On Thin Ice - TTX

INVESTIGATING POSTURES FOR RESPONDING TO COMMERCIAL AIRCRAFT EMERGENCIES IN THE FAR NORTH: SUMMARY & OUTCOMES

SUMMARY & OUTCOMES

The landmark 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic divided up areas of responsibility for search and rescue (SAR) among the eight nations with Arctic territory. Although maritime SAR in the far north gained additional focus following this agreement, there has been relatively less discussion when it comes to aircraft emergencies in the Arctic even though they do happen. So far in 2025 alone, for example, Bering Air Flight 445 crashed on sea ice while enroute to Nome, Alaska on February 6th; on May 10th, a Finnish pilot was forced to emergency eject from a fighter jet crashing near Rovaniemi, Finnish Lapland. Such Arctic crashes are often caused by and/or coincident with adverse conditions that make SAR even more difficult.

U.S. COAST GUARD ACADEMY
CASP
CENTER FOR ARCTIC STUDY AND POLICY

Thus, from February 11-13 2025, the Center for Arctic Study and Policy (CASP) and the Emergency Management and Crisis Leadership Program at the U.S. Coast Guard Academy hosted the tabletop exercise, On Thin Ice – Investigating Postures for Responding to Commercial Aircraft Emergencies in the Far North exercise (referred to hereafter as "Thin Ice" or "the exercise" or "the TTX"), in association with the Arctic Council's Emergency Prevention Preparedness and Response Working Group (EPPR), Search and Rescue Expert Group (SAREG). The exercise included 16 participants ranging in expertise from local emergency response to Coast Guard and Defense operations to civil and commercial emergency response and aviation organizations, came from four countries (U.S., Canada, Kingdom of Denmark, and Norway), and represented a dozen different entities.

The exercise aimed to gather a well-rounded set of experts to brainstorm approaches for handling different types of aircraft crises in remote areas of the Arctic. This exercise was intended to facilitate professional exchange by shining light on helpful or even novel practices, and on unknowns, gaps, and/or seams in existing agreements, plans, and approaches with the goal of enabling the EPPR to consider prioritizing aircraft SAR in future agendas.

No formal research products were created on the basis of this exercise. The broad details in this write-up are for the purposes of retaining professional knowledge and communicating to potential interested stakeholders, which could include Arctic policymakers weighing decisions about prioritizing downed aircraft issues in their upcoming agendas for discussion. However, the results of this exercise are not intended to be directly used to inform investment or other decisions involving budgets.

This document summarizes general observations from the exercise, how it was conducted, and outcomes, and implications and preliminary considerations for next steps. There are two appendices; Appendix A includes the names of participants, facilitators, and note takers; Appendix B includes the full text for the scenarios examined. For more information, please contact CASP (casp@uscga.edu).

BROAD OBSERVATIONS

- Although they may seem like a remote possibility, Arctic aircraft emergencies do happen across the region, putting the lives of people on board and rescuers at risk, in addition to potential consequences for the environment and property.
- Examining potential gaps in effective response to Arctic aircraft emergencies in a TTX format facilitated information exchange between people from different nations, organizations, and capacities, and illuminated topics for further exploration, such as strengthening coordination processes among organizations and between borders.
- Responding to an aircraft emergency in the Arctic looks very different depending on country, organization, and professional roles.
- There are dozens, or perhaps even hundreds, of individual capabilities, capacities, trainings, and agreements that could be needed to facilitate emergency response to an Arctic aircraft emergency – these range from large hardware items such as aircraft on skis to rescue kits with several different items to UAVs to coordination plans to various liaisons.
- Although deliberately lacking information in a scenario may be a useful tool for simulating decision making under uncertainty, it can also hamper a robust discussion of what capabilities, capacities, and agreements could be needed under various circumstances.
- Interweaving opportunities for participants to present and/or ask questions in a flexible setting such as an "open mic" session over lunch afforded additional ways to share information without having a rigid agenda.

HOW THE EXERCISE WAS RUN

The Arctic region was defined according to the 2011 SAR agreement, as depicted in the map below. Theoretical scenarios discussed in the exercise focused on commercial aircraft and occurred within the United States, Canada, Kingdom of Denmark (Greenland), and Norway areas of application depicted below, and along the seams of these areas.

