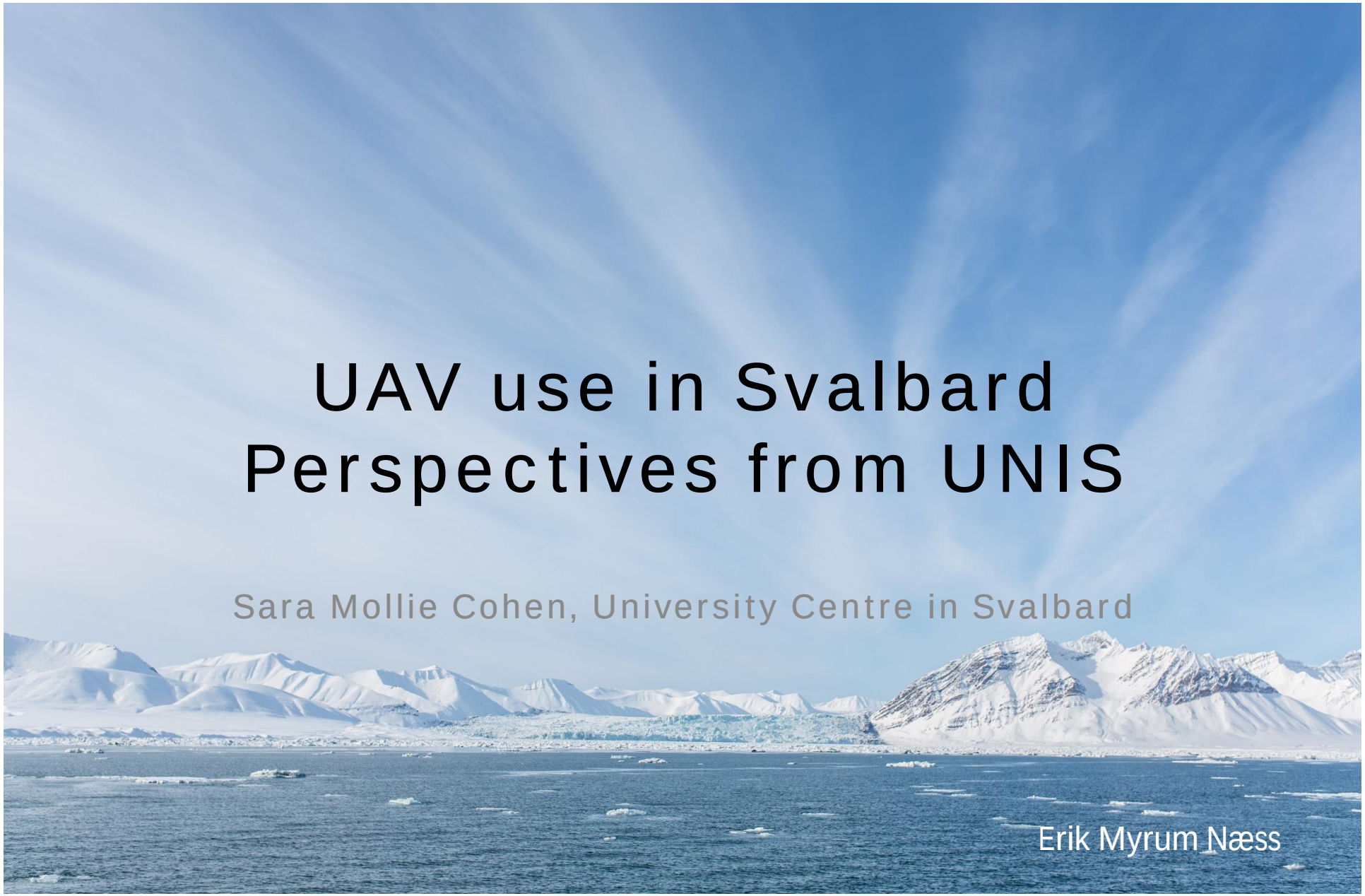


# UAV use in Svalbard
# Perspectives from UNIS

Sara Mollie Cohen, University Centre in Svalbard

Erik Myrum Næss

24 October 2017
University Centre in Svalbard

UNIS

# Presentation Outline

- Program Management at UNIS
- Platforms
- UAV Usage at UNIS
- Challenges
- Future Goals

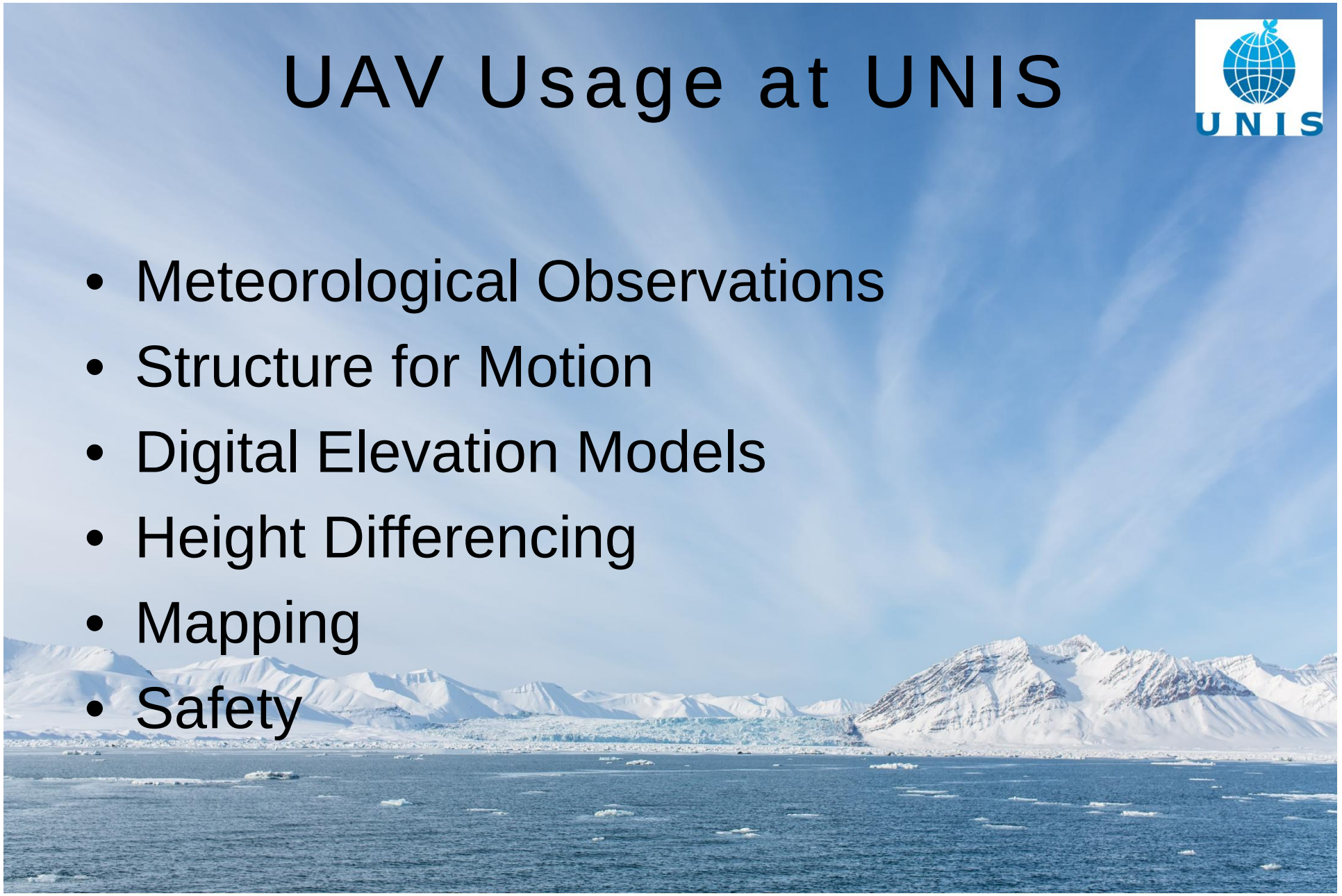
# Program Management

- Operations manual established 2013
- UNIS Airborne Research Group established 2016
- UNIS UAV protocol, in progress
- Current Operations (call airport, weekly plan)
- RO1, RO2, RO3
- Combination of internal and external pilots

