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Climate Change – Implications for the Offshore Petroleum Industry

C-NLOPB Spill Forum
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Overview

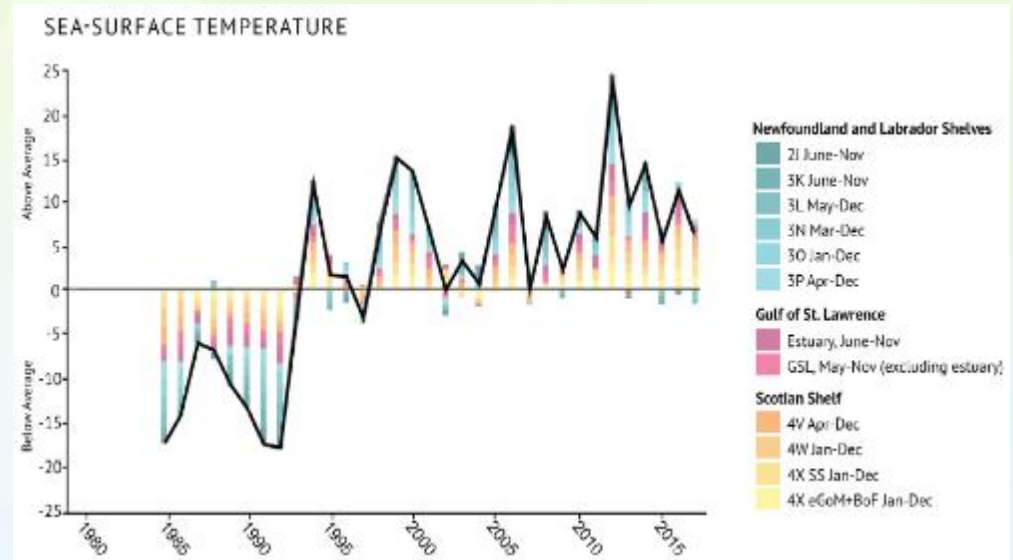
- Climate Trends and Projections
- Considerations for offshore operations
- Proposed next steps

