

IOMASA

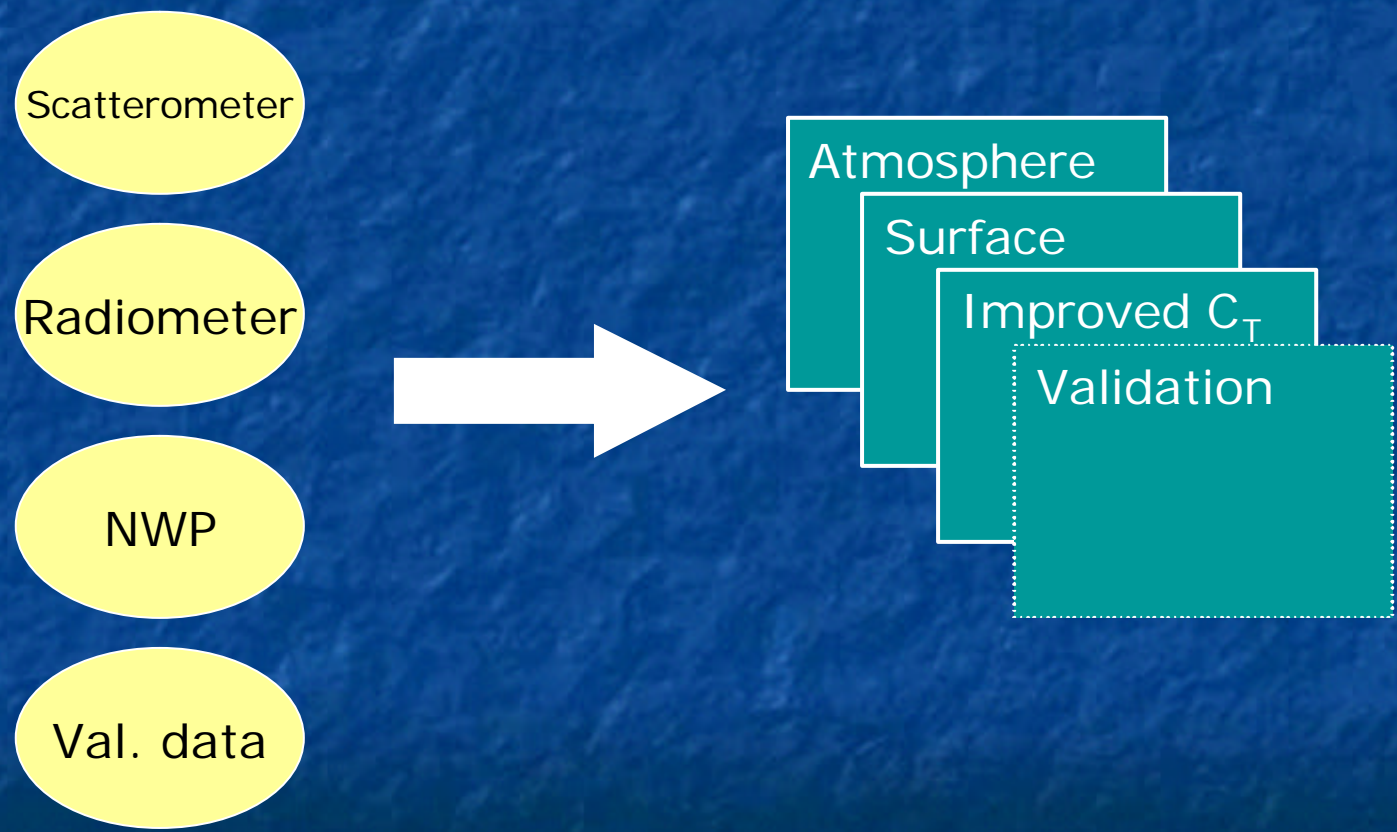
Status of phase 2

Søren Andersen

Thomas Bøvith

DMI

Objectives





Atmosphere data

Scatterometer

Radiometer

NWP



Water Vapour
Wind speed
Liquid Water
Temperature

- Awaits input from parts 1 and 2
- Choose the best source



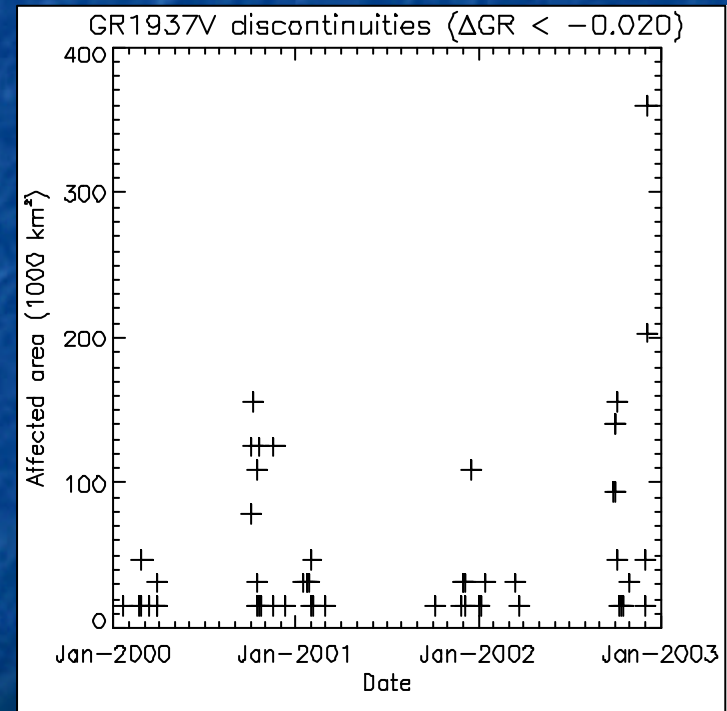
Surface effects

- Identify important surface effects
