

Reading satellite pictures

IN COMBINATION WITH OTHER ICE
INFORMATION

Contents

A. Embedding satpics in the ice finding process

1. Ice finding cycle
2. When to use satpics

B. Understanding satpics from MODIS

1. Where to find MODIS pictures
2. Distinguishing shadow, clouds, water, ice
3. Recognizing new ice (kärnis) and old ice (stöpis)

C. Understanding satpics from Sentinel2

1. Where to find Sentinel2 pictures
2. Recognizing lakes
3. Distinguishing shadows, clouds, water, ice
4. Recognizing new ice (kärnis) and old ice (stöpis)

D. Using other ice information as reference points

1. Incorporating Skridskonätet
2. Extrapolate weather actuals

**Which lake to choose
for tomorrow?**



**Lots of decision factors in
your toolbox**

Skate
and test

Weather
forecast

Water
temps

Ice
history

Micro
climates

Skridsko
nätet

Weather
actuals

Altitudes
of lakes

Social
media

Contact
persons

Weather
patterns

Stöp
speed

Depths
of lakes

Freezing
orders

Winters
history

Marine
traffic

Sea info
services

Shape
of lakes

Water
flows

Radar
images

Trafik
verket

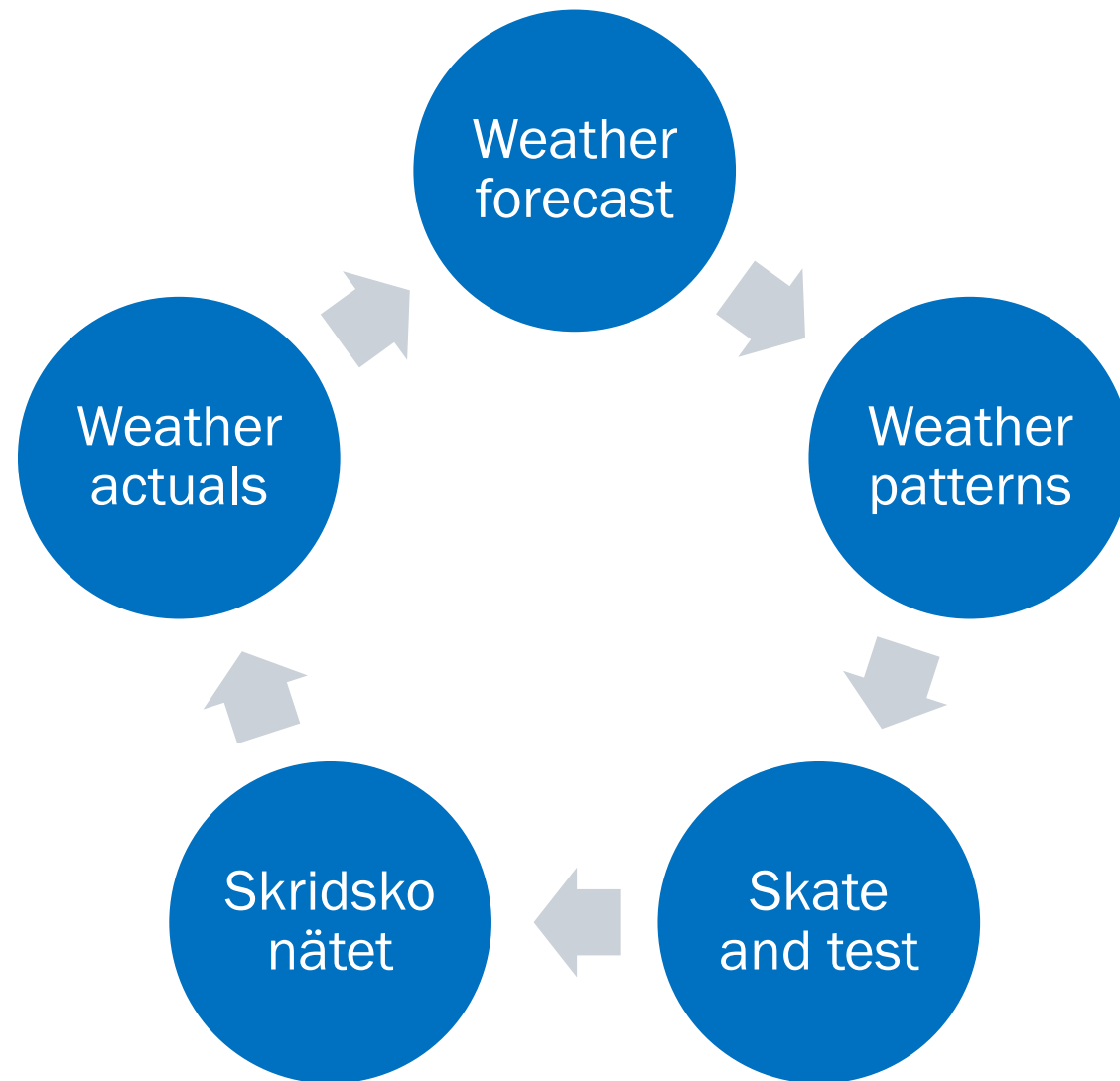
Satellite
pictures

Web
cams

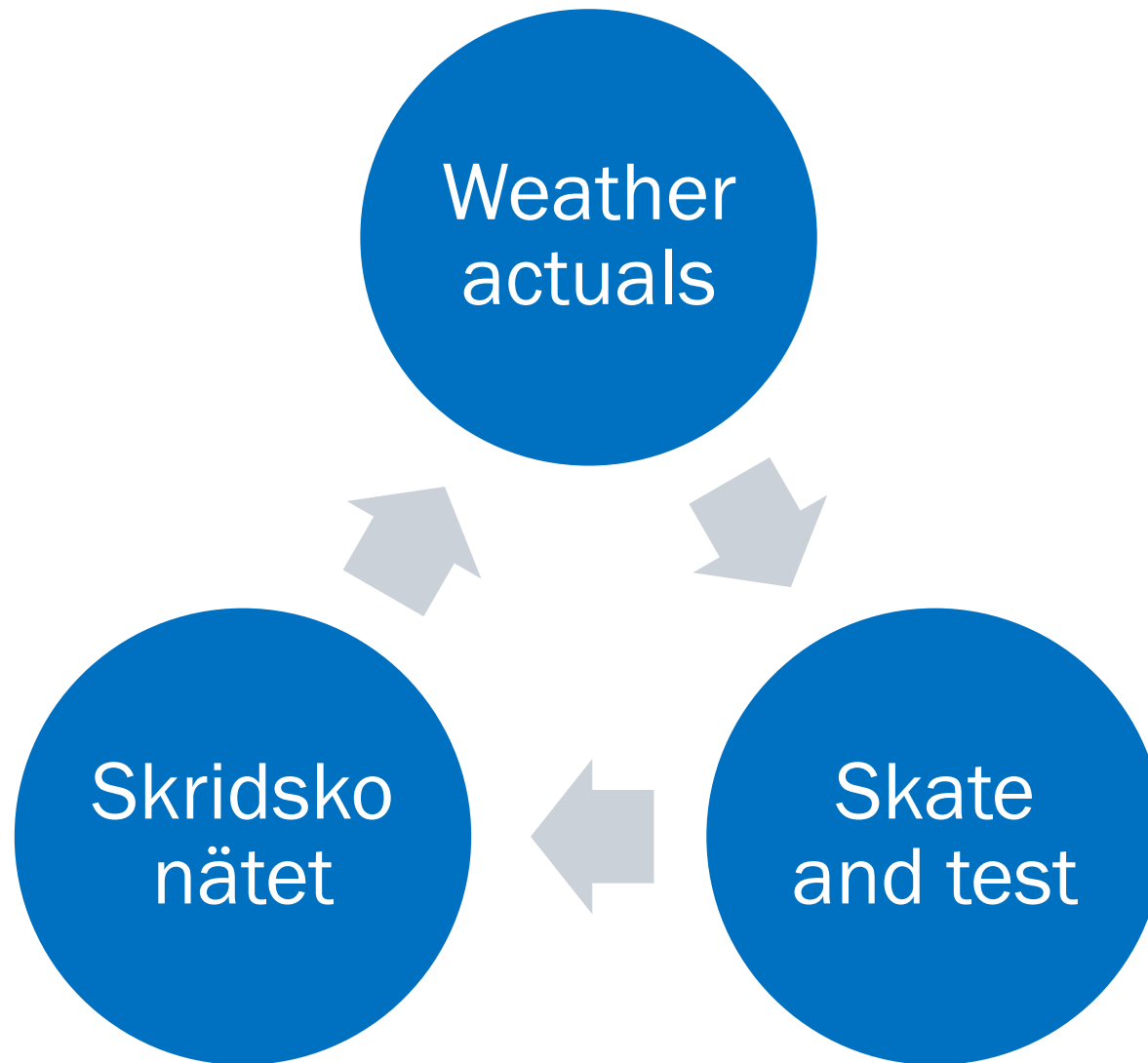
Weather
influence
on ice

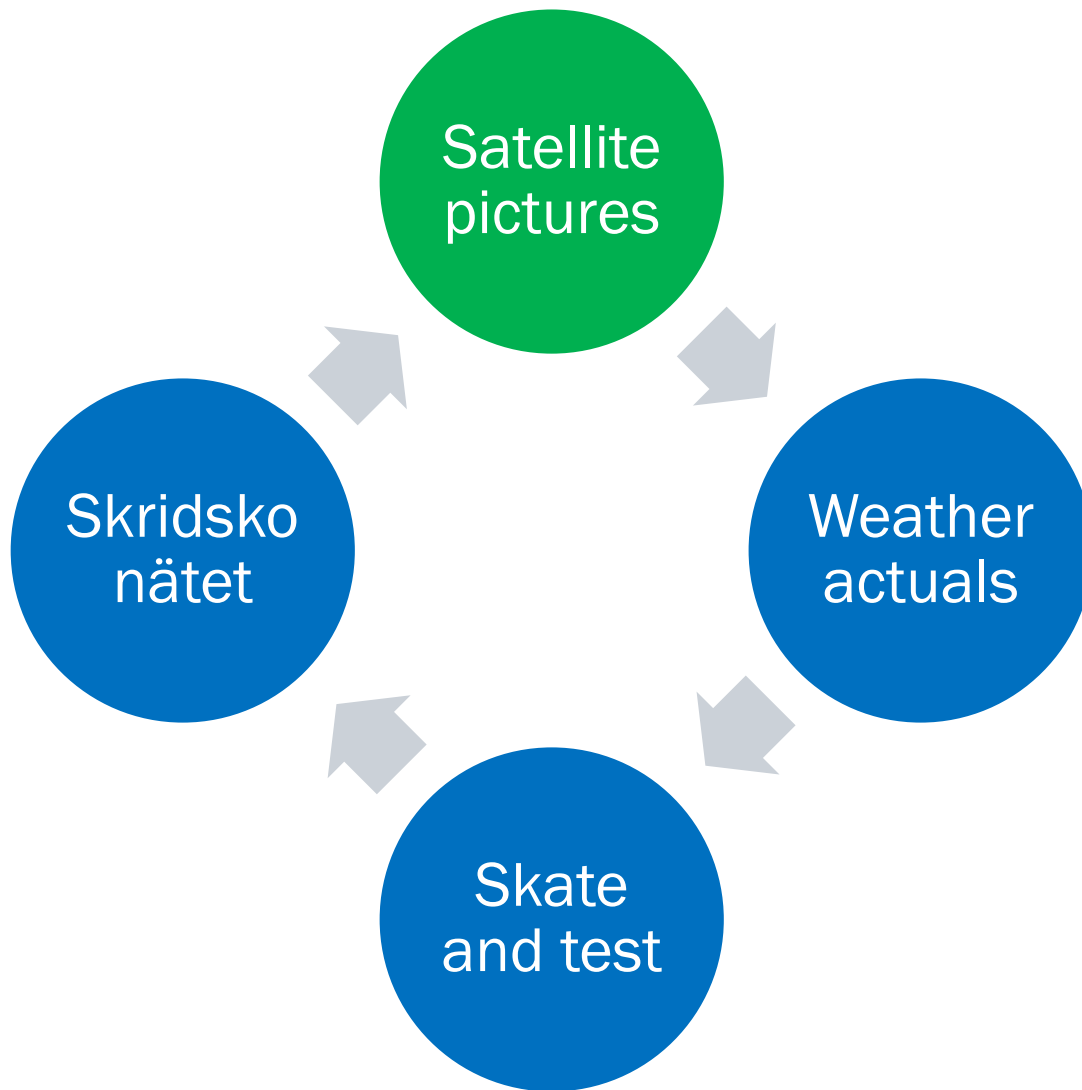
Weather
patterns

During the lesson Finding
Ice of Aspirant Ice Fox, we
came to level 5



For today, we step back to
level 3 first



