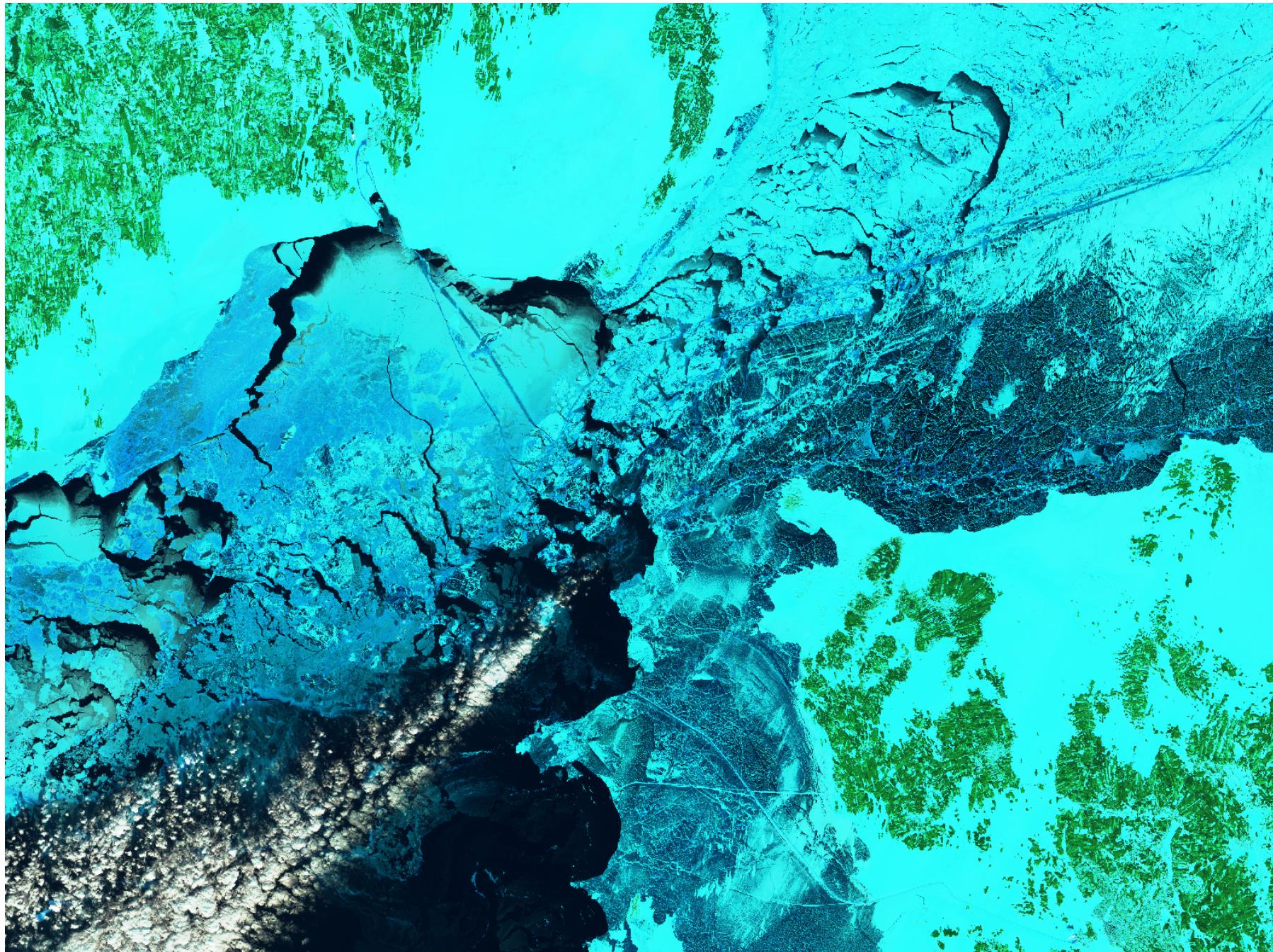


Impact of Climate Change on the Gulf of Bothnia

Jari Haapala

Research Professor, Head of Marine Research
Finnish Meteorological Institute

QUARKEN FROM SPACE, 28th FEBRUARY 2018



(c) FMIARC, False color image, Sentinel 2

SEA ICE AS AN INDICATOR OF CLIMATE VARIABILITY

Science/Environment

May 4, 2008

Sweden's weather service says Baltic Sea region winter was mildest on record

Discussion

2008



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Warm Winter Kills Baby Seals

