



Acquisition Directorate

Research & Development Center

ICECON Update

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UNCLAS//Public | ICECON Update | RDC/ADAC
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CCGDNine | Sep 2017



Agenda



- **Background**
- **Data Analysis (2016-2017)**
- **Issues**
- **Future Plans**
- **Q&A**



Background



- **Fall 2015: D9 “Ice Condition Scale” issue paper:**
 - Develop scale to accurately and concisely describe ice condition severity.
 - Forecast Ice Condition (ICECON) out to 72 hours.
- **Nov 2015 – Jan 16: Discussions with CG-WWM-3, D9, D1, D17, Nationwide Automatic Identification System (NAIS), National Ice Center (NIC), Canadian Ice Service (CIS), CG Research and Development Center (RDC), CG Academy, Arctic Domain Awareness Center (ADAC).**
- **Dec 2015: NIC presented initial ICECON scale.**
- **Winter 2015-2016: Light ice season; minimal data collected.**
- **Jul/Oct 2016: ICECON added to ADAC & RDC workplans.**
- **Nov 2016: “Council of Experts” meets in Cleveland.**
- **Jan 2016: Historical AIS data obtained for analysis.**
- **Winter 2016-2017: Light ice season; minimal data collected.**



NIC ICECON Algorithm



- **Ice Condition is a function of Ice Concentration, Ice Thickness, Temperature, Wind Condition and Ice Features**

| Ice Condition | Point Total | Impacts to Vessels |
|---------------|-------------|---|
| | 0 | No Ice present or imminent |
| 1 | 0-15 | Minimum ice concentrations and thickness, Does not present hindrance to commercial navigation. |
| 2 | 16 -30 | Light Ice conditions present. Still open water areas. May be some hindrance to less ice-capable ships. |
| 3 | 31 -50 | Light-to-moderate ice conditions present. Less ice-capable ships may need icebreaker assistance for transit and/or be at |
| 4 | 51 -75 | Moderate-to-Heavy Ice conditions present. All Commercial ships may require icebreaker assistance for transit. |
| 5 | 75+ | Heavy-to-extreme ice conditions. All transits require icebreaker escort. Approaching or exceeds capabilities of light icebreaker assets. Increased risk of damage to vessels. |



Data Analysis (2016-2017)



- Ice encounter data collected by crews of *USCGC Alder* and *CGC Griffon* providing ship-based estimates of ice parameters and in-situ assessments of ICECON index.
- Applying NIC algorithm, ship-based ice observations resulted in a concurrence rate of 62.5% (45 out of 72 cases)
- Using Monte Carlo optimization we made minor adjustments to NIC algorithm to increase number of concurrences by 16% (72.2% concurrence rate).
- NIC algorithm uses “ice type”, which is not available as forecasted data product. Excluding ice type from algorithm reduces concurrence rate to 58%.
- We will seek other parameter (e.g., ice pressure, snow depth or water temp) that may have equivalent predictive value.

