Sea Level CCI Phase II
Final review

WP2220 : Improving Arctic Sea Level data

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Plan of Talk

- Classification
- Retracking
- Editing

(Interpolation)
Classification: Neural Net

Oceans

- Brownian: 1
- Brownian + noise plateau: 10

Floes

- Brownian + pic: 6 and 5
- 2 Leading Edges: 11

Leads, Floes

- Distorted Brownian: 7 and 14
- Shifted Brownian: 12 and 16
- Peaky: 2, 4, 8

Multi peaks/noise: 3
Linear noise: 15
Unknown: 9
Time series of **Oceans**, **Floes** & **Leads** look realistic.
Classification: Multi-Criteria

Oceans

\[ P_k < 3 \]

<table>
<thead>
<tr>
<th>SIC</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SIC = 0, diffuse ⇒ ocean</td>
</tr>
<tr>
<td>0 &lt; SIC</td>
<td>0 &lt; SIC &lt; 75%, diffuse ⇒ floe</td>
</tr>
<tr>
<td>75%</td>
<td>SIC ≥ 75%, specular ⇒ leads</td>
</tr>
</tbody>
</table>

Leads

\[ 3 \leq P_k \leq 30 \]

\[ P_k > 30 \]

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\[ P_k = \text{peakiness} \]
\[ \text{SIC} = \text{sea-ice conc.} \]
Classification: Multi-Criteria
Validation with MERIS

$$S_{778} = \frac{R_{778}}{R_{489}}$$
Classification: **Multi-Criteria**

Validation with MERIS

**Idepix** for cloud-clearing

Min & Max-Min
Classification: Multi-Criteria Validation with MERIS

Min S_{778}
### Classification: Comparison -> Hybrid

<table>
<thead>
<tr>
<th>Ocean</th>
<th>Floes</th>
<th>Leads</th>
<th>Unclassified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Class 4-6</td>
<td>Classes 2</td>
<td>Other Classes</td>
</tr>
<tr>
<td>411740</td>
<td>219472</td>
<td>0</td>
<td>137</td>
</tr>
<tr>
<td>10194</td>
<td>74656</td>
<td>145130</td>
<td>1580</td>
</tr>
<tr>
<td>52383</td>
<td>2155935</td>
<td>76264</td>
<td>47739</td>
</tr>
</tbody>
</table>

*This table shows the classification results for Ocean, Floes, Leads, and Unclassified categories using both multiple criteria and neural network methods.*

*View – 27-28 Feb. 2017*
Retracking: Modified Brown

Class 1 waveform

Class 2 waveform

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Retracking: Difference from Ocean

S.D. = 2.4 mm
Editing: Selection of peaks
Interpolation & Evaluation
(Envisat)

Variability

Annual cycle

Trend

CLS/PML Jan 2004

CLS/PML Phase 1

CLS/PML S. D.

CLS/PML mm/yr
Summary

- **Classification**
  - Neural Net and Multiple-Criteria approaches implemented and compared -> Hybrid algorithm

- **Retracking**
  - Modified Brown implemented, with minimal bias relative to ocean retracker

- **Editing**
  - For leads, only near-nadir sea level estimates kept

- **Interpolation & Evaluation**
  - 8 yrs Envisat data processed, and analysed for variability, seasonality & trends
  - AltiKa & Cryosat to be included??

- **Deliverables**
  - Dataset available
  - Paper almost complete (has been for 8 months)