abc NEWS

By Christel KUCHARZ
PASSAU, Germany March 11, 2008

Hailuodon jäätie voi jäädä ensimmäistä kertaa tekemättä

2015



BBC News - Dozens of ships freed from Baltic Sea ice - Mozilla Firefox

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The Telegraph

2010

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Over 1000 trapped as ships stuck in Baltic ice

Nearly 1,100 people were trapped on two passenger ferries and two cargo ships in the Gulf of Bothnia

Dozens of merchant vessels stuck in packed ice in Gulf of Bothnia

Getting ships detached from the ice will take at least a week

Owing to the strong winds and the difficult ice situation, almost all ship traffic to and from harbours has ground to a halt in Northern Finland. The vessels cannot get to the harbour through the packed ice without the help of icebreakers.



2011

WORLD NEWS

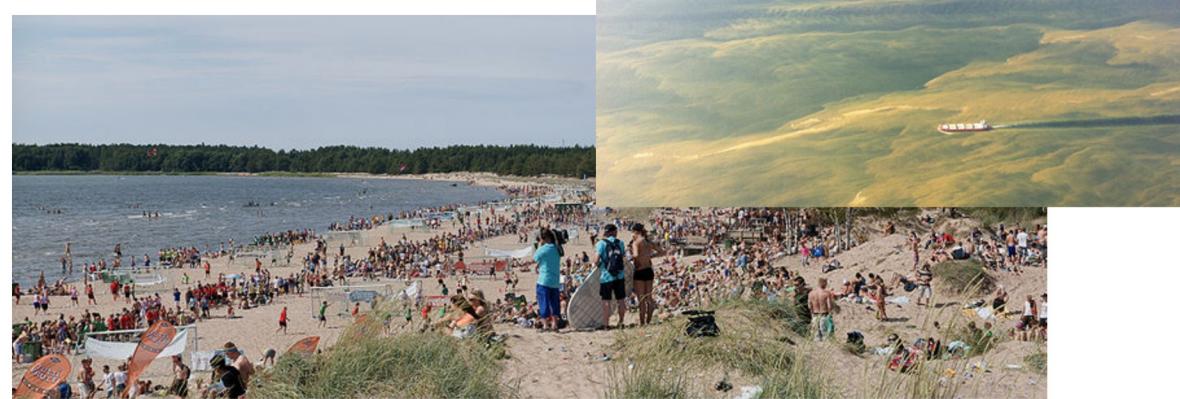


Ships stuck in Baltic Sea ice

05/03/10 07:31 CET

OUR CLIMATE IS CHANGING WHAT HAPPENS FOR THE GULF OF BOTHNIA REGION ?