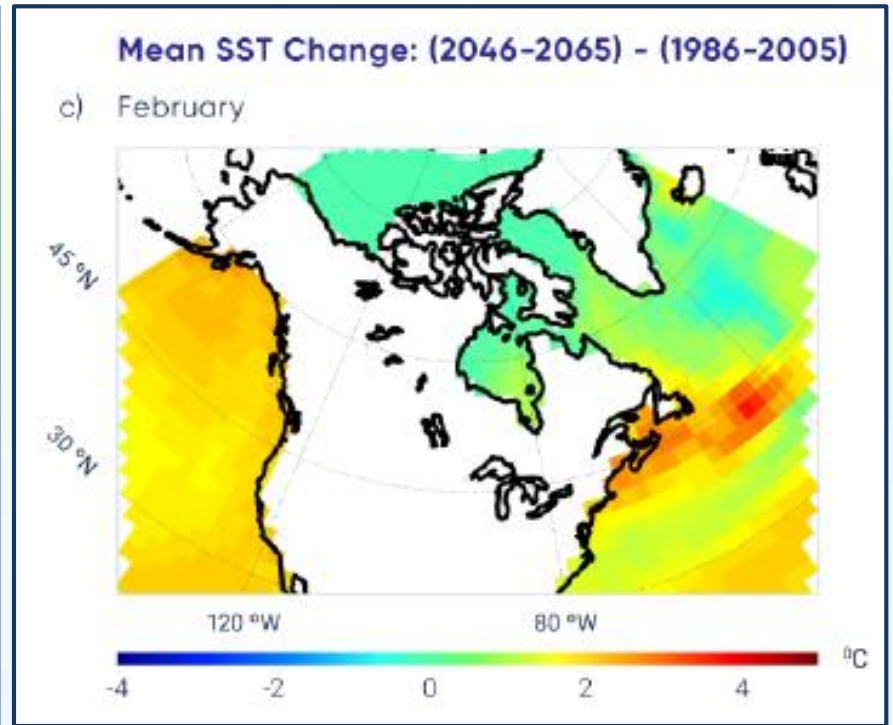
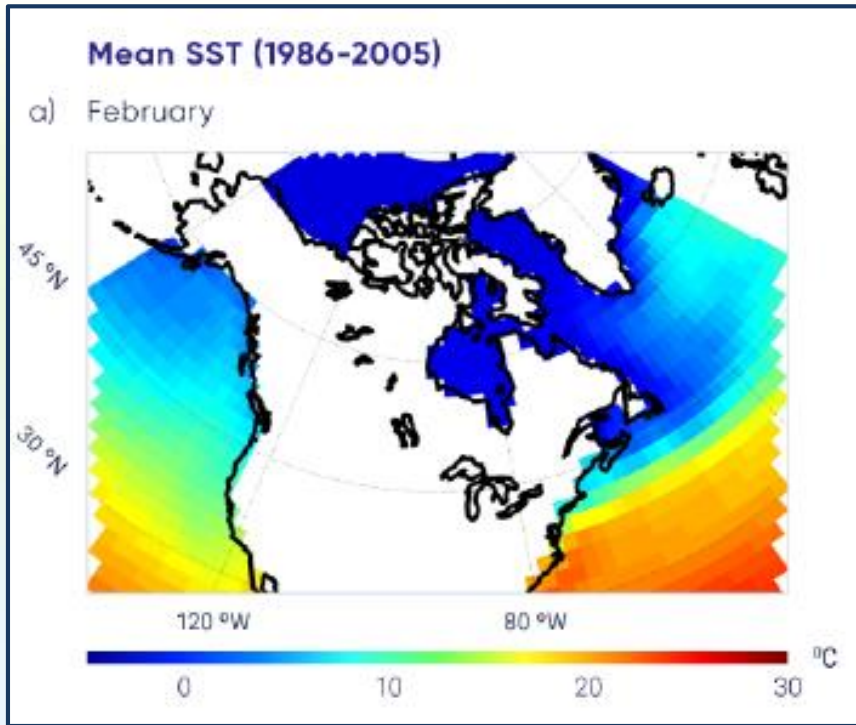


<https://changingclimate.ca/CCCR2019/>

Sea Surface Temperature

- Surface warming over past several decades on Labrador and Newfoundland shelves ($0.13^{\circ}\text{C}/\text{decade}$ at Station 27 since 1950)
- Earlier spring warming between 1985 and 2011 (1.6 weeks per decade)
- No statistically valid warming in Labrador Sea

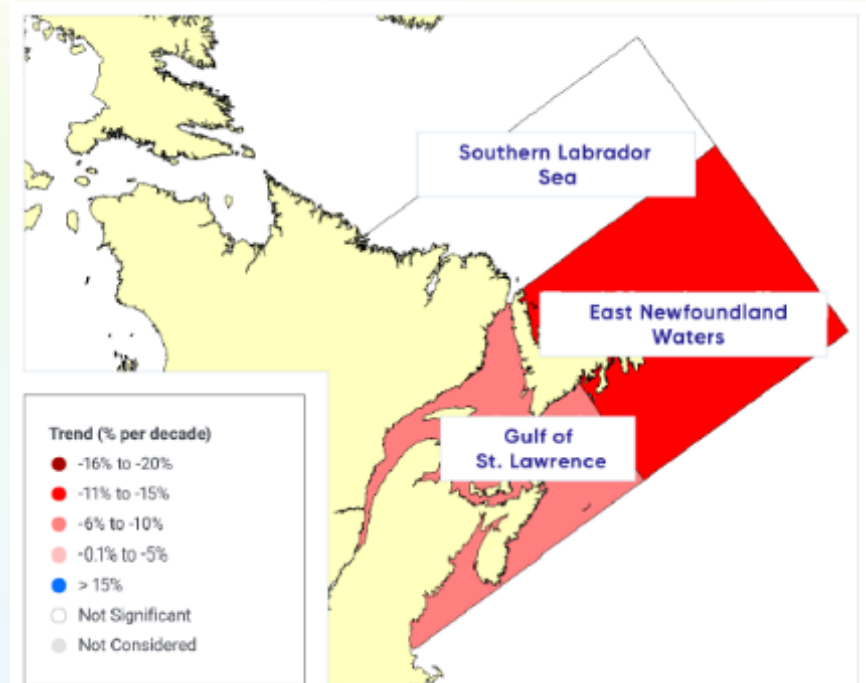




(Source: Canada's Changing Climate Report, 2019).

