



USNIC Provides IDSS Across Washington, D.C. Waterways & The Great Lakes

Sierra Taylor¹, Jonathan Edwards-Opperman¹, Ryan Sale¹, Walt Clark¹, Lenetta Mallory¹, Carl Gerland¹, Daniel Helmricks¹, Kevin Berberich¹, Gregory Monaghan²

¹. U.S. National Ice Center, Suitland MD

². ERT contractor at Office of Satellite and Products Operations, College Park, MD

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Abstract

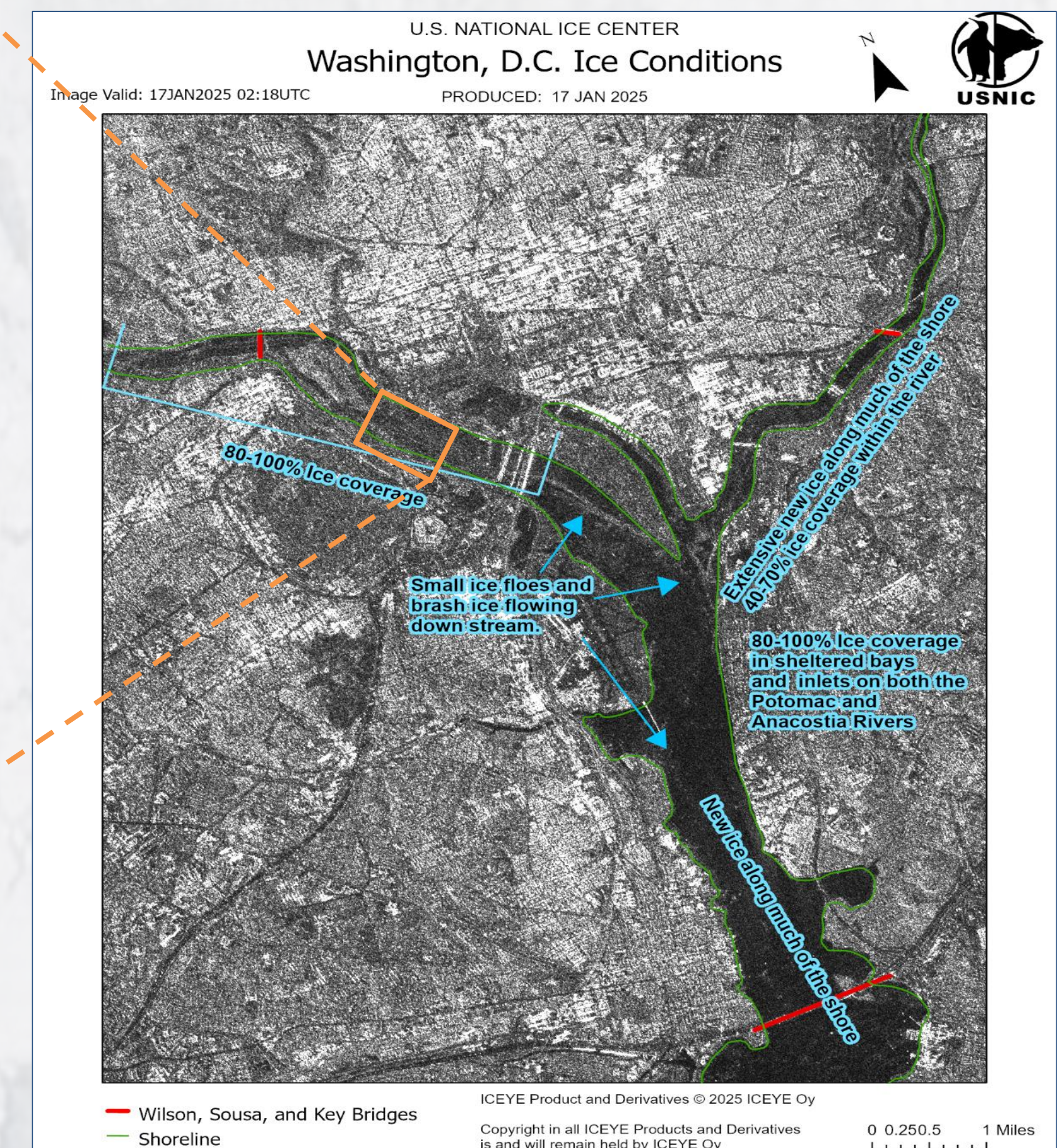
During the 2024-25 northern hemisphere winter season, the U.S. National Ice Center (USNIC) fielded several requests for Impact-Based Decision Support Services (IDSS) asking for daily ice analysis, satellite imagery, and ice forecasts covering both the Washington, D.C. area and parts of the Great Lakes. Persistent sub-freezing January temperatures in the Washington, D.C. area resulted in favorable conditions for ice formation in the Potomac and Anacostia rivers through early February. During this period, the USNIC provided tactical scale support services to enable safety of operations for the U.S. Coast Guard (USCG) and Washington, D.C. Fire Department Marine Division's support of the Presidential Inauguration in addition to the efforts of emergency services as they responded to a January 29th mid-air collision near Ronald Reagan Washington National Airport. Timely ice information to core partners is particularly important in this region due to the small number of ice capable vessels available to emergency services and the Coast Guard.