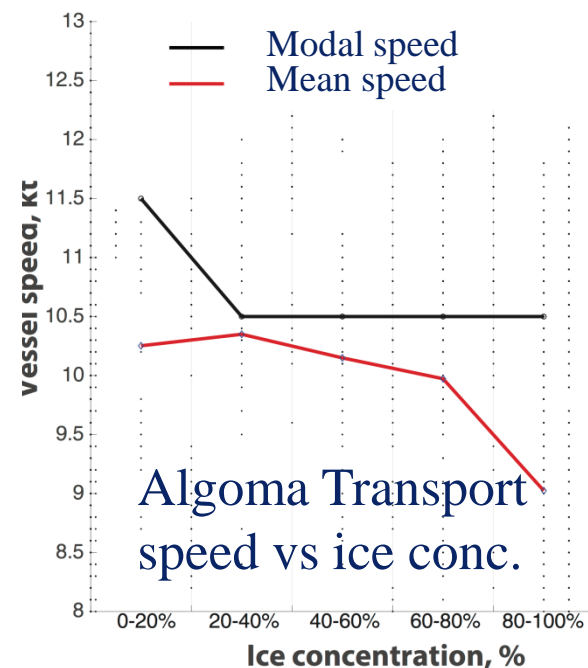
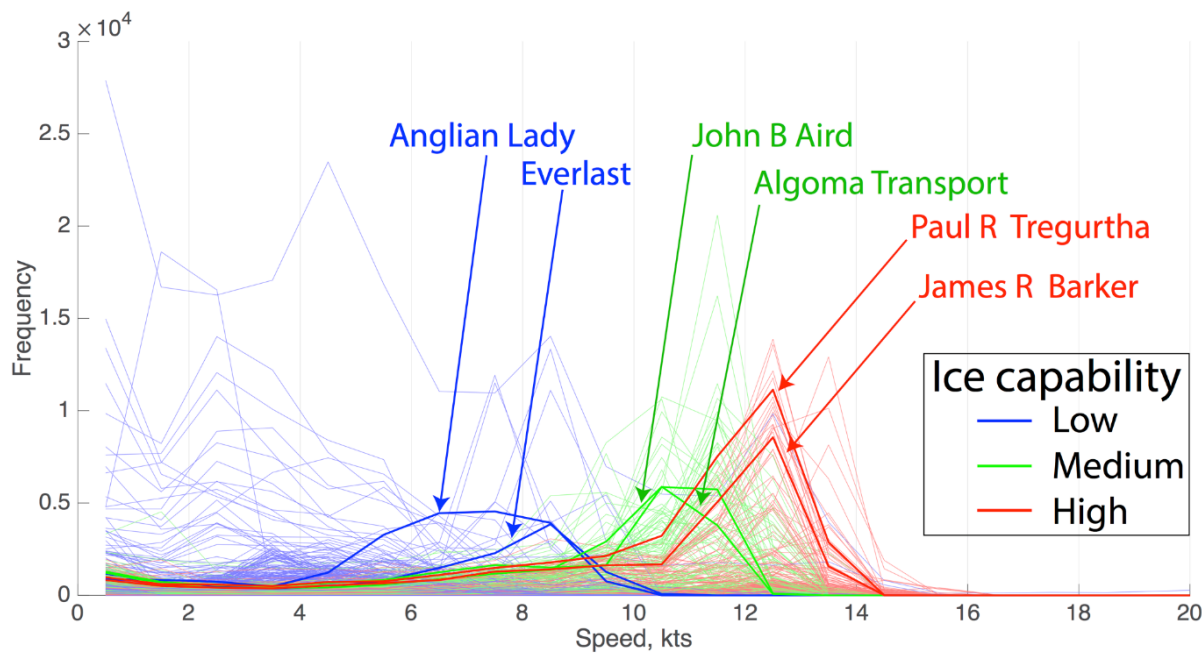


Data Analysis (2016-2017)



Analysis of ice and AIS data from the Great Lakes

- Modal (i.e., most common) ship speed useful for first-order classification scheme for ice capability
- *as per examples provided by USCG D9 personnel*
- Some vessels show clear decrease in mean / modal speed with increasing ice concentration





- **Mild winters:**
 - Limit the volume of data gathered.
 - Limit the breadth of data collected (location, environmental conditions).
- **Transition:**
 - Who hosts? (The National Ice Center has offered to host.)
- **Ship classes:**
 - Not standardized by formal construction rules as done for Canadian Arctic.



Future Plans



- **ADAC ICECON project plan approved for 2017-2018:**
 - Update algorithm based on variables available as now-cast or forecast data.
 - Validate new ICECON algorithm using historical AIS data, Great Lakes Coastal Forecasting System (GLCFS) output and NIC ice charts.
 - Present to council of experts a feasibility assessment for modifying ICECON now-cast and forecast results to account for icebreaker activities.
 - Functioning Python programming language code for now-casting and forecasting ICECON.
 - Present plan for operational implementation of ICECON now-cast/forecast capability to council of experts.
- **Develop transition/support agreement with NIC.**
- **Expand/modify for D17, D1.**





Questions?

