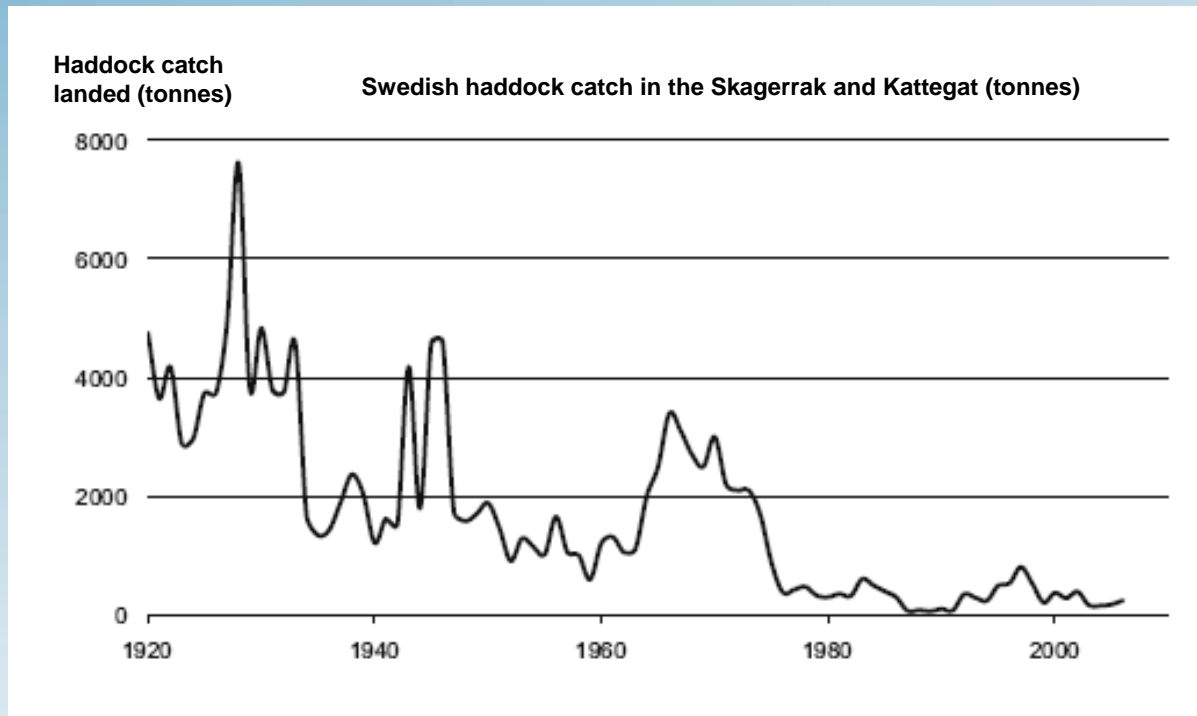


# Long-term assessments: The importance of time series and historical data

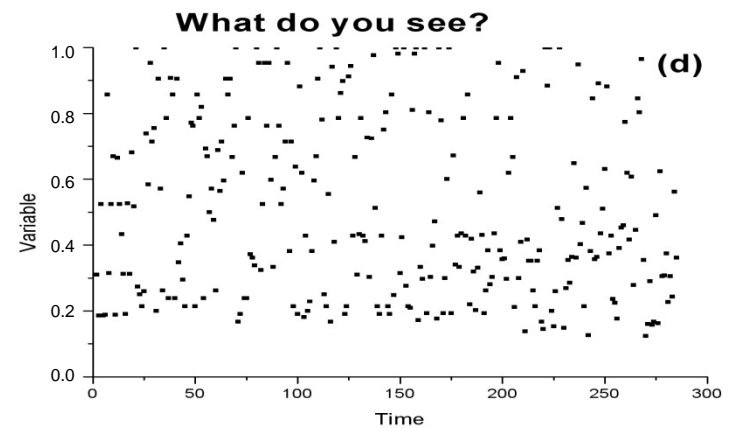