# Platforms

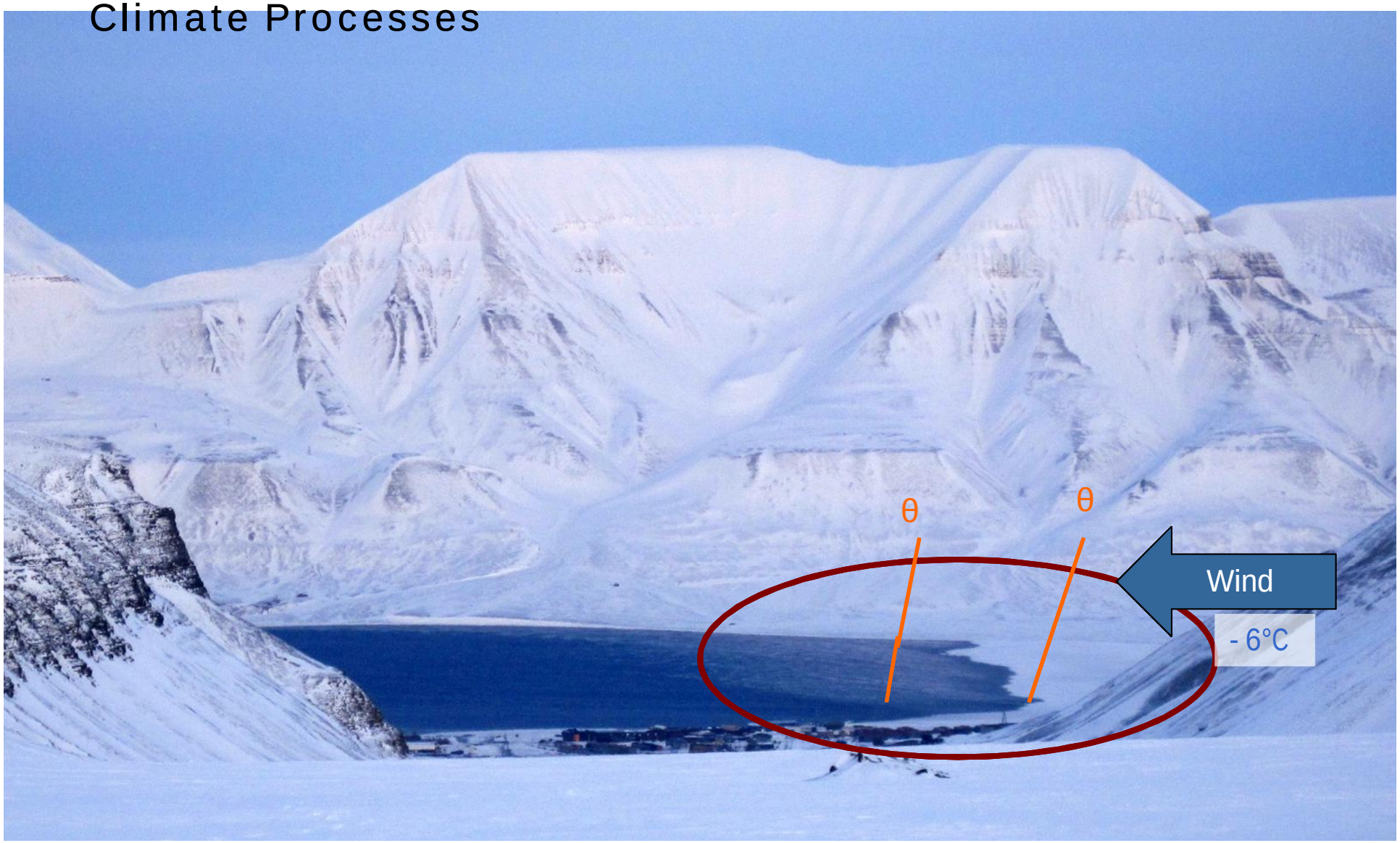
- Geophysics
  - Paparazzi based SUMO, Mini Talon, Bebop 2
  - AMOR system
- Geology
  - DJI Phantom 3 & 4
  - 3DR Iris+

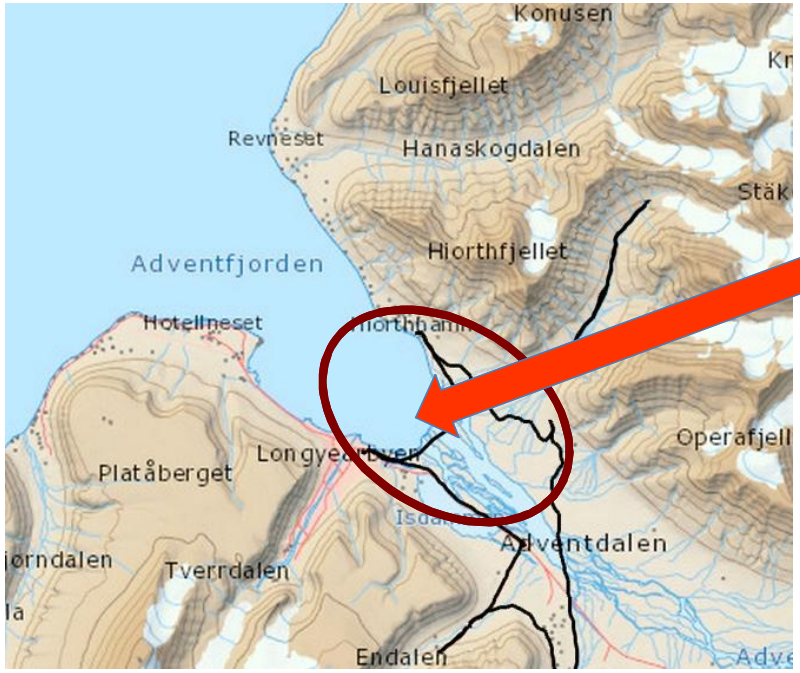
# UAV Usage at UNIS



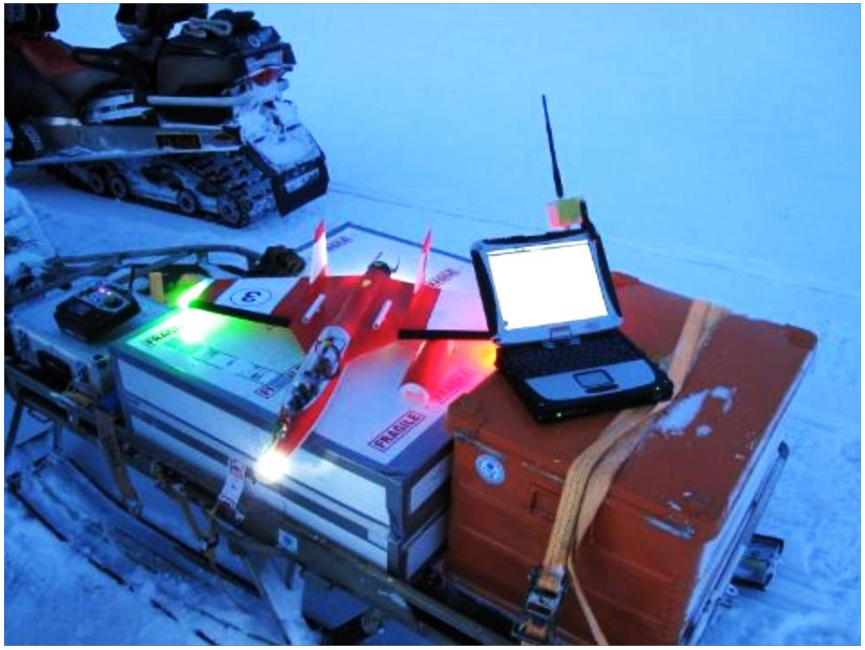
- Meteorological Observations
- Structure for Motion
- Digital Elevation Models
- Height Differencing
- Mapping
- Safety

