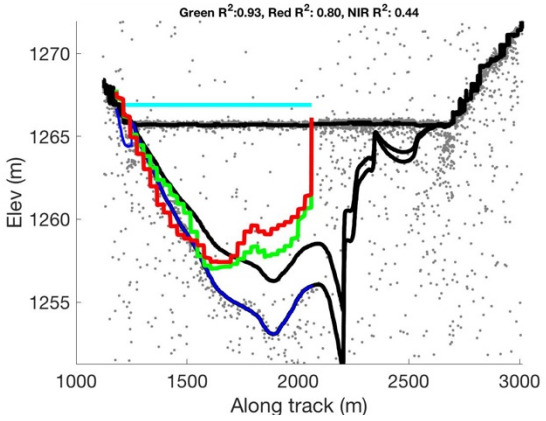
Lake 4

Landsat June 17th



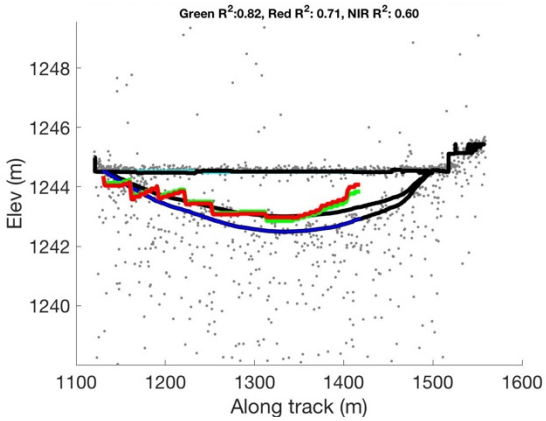
Lake 5:

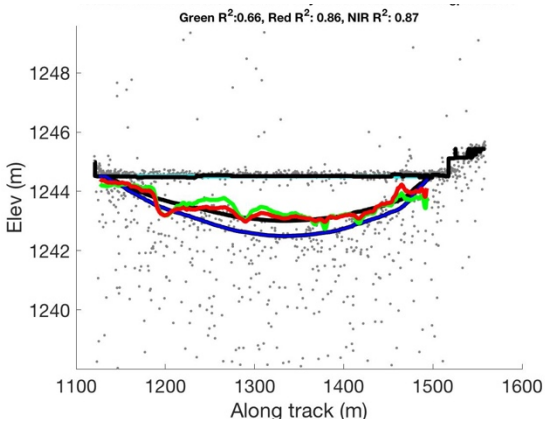
Landsat June 17th



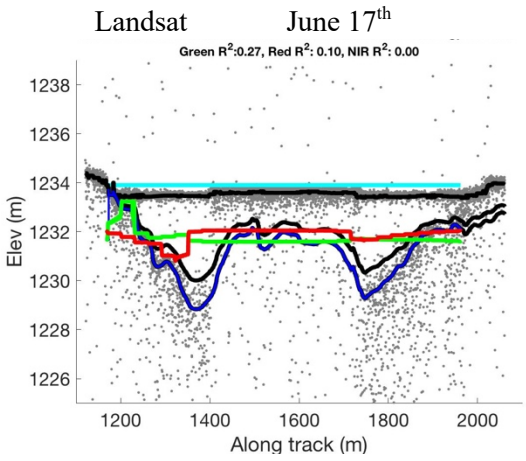
Lake 6

Landsat June 17th SkySat June 17th

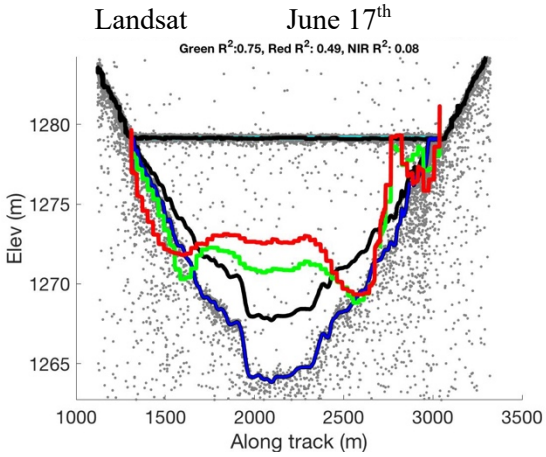




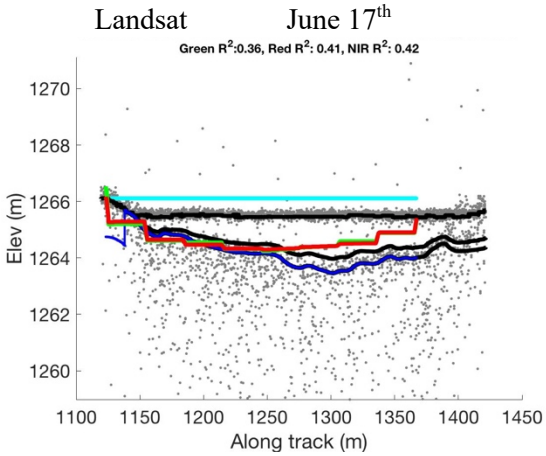
Lake 7:



Lake 8:

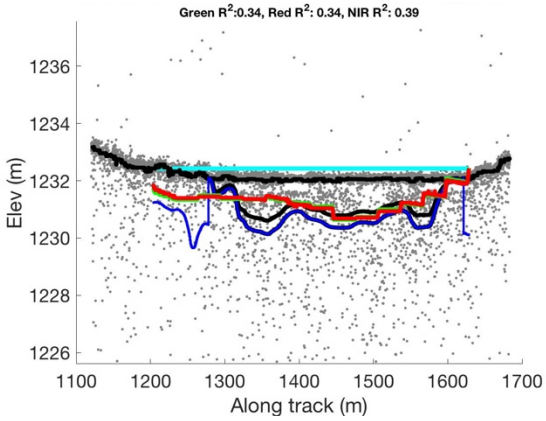


Lake 9:

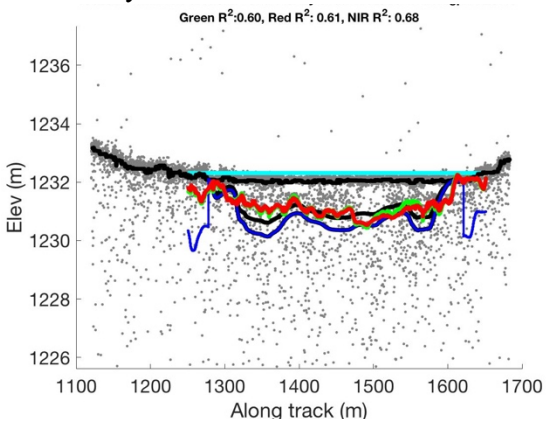


Lake 10

Landsat June 17th

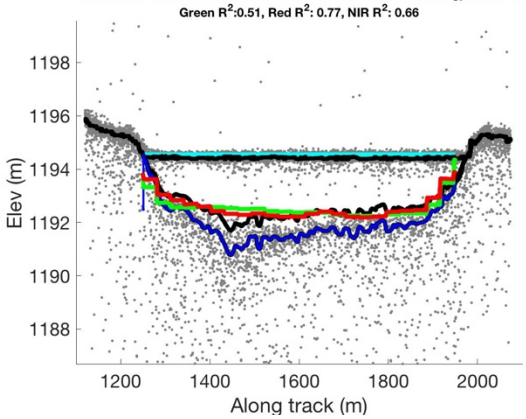


SkySat June 16th



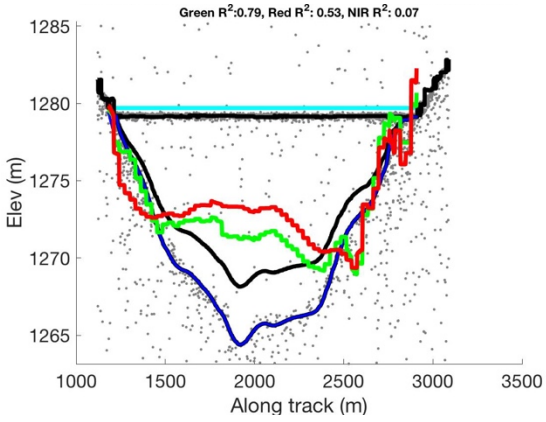
Lake 11

Landsat June 17th



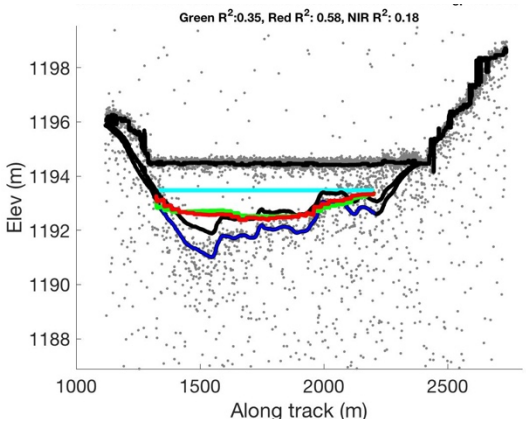
Lake 12

Landsat June 17th



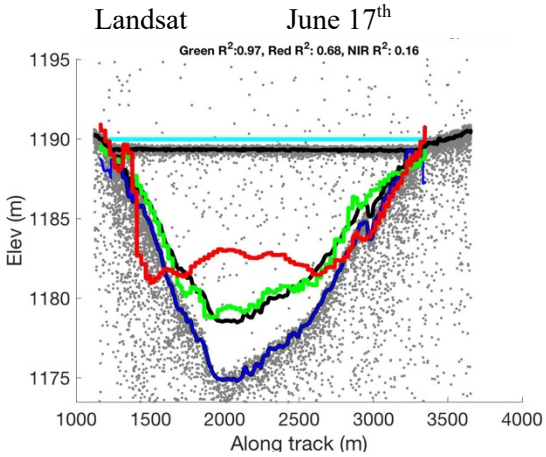
Lake 13

Landsat June 17th