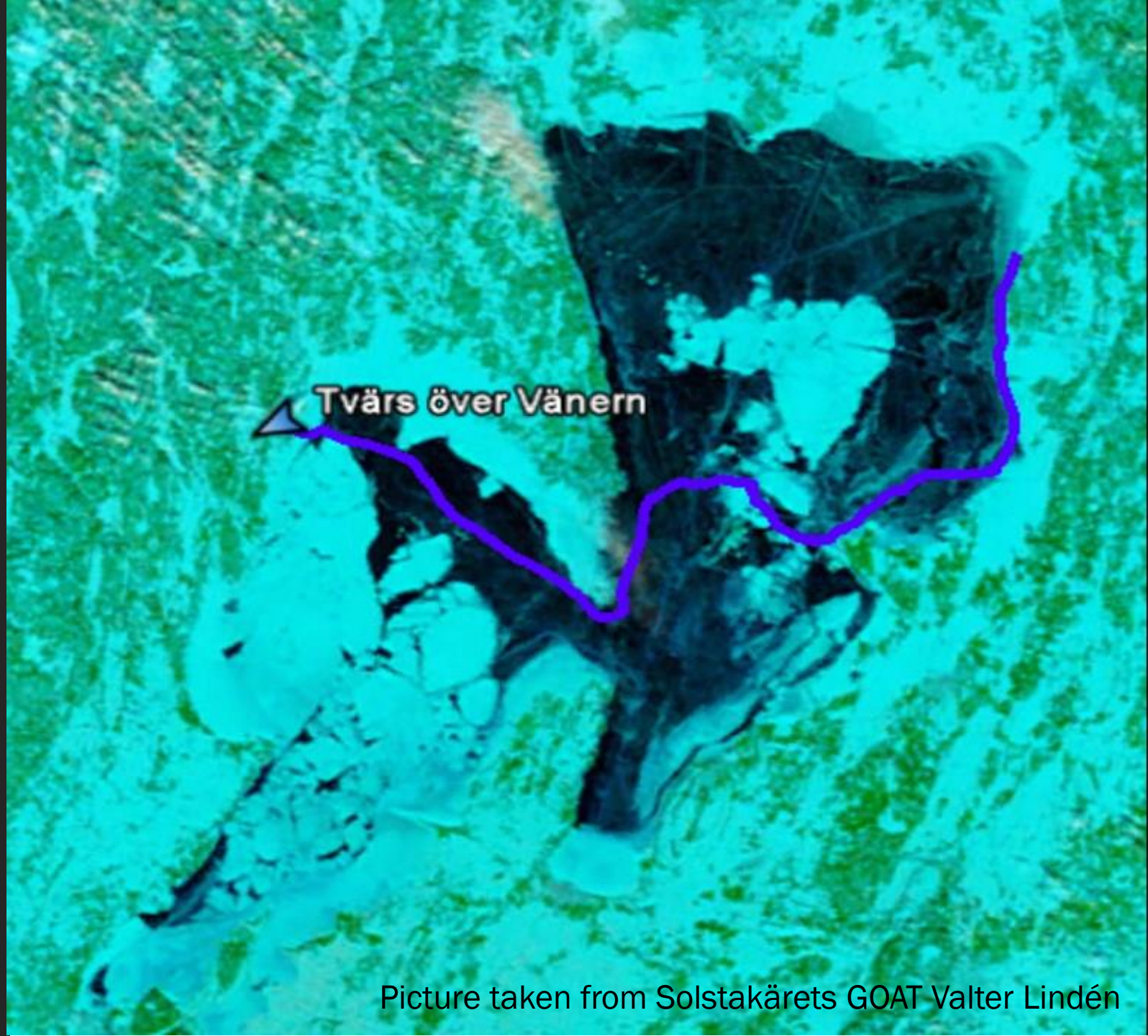


And then we add satellite pictures (but for now only the ones in visible light spectrum)

When to use satpics?

- ☐ To find new ice
- ☐ To check if old ice became skateable again
- ☐ To check reference points
- ☐ For planning your tour

(And in some cases as replacement for ice info from Skridskonätet)



Picture taken from Solstakärets GOAT Valter Lindén

MODIS – where to find?

SKRIDSKONÄTET

Rapporteren IJinfo Tochten Zoek Admin Help Skridskonet

22-03-23

IJsobservaties
Kaart
Kaart met tijdsinterval
IJsnieuws
Via email
Geveegde banen
IJsbedekkingsdagen
IJsbrekers
Koudehoeveelheid
Heatmap

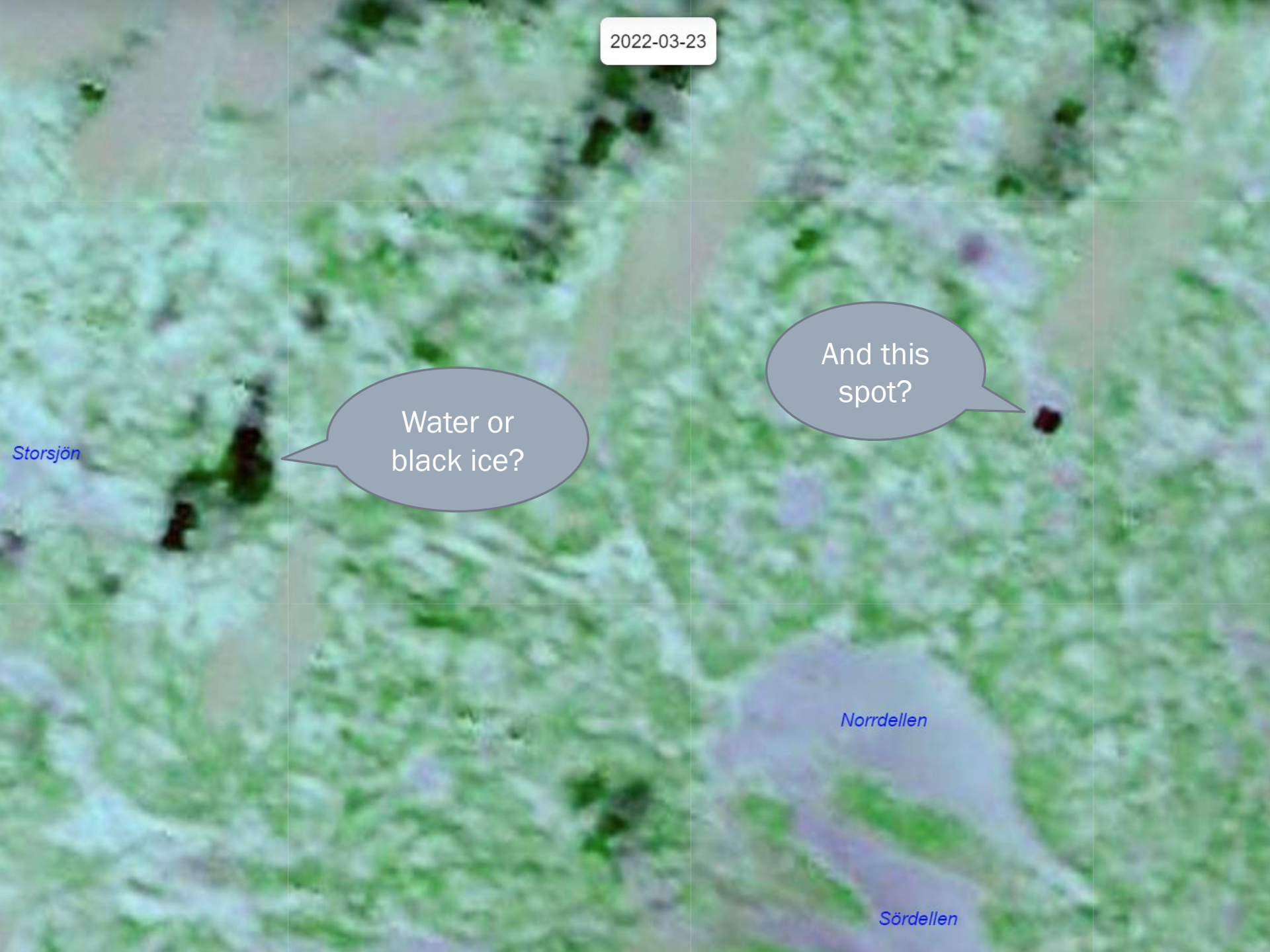
☐ Norden
☐ OSM
☒ MODIS

☒ IJsobservaties
☒ Tochtrapporten
☒ Beelden
☒ Tochtspoor
☒ Atlasinfo
☒ Temperaturen
☐ AIS
☐ Landcover

MODIS is the “old” NASA satellite, still running, but pictures are in low resolution.

Pick date 2022-03-23 to see this satpic

2022-03-23



Pick date 2022-03-23
and scroll to north of
Stockholm to see this
exact same satpic.

2022-03-23

Water or
black ice?

Norrdellen

Sördellen

The left case first.
Change a few times
between the map and
the MODIS picture. You
will see there is no lake
at the black spot. So it
must be a shadow.

When you look closer,
you will see two vague
grey spots south of the
black spots. Those are
the clouds of which the
shadows make up the
black spots.