 - Timeseries of scatt and SSMI data
 - Timeseries of Concentration algorithms
 - Near 90 GHz, NASA, NT2, Bootstrap
- Develop detection schemes
- Correct or flag data



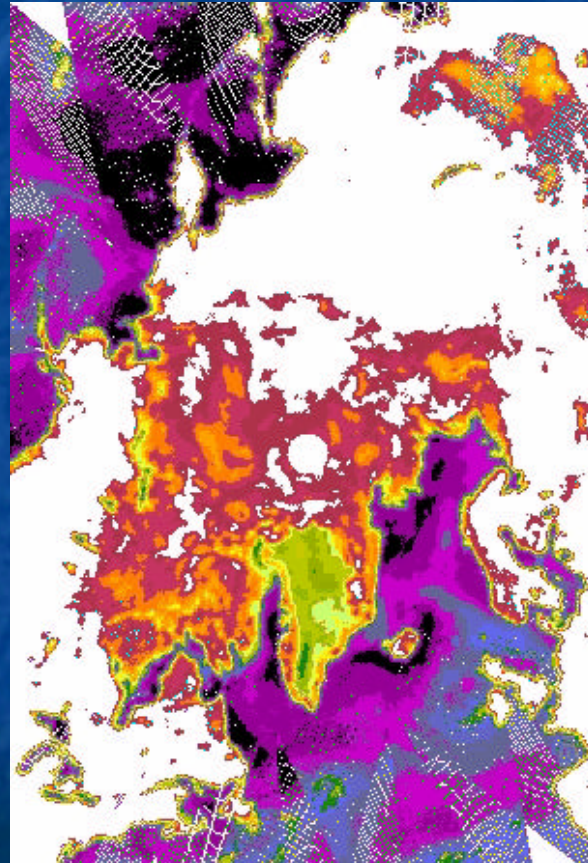
Melt events

- Melt and refreeze affects ice conc. retrievals
- Detectable in timeseries of NASA/TEAM retrievals over FY and MY surfaces
- Does not affect all algorithms equally