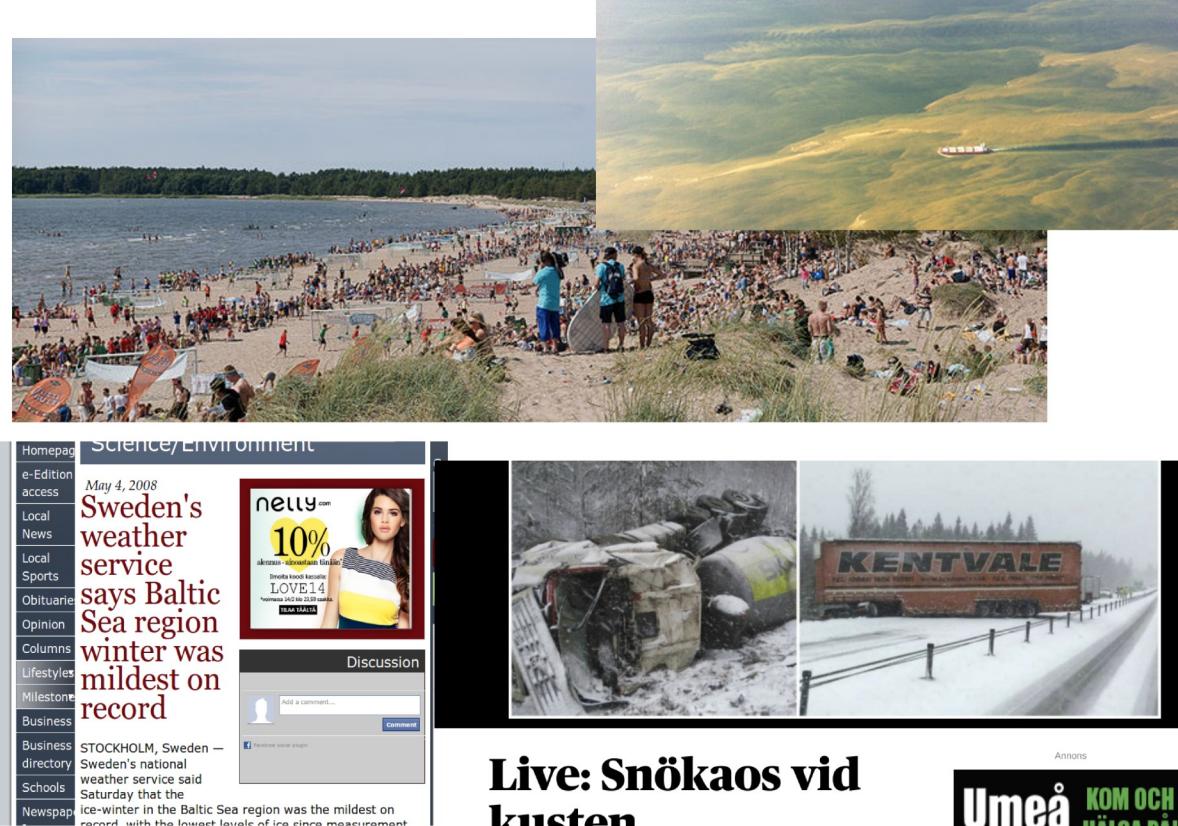
WARMER SUMMERS ?
MORE ALGAE BLOOMS ?



OUR CLIMATE IS CHANGING WHAT HAPPENS FOR THE GULF OF BOTHNIA REGION ?

WARMER SUMMERS ? MORE ALGAE BLOOMS ?

WARMER WINTERS ? LESS SNOW AND ICE ?



Live: Snökaos vid kusten

VÄDER. Vädervarningarna för kusten har utökats

Annons

OUR CLIMATE IS CHANGING WHAT HAPPENS FOR THE GULF OF BOTHNIA REGION ?

WARMER SUMMERS ? MORE ALGAE BLOOMS ?

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MORE STORMS ?
MORE WAVES ?
MORE FLOODS ?