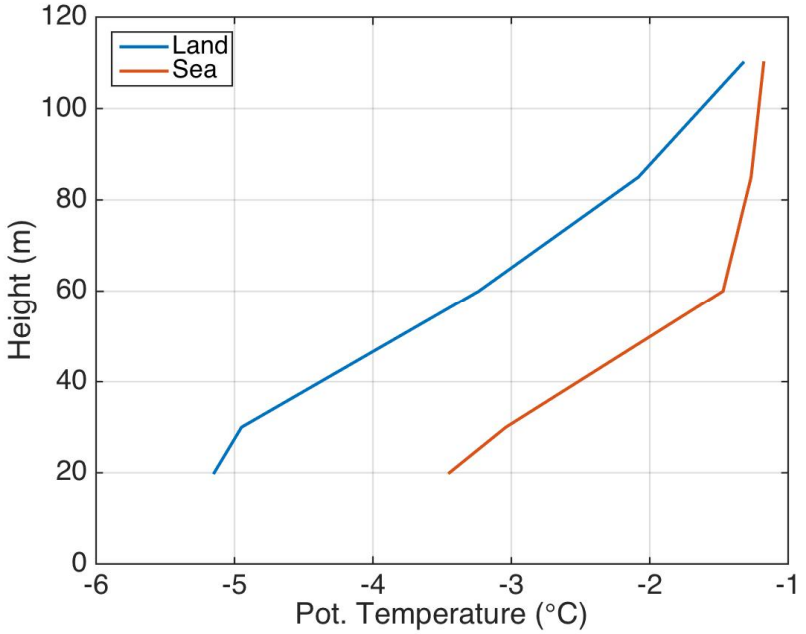
UAV Use at UNIS Study 1
Air-Land-Sea Interaction in Svalbard, Marius Jonassen
AGF 350/850
The Arctic Atmospheric Boundary Layer and Local Climate Processes