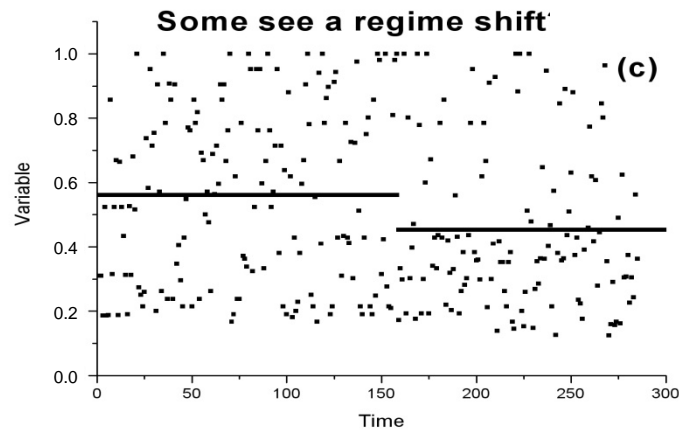
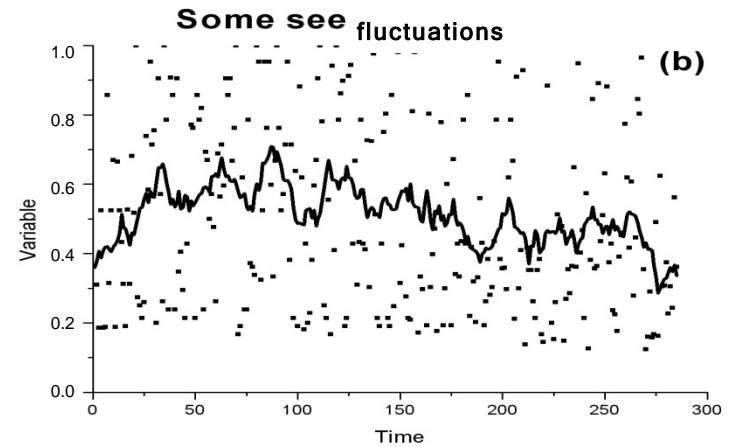
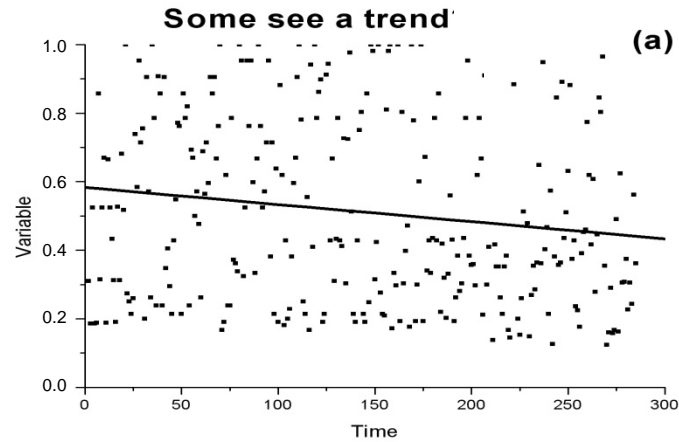
Anders Omstedt