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Saija Saha
@Saijalnkeri

#vaasa #ukkosmyrsky #huoneistokeskus

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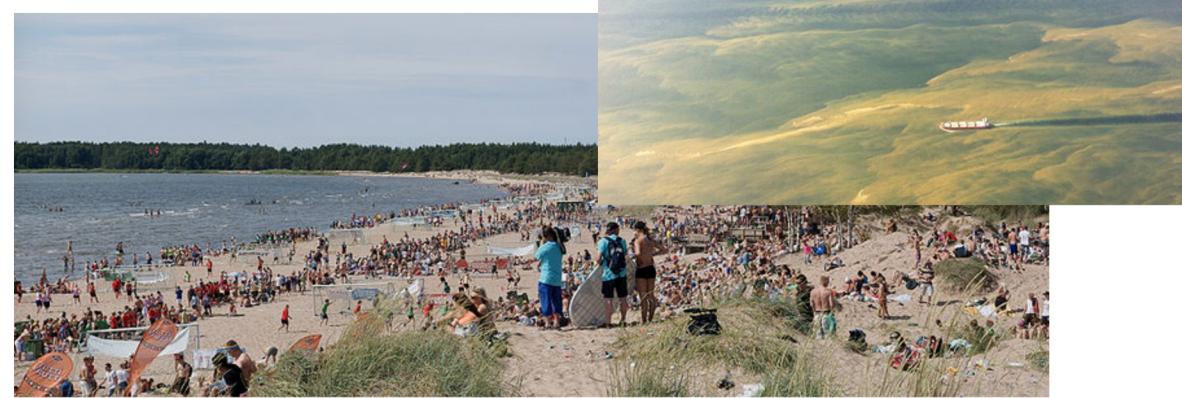
VÄDER. Vädervarngarna för

Annons

Ulmeö KOM OCH

OUR CLIMATE IS CHANGING WHAT HAPPENS FOR THE GULF OF BOTHNIA REGION ?

WARMER SUMMERS ?
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WARMER WINTERS ?
LESS SNOW AND ICE ?

MORE STORMS ?
MORE WAVES ?
MORE FLOODS ?

LESS SALT ?
LESS HERRING ?
MORE VENDANCE ?



 **Saija Saha**
@Saijalnkeri

#vaasa #ukkosmyrsky #
#huoneistokeskus

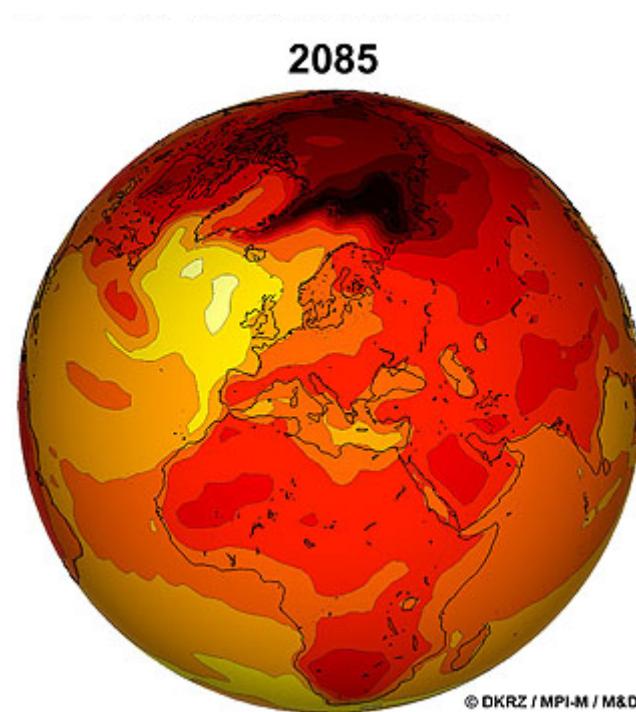


**Live: Snökaos vid
kusten**

VÄDER. Vädervarningarna fö

Annons
Umeå KOM OCH

ONE ESTIMATE ON GLOBAL WARMING



DRIVER OF THE BALTIC SEA RESEARCH UNDERSTAND VARIABILITY AND CHANGE OF ECOSYSTEM

What is the link between the global scale change and local characteristics ?

