

ICARP II key scientific questions

- How does high frequency environmental forcing control arctic coastal dynamics?
- What are the responses of on/offshore permafrost dynamics and gas hydrate stability to projected warming?
- How do biogeochemical transformations and sediment dynamics in the coastal zone affect the marine environments?
- What are the potential consequences of natural hazards and extreme events (ice push events, seismicity, tsunamis...)?

Potential products from this workshop: what don't we know? What needs to be observed?

- 1) Sea surface heights (question #1)
- 2) Nearshore/coastal permafrost (question #2)
- 3) Sediment dynamics (question #3)
- 4) Natural hazards and extreme events (question #4)

1) Sea surface heights

Observational programs (independent/local or long term/global): who does the observations (public, private)?

- Water levels: need for tide gauge
- Need for direct observations to validate FNMOC WW3 wave model predictions.
- meteorological stations for wind: need for more and better offshore data (e.g.: international arctic boy program),
- shelf and nearshore bathymetry <10m.
- waves, tides, sea-ice, surges
- changes in river hydrology: salinity, temperature, currents
- Water masses circulation: how does that influence coastal and nearshore permafrost.

How do we upscale from what we currently know? More accurate, frequent and reliable data. ACD GIS database.

2) Nearshore/coastal permafrost

Offshore permafrost is not as humanly important, we should focus on ice bonding of sediment and ground ice at the coast.

- Changes to hydrology (drainage channel, subsurface flow)
- Subsidence (infrastructures strength, flooding)
- Carbon, nutrients fluxes
- Nearshore circulation, advection and sediment transport
- Spatial variability (TSP, GTN-P, ITEX)
- What do we need in terms of observational monitoring? Sea bottom temperature (see CANCO proposal), but there is a scale issue.

Who cares? So what?

- Future need: how can we develop coastal infrastructures if we don't know how the coast functions?
- Development: need for environmental impacts assessment.
- Local issues, cultural sites
- Flux of carbon (carbon cycle), input of nutrients and trophic fluxes, input of sediment
- Can we provide enough information to answer an engineering question?
- Sedimentation and water quality (contaminants)
- Predicting spills, spill sensitivity assessment

3) Sediment dynamics

- Change in ice volume = change in coastline, creation of new landscape
- Glacial output
- Hard coast and communities as tourist destination (iceberg hazard)
- Search and rescue, circulation
- Hard coast: biodiversity relevance, glaciers

4) Natural hazards and extreme events

- avalanches
- locally generated tsunamis
- storm surges, flooding
- modification of newly deglaciaded surfaces (slope failure, mass wasting)
- gas hydrates
- convective rainfall is coming
- vulcanism (flooding, offshore currents)
- rapid sea-ice movements
- vulnerability, monitoring of specific types of coast (question of scale)

List of participants

- Arvid Bring
- Nicole Couture
- Tom Douglas
- Alexander Ermolov
- Don L. Forbes
- Georg Hansen
- Hughes Lantuit
- Dan Lawson
- Tom Lippman
- Owen Mason
- Stanislaze Ogorodoze
- Paul Overduin
- Pavel Recant
- James Sivitsky
- Steve Solomon
- Dominique St-Hilaire
- Irina Streeletsaya
- Wojciech Sulisz
- Jean Tremblay
- Alexandre Vasiliev
- Wieslaw Ziaja

Components of the physical system

- Sea ice (landfast ice, bottom fast, mobile)
- Permafrost (land and subsea, ground ice)
- Run-off, rivers
- Lithology
- Snow, precipitation
- Glaciers
- Wind, waves, storms
- Relative sea-level change
- Tides, currents
- Shorface morphology
- Continental shelf
- Sediment transport
- Carbon and contaminant fluxes
- Marine accretion, erosion
- Estuary,deltas,lagoons
- Developed shoreline
- Flooding

We aim to created an integrated, comprehensive report on the arctic coastal zone.

How do we proceed?

Let's consider the 4 following models:

1. Update the ACIA?

develop subject outline

concrete, local examples

integrated report: (forcing (drivers), processes, impacts)

2. Coastal policy document

For policy makers at three levels: local, regional, federal.

Or educational document for journalists

3. ICARP II report

Let's review their research questions, reuse that frame.

4. Press pocket

Journalist audience, local press

Our questions to you

What kind of information do the other groups (biology/ecology, governance/management, modelling/prognosis) want from us: they are our audience.

Should we deliver:

- Our key questions? The knowledge gaps?
- State of the art executive summary?
- Specific information?