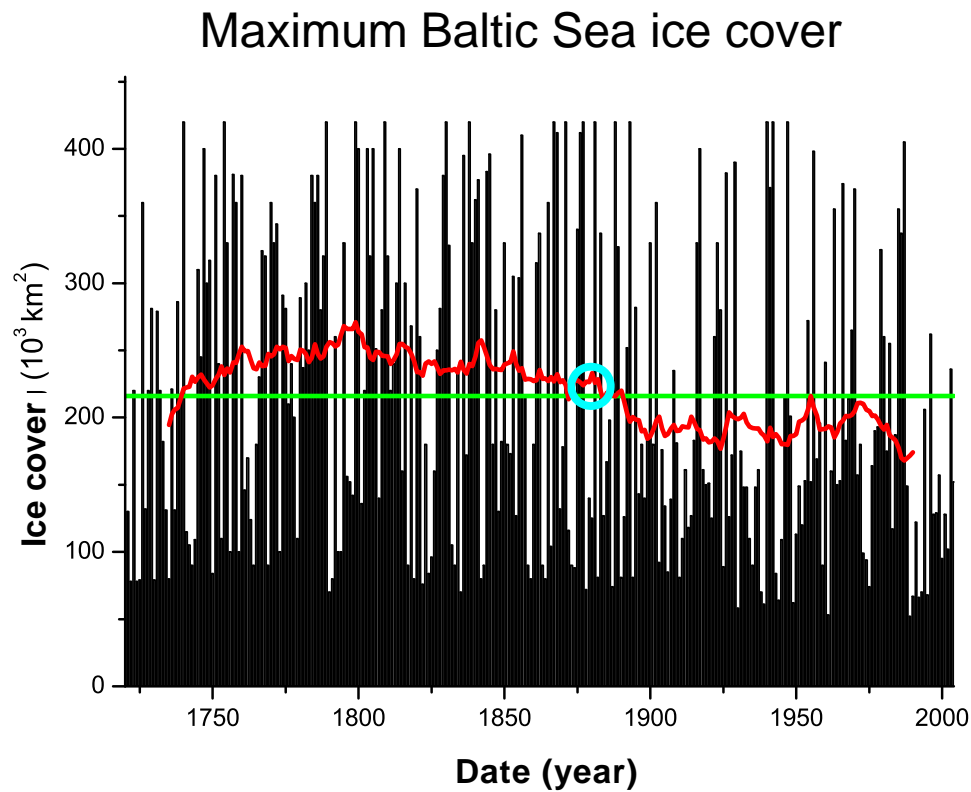
# Haddock landings in the Skagerrak and Kattegat



# What do the data tell us?



# Maximum annual ice cover, Baltic Sea

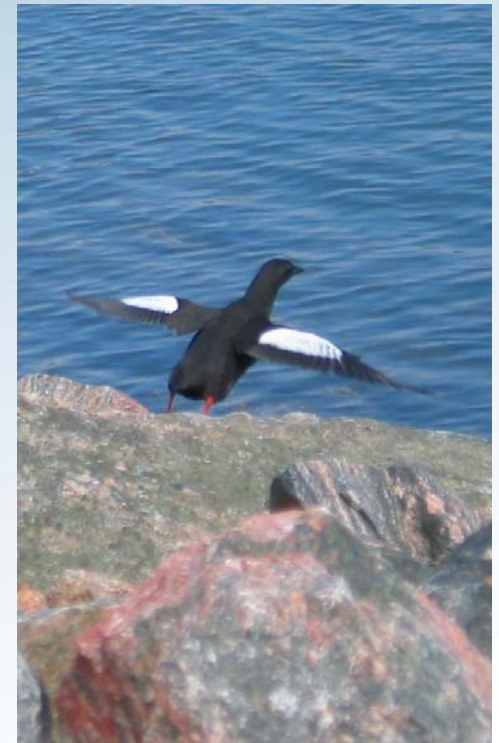


# Message 1

AT THE INTERFACE OF POLICY, MEDIA AND SCIENCE, 'OVER-SELLING' TAKES PLACE. SCIENTISTS ARE PARTLY RESPONSIBLE. BASING MARINE MANAGEMENT POLICY ON THE BEST AVAILABLE KNOWLEDGE MEANS RELYING NOT ON A SINGLE SCIENTIST BUT ON SYSTEMATIC SCIENTIFIC ASSESSMENTS.