The exercise reviewed two types of scenarios – in the first type, aircraft crash in the vicinity of remote airports; in the second type, aircraft are at least initially still in the air but are ambiguously located in the border areas of responsibility between various countries. The full text of the scenarios can be found in Appendix B.

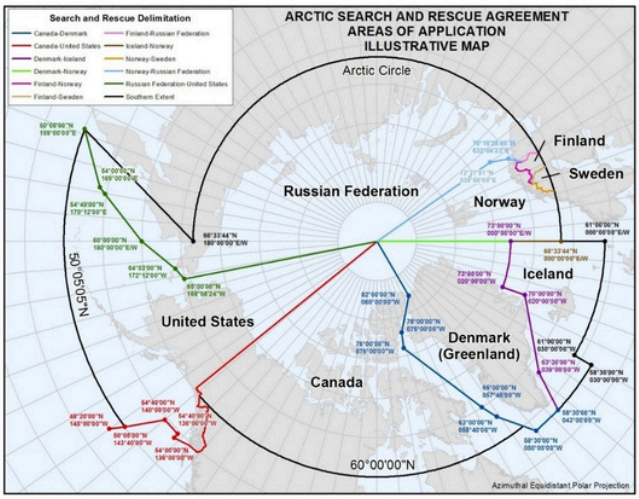


Figure 1. Arctic Region (source: arcticportal.org)

Participants were asked, under the Chatham House Rule, to draw upon their current and prior experience (but not necessarily as a representative of their present organizations) to work in small teams to outline a plan for an effective response to each scenario, which capabilities and capacities available today could be brought to bear, and what gaps, constraints, or other issues might require resolution to sustain an effective response over the first initial hours to days following the incident. The exercise was structured and discussion-based, and evaluators provided teams of participants with constructive feedback on their approaches after teams reported out findings following each breakout session.

The exercise included plenary sessions, breakout sessions, and "open mic" discussions over lunch during days 1 and 2. Day 3 was a half-day wrap-up in a plenary session. The plenary sessions brought all participants and others together to provide information on the exercise and/or to share findings from the breakout sessions. The "open mic" was intended to allow participants to present information about their respective organizations to inform the broader group over lunchtimes. The figure below shows the structure of how the breakout sessions were run, as these were where the "meat" of the exercise was and from which most of the outcomes were derived. There were four breakout groups in total, with a mix of organizations and professional expertise represented in each.

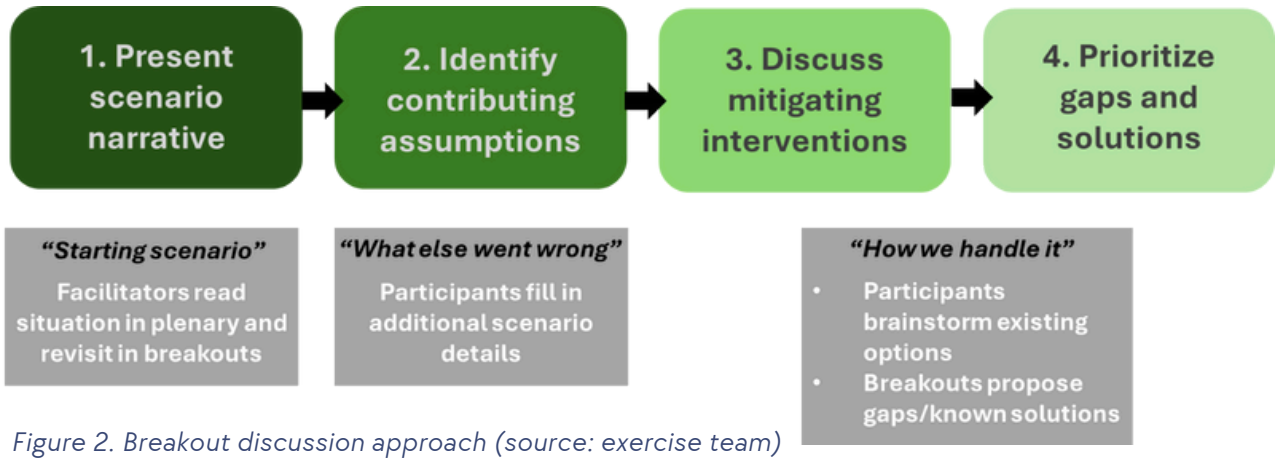


Figure 2. Breakout discussion approach (source: exercise team)