1. Global to North-Atlantic / Eurasian scale

- controlled by the global climate system
- very strong feedback between scales

2. Baltic Sea scale

- climate variability very much controlled by the atmospheric circulation
- some feedback to large scale

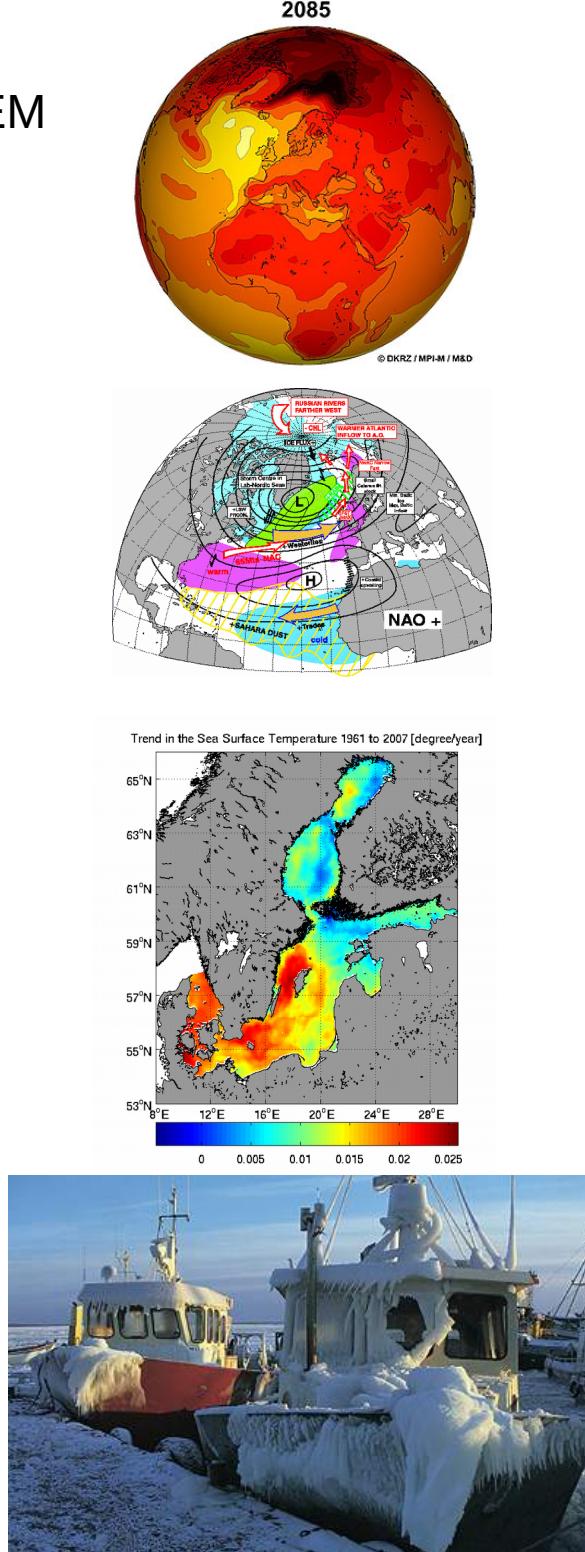
3. Basin scale

- atmospheric forcing is modified by the local characteristics : shape of the basin, interaction between the sub basins, river runoff etc.

4. Response of the ecosystem

- depends very much on the basin scale characteristics, even smaller sub-basin scale changes could be important.
- dowscaling from global to the basin scale has been actively studied during the last 10+ years, but comparable little is known on the impact of CC on local scale.