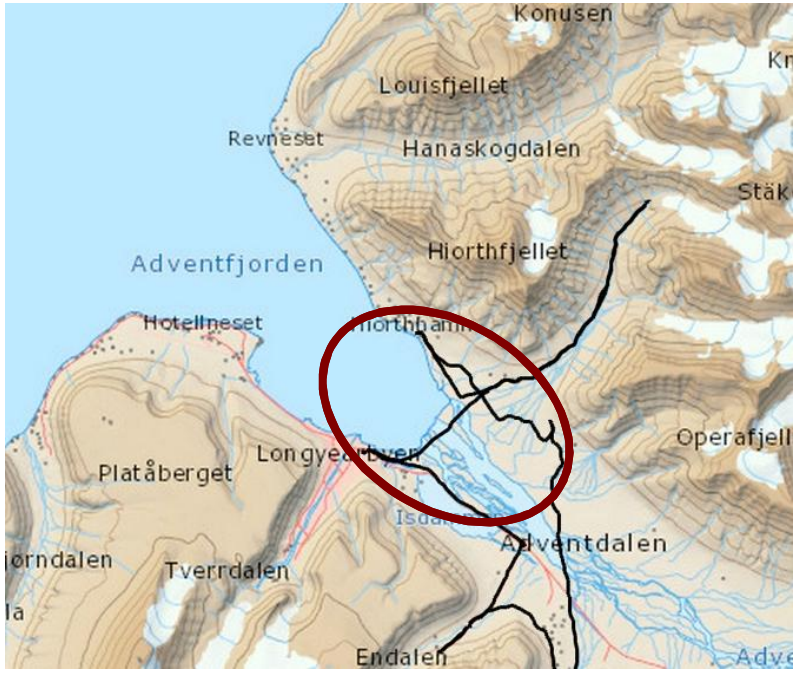




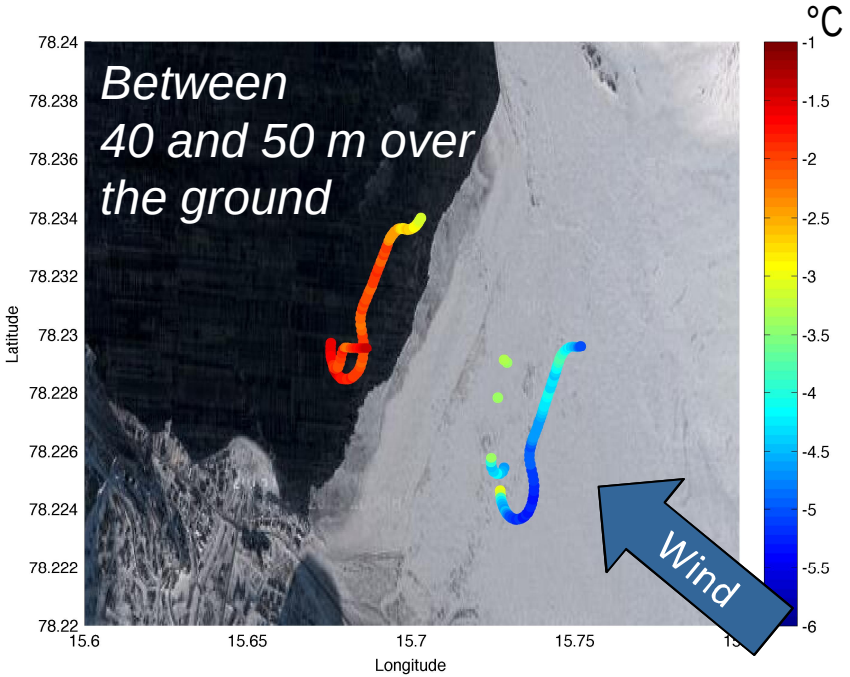

Topo-svalbard, NP

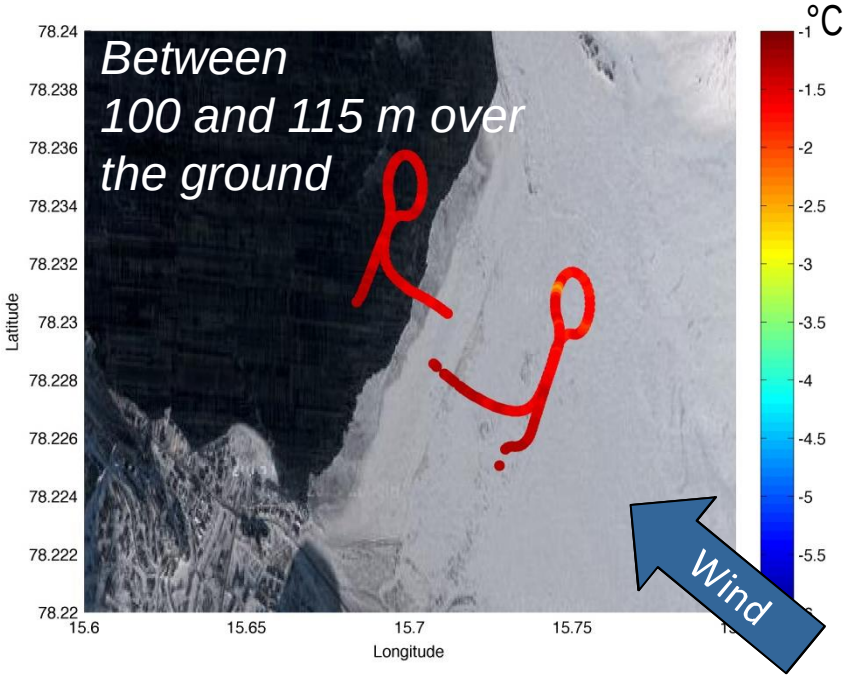




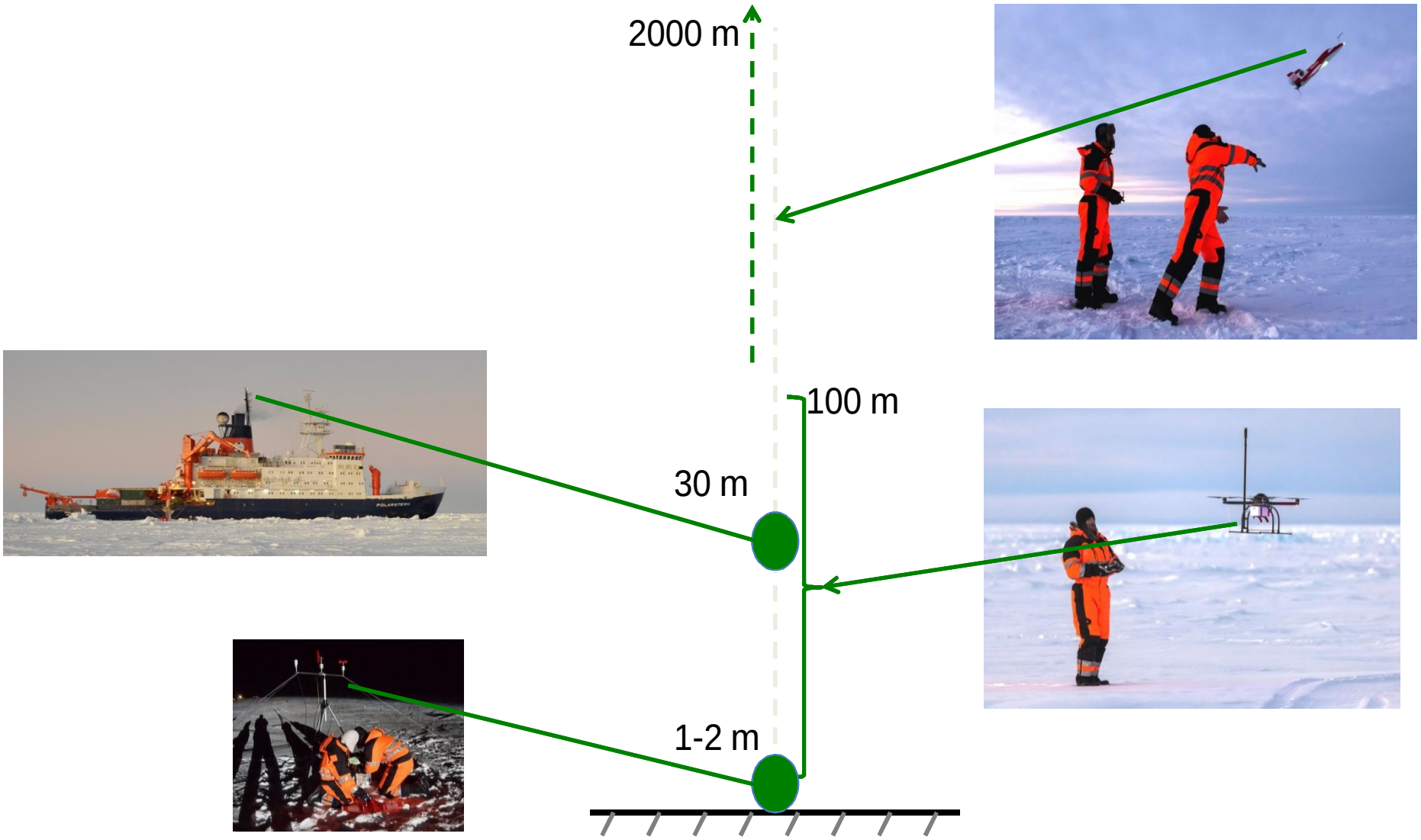