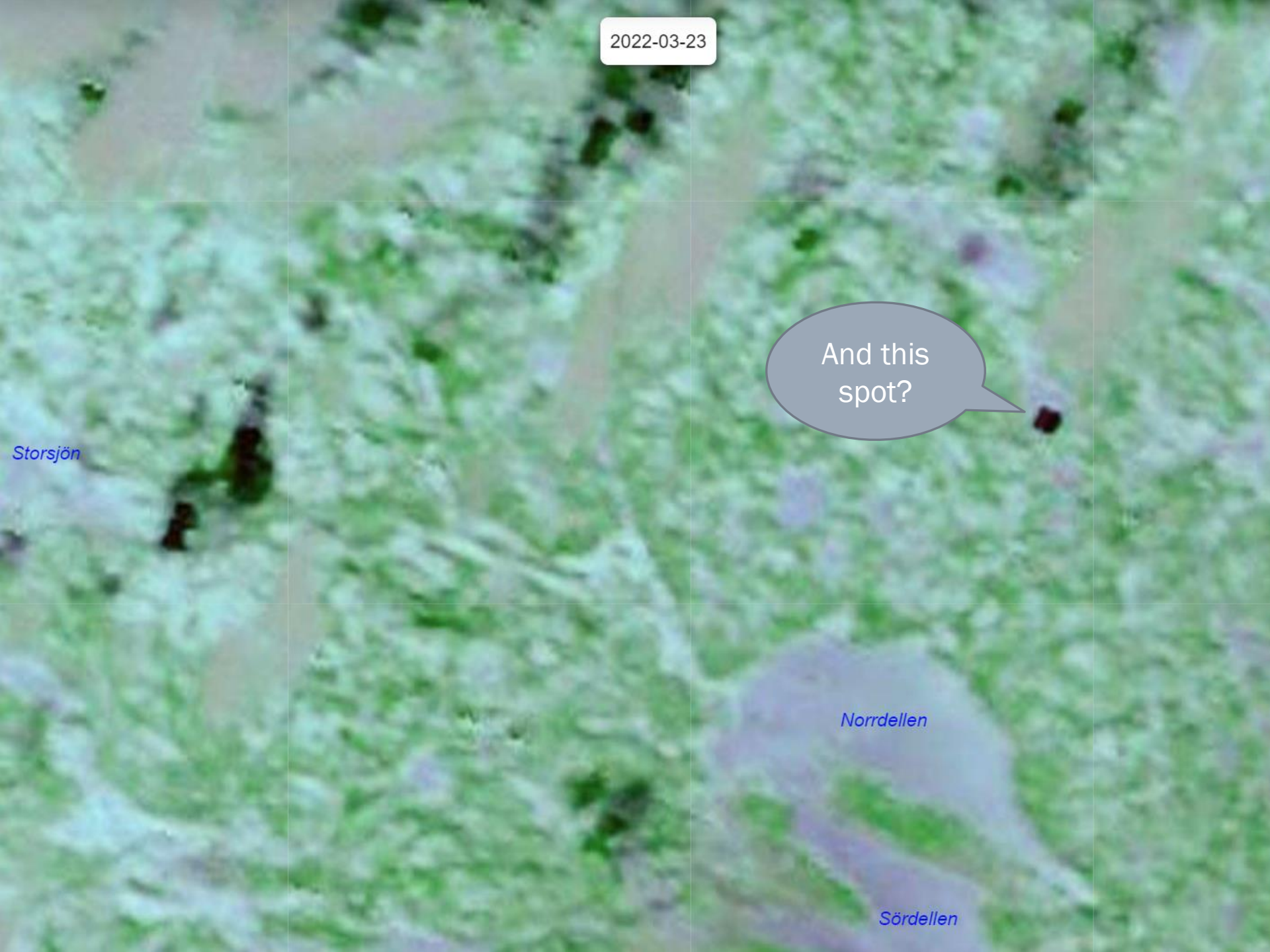
2022-03-23


And this spot?

Then this one. Do the same trick by clicking from map to MODIS. You will see the black spot is in the lake, so no answer yet.

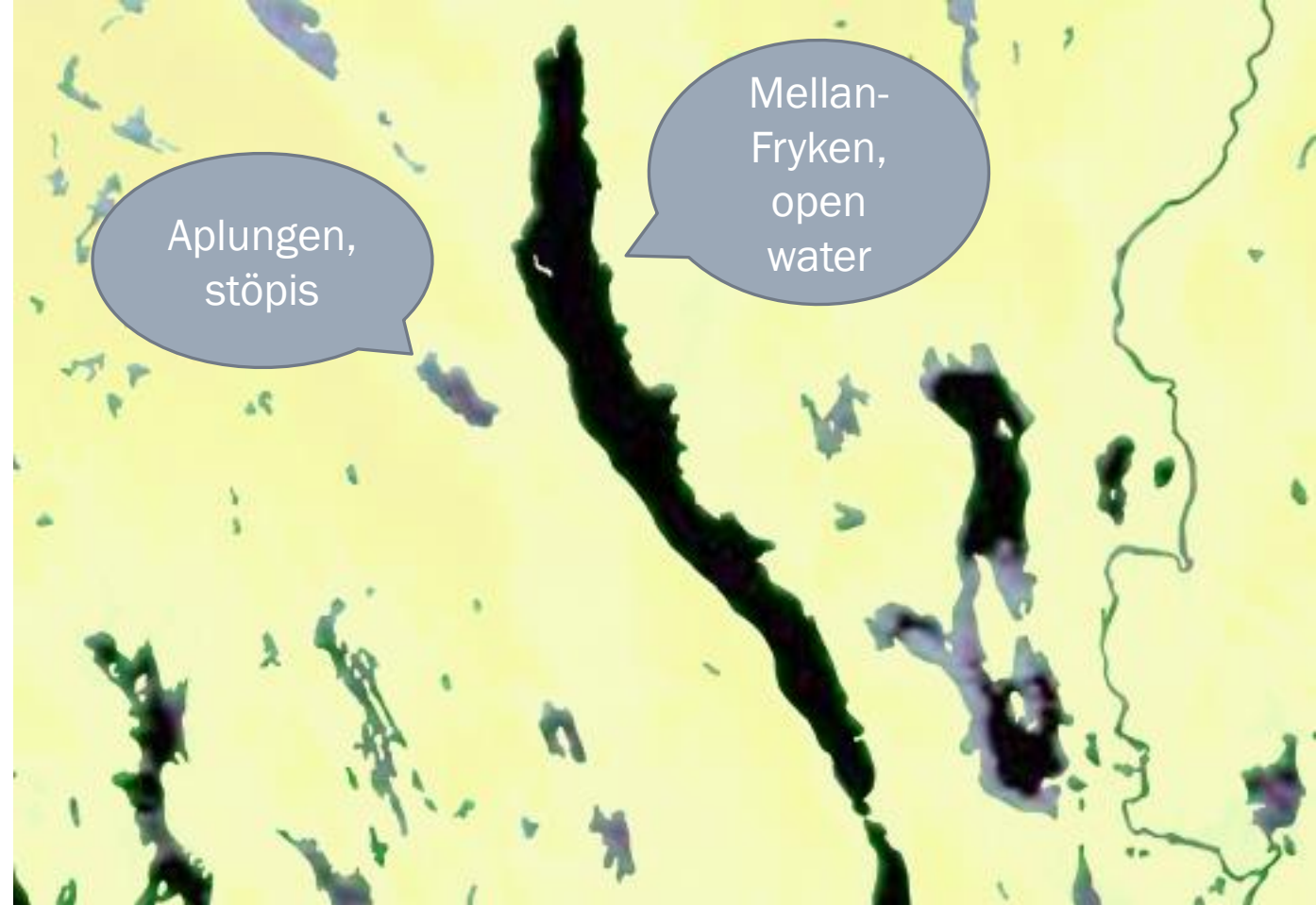
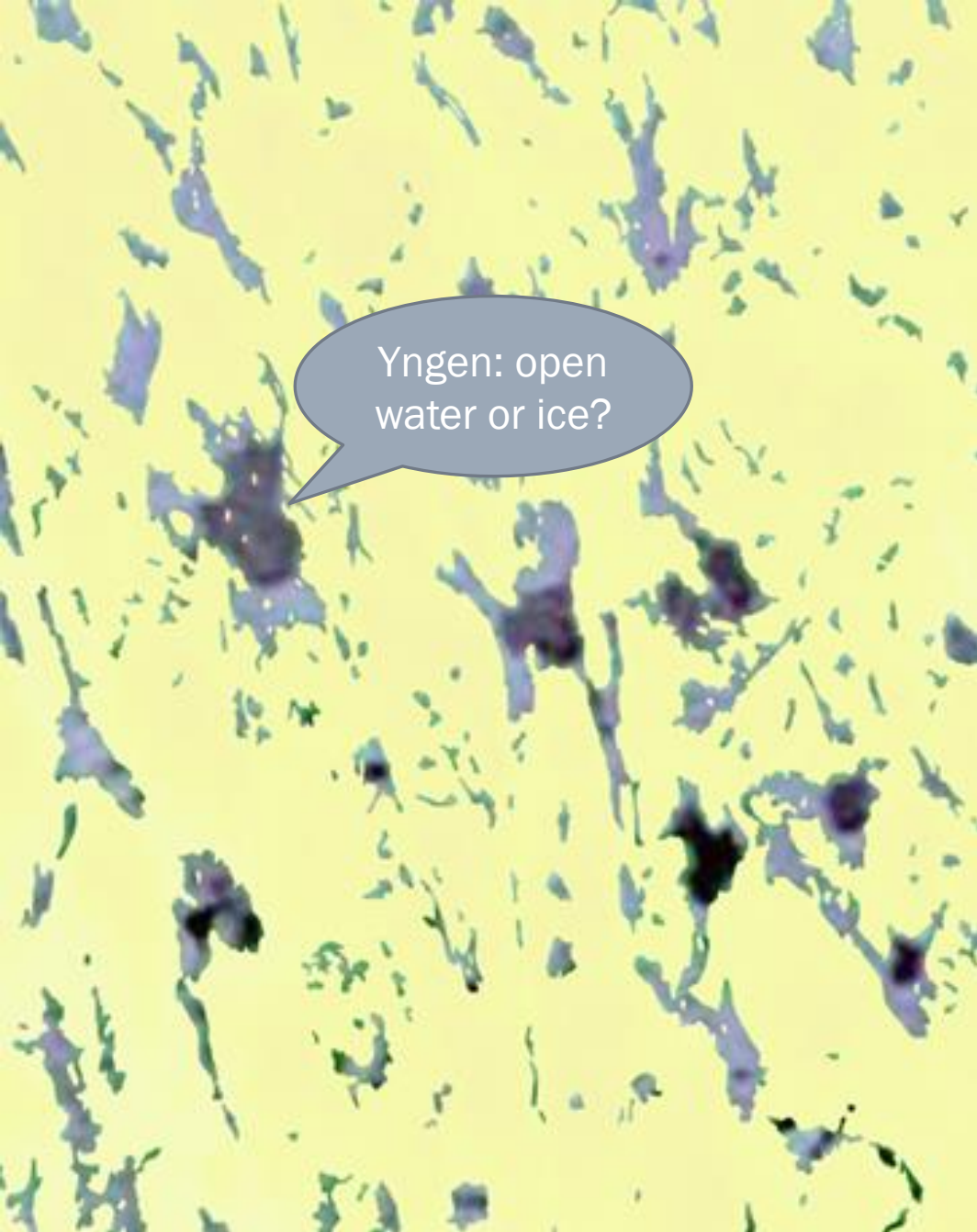
Now look for a cloud that looks like the clouds causing the shadows on the left case. You might think the small spot south of the black spot is a cloud. But change again between the map and MODIS. You will see that that spot is not a cloud, but a lake too.

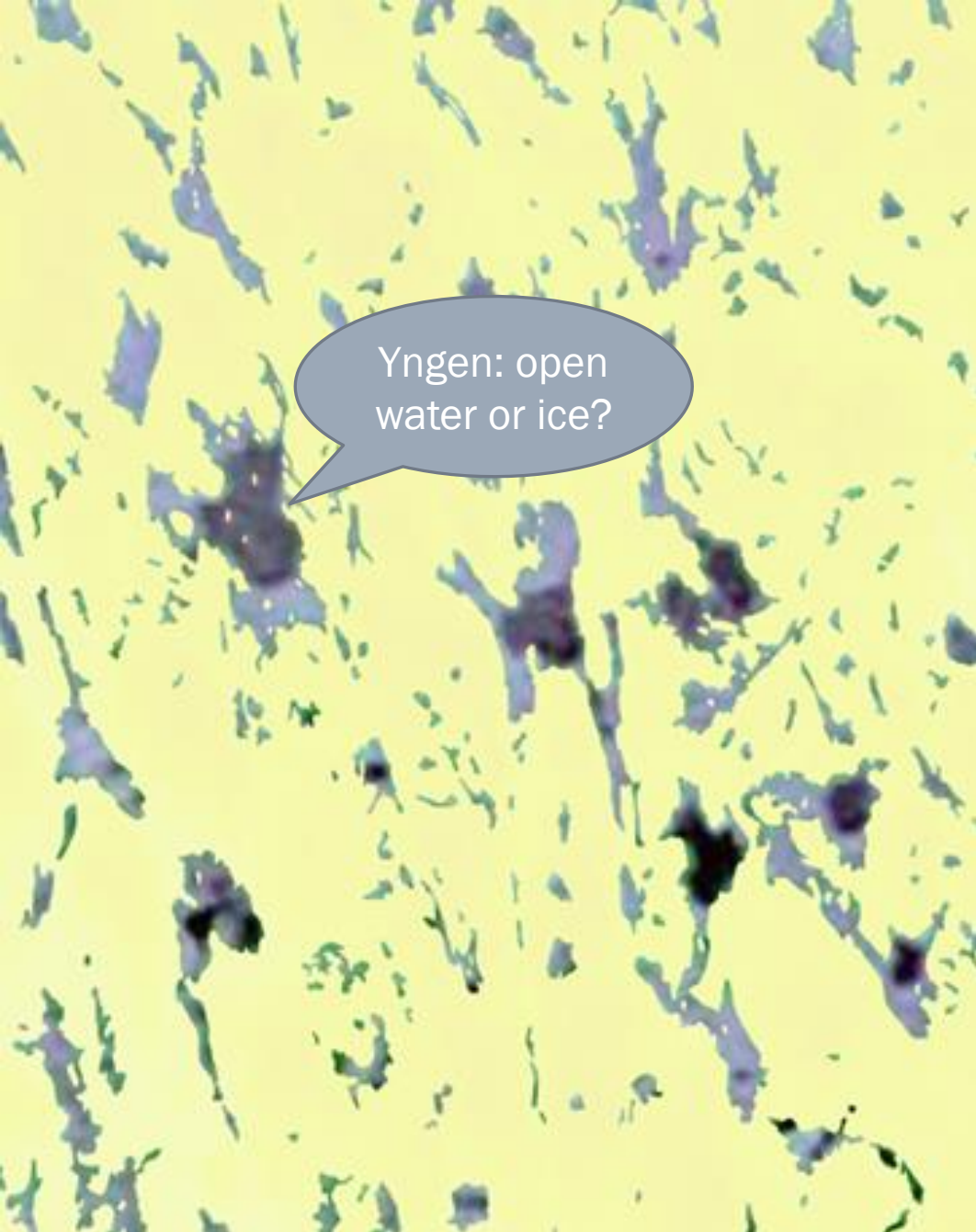
The black spot is most probably open water.