December 2002





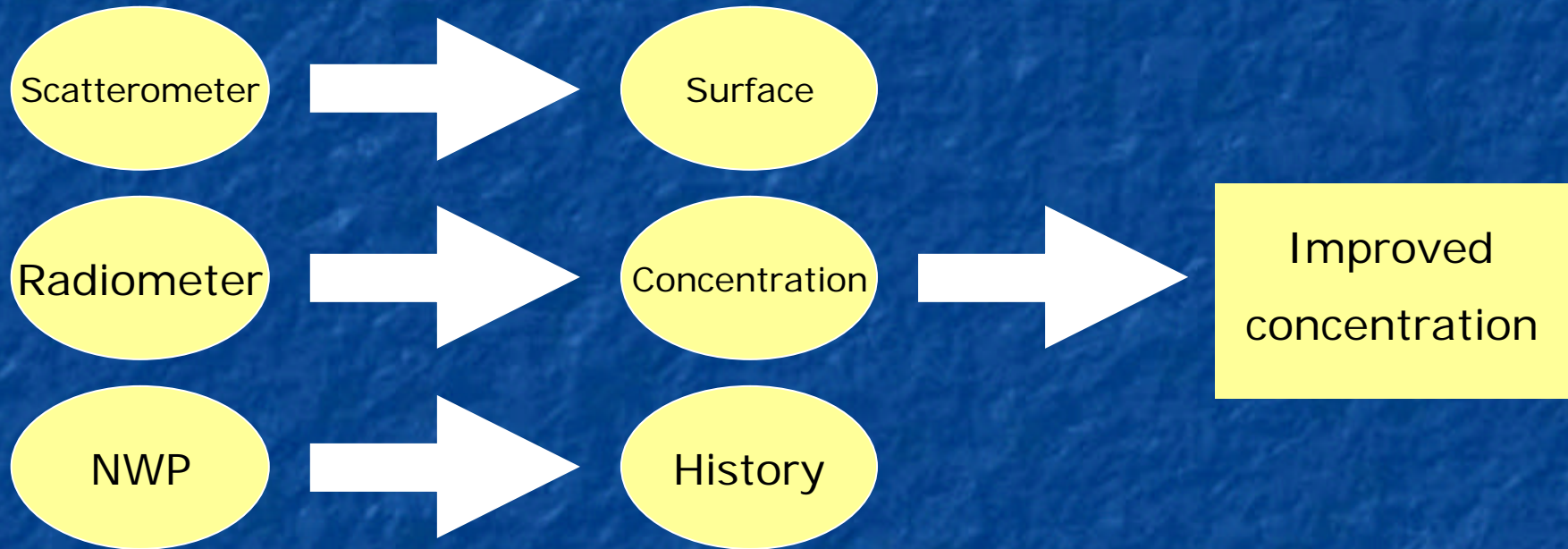
Melt signatures

Ice type	Temp.	GR ₁₉₋₃₇	PR ₁₉	Tb ₁₉	Tb ₃₇	Tb ₈₅	s ₀	APR	BS IC	NT IC	near90GHz IC
FY											
MY											

- Example of input to algorithm design
- Helps discover synergy



Alg. Development



- Focus on surface effects
- Atm. correction may use existing techniques



Alg. Development

- Initial phase: Datasets online
- Near future:
 - Identify problematic conditions
 - Identify algorithm differences
 - Identify active/passive "fingerprints"
 - Feedback to part 2 (surface properties)
 - Correlation between orbits (met.no)
 - Tuning of Seawinds statistics (met.no)
 - Coinciding interests with EUROCLIM project (met.no)



SAR Classification

- Code received from L. Kalesche
Streamlined and optimised
 - Adapted to operational use
 - Parallelised
 - Interface to ice analysts workstation
- Idea is to provide ice analyst with tool to delineate ice in great detail.