Changing Ice Conditions

- Clear trends in winter seasonal ice area (1969-2016) although significant annual variability
- Projected to be free of seasonal ice by mid-century
- Uncertainty – potential for changes in transport of sea ice from Arctic to east coast
- With increased ice berg calving from West Greenland ice sheet, potential for more, larger ice bergs reaching Newfoundland in coming decade



Map of average Jan-Mar sea ice area trends

Storms & Waves

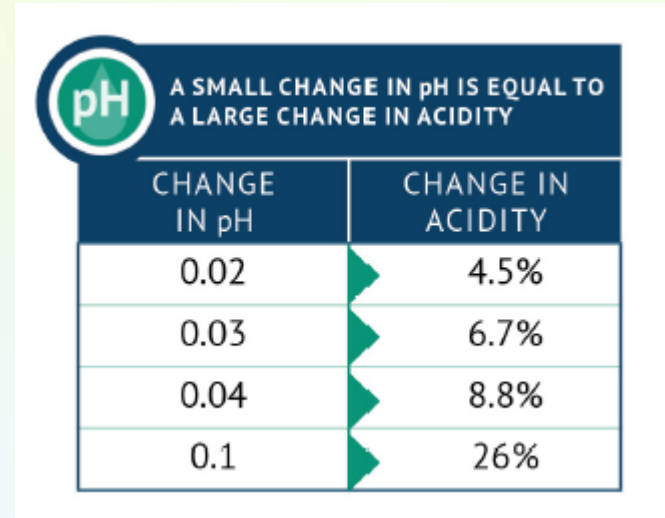
- A slight northward shift of storm tracks, with decreased wind speed and lower wave height has been observed between 1982-2001 (*low conf*)
- Increasing trend in frequency of *autumn* extreme storms (core pressure <980 hPa) over 1958-2010
- Models project reduction in late summer and autumn storms off Atlantic Canada although extreme storms may have increase in intensity.
- Increased wave activity expected as sea ice declines.
- Recent increased severity of cold Arctic-air outbreaks in fall/winter – possible increase in extreme winter conditions?



Ocean Acidification

Acidity has increased at a higher rate in Canadian Atlantic waters than in other parts of the world

Acidity of the Labrador Sea region has been increasing steadily since 1993. Decrease in pH at a rate of about 0.02 pH units per decade.



Source: *Canada's Oceans Now, Atlantic Ecosystems*, DFO 2018

Potential Impacts on Operations

Climate change is likely to exacerbate existing risks

- Increased frequency of severe storms would cause more personnel evacuations from platforms and delay drilling and/or production.
- Increased iceberg movement or transits of high Arctic ice packs could disrupt drilling and damage rigs and transportation vessels.
- Reduced ice coverage could lead to increased wave action on platforms

A changing ocean environment

- Ocean acidification decreases availability of carbonate for shell growth, increases corrosive effect on shells and skeletons, inhibiting growth or requiring more energy to grow.
- Changing ocean temperatures and sea ice reductions will affect species mix and food chains.



Considerations for Oil Spills

- Changes in ice conditions and storms – implications for response, technologies needed?
- Impacts of ocean acidification on spills and ecosystem recovery?



Proposal

- Develop a State of Play report detailing:
 - Climate trends and projections for the regions
 - The potential impacts for offshore production
 - How risks are, or could be, addressed in design and operations
 - Identify specific knowledge gaps and needs to enable adaptation to climate changes in the offshore industry

Report would be developed in collaboration with government departments, industry and other organizations.