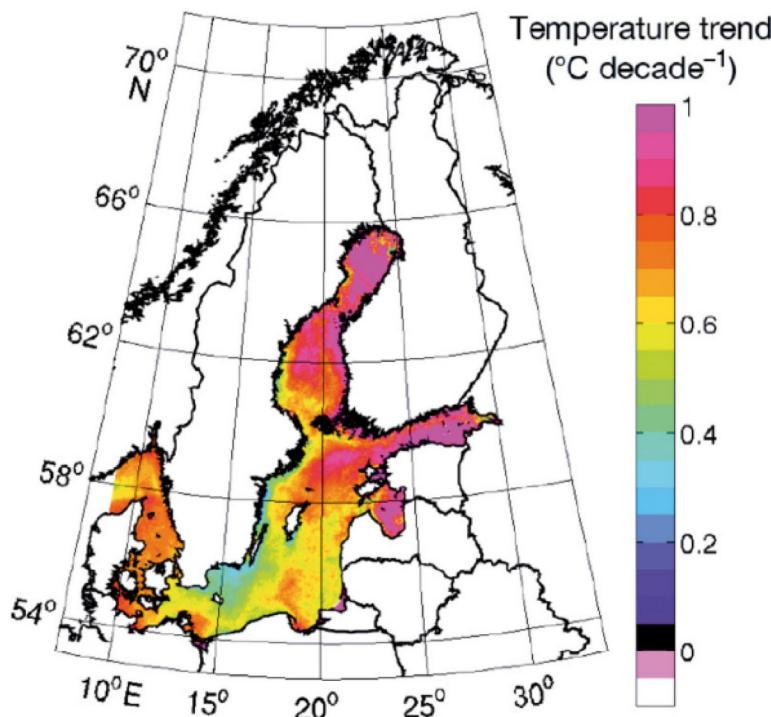
LINK BETWEEN SCALES



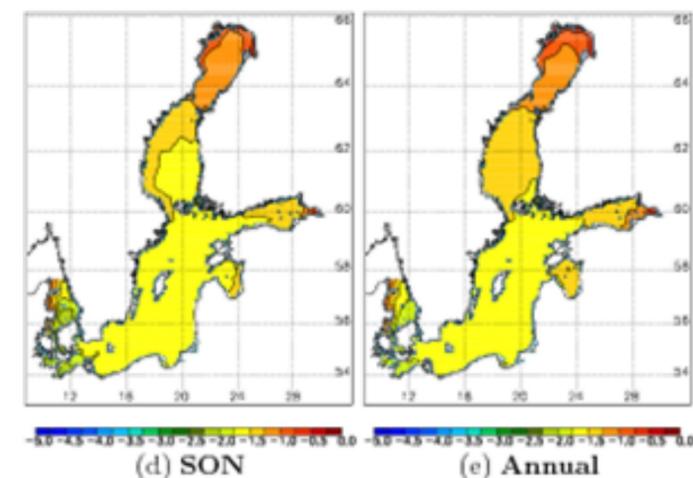
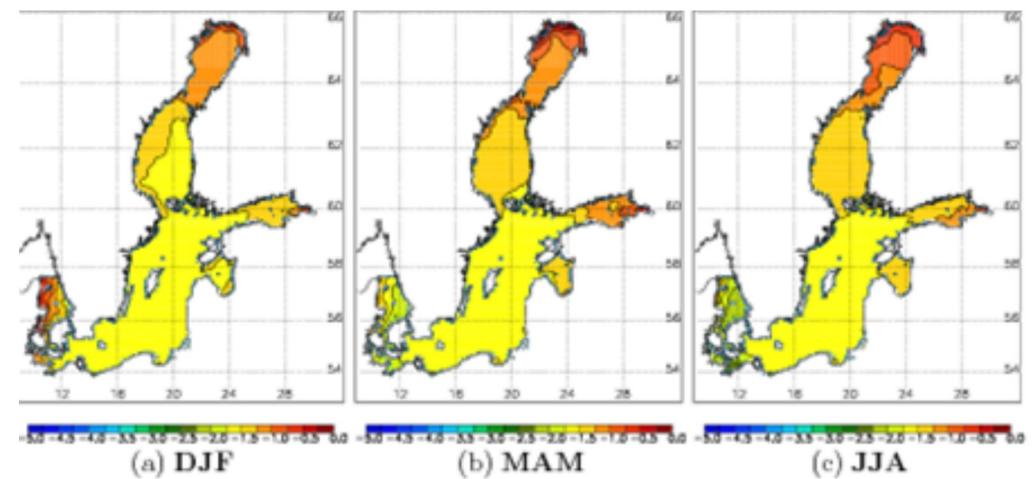
WHAT HAPPENS FOR THE GoB REGION ?