OUTCOMES FROM BREAKOUT GROUPS

Several themes emerged in some or across all breakout group discussions of scenarios. These represent some prominently discussed points within breakouts and during plenary summaries:

Lack of infrastructure, capacity, trained personnel

Discussions throughout and across breakout sessions repeatedly confirmed the existence of issues related to capability and capacity. Aircraft emergencies can be challenging wherever they occur for various reasons. In the Arctic, vast distances, challenging environmental conditions, and low density of domain awareness, communication, transportation, energy, medical, and hospitality infrastructure considerably amplify the difficulties in responding to emergencies, even in locales such as southeastern Alaska and northern Norway which have, relatively speaking, well established services and connectivity in various forms.

Participants also pointed out that even if various services are available, these are much more capacity-limited than they are, in general, at lower latitudes. For instance, there would be a large difference in ability to help survivors of a commercial jumbo jetliner crash than there would be in the case of a small helicopter.

Availability of trained personnel is a perennial issue. Not only are specialized operational and survival skills needed at high latitudes, but additional training is also needed to operate specialized equipment and/or equipment that operates differently in the Arctic. The training pipeline is also particularly capacity-limited for Arctic environments, further exacerbating these issues.

Finally, the fact of having multiple emergencies with cascading impacts multiplied the strains on capabilities and capacities for response. One effect of this was that participants were cautious in designing action plans to avoid wasting limited resources and putting rescuers in harm's way. For example, some breakout groups did not immediately deploy potential rescue assets when aircraft reported having trouble navigating as it was not yet clear whether they would crash or not, and those assets might be more needed where clearer emergencies had already occurred in the scenario.

Limited information on root cause hampered decision making

The cause of the ongoing aircraft navigation problems in the scenarios was intentionally left somewhat unclear, though a massive solar storm and navigation software glitch were alluded to as at least part of the problem. Participants reported that this real-world situation of having limited information was challenging, in particular because it made the anticipation of and planning for the scope of response needs especially difficult. Furthermore, the solar storm posited in the scenario itself also impacted already limited domain awareness and communications at higher latitudes, which some breakout groups reported they anticipated would have made the "fog" of the situation even more intense.

OUTCOMES FROM BREAKOUT GROUPS CONTINUED

No "one size fits all" solution

Each scenario and crash location in the scenarios presented very unique challenges. There was a great degree of heterogeneity among breakout groups as to what capabilities and capacities would need prioritization. There was robust discussion on ready emergency response capabilities, and consideration given to particular experience or skill areas (e.g., liaisons of various types) and agreements/contracts that could be helpful in various situations, highlighting that hardware is only part of any solution.

Space becoming increasingly essential

Satellite-based solutions are compelling for a variety of communications and domain awareness gaps at high latitudes. What became clear in the breakout groups is how what is becoming increasingly the "go to" solution is not reliable under every scenario, and redundant operating mechanisms are now often either no longer available or supported, or no longer widely trained for. This may be an increasing vulnerability for high latitude emergency response.

Icebreakers not essential…at least in these scenarios

Despite their importance in meeting numerous types of needs, icebreakers were noticeably absent from discussions during this TTX. More broadly, this observation was an important reminder that there is no single "multipurpose tool" for Arctic aircraft emergencies, and a portfolio of capabilities and capacities are likely needed. This, in turn, makes planning ahead – for example, which capabilities to pre-position where – even more of a challenge.

Arctic aircraft emergencies could merit more planning focus

This TTX seemed to raise more questions than answers in the breakout sessions. More engagement on Arctic aircraft emergencies will improve awareness of potential gaps, relevant organizations, their capabilities, and how to connect as needed.