Topo-svalbard, NP

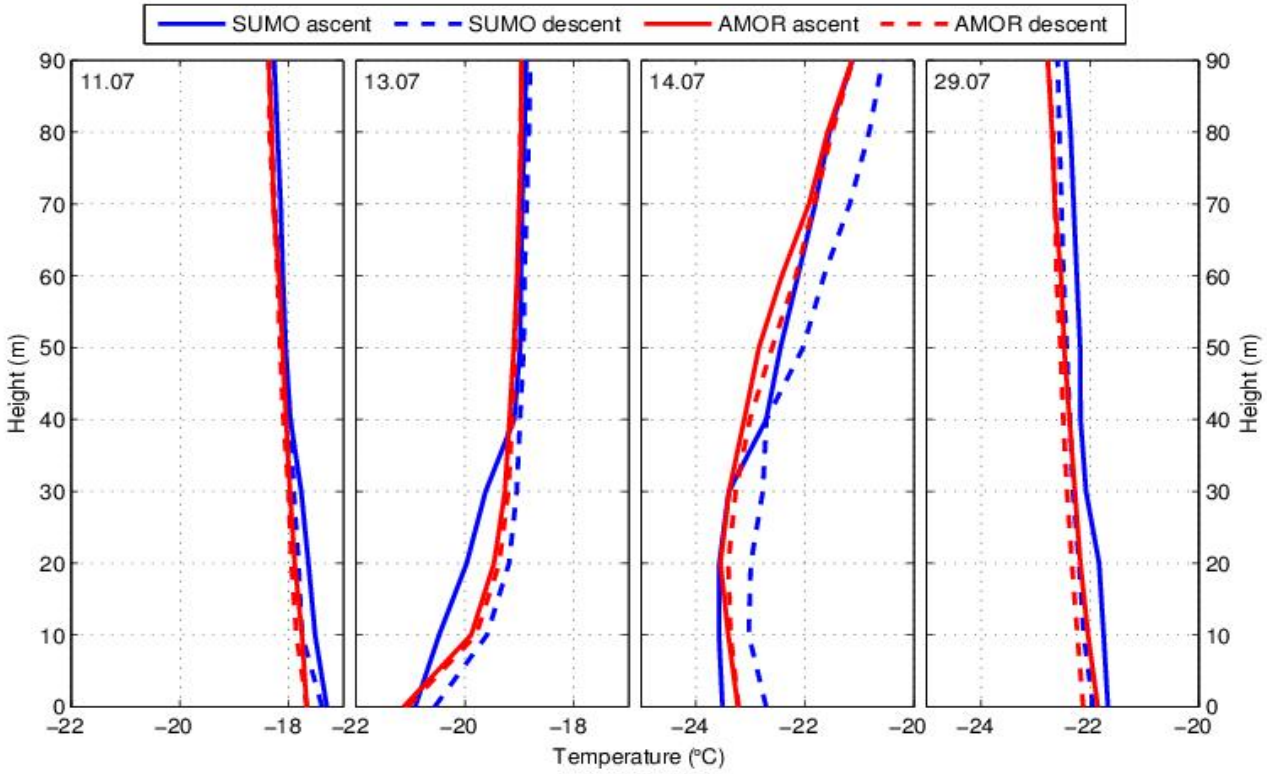


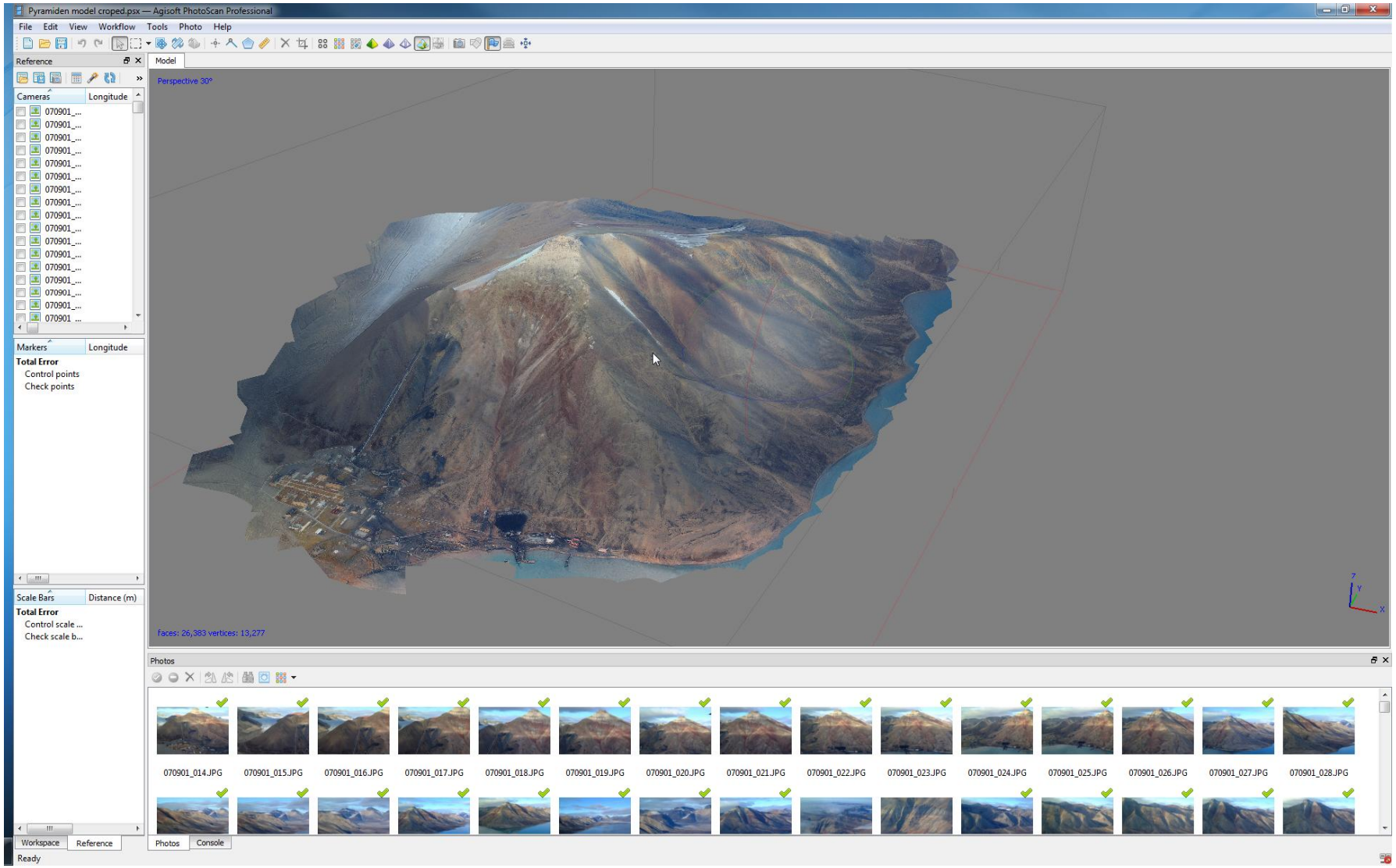
# UAV Use at UNIS Study 2
# Measurements of Antarctic Boundary Layer
Marius Jonassen, AGF