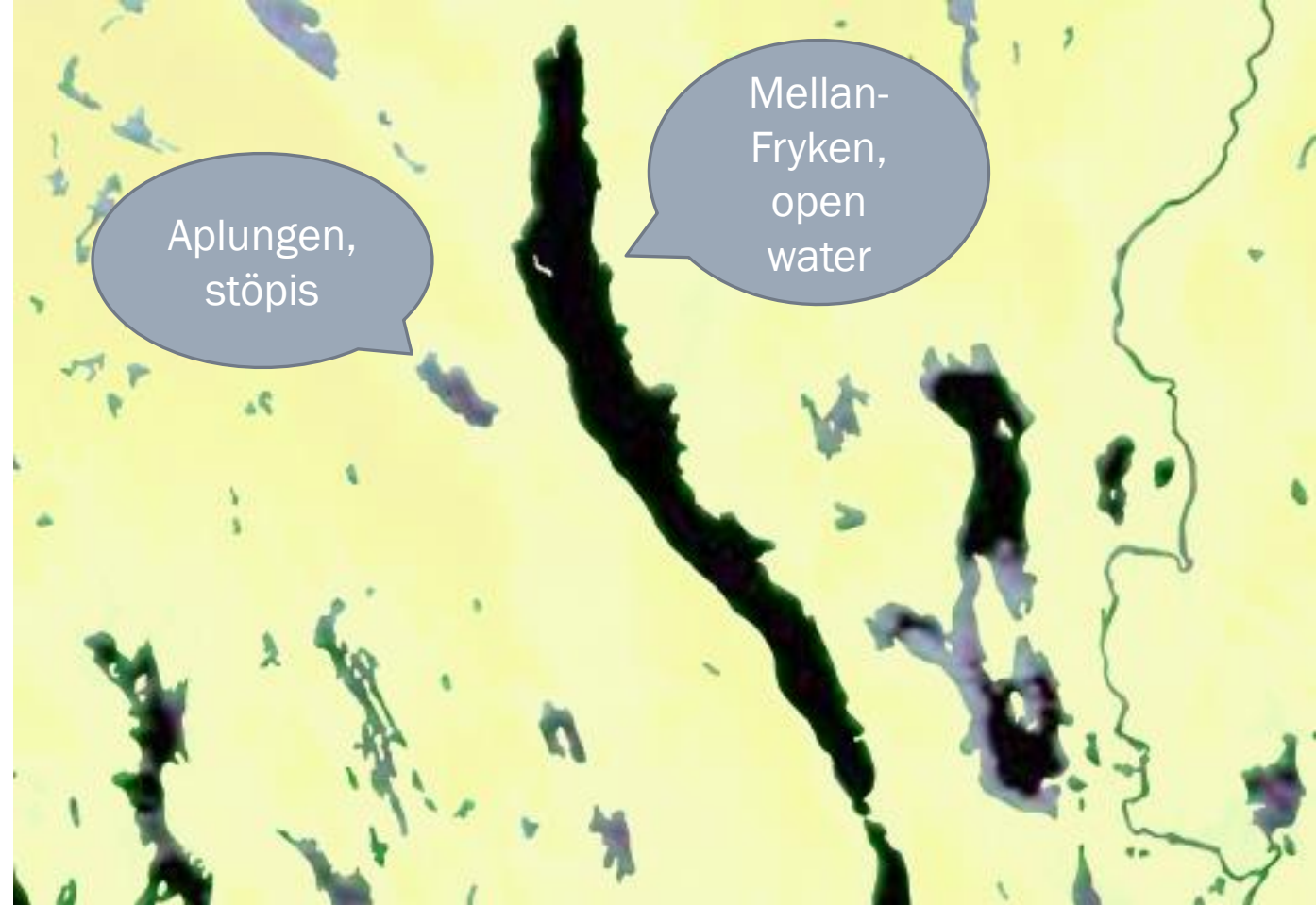


Yngen: open
water or ice?





Yngen: open
water or ice?

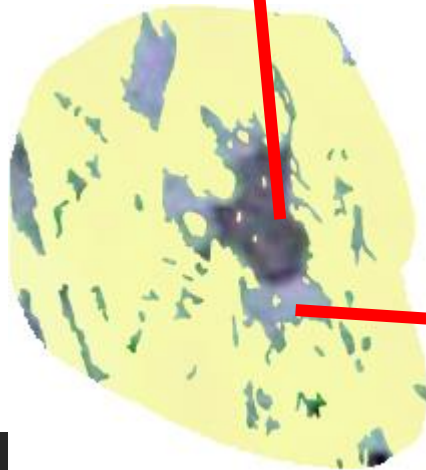


Aplungen,
stöpis

Mellan-
Fryken,
open
water

No further information about Yngen available, but two reference points have 100% sure information: Mellan-Fryken is open and Aplungen has stöpis. The color of Yngen shows that best guess is that it has stöpis, maybe even better quality than Aplungen.

Satellite picture and reality the day after



Sentinel-2 makes “visible light” pictures

- ❑ Sentinel2 (European) uses newer technology than MODIS
- ❑ Sentinel2 gives better pictures (high resolution) than MODIS
- ❑ Is not covering earth each day, but once every 2 to 4 days
- ❑ Clouds and shadows are disturbing the pictures

Sentinel2 – where to find?

The screenshot shows the SKRIPSKONÄTET website interface. The top navigation bar includes links for **Rapporteren**, **IJsinfo**, **Tochten**, **Zoek** (circled in red), **Admin**, **Help**, and **Skrids**. The **Zoek** dropdown menu is open, listing various categories: **IJsobservaties**, **Tochtrapport**, **Tochtspoor**, **Foto's**, **Schaatstochten**, **Externe links**, **Weer en ijs** (circled in red), **Statistiek**, **Persoon**, **Meer / Water**, **Bibliotheek**, **Evenementen**, **Artikel**, and **Incidentrapport**.

The main content area is divided into three columns:

- Weer en ijs**
 - Weersituatie en vooruitzichten**
 - Baltrad (se)
 - DMI
 - klart.se
 - Luffartsverket: SWC Norden
 - satellites.pro > Sweden
 - Sjöräddningen: Kustväder
 - SMHI
 - Havsis
 - Kustväder
 - Marine & coastal weather
 - Mätstationer
 - Radar med blix
 - Satellit, Norden
 - Senaste dygnet: Gå till Vädret i Sverige. Sök ort. Välj "10-dygnsprognos", där finns "Senaste dygnet".
 - Vattenstånd och vågor
 - temperatur.nu

- IJs en prognoses**
- Icefinder av Oskar Karlin
- Isprediktorn
- Isutsikter
- Isvarsler > Østlandet
- Jääkartta Iskarta Ice chart (FMI • pdf)
- Satellietbeelden**
- ESA Sentinel Online > EO Browser > Sentinel Playground
 - EO Browser - Landsat 8 av Oskar
- IS-SAR Sentinel-1
- NASA Worldview
 - Near Real Time
 - Worldview Snapshots > ARM Hyy
 - Gulf of Bothnia • Gustav Dalén To
 - Southern Norway and Sweden
- Sentinel Acquisition Plan

1. Scroll down
2. Enter date range
3. Click Search

The screenshot shows the EO Browser interface. At the top, there's a navigation bar with a back arrow, the EO Browser logo, a language selector set to 'ENGLISH', and a 'Login' button. Below this is a secondary navigation bar with tabs: 'Discover' (active), 'Visualize', 'Compare', and 'Pins'. Under the 'Discover' tab, there's a 'Theme' section with a gear icon and the text 'Login to use custom configuration instances.' Below that is a 'Default' dropdown menu. The main content area has three tabs: 'Search' (active), 'Commercial data', and 'Highlights'. Under the 'Search' tab, there's a list of data sources with checkboxes: Envisat Meris, MODIS, DEM, Copernicus Services, Proba-V, GIBS, Planet NICFI, and Other. Below this list is a 'Time range [UTC]' section with two date pickers showing '2022-09-04' and '2022-10-04', and a checkbox for 'filter by months'. At the bottom of the search section is a large green 'Search' button. To the right of the search controls is a map of Southern Sweden, showing cities like Oslo, Drammen, Moss, Karlstad, Gothenburg, and Halmstad. Three red callouts are overlaid on the interface: callout '1.' points to the 'Search' button, callout '2.' points to the date range input fields, and callout '3.' points to the 'filter by months' checkbox.

EO Browser

ENGLISH Login

Discover Visualize Compare Pins

Theme Login to use custom configuration instances.

Default

Search Commercial data Highlights

☐ Envisat Meris

☐ MODIS

☐ DEM

☐ Copernicus Services

☐ Proba-V

☐ GIBS

☐ Planet NICFI

☐ Other

Time range [UTC]

2022-09-04 - 2022-10-04

☐ filter by months

Search

Oslo Drammen Moss Karlstad Gothenburg Halmstad

1.

2.

3.