Ice analyst interface

- View and select features
- Select and manipulate training areas
- Review classification results
- Mask untrusted regions

The screenshot displays the ERDAS IMAGINE 8.4 software interface. The main window is titled "Training area generation (thb)". It features a "Source File" field, an "Open" button, and a "Create annotation" button. Below these are fields for "UL X", "UL Y", "LR X", and "LR Y", along with "X Cell Size" and "Y Cell Size" fields. The "Layer Width" is set to 5630 and "Layer Height" is 5731. There are "Set Values...", "OK", "Export", and "Cancel" buttons at the bottom.

The "Attributes for /priv_1/thb/temp.ovr" window is open, showing a table of annotation elements:

Row	ID	Type	Name	Descrip
1	0	Rectangle	Sea Ice	Sea Ice
2	5	Rectangle	Sea Ice	Sea Ice
3	6	Rectangle	Sea Ice	Sea Ice
4	7	Rectangle	Water	Water
5	11	Rectangle	Water	Water

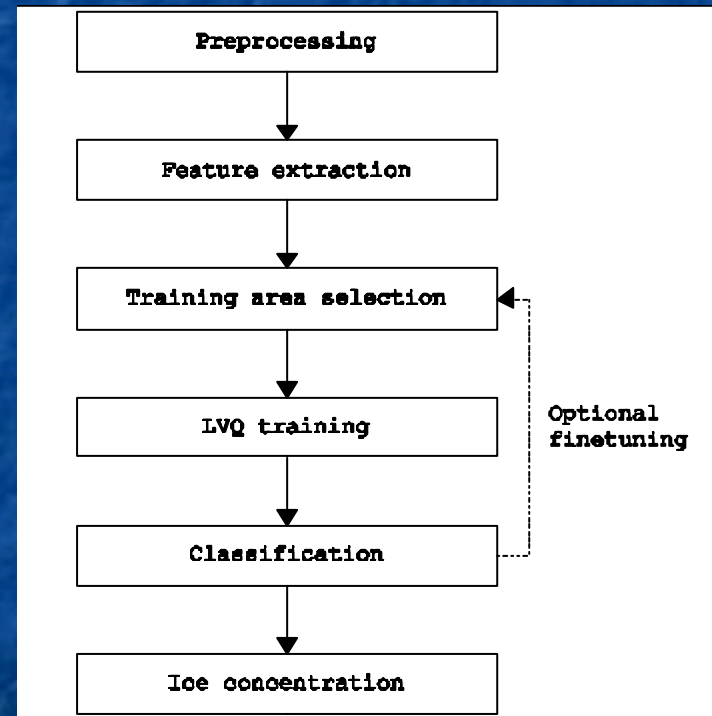
The "Viewer #1 : temp.ovr" window shows a grayscale satellite image of a textured surface, likely sea ice. Several red and yellow rectangular markers are overlaid on the image, indicating training areas. The viewer window has a menu bar with "File", "Utility", "View", "AOI", "Raster", "Vector", "Annotation", and "TerraModel".

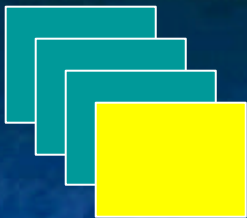
The "Styles for /priv_1/thb/temp.ovr" window is also visible, showing settings for "Line Style", "Fill Style" (set to yellow), "Text Style" (AaBbCc), and "Symbol Style" (set to a plus sign).



SAR Classification

- Draft report available
- 5 representative scenes
 - Worst recognition accuracy ~ 80%
 - Typically > 90%
 - Some features are consistently helpful