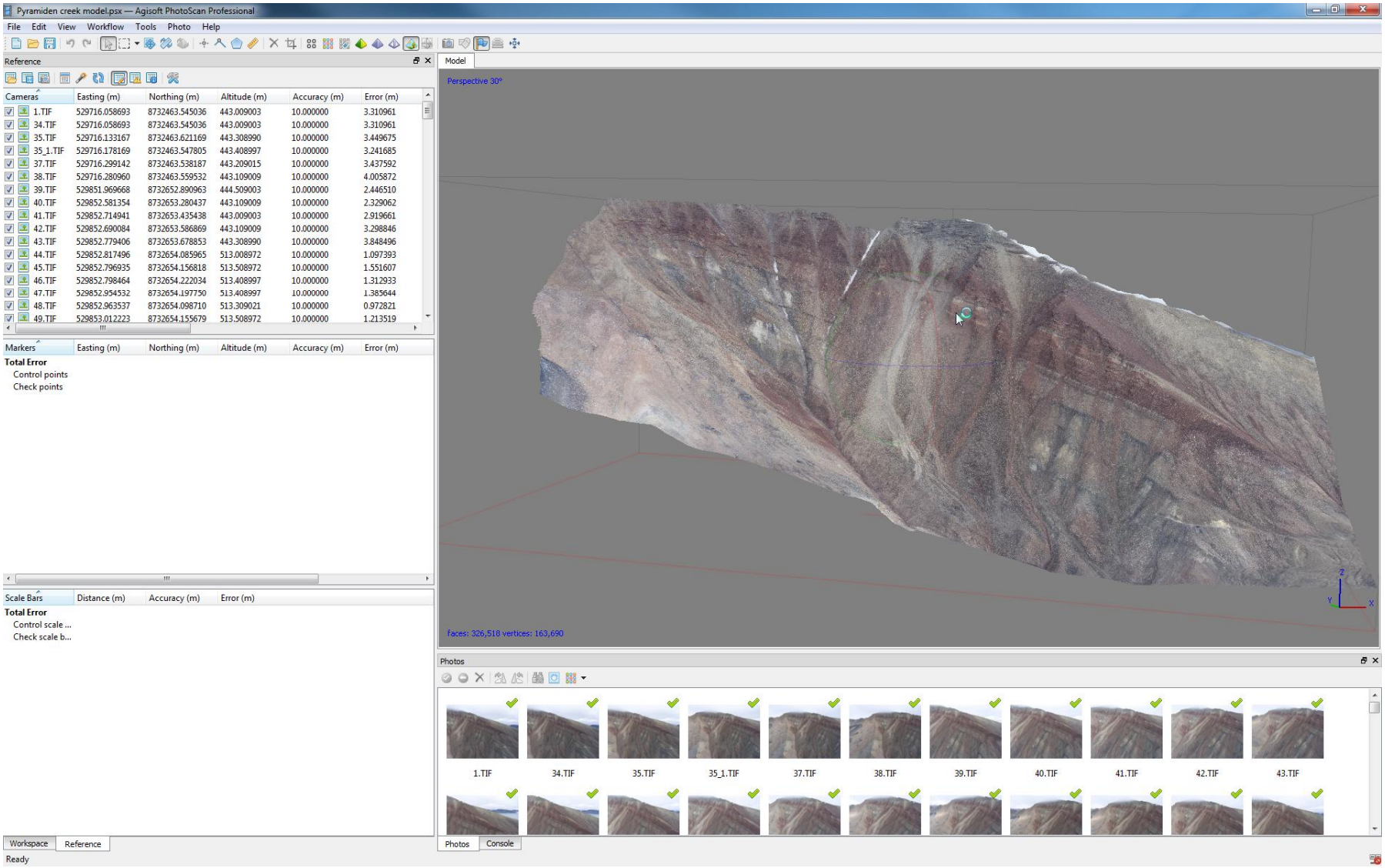


https://www.youtube.com/watch?v=VWEa_4Hlm2s



# UAV Use at UNIS Study 3
# Pyramiden 3D Modelling Aleksandra Smyrak-Sikora, AG PhD Student




Pyramiden creek model.psx — Agisoft PhotoScan Professional
File Edit View Workflow Tools Photo Help
Reference
Cameras Easting (m) Northing (m) Altitude (m) Accuracy (m) Error (m)
1.TIF 529716.058693 8732463.545036 443.009003 10.000000 3.310961
34.TIF 529716.058693 8732463.545036 443.009003 10.000000 3.310961
35.TIF 529716.133167 8732463.621169 443.308990 10.000000 3.449675
35_1.TIF 529716.178169 8732463.547805 443.408997 10.000000 3.241685
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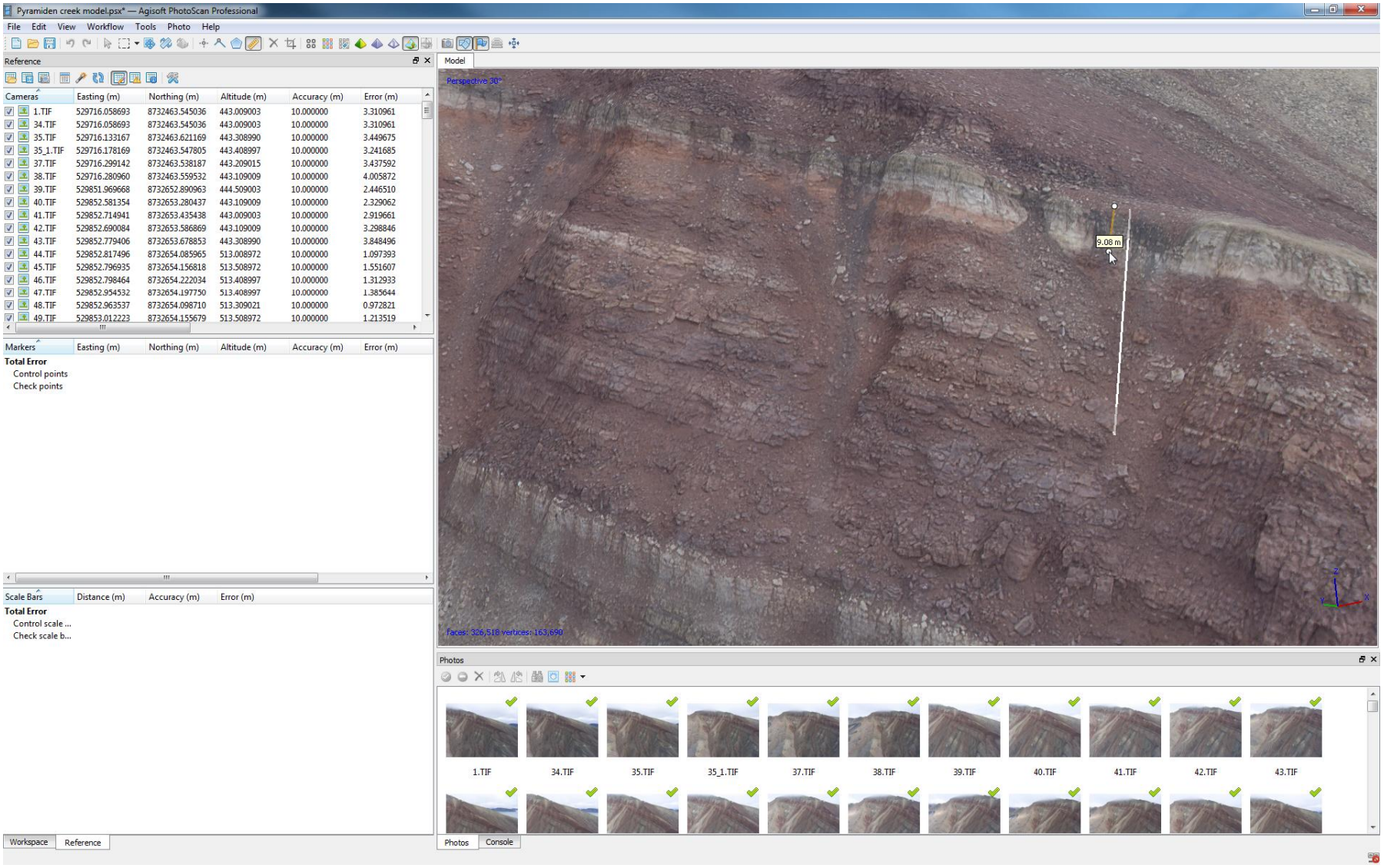
Markers Easting (m) Northing (m) Altitude (m) Accuracy (m) Error (m)
Total Error
Control points
Check points
Scale Bars Distance (m) Accuracy (m) Error (m)
Total Error
Control scale ...
Check scale b...
Workspace Reference
Ready
Model
Perspective 30°
faces: 326,518 vertices: 163,690
Photos
1.TIF 34.TIF 35.TIF 35_1.TIF 37.TIF 38.TIF 39.TIF 40.TIF 41.TIF 42.TIF 43.TIF
Photos Console