4.
Browse
through
the list

5.
Click the
picture
you want
to see

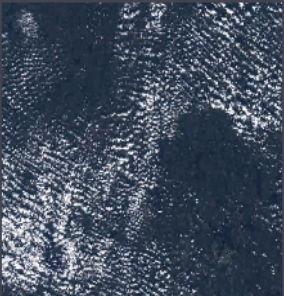
EO Browser

ENGLISH Login

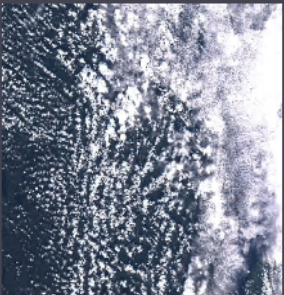
Discover Visualize Compare Pins

← Back to search Showing 50 results

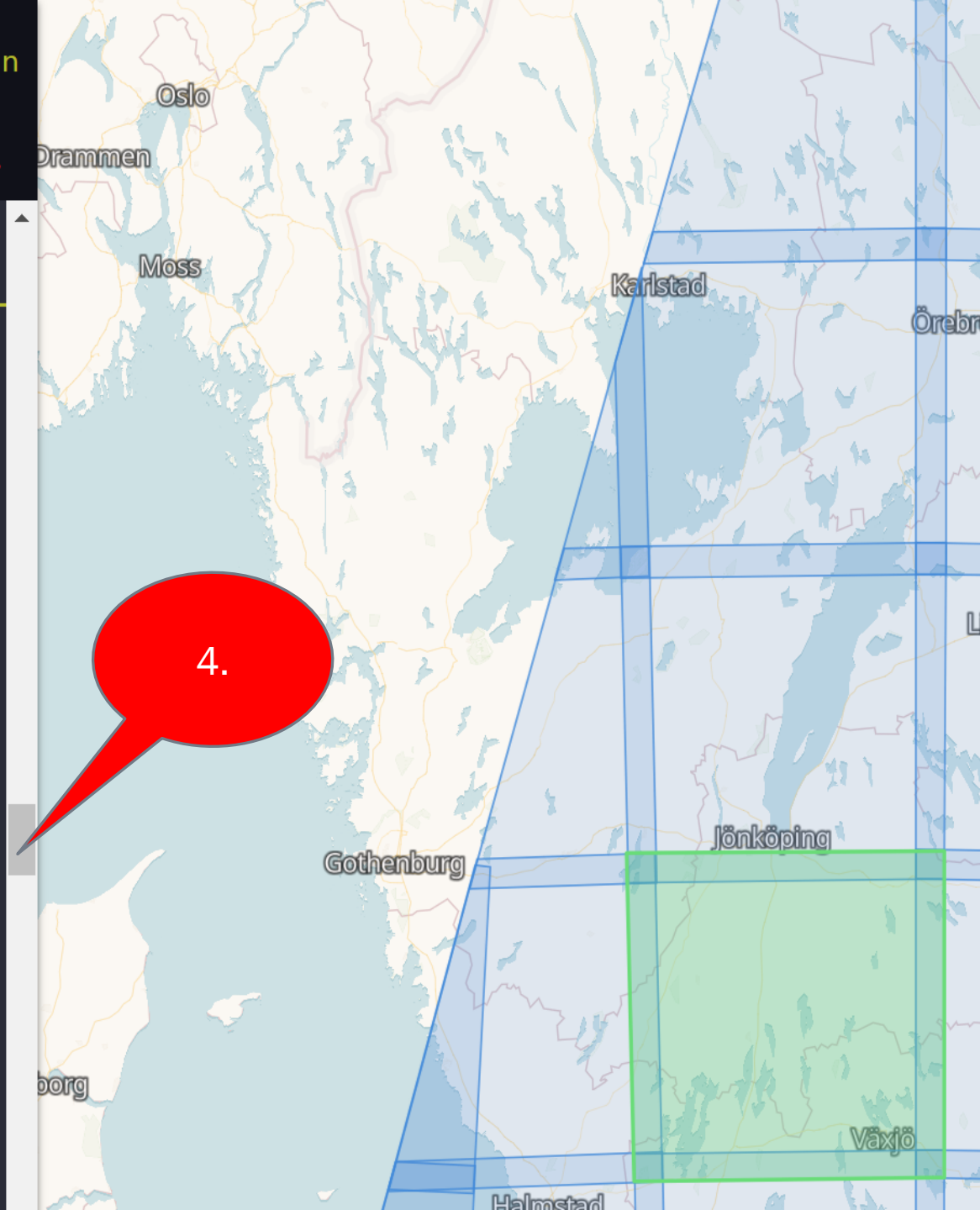
Visualize 33VXC

 Sentinel-2 L2A
2022-10-03
10:24:53 UTC
5.8%
33VVD

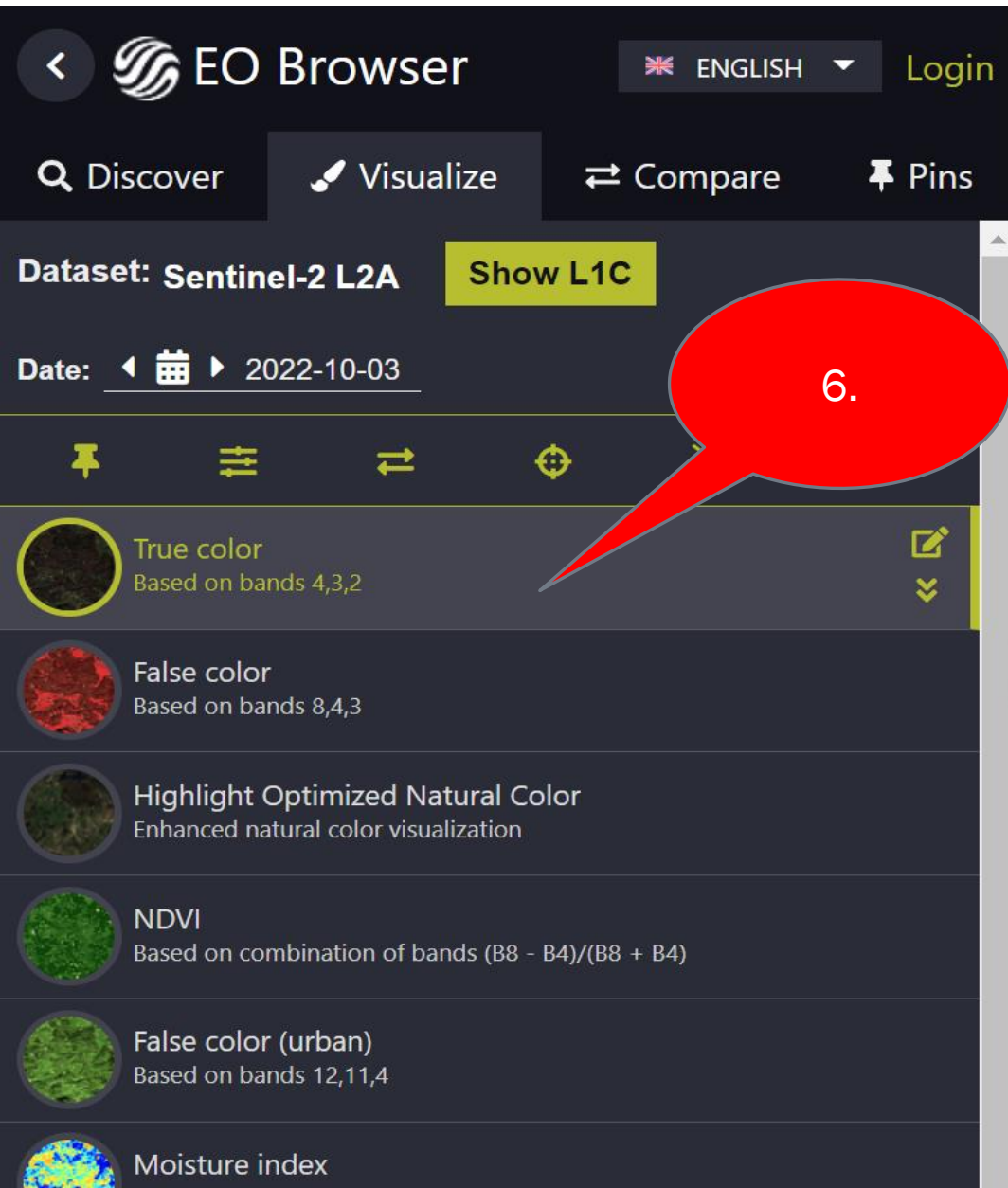
Visualize

 Sentinel-2 L2A
2022-10-03
10:24:48 UTC
24%
33VVD

Visualize



6. Choose the band you want



The screenshot shows the EO Browser interface. At the top, there's a navigation bar with a back arrow, the EO Browser logo, a language dropdown set to 'ENGLISH', and a 'Login' button. Below this is a secondary bar with 'Discover', 'Visualize', 'Compare', and 'Pins' tabs. The 'Visualize' tab is active. The main panel shows 'Dataset: Sentinel-2 L2A' and a 'Show L1C' button. Below that is a 'Date' selector set to '2022-10-03'. A red speech bubble with the number '6.' points to the visualization options menu. This menu lists several options: 'True color' (Based on bands 4,3,2), 'False color' (Based on bands 8,4,3), 'Highlight Optimized Natural Color' (Enhanced natural color visualization), 'NDVI' (Based on combination of bands $(B8 - B4)/(B8 + B4)$), 'False color (urban)' (Based on bands 12,11,4), and 'Moisture index'.

< EO Browser

ENGLISH Login

Discover Visualize Compare Pins

Dataset: Sentinel-2 L2A Show L1C

Date: 2022-10-03

True color
Based on bands 4,3,2

False color
Based on bands 8,4,3

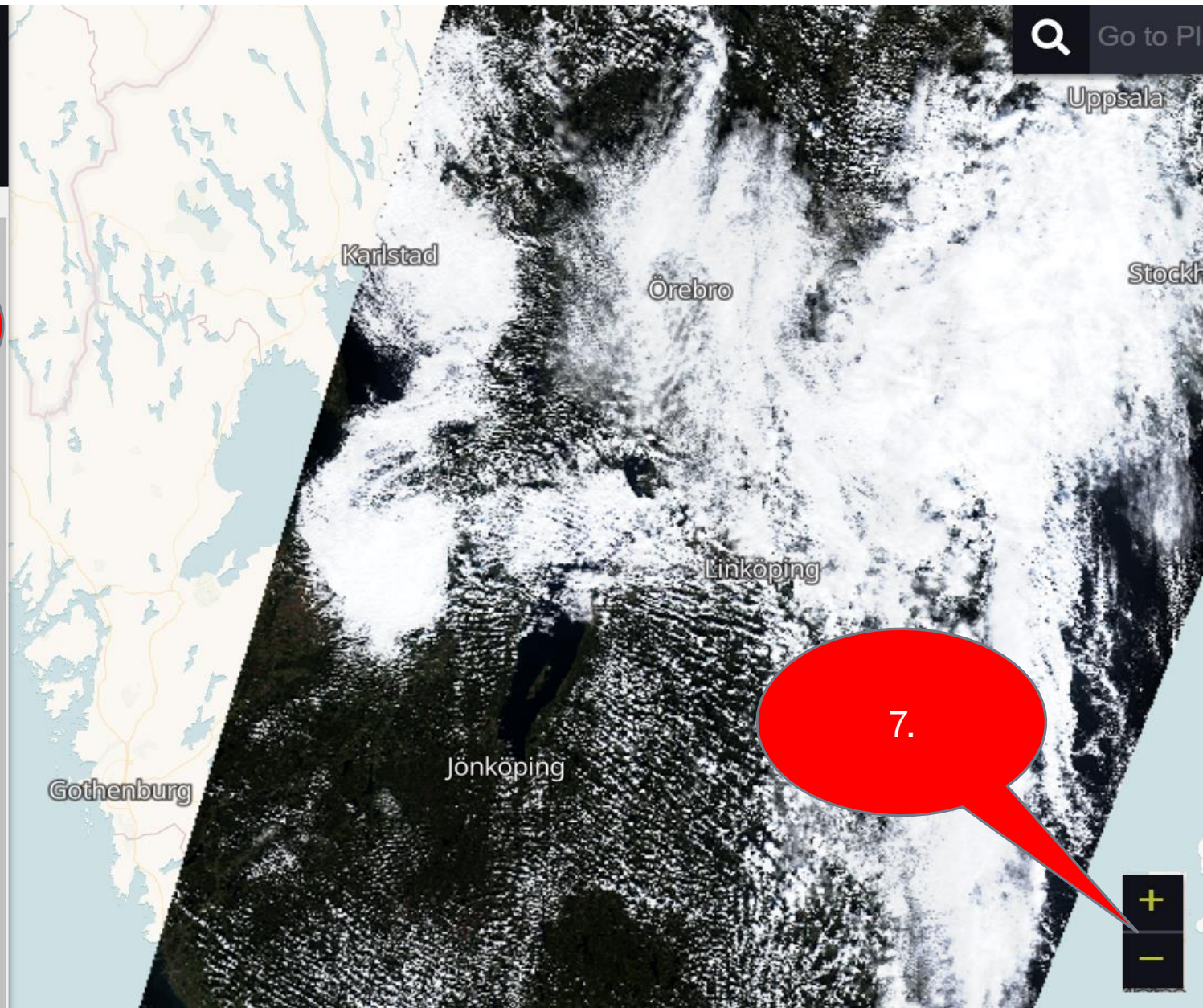
Highlight Optimized Natural Color
Enhanced natural color visualization

NDVI
Based on combination of bands $(B8 - B4)/(B8 + B4)$

False color (urban)
Based on bands 12,11,4

Moisture index

7. Zoom in or out



The screenshot shows the EO Browser interface with a zoomed-in satellite image of Sweden. The map displays several cities: Gothenburg, Karlstad, Örebro, Linköping, Jönköping, and Uppsala. A red speech bubble with the number '7.' points to the zoom controls in the bottom right corner. These controls consist of a '+' button for zooming in and a '-' button for zooming out.