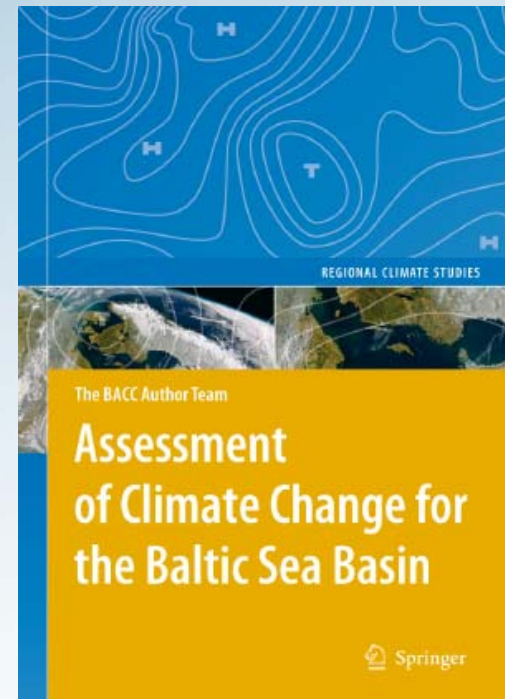
## QUESTION 1

HOW CAN WE OBTAIN SCIENTIFICALLY VERIFIED KNOWLEDGE THROUGH SYSTEMATIC BALTIC SEA ASSESSMENT?



# Assessment model

**BACC II** (THE SECOND BALTEX ASSESSMENT OF CLIMATE CHANGE FOR THE BALTIC SEA BASIN) IS THE SUCCESSOR TO BACC, WHICH WAS FINALIZED WITH THE PUBLICATION OF THE 'BACC BOOK'. THE PURPOSE OF BACC IS TO INFORM THE SCIENTIFIC COMMUNITY ABOUT ONGOING CLIMATE VARIATIONS IN THE BALTIC BASIN.



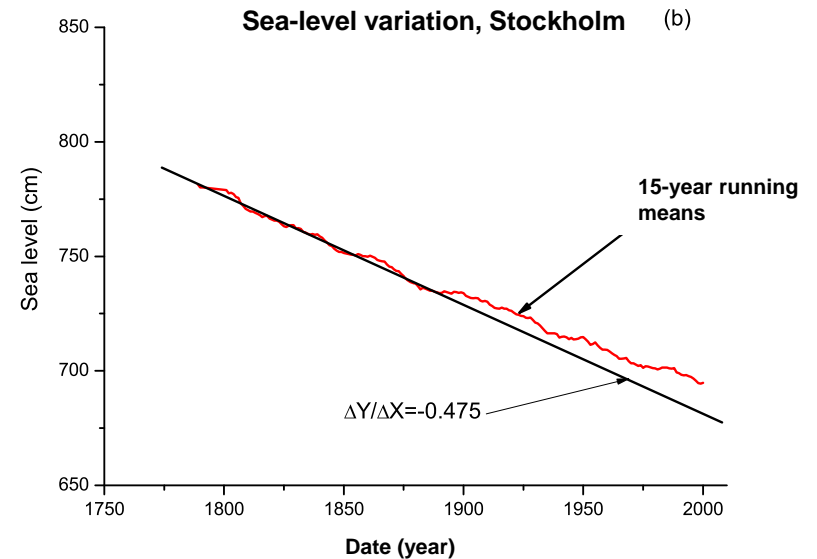
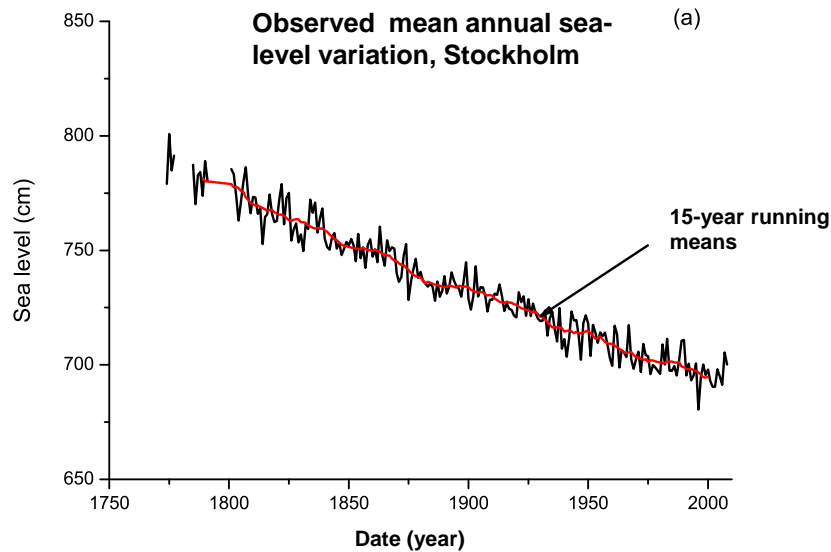
# Planned BACC II content