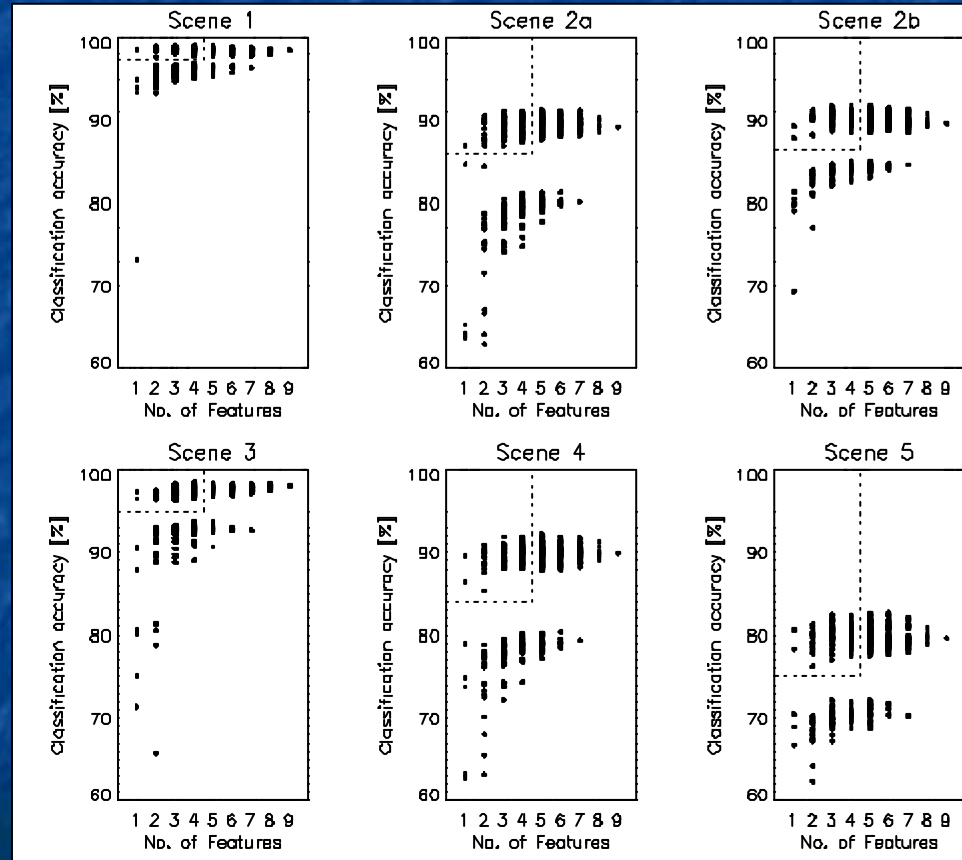
SAR features

Homogeneity texture measures		
ASM	Angular Second Moment (or Energy)	$ASM = \sum_{i,j=0}^{G-1} C_{ij}^2$
ENT	Entropy	$ENT = - \sum_{i,j=0}^{G-1} C_{ij} \log C_{ij}$
Smoothness texture measures		
CON	Contrast	$CON = \sum_{i,j=0}^{G-1} C_{ij} (i-j)^2$
DIS	Dissimilarity	$DIS = \sum_{i,j=0}^{G-1} C_{ij} i-j $
HOM	Homogeneity	$HOM = \sum_{i,j=0}^{G-1} \frac{C_{ij}}{1+(i-j)^2}$
INV	Inverse Difference Moment	$INV = \sum_{i,j=0}^{G-1} \frac{C_{ij}}{1+ i-j }$
Other texture measures		
COR	Correlation	$COR = \frac{\sum_{i,j=0}^{G-1} (i-\mu_x)(j-\mu_y)C_{ij}}{\sigma_x \sigma_y}$
MU	Mean	$MU = \sum_{i,j=0}^{G-1} iC_{ij}$