Go to PL

Uppsala

Stockholm

Örebro

Linköping

Jönköping


Gothenburg

Karlstad


7.

+

-



7.



8.

7. Click on Discover
8. Click Back to search

< EO Browser

ENGLISH Login

Discover Visualize Compare Pins

← Back to search Showing 50 results

Sentinel-2 L2A

2022-10-03

11:15:16 UTC

58.8%

31VED

Visualize

Sentinel-2 L2A

2022-10-03

11:15:14 UTC

36.3%

32VKJ

Visualize

Sentinel-2 L2A

2022-10-03



Search Gullkrona,
Finland on the map.
Select date range
2018-03-29 to
2018-03-29 (one day)



Cloud in the
air or snow
on the ice?

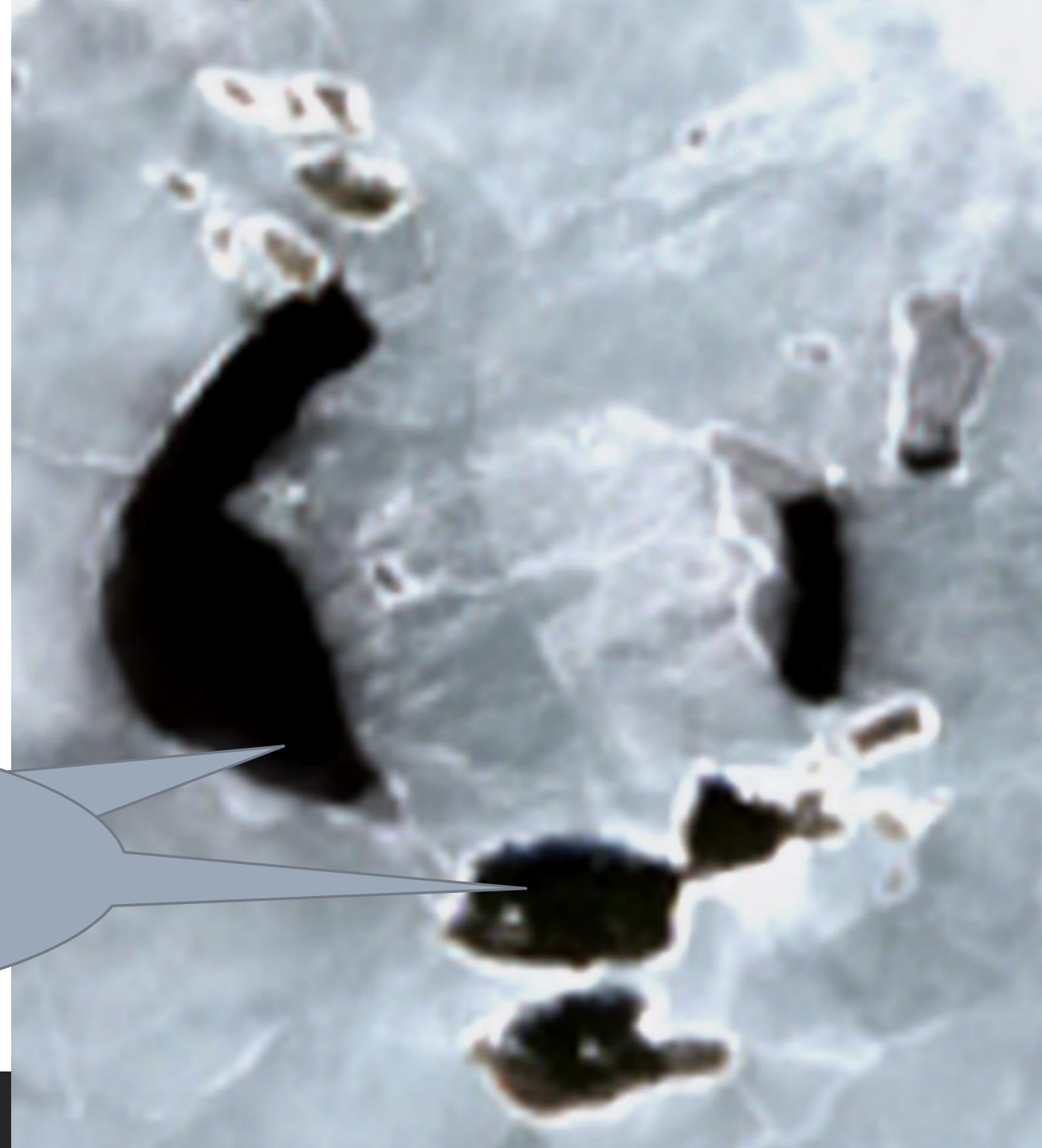


Cloud in the
air or snow
on the ice?

Zoom in first, until the scale in the lower right corner is down to 500 meter. Then change between map and picture. You will see the islands crystal clear. That can only mean the white spot is not a cloud, but snow on the ice.

Now zoom out again until the scale is 5 km. This is how you get a feel how snow covers land and ice in “feathers”.

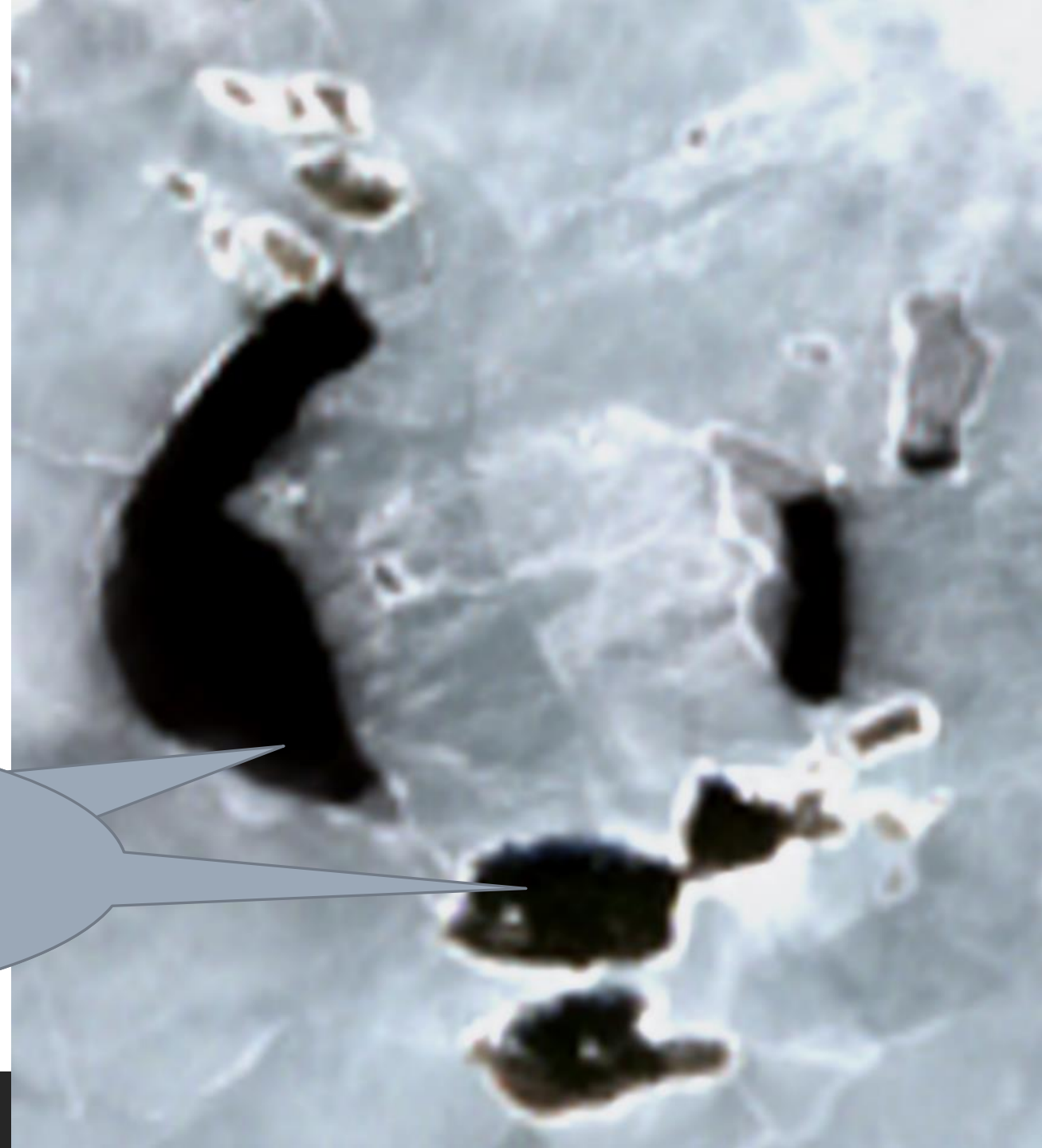
Open spots or
islands?



Find the exact spot on the satpic first. Then change between map and picture a few times. You will notice that some of the spots are islands, while others are not.

On the big black spot, there is no stöpis (anymore). It looks like open water, but the spot might have new black ice, if new frost came after all other stöpis had formed and the spot went open before the frost came.

Open spots or
islands?

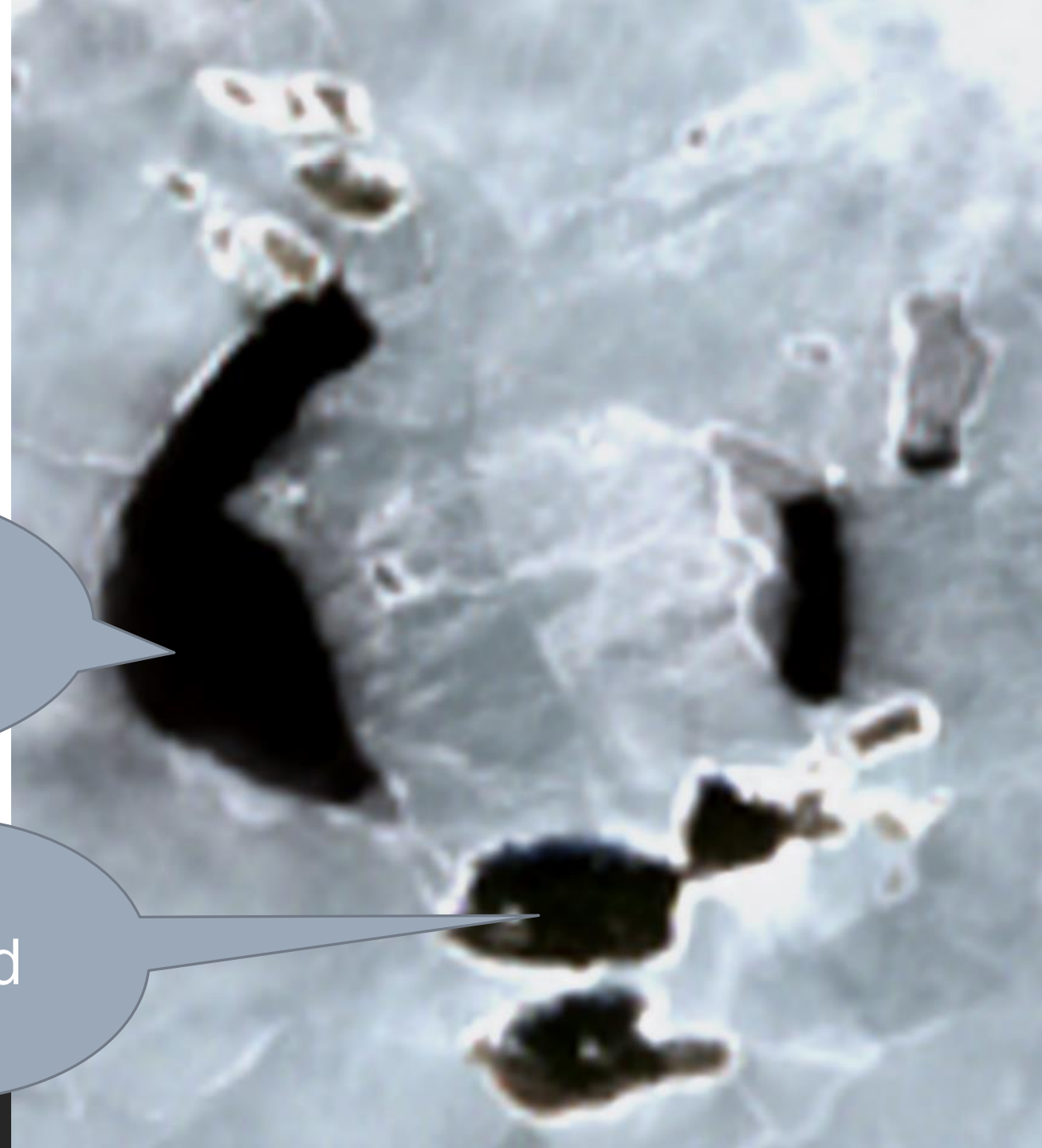


Find the exact spot on the satpic first. Then change between map and picture a few times. You will notice that some of the spots are islands, while others are not.