Pyramiden creek model.psx* — Agisoft PhotoScan Professional
File Edit View Workflow Tools Photo Help
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Cameras Easting (m) Northing (m) Altitude (m) Accuracy (m) Error (m)
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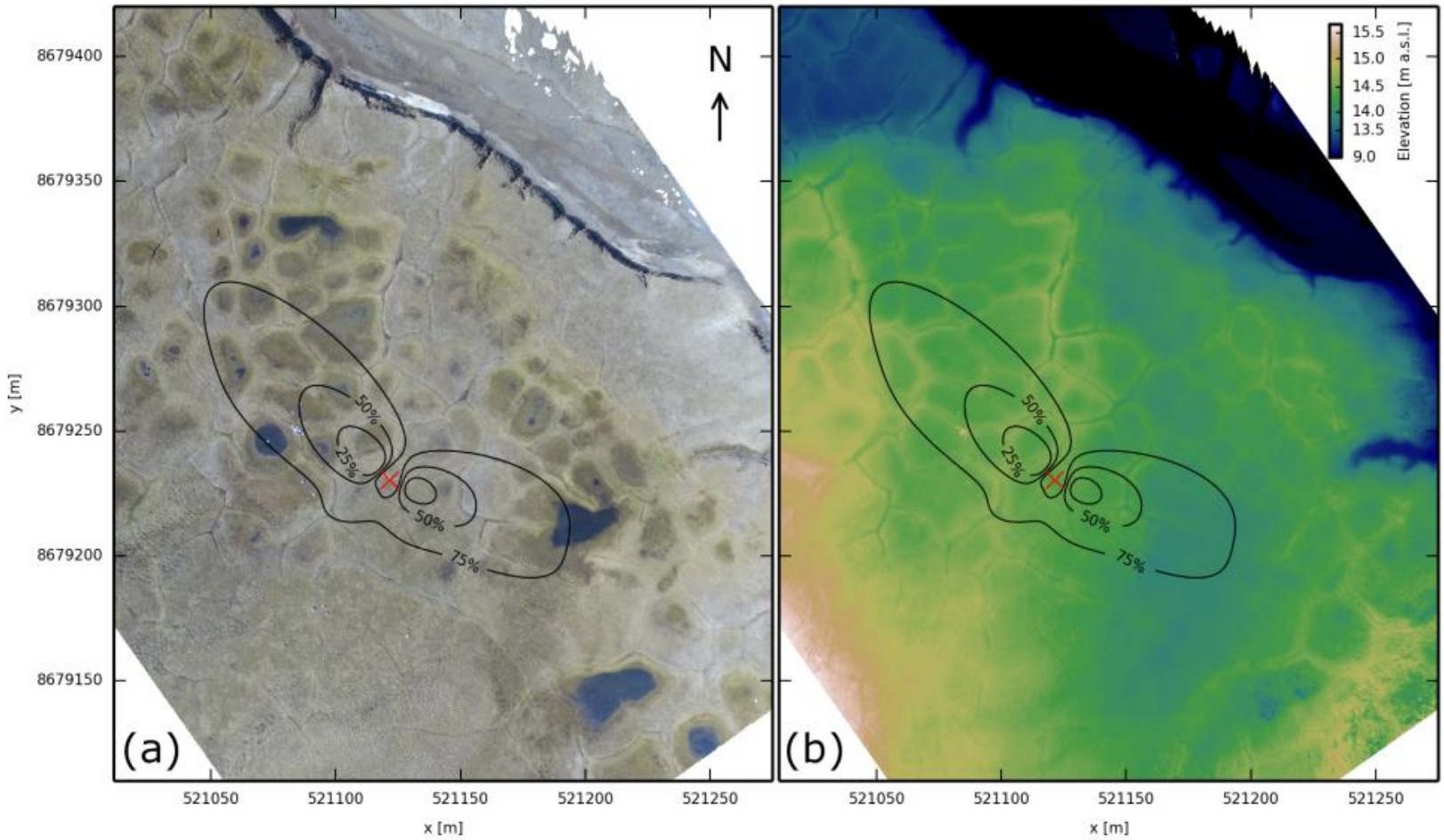
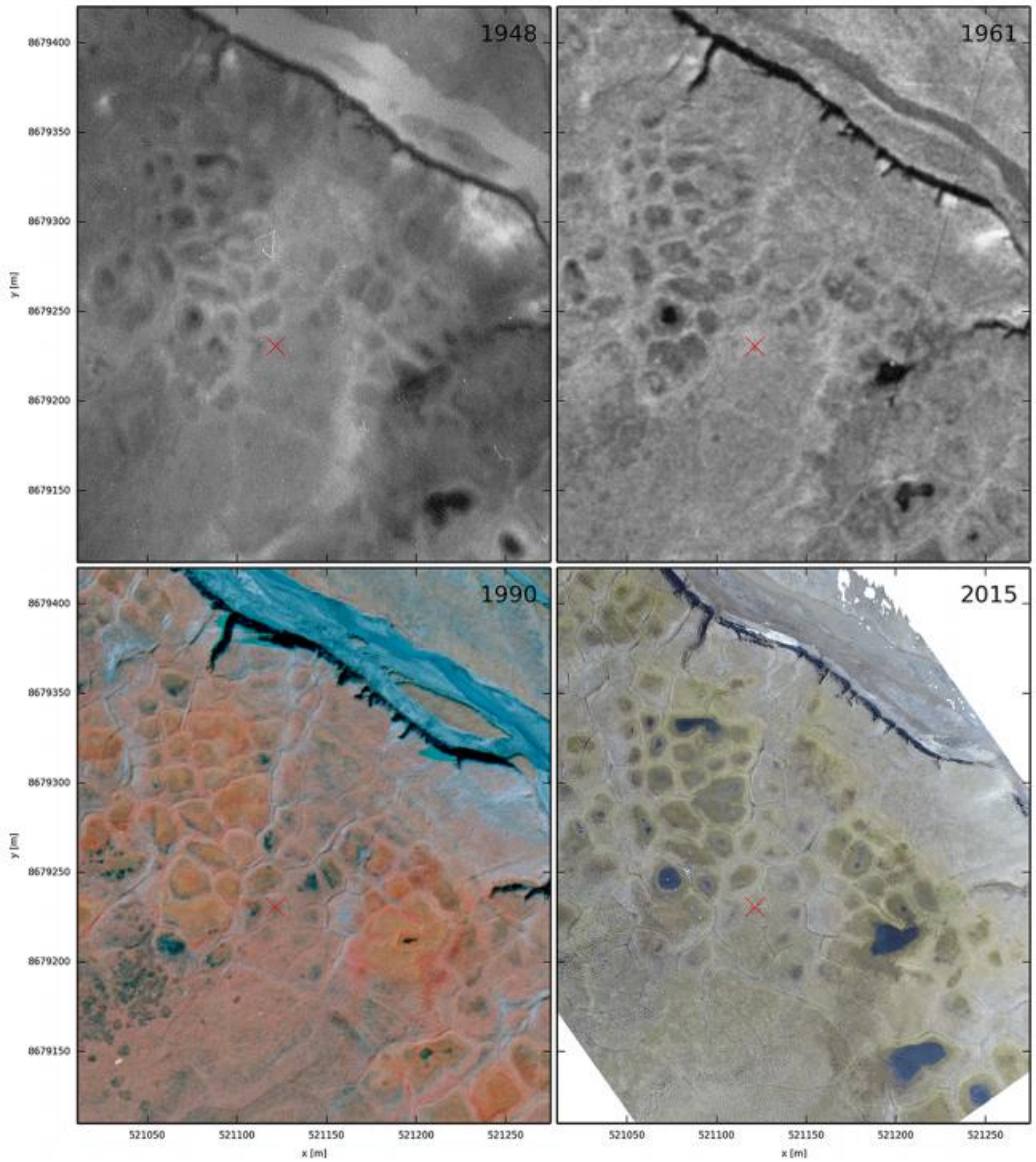
48.TIF 529852.963537 8732654.098710 513.309021 10.000000 0.972821
49.TIF 529853.012223 8732654.155679 513.508972 10.000000 1.213519
Markers Easting (m) Northing (m) Altitude (m) Accuracy (m) Error (m)
Total Error
Control points
Check points
Scale Bars Distance (m) Accuracy (m) Error (m)
Total Error
Control scale ...
Check scale b...
Workspace Reference
Model
Perspective 30°
9.08 m
Faces: 326,518 vertices: 163,690
Photos
1.TIF 34.TIF 35.TIF 35_1.TIF 37.TIF 38.TIF 39.TIF 40.TIF 41.TIF 42.TIF 43.TIF
Photos Console