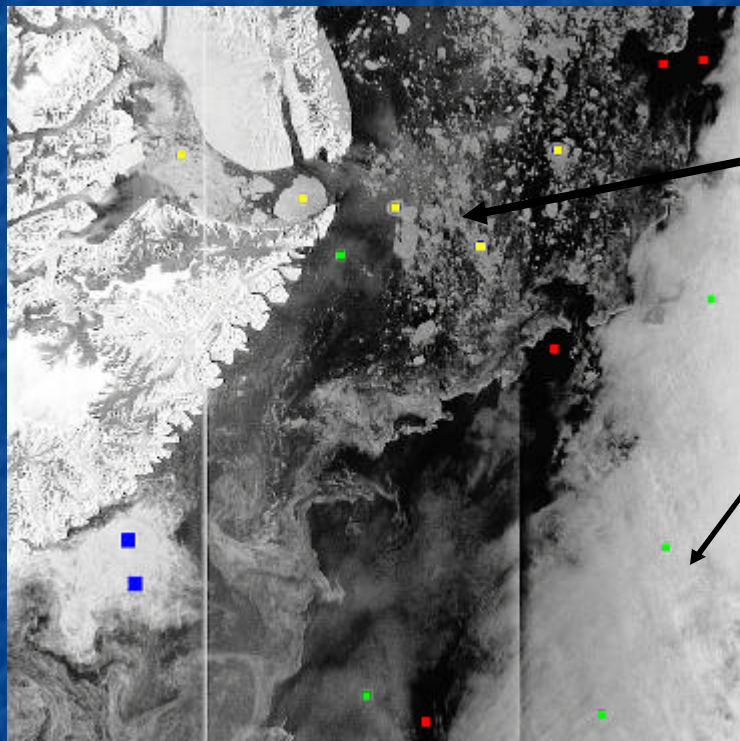
Feature selection

- Too many features harmful
- Consistently useful:
Con, asm, ent, lee
- Occasionally useful:
Inv, cor, hom, dis,
Mu (~lee)