Warmer summers ? Definitely yes, large regional differences
More algea bloom ? Yes, if nutrient loads remain same

OBSERVED TREND



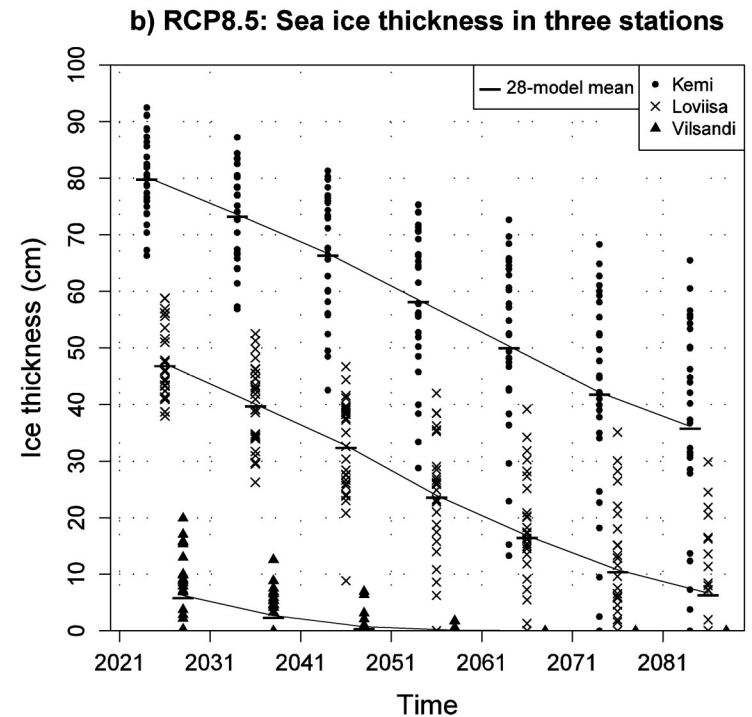
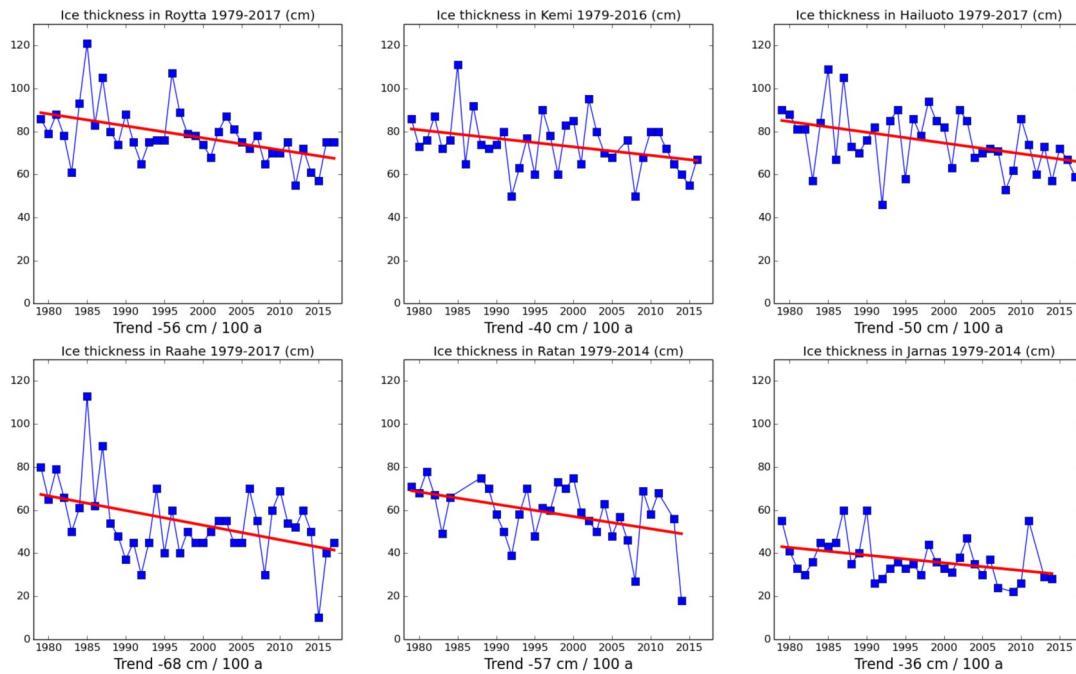
PROJECTIONS UNTIL END OF CENTURY