On the big black spot, there is no stöpis (anymore). It looks like open water, but the spot might have new black ice, if proper frost came after all other stöpis had formed and the spot went open before the frost came.

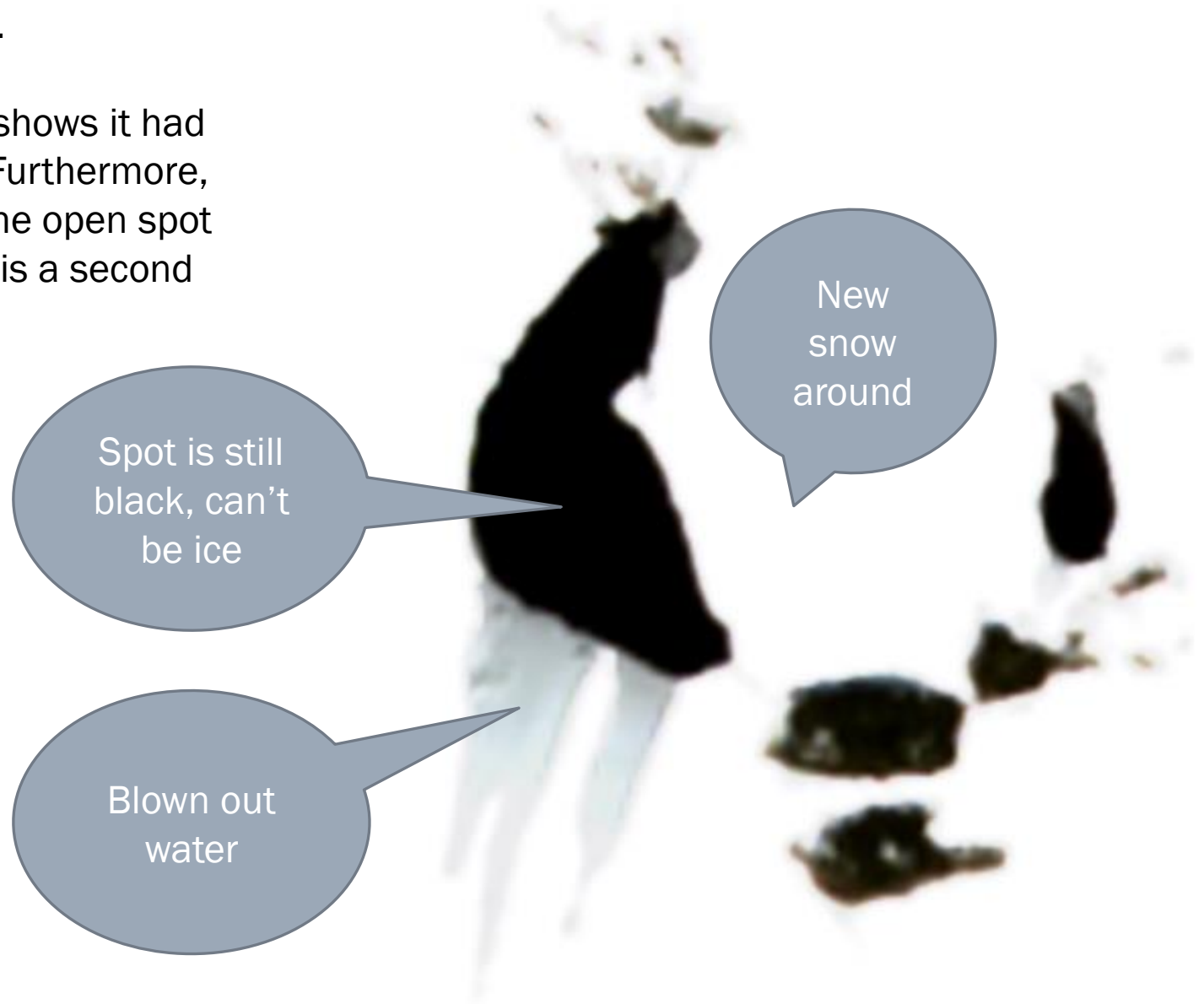
Open water
or new black
ice

Island



One of the tricks to know if a black spot is open water or ice, is jumping to another date not far away.

In this case, the picture of three days later shows it had been snowing but the spot remains black. Furthermore, you see blown out water that came out of the open spot and was blown/sucked into the snow. That is a second indication the spot is open water.





Open spot
between islands

Släpråk

Råk

Shipping
lanes

Vrakis?

Drifting
ice plate

Open
water?



Markermeer in The Netherlands, 2018-03-02

Using reference information

- ❑ Usually other known ice information and/or weather actuals
- ❑ Can be used for (mainly) two goals:
 1. reference information from before the satpic can give a logical explanation to support (or deny) your conclusion about a satpic
 2. reference information from after the satpic can be used to extrapolate if a lake is skateable or not

2022-01-17

Black ice or
open water?



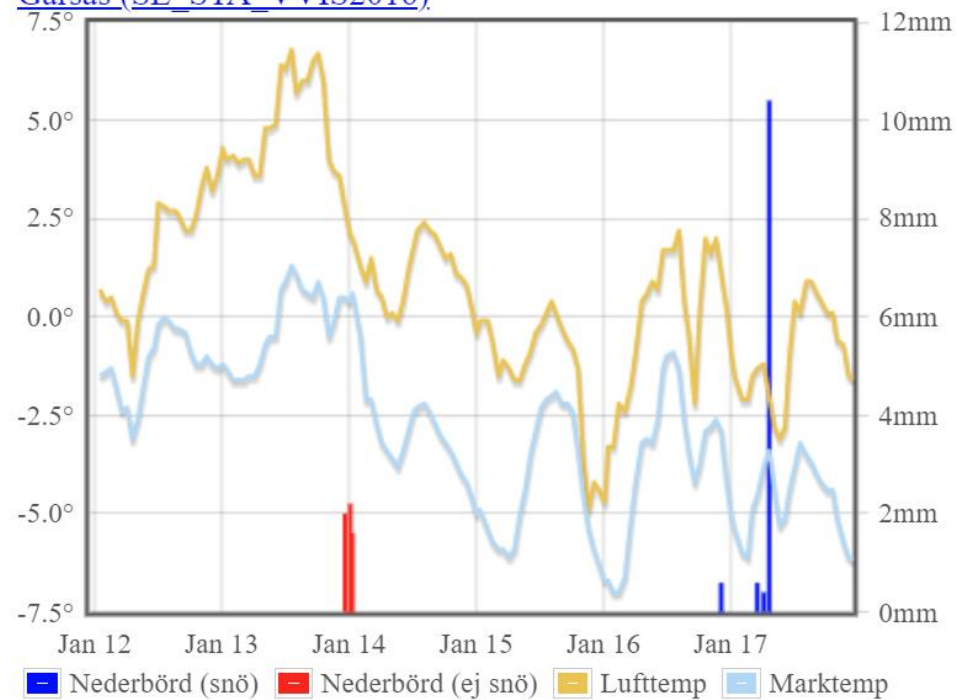
+

-

2022-01-17

Black ice or
open water?

Garsås (SE_STA_VVIS2016)

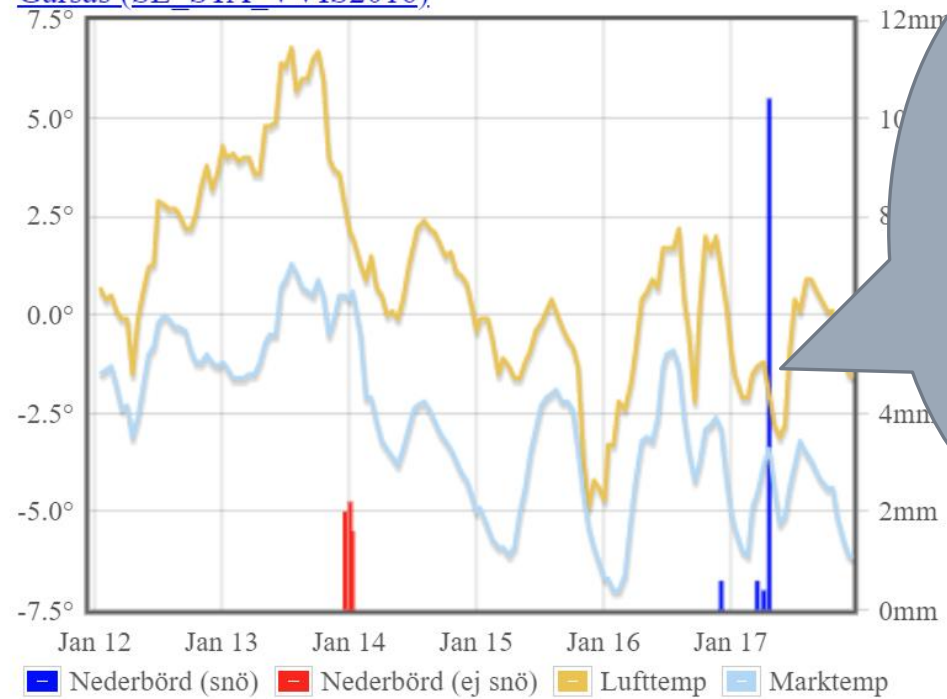


(Antal mm snö i osmält form)

[Data från Trafikverket](#)

2022-01-17

Black ice or
open water?