# UAV Use at UNIS Study 4
# DEMs and Structure for Motion

Jordan Mertes & Norbert Pirk

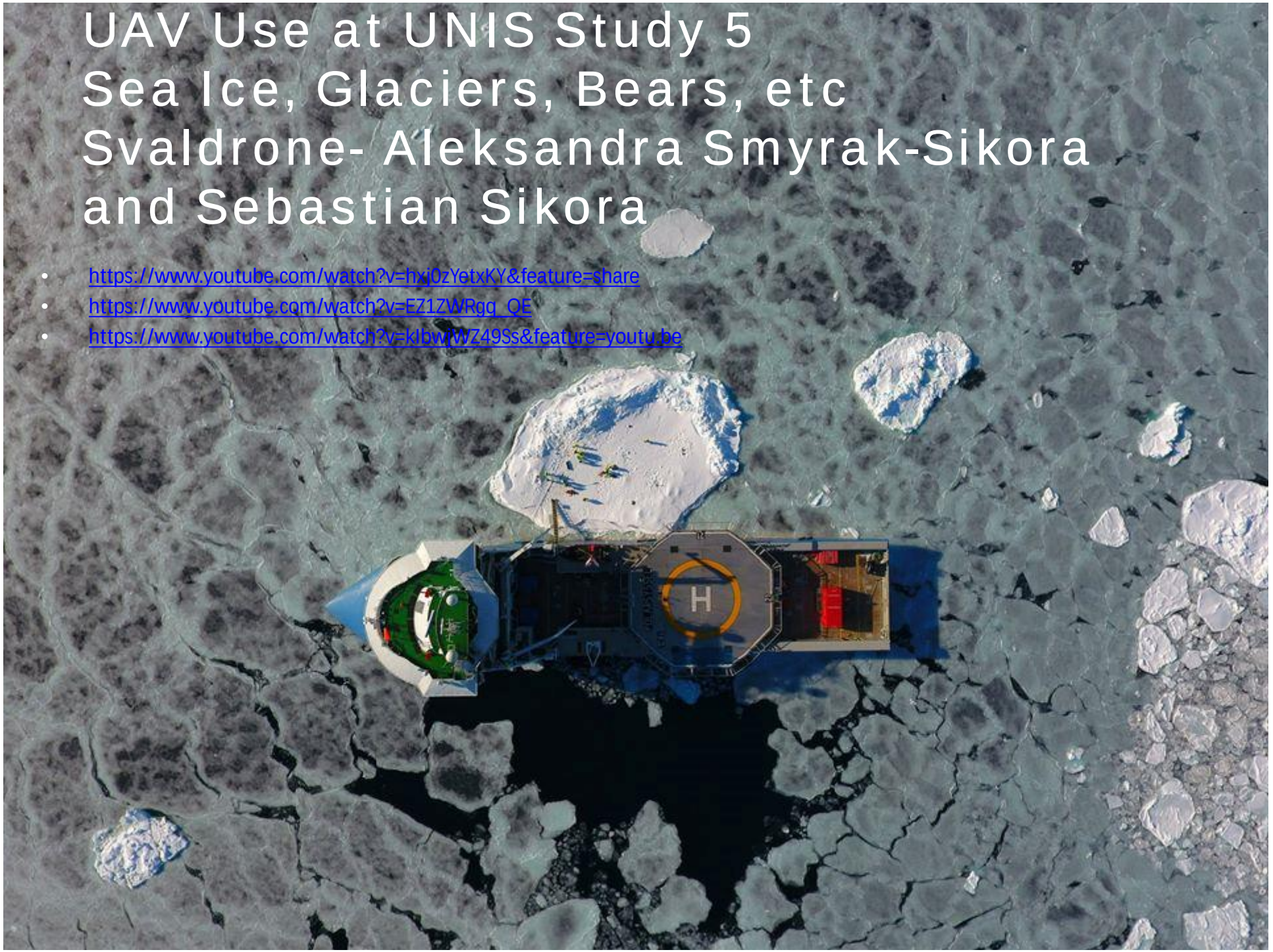

N
(a)
(b)
50%
25%
50%
75%
50%
25%
50%
75%
8679400
8679350
8679300
8679250
8679200
8679150
y [m]
521050
521100
521150
521200
521250
x [m]
15.5
15.0
14.5
14.0
13.5
9.0
Elevation [m a.s.l.]


1948
1961
1990
2015
8679400
8679350
8679300
8679250
8679200
8679150
y [m]
521050
521100
521150
521200
521250
x [m]

Mertes, 2016

# UAV Use at UNIS Study 5
# Sea Ice, Glaciers, Bears, etc
# Svaldrone- Aleksandra Smyrak-Sikora and Sebastian Sikora

- https://www.youtube.com/watch?v=hxj0zYetxKY&feature=share
- https://www.youtube.com/watch?v=EZ1ZWRgq_QE
- https://www.youtube.com/watch?v=kIbwWZ49Ss&feature=youtu.be

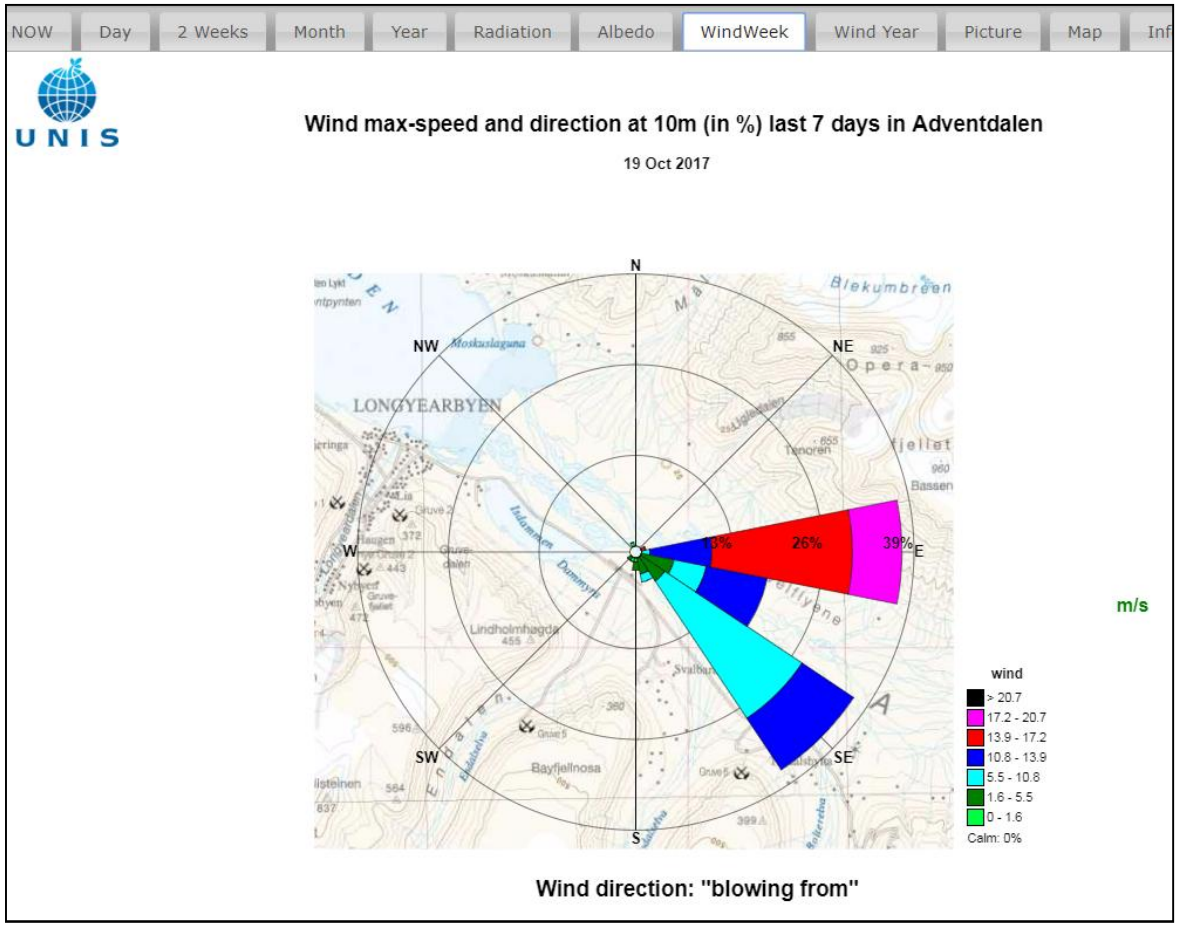



Mikael Härd, 2017
Mavic Pro


Erik Myrum Næss

# Challenges

- Environmental Challenges



Erik Myrum Næss


http://blog.pfump.org/?lang=en

Battery life can be cut by more than half in cold temperatures & UAVs can shut down completely at cold temperatures, sometimes ‘funny things’ just happen

http://blog.pfump.org/?lang=en


Erik Myrum Næss

# Challenges

- Technical Challenges
  - Resources are far away
    - Repairs
    - Replacements
  - Lack of WiFi/Internet in many situations
  - Lose GPS connection frequently
  - Lack of competence
    - Many UAVs are ‘plug and play’ which are fine for amateurs, until they don’t work anymore
  - Continuous updates/changes
    - Both to technology and regulations
  - Manpower
  - ‘Funny things’ happen frequently, Arctic problem or problem in general?

# Future Goals

- All Departments will use UAVs with collaboration to strengthen methods & results
  - The small size of UNIS gives us unique opportunity for collaboration at a university/top research scale
- Fully Functional Program
  - Full time UAV technician, up to date with all requirements & technology
- UAV Usage at the top level for research
- Innovating methods for the Arctic
- UAV Service at UNIS
  - Can rent out similar to boat or snow mobile with pilot