IMPLICATIONS AND POTENTIAL NEXT STEPS

The EPPR working group's Search and Rescue Expert Group (SAREG) should organize and execute aircraft emergency table-top and live exercises under the Arctic SAR Agreement. While aircraft emergencies are not inherently a coast guard responsibility, any response in the Arctic will likely include aerial and surface assets from national coast guards along with shoreside support from rescue coordination centers. Consideration should be given to the 2021 Arctic Council—Arctic Coast Guard Forum Statement of Cooperation and collaboration with the Arctic Coast Guard Forum should be encouraged. These activities will help foster greater familiarity with regional response capabilities and foster continued discussion among emergency responders.

A preliminary After Action Report was already presented by participants from Norway and the Kingdom of Denmark at the EPPR's Emergency Management Conference in Bodo, Norway, in March 2025.

APPENDIX A

IN-PERSON

Jereme Altendorf	University of Alaska Anchorage
Will Albright	U.S. Coast Guard
Christy Brewer	Alaska Air National Guard
Eric Chan	109th Airlift Wing, NY Air National Guard
David Edwards	U.S. Coast Guard
Sean Gavin	106th Rescue Wing, NY Air National Guard
Jens Heine Grauen Larsen	Kingdom of Denmark, Arctic Council EPPR Working Group
Tore Hongset	JRCC North-Norway, Arctic Council EPPR Working Group
Johannes Kibsgaard	Norwegian Defence University College (NDUC)
Sam Krakower	Ted Stevens Center for Arctic Security Studies
Shawn Lamoureux	Canadian Armed Forces
Iain Miller	Alaska Air National Guard
Johnathan Nelles	Canadian Armed Forces
Stephanie Nelson	Inupiat Community of the Arctic Slope
John Welton	International Civil Aviation Organization
Jennifer Whitcomb	U.S. Coast Guard

VIRTUAL PRESENTERS/PARTICIPANTS

Sigurd Schjott	Air Greenland
Shea Quinn	U.S. Northern Command
Rob Brown	Memorial University

FACILITATORS/EVALUATORS/CADETS

Benjamin Strong	Elise Beauchemin (Cadet)
Abbie Tingstad	Maureen Hammond (Cadet)
Erin Lambie	Sean Lyman (Cadet)
Tony Russell	Hazel Mitrik (Cadet)
Ben Trachik	Emelia Campbell (Cadet)
Joe Boudrow	Sean Rojas (Cadet)
Jonathan Roth	Joseph Chavez (Cadet)
Wyman Briggs	

APPENDIX B

Day One Scenario Text

"Thin Ice" Day One Scenario

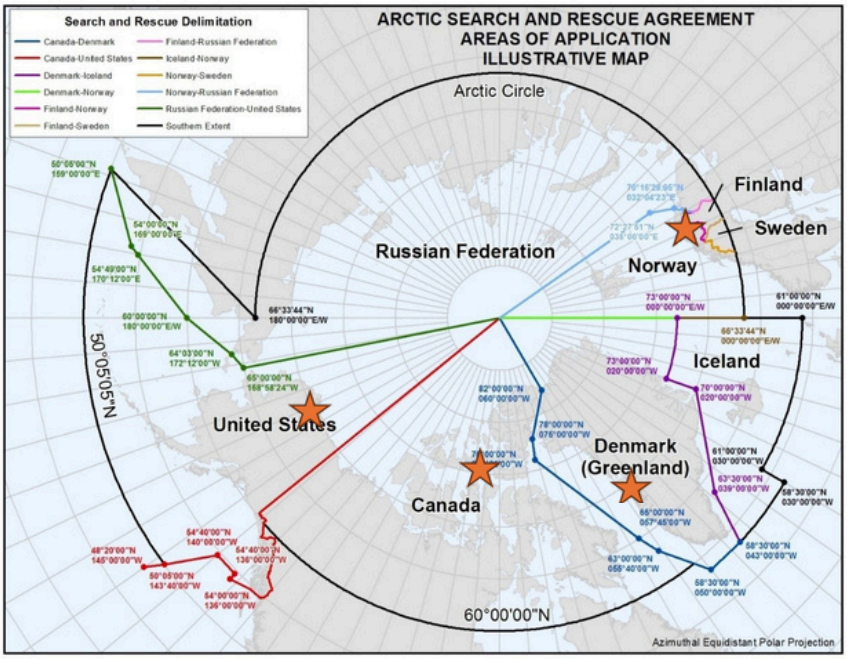
We find ourselves fast forwarded in time to early next month, March 2025. Most of us heard the news from our space agencies about the anticipated geomagnetic storm but let's be honest, what was looking like a pretty minor event got a little lost in the dizzying soup of news, and we're all just getting a little crisis fatigued.
In that sharp hindsight, however, we should have paid more attention, because as it turns out, our scientists were wrong that the solar maximum was back in the fall of 2024. Very, very wrong. We wake up – or are woken up – to the new reality that this isn't just the new solar maximum for the last decade, we're in the middle of a geomagnetic storm that hasn't been seen for centuries, maybe a millennium or more, we won't know until it's over and the data have been analyzed.