1. Overall assessment and summary
2. Past (approx. 200 years) and present climate change, detection and attribution
  - 2.a Atmosphere
  - 2.b Baltic Sea
  - 2.c Sea ice
  - 2.d Sea level
  - 2.e Hydrology
  - 2.f Cities
3. Climate variability over the past millennium
4. Performance of regional climate models
5. Projections of future climate change
6. Effects of changing regional drivers, e.g. industrial aerosols and land use
7. Climate-related change in terrestrial ecosystems
8. Climate-related change in marine ecosystems
9. Socioeconomic impacts
10. Empirical evidence for consensus and dissent among regional climate researchers

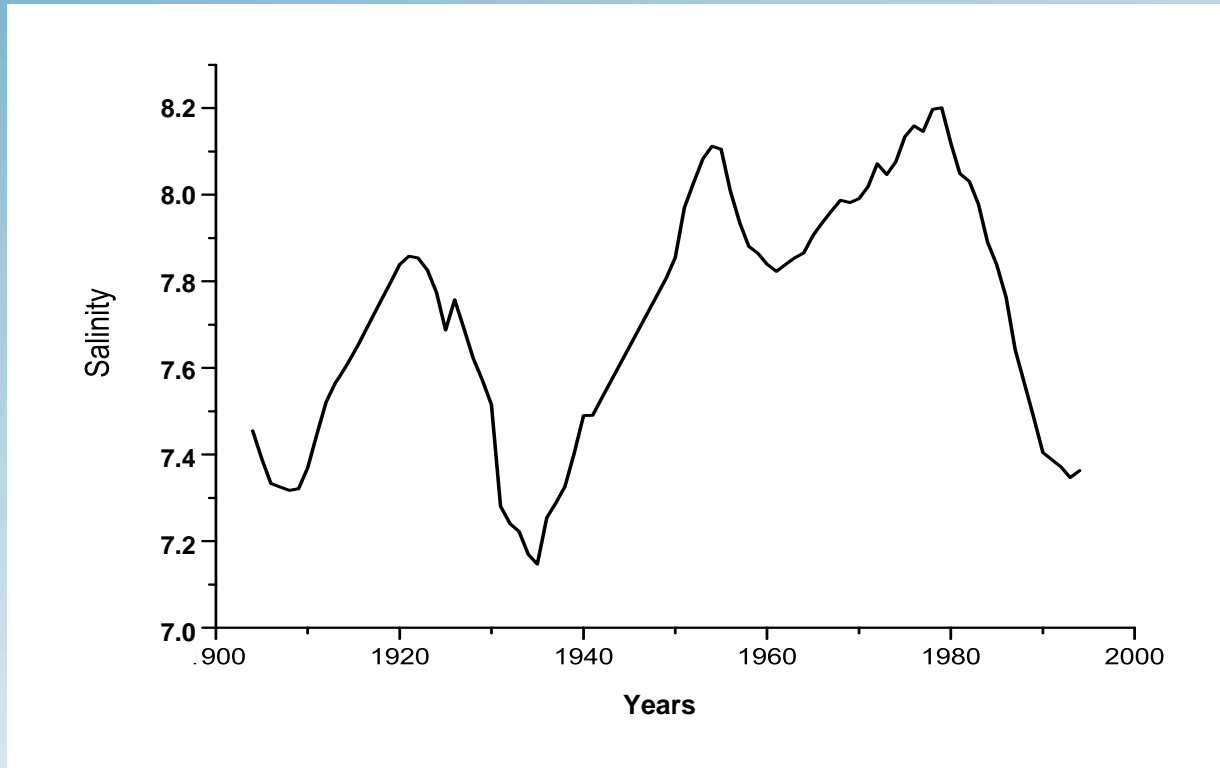