Ice analysis and forecasting products were also provided to the USCG Great Lakes District starting on January 6. These initially covered Whitefish Bay, the Straits of Mackinac, and the Western Basin of Lake Erie, but had to be extended to the Eastern Basin of Lake Erie on January 30 due to difficult ice conditions brought on by rapid ice formation.

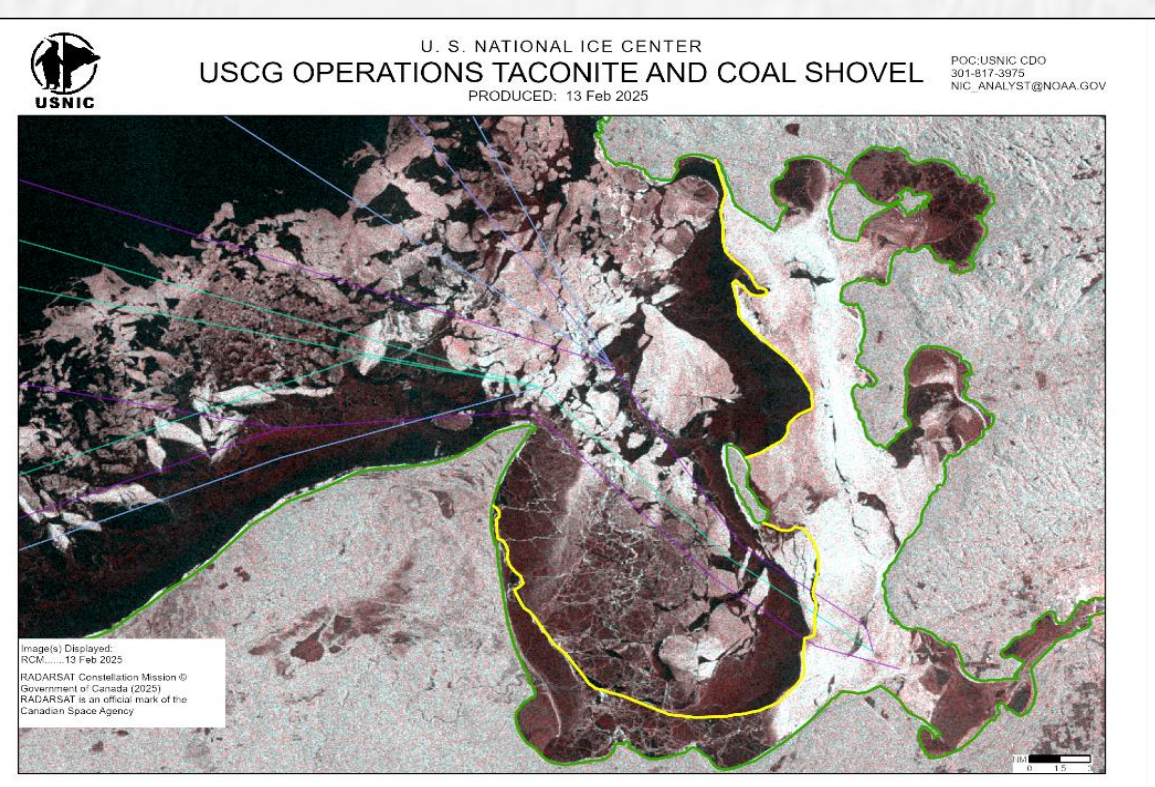


Ice conditions on the Potomac River on January 17th, 2025 as depicted by a photograph* (Above) taken from the window of a plane approaching Ronald Reagan Washington National Airport and a USNIC IDSS product (Right) with an annotated 15 meter resolution ICEYE (X-band) synthetic aperture radar (SAR) image that was created to support the U.S. Coast Guard's Presidential Inauguration operations.