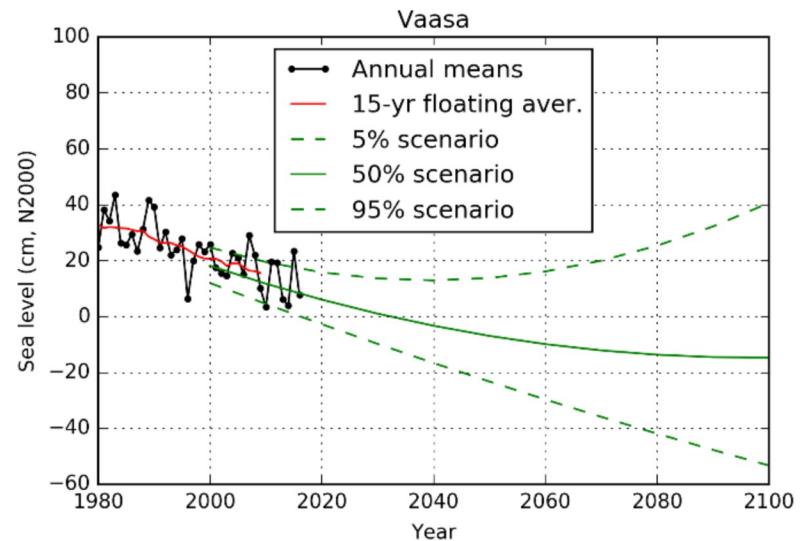
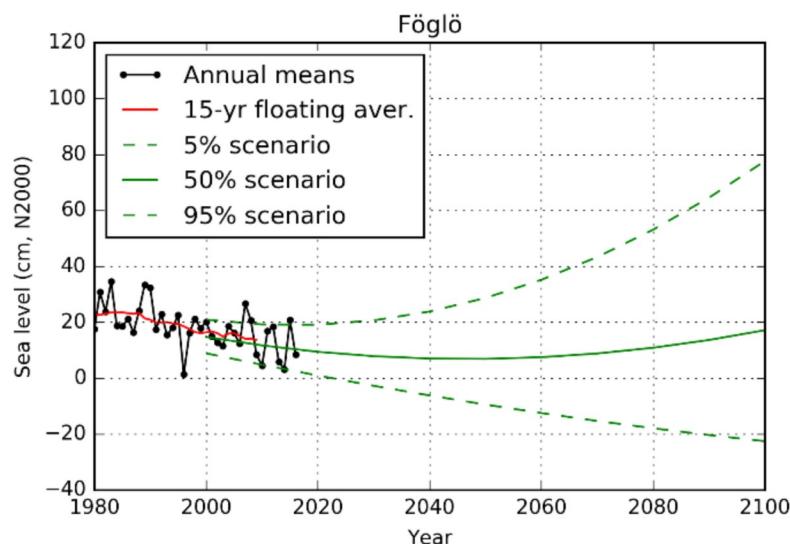
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Less snow and ice ? Sea ice has already reduced much,
inter-annual variability large, but trend continues



WHAT HAPPENS FOR THE GoB REGION ?



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More waves ? Yes, because disappearance of ice
More floods ? Not really, thanks to coastal uplift

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Less salt ? Yes, Baltic will become fresher, but how much ?
Less herring ? Difficult to say, but distribution of fishes depends on salinity

For more information, visit

smartsea.fmi.fi

COMING SOON

SmartSea Gulf of Bothnia Climate Change Assessment



INVITATION TO THE
WORKSHOP ON “FUTURE OF THE GoB”

18th - 19th September 2018, Vaasa