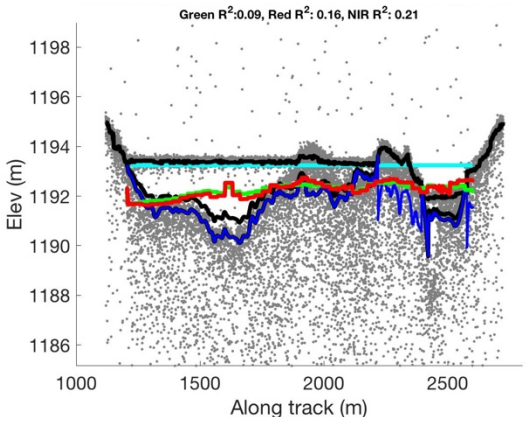
Lake 14

Landsat June 17th



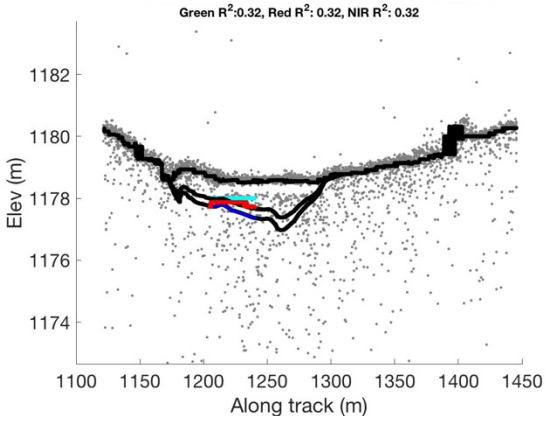
Lake 15

Landsat June 17th



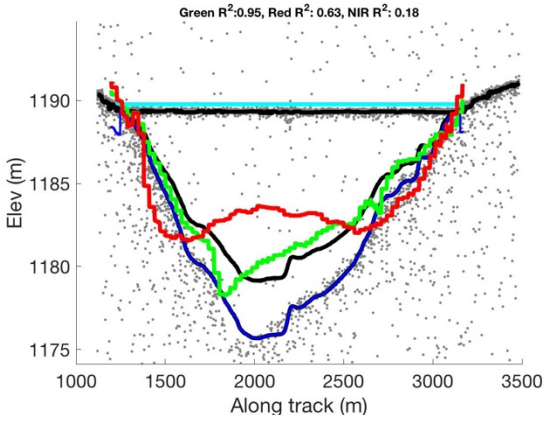
Lake 16

Landsat June 17th



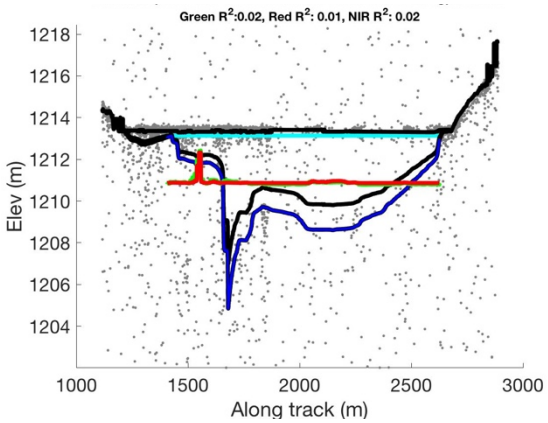
Lake 17

Landsat June 17th



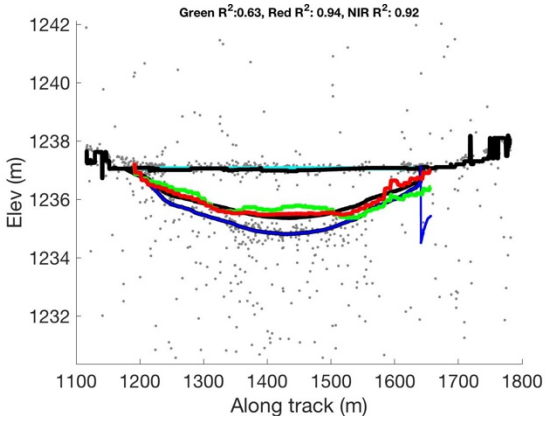
Lake 18

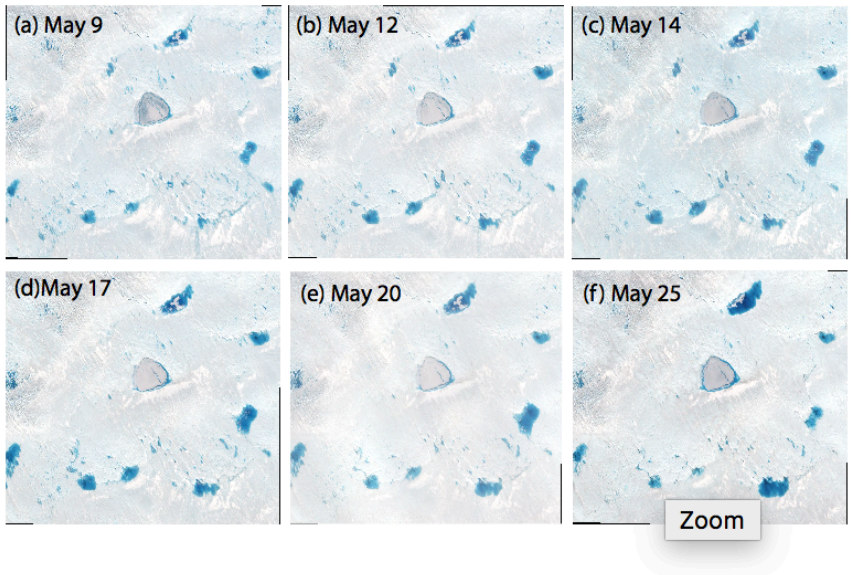
Sentinel-2 June 16th



Lake 19

Sentinel-2 June 16th