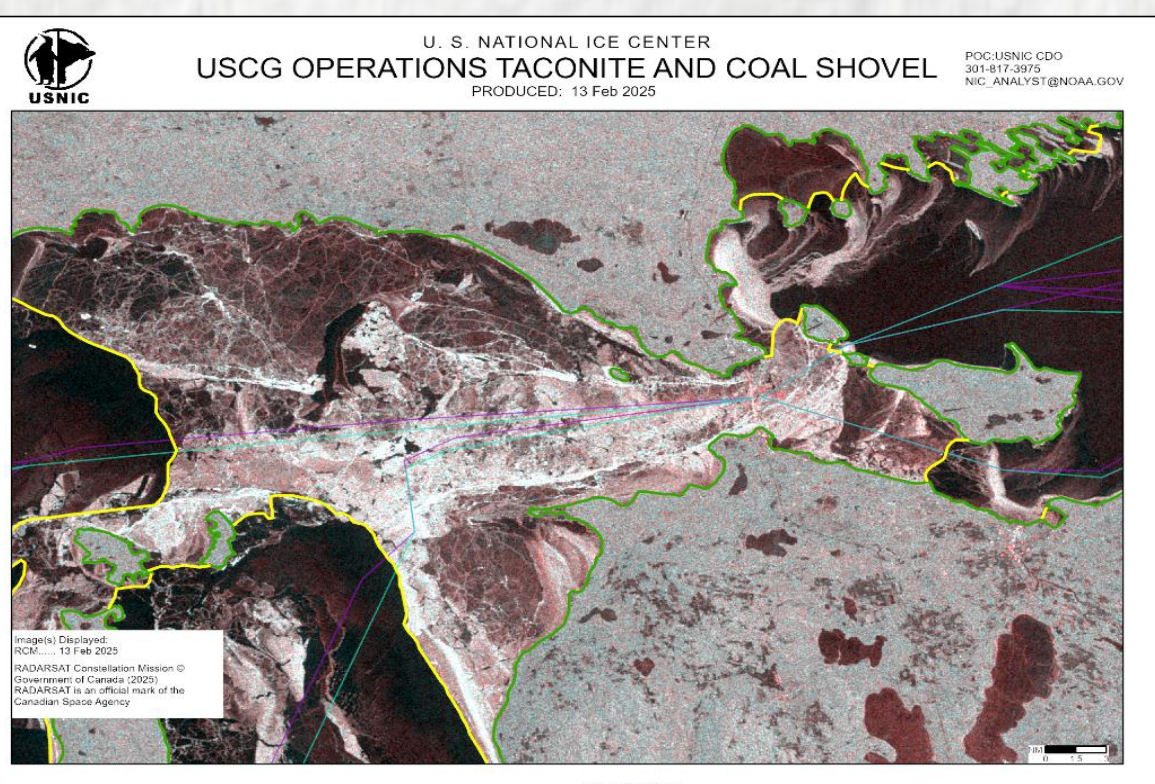
The area captured in the photograph has been outlined in orange on the IDSS product (Right) to highlight how marine ice appears to the naked eye compared to SAR imagery, which the USNIC relies on to produce high resolution ice analysis. *Photo Courtesy: Logan Dawson/WWS OFC