What is clear is that much of the far north is feeling pretty severe consequences. Power is interrupted where there are grids and navigation is unreliable. The timing couldn't be worse for aircraft using inertial navigation system Z. Yesterday's crisis was a buggy software update that made these systems glitchy and it still isn't clear how widespread the problem is and how the company's fixes are working.

Some aircraft are starting to make emergency landings while en route to wait out the disruptions to navigation. There are a few crashes upon landing, and what little we know suggests that there are potential casualties and unreliable navigation isn't totally to blame.

But we don't have time to linger on our doom-scrolling. Some of these crashes are close to home, among a growing list happening in:

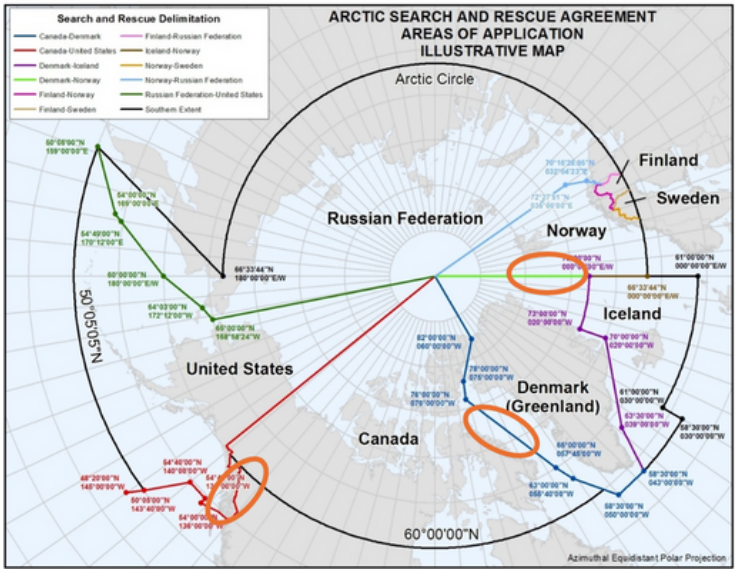
- Alta, Norway
- Ilulissat, Greenland
- Resolute Bay, Nunavut, Canada
- Prudhoe Bay, Alaska, United States



Day Two Scenario Text

"Thin Ice" Day One Scenario (Part 1)

Even as we are dealing with a series of emergency landings and a handful of crashes, we now receive reports that there are at least three *Polar Bear Air* flights that are disoriented. They are still sporadically communicating, and report that their navigation is so disrupted that they believe they have wandered off course and are increasingly unsure of exactly where they are. Based on their last known locations and limited communications, you estimate that flight UR 7 – scheduled from Tromsø to Longyearbyen – is somewhere between northeastern Greenland and Svalbard, UR 2 – scheduled from Iqaluit to Nuuk – is somewhere in the middle of the Davis Strait, and UR 11 – scheduled from Anchorage to Dallas – is in the general vicinity of Whitehorse and Ketchikan.



"Thin Ice" Day Two Scenario (Part 2)

Unfortunately, no news from the *Polar Bear Air* flights is indeed bad news. We now believe all three have come down. It is still unclear where exactly they are but it is not out of the question that there could be survivors. We start searching for:

- UR 7 in the broader vicinity of Svalbard
- UR 2 on the central western part of the Greenland ice sheet
- UR 11 along the US-Canada coast between Cordova, Alaska and Carcross, Yukon