

# Outcomes from Workshop Discussions

*Climate Change for Arctic Seas and Shipping*

3<sup>rd</sup> CRAICC-PEEX Workshop  
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# Conclusions and Outcomes

- Maritime industry, services and increased shipping in the Arctic: what kind of needs and requirements?
- Climate change projections for possibilities to increase ship traffic in Arctic
- Future scenarios of increased ship emissions, effects on atmospheric pollution, feedbacks on meteorology and climate
- Providing ice and maritime services and predicting capabilities for shipping in Arctic
- Forecasting extreme weather events for shipping in Arctic and link with climate change
- Requirements from end-users: what is needed for practical realization and mitigation scenarios ?

# Key Questions to Answer

- What is important for providing shipping (different types and purposes) in Arctic?
- What observations are providing max impact?
- What kind of atmosphere-ice-ocean-chemistry integration and seamless modelling is needed for modelling for shipping?
- How to utilize existing satellite data?
- How well we can predict ice conditions for shipping?
- Are we able to predict HIW in Arctic, e.g. Polar Low events? What is needed to improve such abilities?
- What new measurement technologies can be used? (vertical profiling, NRT data access, etc.)
- How to utilize and assimilate different data in models and predicting capabilities?
- Decreasing ice conditions leads to increasing fishing ? How to manage such a problem? (to be included into social part of the PEEEX Science Plan)

# Some Examples and Approaches

- Integrated systems of modelling and observations
- Coupled Atmosphere-Ice-Ocean-Chemistry modelling systems
- New methods and different applications of satellite remote sensing for Arctic
- Satellite RS is extremely important for nowcasting of HIW in the Arctic (where Radars do not cover these large territories)
- Data assimilation is one of key task for future developments
- Ships as a platform for observations in Arctic
- Polar Lows as one of the most important examples of problems
- Water/Ice combined surfaces, polynia problem for flux and ocean-atmosphere interaction
- Probabilistic risk assessments for shipping in Arctic

# Platform for Collaboration

- Complex study of / services for shipping in the Arctic (CC, emission, HIW, ice services, etc.) is needed
- PEEEX as a great integrating platform
- PEEEX Modelling Platform: extension by ocean and ice modelling is needed
- WMO WWRP/ GAW/ WCRP as a global effort for Arctic
- Coordination with PPP and YOPP observation experiment (2017-2019), extension for aerosols and environmental studies
- Observations need to be harmonized: requirements (WMO RRR, WIGOS), recommendations from modelling community
- Model evaluation, analysis of prediction capabilities
- Different temporal (nowcasting, forecasting, seasonal, climate) and spatial scales are important