Great Lakes Support



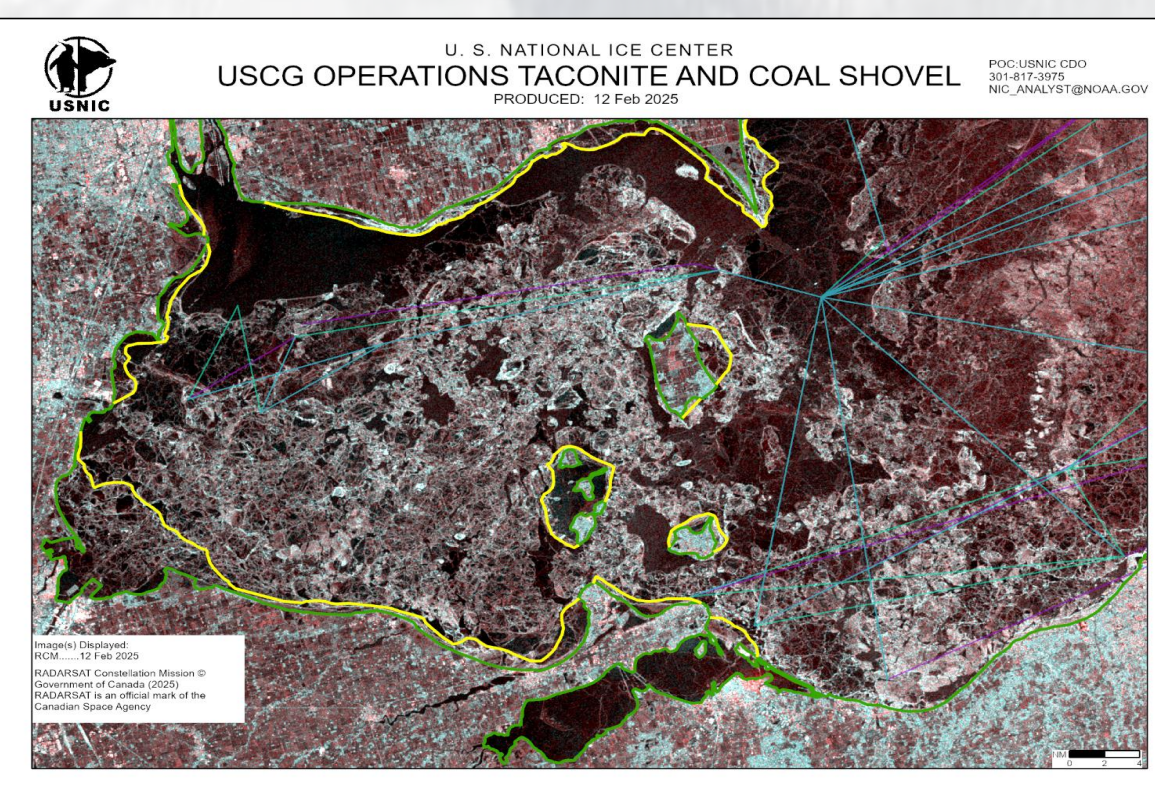
Low temperatures and frozen precipitation have led to the formation of landfast ice in Whitefish Bay.



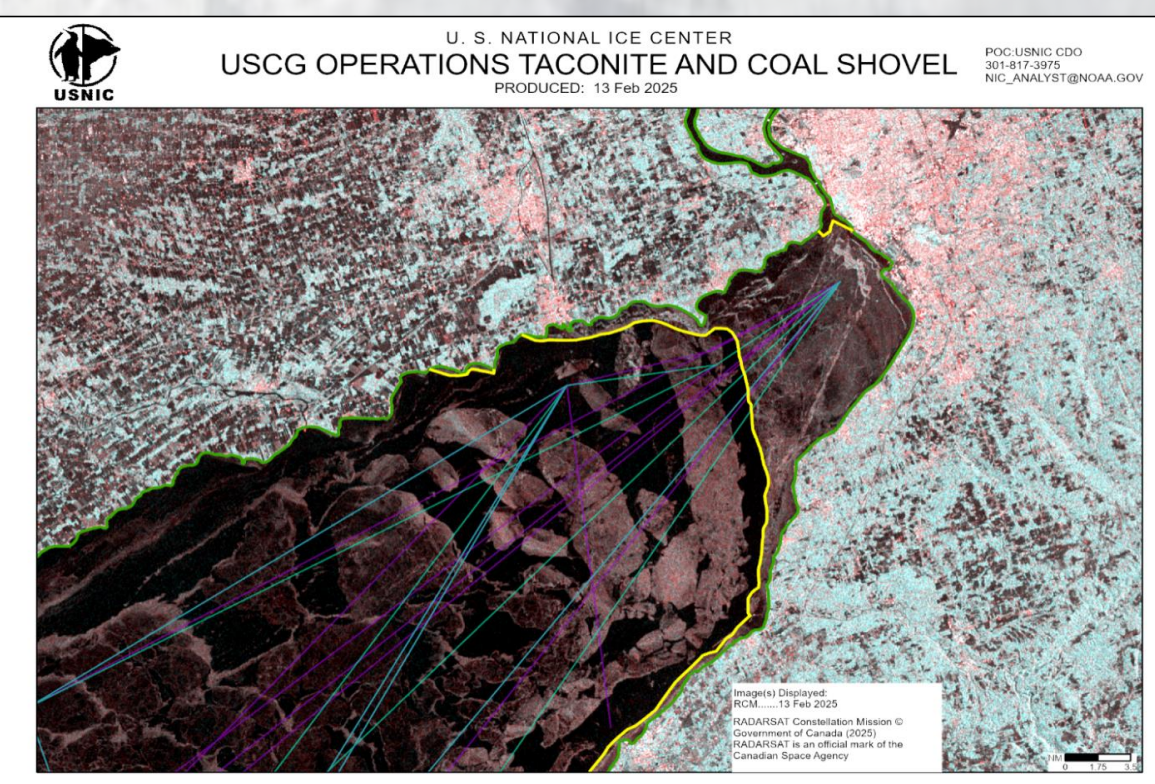
Cold temperatures in the low 20s and east winds have pushed mobile ice westward away from the land-fast ice in the Straits of Mackinac.