Garsås (SE_STA_VVIS2016)

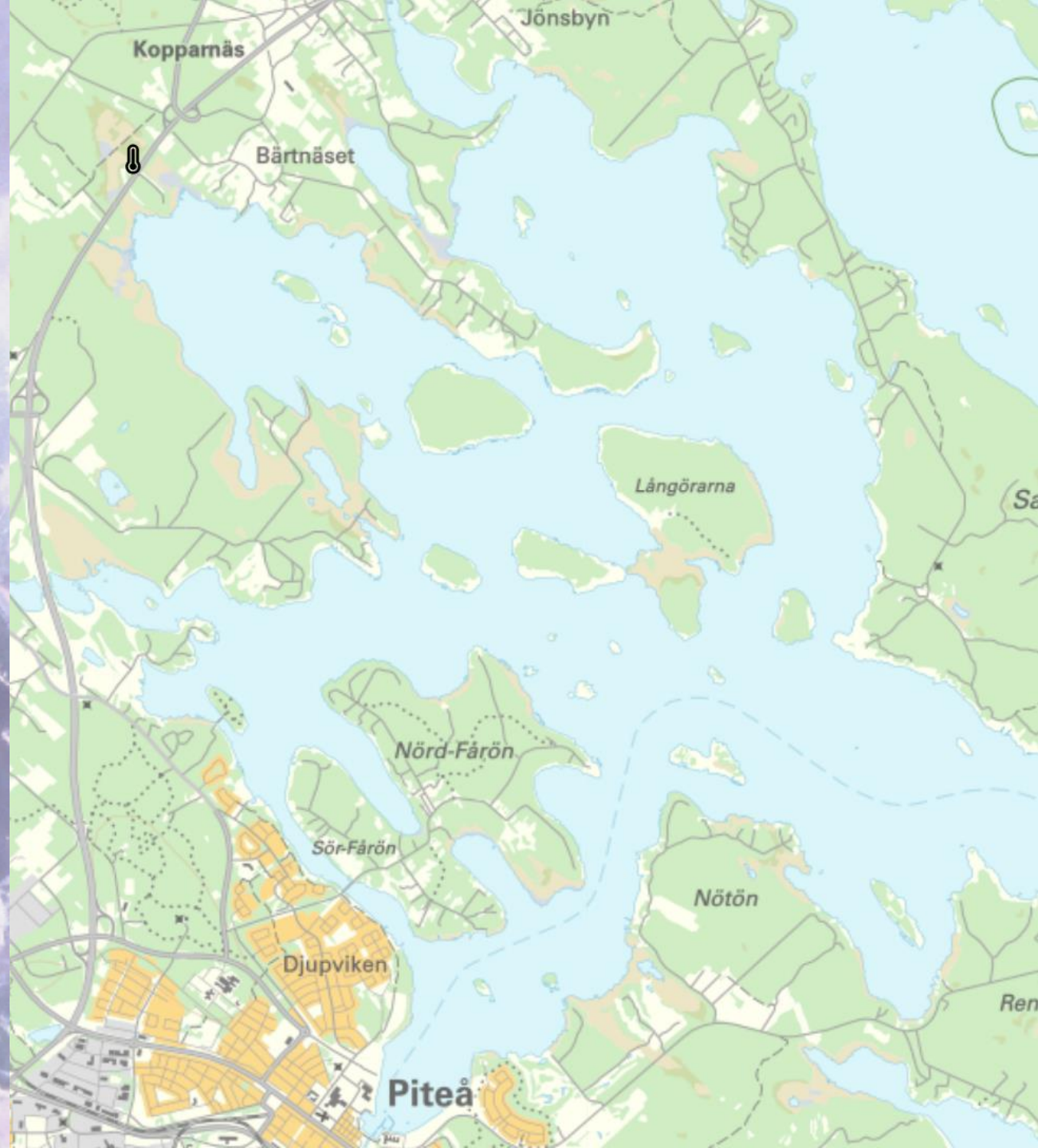
(Antal mm snö i smält form)

[Data från Trafikverket](#)

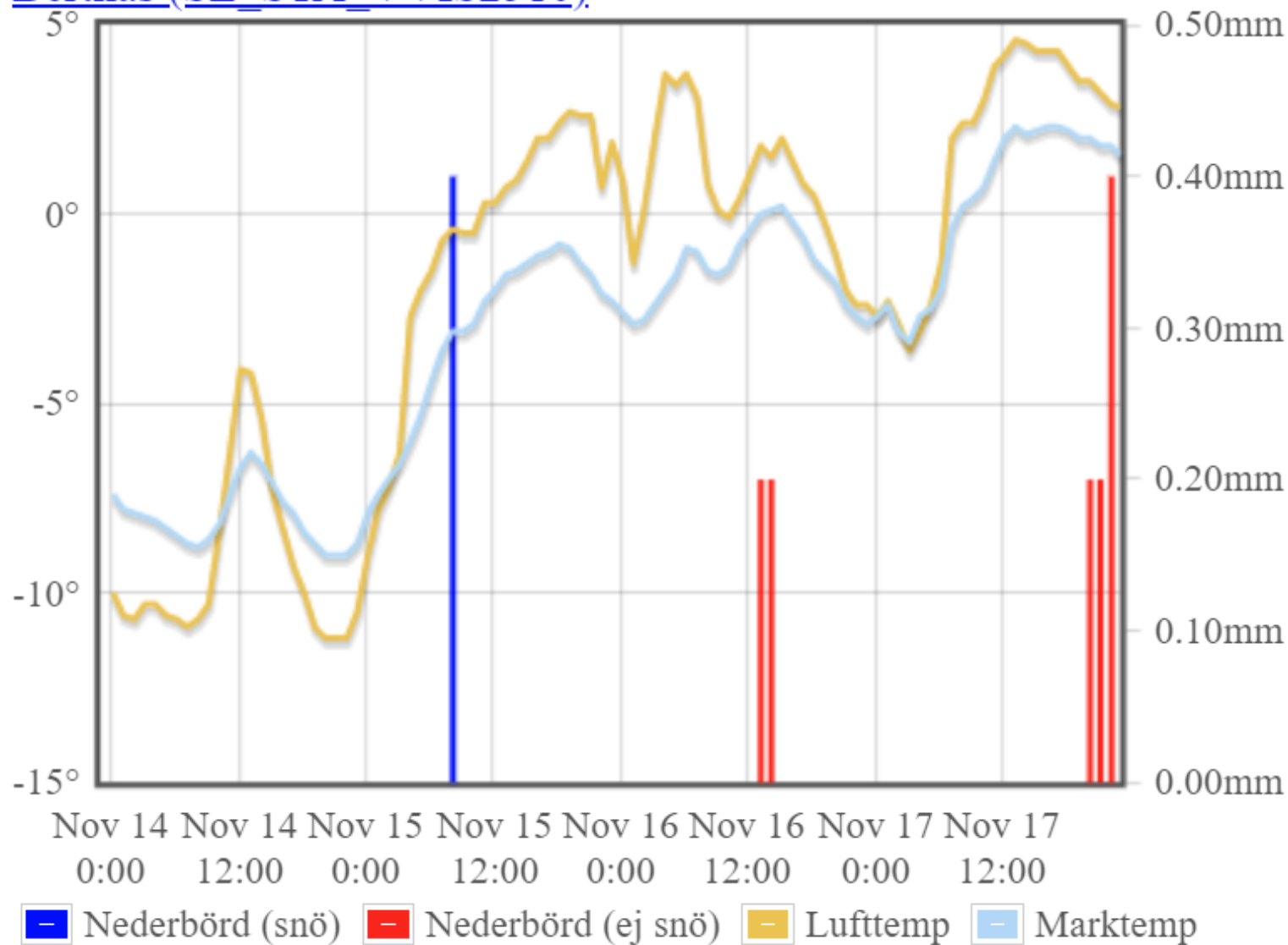
It snowed
just before
the picture
was taken.
So most
probably it is
open water.



Piteå Skärgård
2021-11-14



Bertnäs (SE_STA_VVIS2510).



The weather actuals from November, 14th up to November 17th, 2021.

What do you think, was Piteå Skärgård green, blue, yellow or red dot on November 17th?

(Antal mm snö i osmält form)

[Data från Trafikverket](#)

Isoobservaties van tochtdeelnemers

● Bärtnäsfjärden (Rob Mulders)

Vattenbegjuten slät kärnis, mestadels mellan 8-12 cm. Tunnare is finns i sund och bredvid råkar, men det går bra att åka runt.

● Davids stenar (Rob Mulders)

Islagd med vattenbegjuten kärnis men för tunnt, circa 3 - 5 cm.

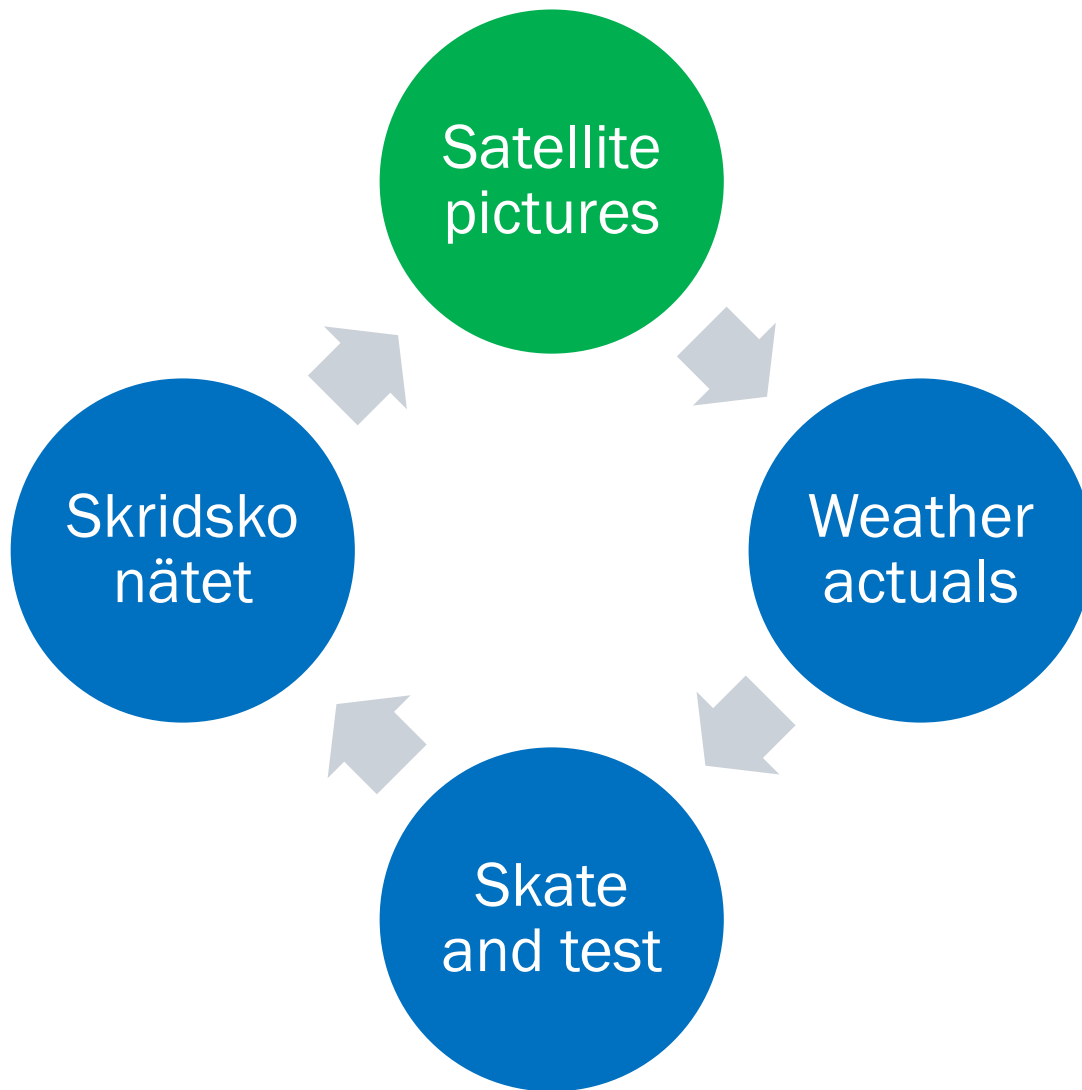
● Håkansöfjärden (Rob Mulders)

Vattenbegjuten kärnis, mestadels mellan 8-12 cm. Nyare generationer finns i sund och mot Davids stenar. Lätt överis i morse försvann snabbt idag pga värme och vatten på isen. All snö borta.

● Nördfjärden (Rob Mulders)

Vattenbegjuten slät kärnis, mestadels mellan 8-12 cm. Tunnare is finns i sund och vid inlopp i staden.





DO NOT FORGET
For optimal use of satellite pictures, use ice information and weather actuals for explaining what's going on!