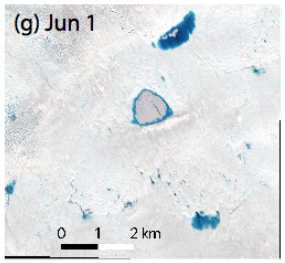


Figure S4: Lake evolution throughout the season in region of Western Greenland (see Fig. 1 in main) from Sentinel-2 imagery. Surface water extent (where NDWIice > 0.2) remains consistent at 3%

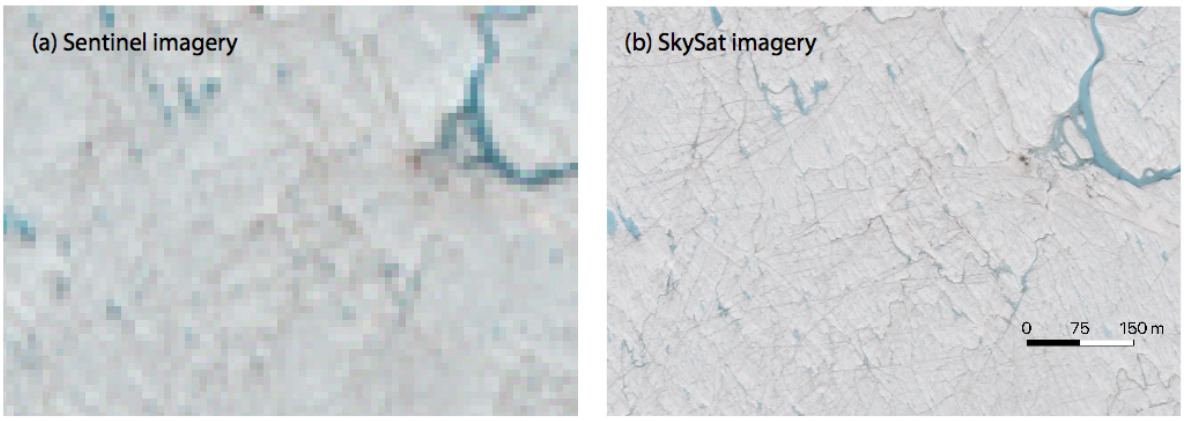


Figure S5: Higher resolution imagery capturing small-scale stream features on June 1st in Western Greenland. (a): Sentinel-2 imagery (10m) (b): SkySat imagery