# BACC II objectives

- ‘... SYNTHESIS OF MATERIAL DRAWN COMPREHENSIVELY FROM THE AVAILABLE SCIENTIFICALLY LEGITIMATE LITERATURE (E.G. PEER REVIEWED LITERATURE, CONFERENCE PROCEEDINGS, REPORTS OF SCIENTIFIC INSTITUTES).’
- ‘THE ASSESSMENT SHOULD ... ENCOMPASS THE KNOWLEDGE ABOUT WHAT SCIENTISTS AGREE ON BUT ALSO IDENTIFY CASES OF DISAGREEMENT OR KNOWLEDGE GAPS.’

# Annual sea-level variation, Stockholm



# Mean salinity, Baltic Sea

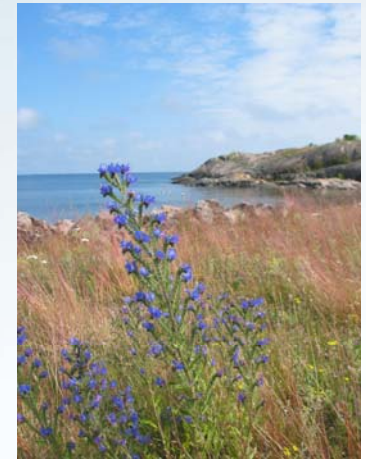


# Message 2

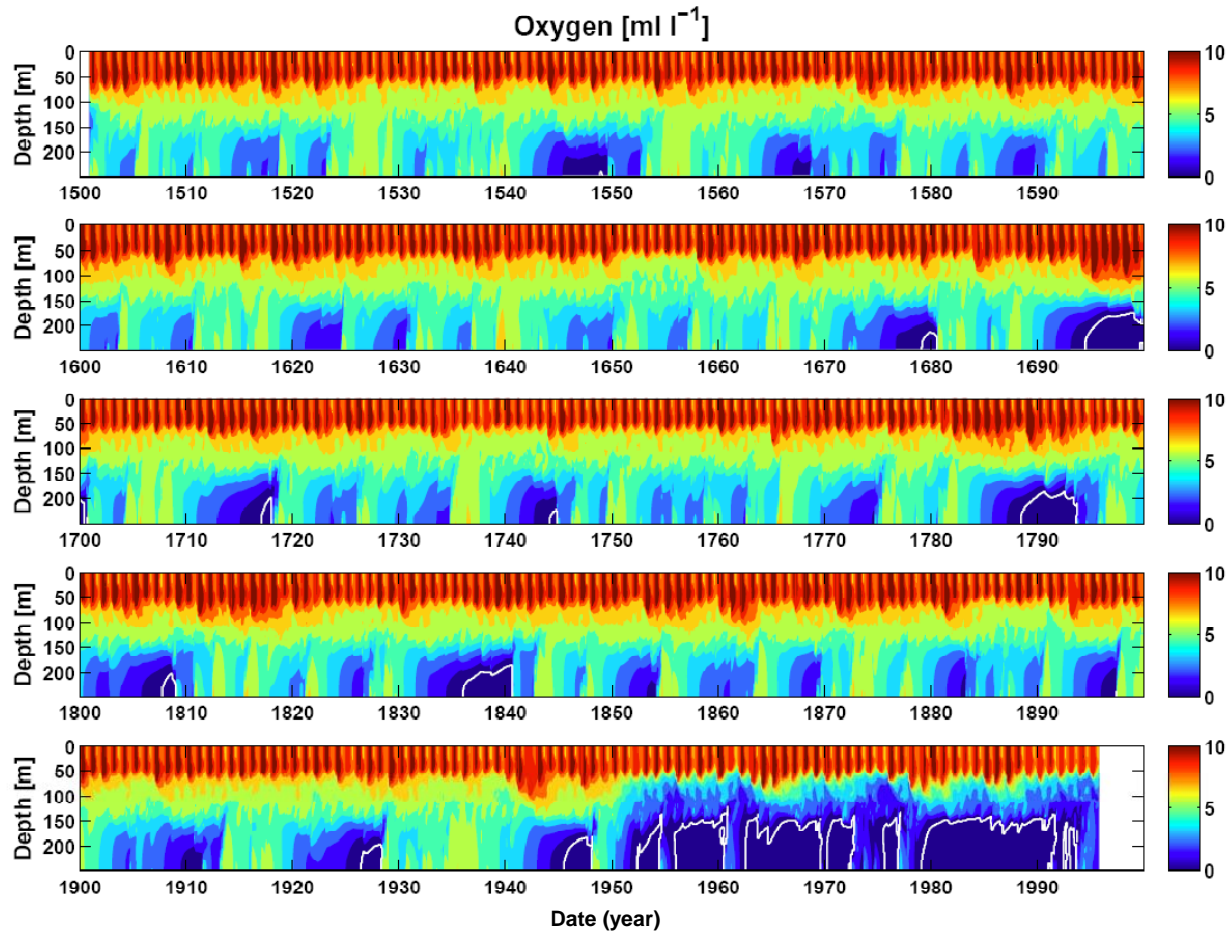
TO DETECT CHANGES, WE NEED LONG-TERM DATA SETS AND BOTH HISTORICAL AND GEOLOGICAL INFORMATION. PRESENT-DAY MONITORING PROGRAMMES ARE ONLY PARTLY DESIGNED FOR DETECTION STUDIES AND MANY DATA SETS ARE NEITHER READILY AVAILABLE NOR WELL DOCUMENTED.