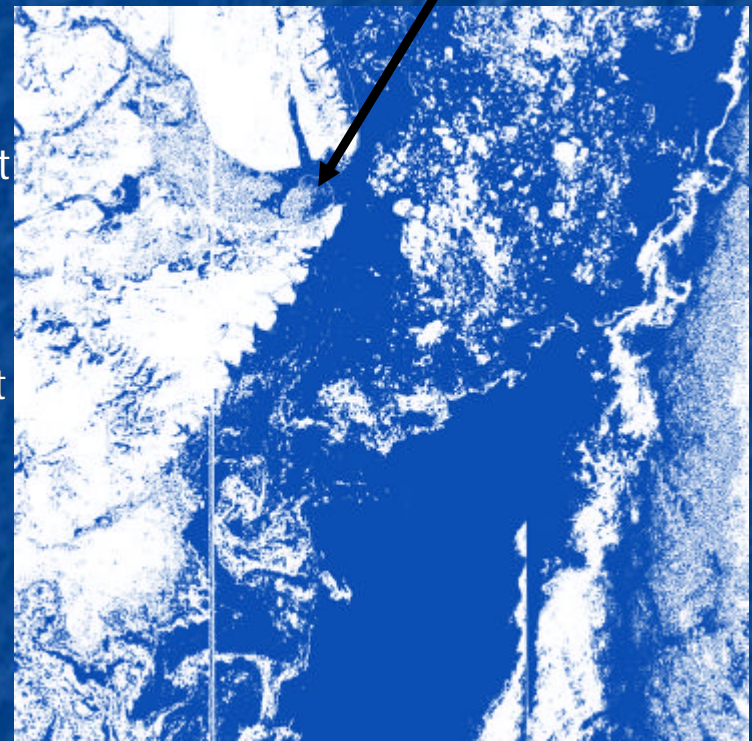


Turbulent sea limit



Ice +
Turbulent
water

Turbulent
water

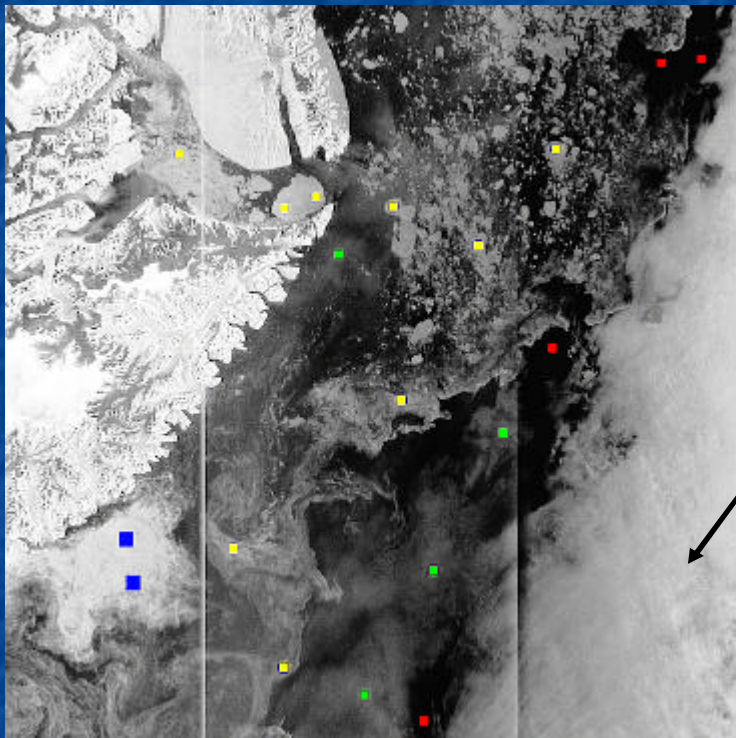


Should be ice

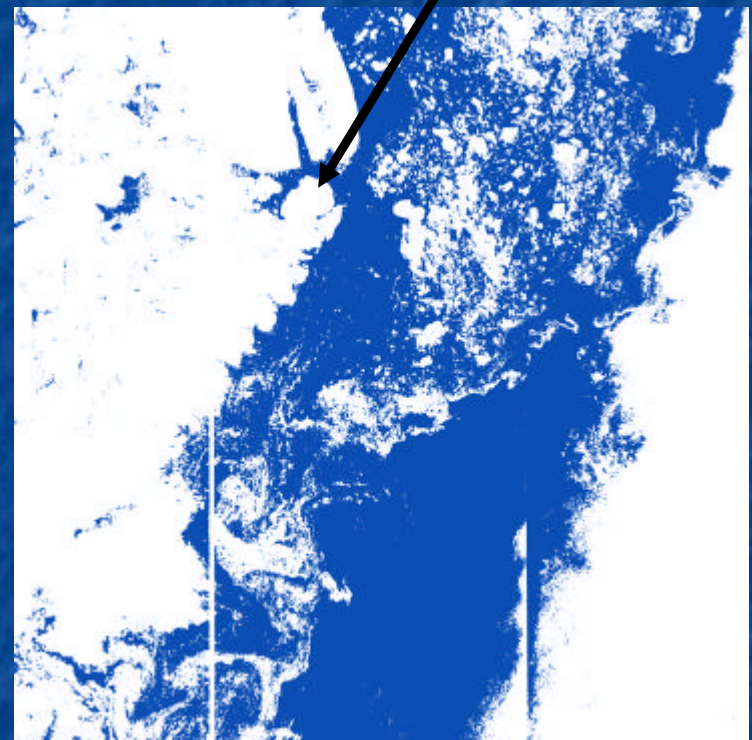
- Turbulent water and ice are indistinguishable
- Overestimates the turbulent water class