During the winter season, the USCG Great Lakes District received support through ice analysis products identifying land-fast ice in critical waterways to ensure safe vessel navigation.

The USNIC utilized available Radarsat Constellation Mission (RCM) (C-band) SAR imagery to delineate land-fast ice with a yellow line, enhancing situational awareness, and produced 24-hour forecasts to show expected ice movement. All products include forecasts illustrating anticipated ice movement.



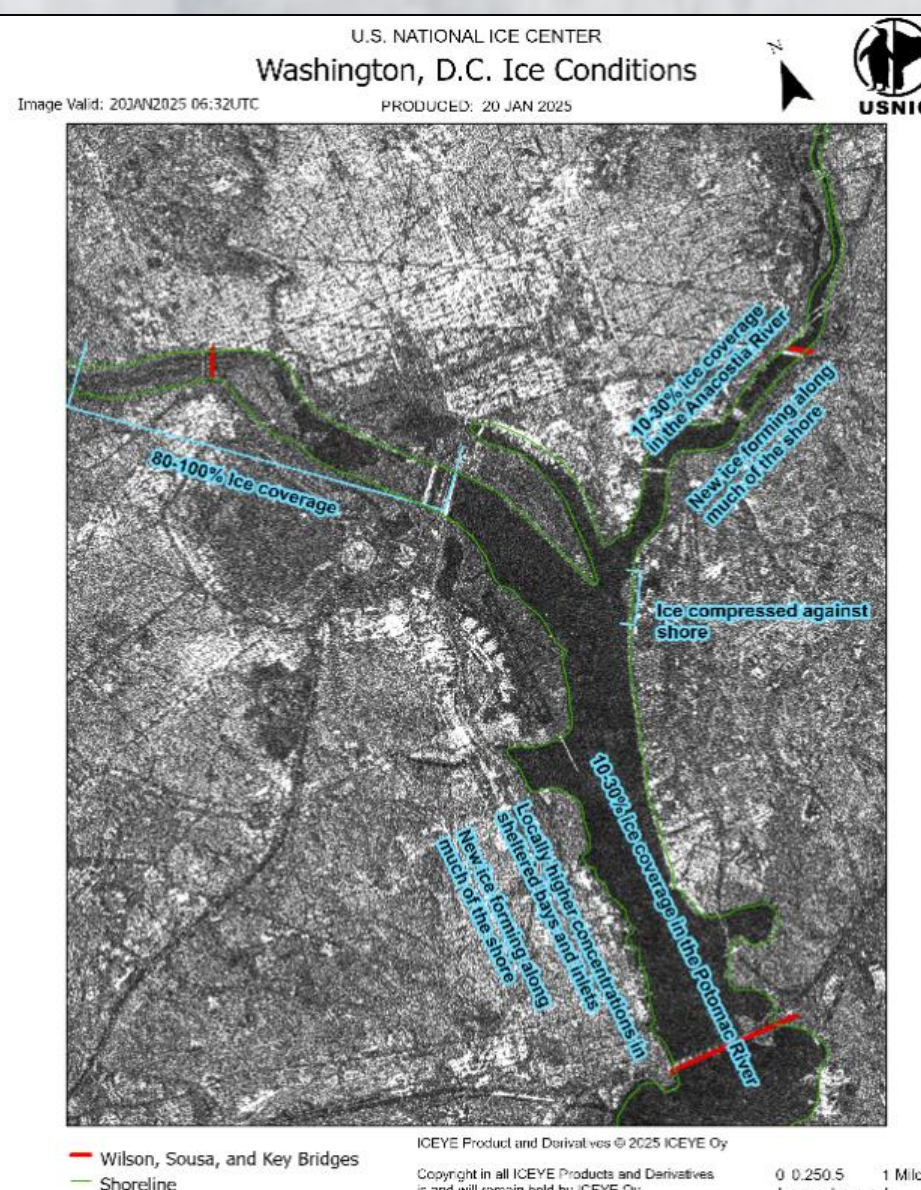
Light northeast winds have pushed mobile ice toward the south and west shores of Western Lake Erie, while below-freezing temperatures have led to new ice forming in open water.



