Long term coastal monitoring along the Yukon Coast indicates acceleration of coastal retreat in the last 20 years

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1/3 of all coasts consist of permafrost
Permafrost 2 x more carbon than atmosphere
Arctic coasts erode up to 30 meters per year
Study Area

USA/CA Border, 2012, © D. Forbes

Avadlek Spit, 2012, © A. Konopczak

King Point, 2012, © A. Konopczak

West of King Point, 2012, © G. Manson

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Methods

Field work
1991 - 2015

- Theodolite measurements
- RTK & DGPS measurements

Remote sensing
1952 - 2011

- Aerial imagery
- Satellite pictures
- DEMs

DSAS

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Results: temporal analyses

Max: 1.7
Median: -0.5
Mean: -0.7
Min: -6.3

DSAS statistics:
1952 – 2011
Accumulation: 13 %
2 % >= 1 m/a
Erosion: 87 %
30 % >= 1 m/a

n = 1992
Results: temporal analyses


- Decrease of Erosion 51%
- Decrease of Accumulation 4%
- Increase of Accumulation 3%
- Erosion to Accumulation 13%
- Accumulation to Erosion 5%
- Increase of Erosion 24%

n = 275
Results: temporal analyses

Acc = 20%    Er = 80%

Acc = 13%    Er = 87%

n = 275
Results: spatial analyses

- Active tundra cliffs: -0.8
- Marine beach: -0.7
- Inundating tundra: -0.5
- Tundra flats: -0.4
- Tundra slopes: -0.1
### Results: Stokes Point west

<table>
<thead>
<tr>
<th>Time period</th>
<th>Erosion rate [m/a]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-2015</td>
<td>8.9</td>
</tr>
<tr>
<td>2007-2014</td>
<td>8.8</td>
</tr>
<tr>
<td>2006-2007</td>
<td>0.5</td>
</tr>
<tr>
<td>1999-2006</td>
<td>0.2</td>
</tr>
<tr>
<td>1997-1999</td>
<td>1.1</td>
</tr>
</tbody>
</table>

The background aerial image is a GeoEye scene from 2011. It is covered by a georeferenced aerial imagery from 1996.
Conclusions

• Coastal changes along the Yukon coast show very high spatial and temporal variability

• Within the last two decades broad sections of the coast were experiencing acceleration of coastal erosion
Research funding: POLMAR, DBU, CANADA, ANI

Quyanaq for your attention

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