## QUESTION 2

HOW CAN WE ESTABLISH AN ARENA FOR CHECKING DATA, INTERPRETING SCIENTIFIC STATISTICS AND SHARING INFORMATION?



# Increasing hypoxia in the Baltic Sea (Hansson & Gustafsson, 2010 [submitted])



# Message 3

OBSERVATION TELLS US ABOUT PAST CONDITIONS AND VARIATIONS. HOWEVER, WE NEED MODELS TO ASSIGN CHANGES TO CAUSES AND MAKE PREDICTIONS. THE MONITORING AND MODELLING COMMUNITIES MUST COMMUNICATE BETTER.

## QUESTION 3

HOW CAN OBSERVATION AND MODEL DATA BE COMBINED, AND HOW SHOULD MONITORING PROGRAMMES BE DESIGNED TO FOSTER MODEL DEVELOPMENT?



# Scientific progress?

WE ARE LEARNING MORE ABOUT, FOR EXAMPLE, CLIMATE CHANGE, INCLUDING ANTHROPOGENIC CHANGE DUE TO INCREASED BURNING OF FOSSIL FUELS.

BUT UNCERTAINTIES PERSIST, SOME PROCESSES ARE UNRESOLVED AND KNOWLEDGE IS MISSING. AND CONFIDENCE IN SCIENCE IS BEING ERODED BY OVER-SELLING (ALARMIST REPORTS) AND UNDER-SELLING (THE SCEPTICS' STATEMENTS).

# Social or media-cultural constructs

WE ARE TOLD THAT THE BALTIC SEA IS DEAD OR DYING — DESTROYED BY HUMANKIND. RESEARCHERS ARE SAID TO BE UNDERFUNDED. PHOSPHORUS IS LEACHING FROM SEDIMENTS AND THIS, TOO, IS ATTRIBUTED TO HUMAN ERROR.

'SCIENTIFIC UNCERTAINTIES' ARE PERCEIVED AS MEANING THAT SCIENTISTS DO NOT KNOW WHAT THEY ARE DOING, AND ARE USING THE LACK OF CONCLUSIVE DATA AS A WEAPON TO MANIPULATE SCIENCE.

# Message 4

Baltic Sea conservation requires both scientific analysis and political decision-making. The science needs self-reflection open for fundamental science values such as contradiction, openness, sustainability, independence of individuals and falsification and enable science to unfold its potential as provider of *guiding knowledge*. For this purpose, natural science needs input from social science, cultural studies and a discerning public.

## Question 4

How can interaction between science and the community be improved? What are the various functions of science, management and politics?



Thank you