Turbulent sea limit



To be
masked

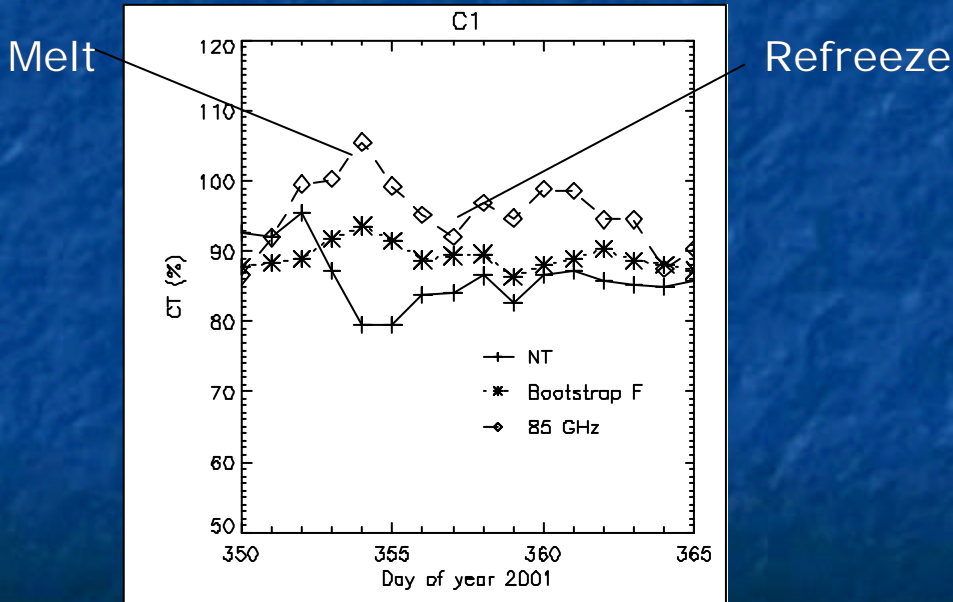


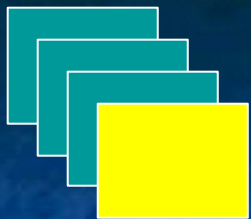
- Training areas in very turbulent water omitted
- User must know the limitations of the data



16-26 Dec. 2001

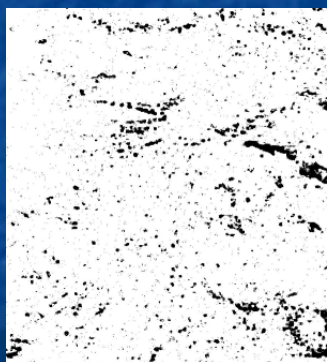
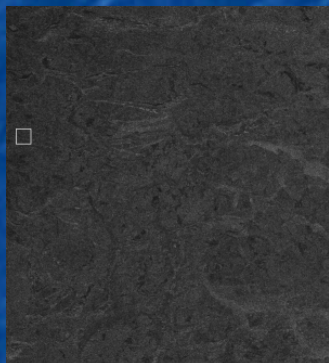
- Melt and refreeze
- Series of 3 scenes analysed in boxed area





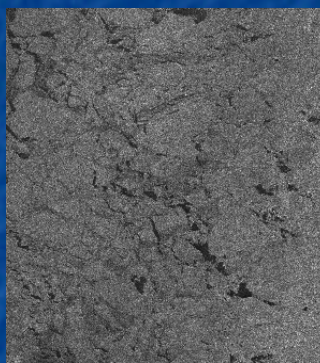
Results

16 Dec



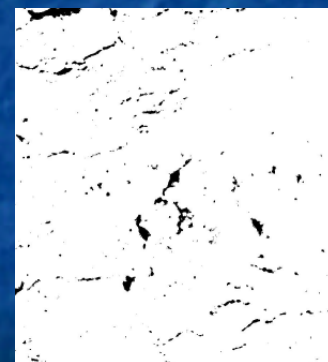
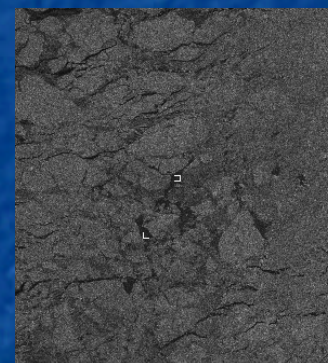
93.56%

22 Dec



98.96%

26 Dec



97.59%



Plans

- Test dependence on ice expert
- Training by ice analysts
- Compare method to 2001 Odden + 2003 Polarstern flight data
- Initiate routine processing
- Test Gamma and PMR features
- Coincident Radarsat/Envisat data