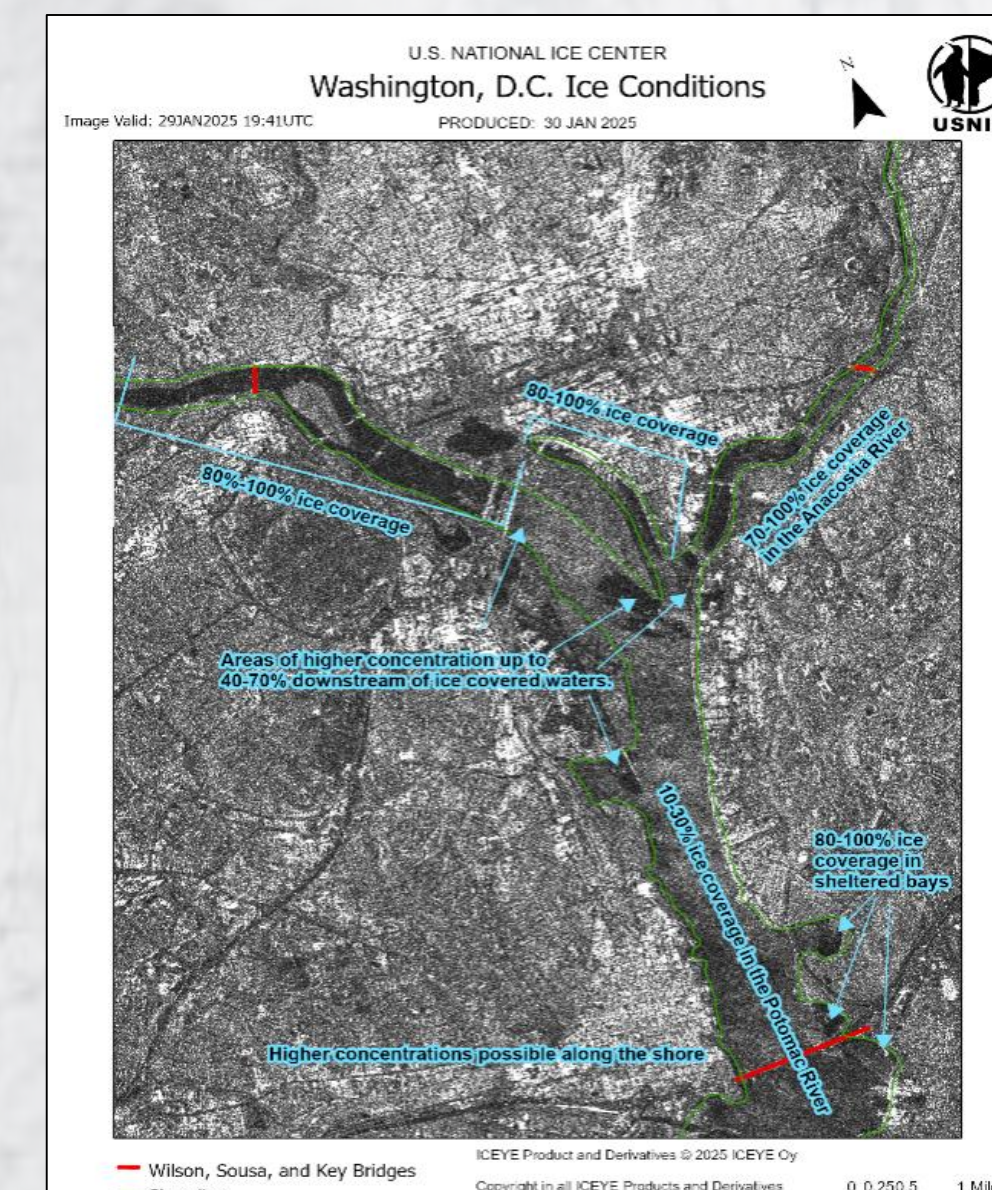
East-northeast winds are pushing mobile ice against the southern shore and away from land-fast ice in Eastern Lake Erie, while near-freezing temperatures limit ice growth and cause breakage.

D.C., Potomac & Anacostia Support

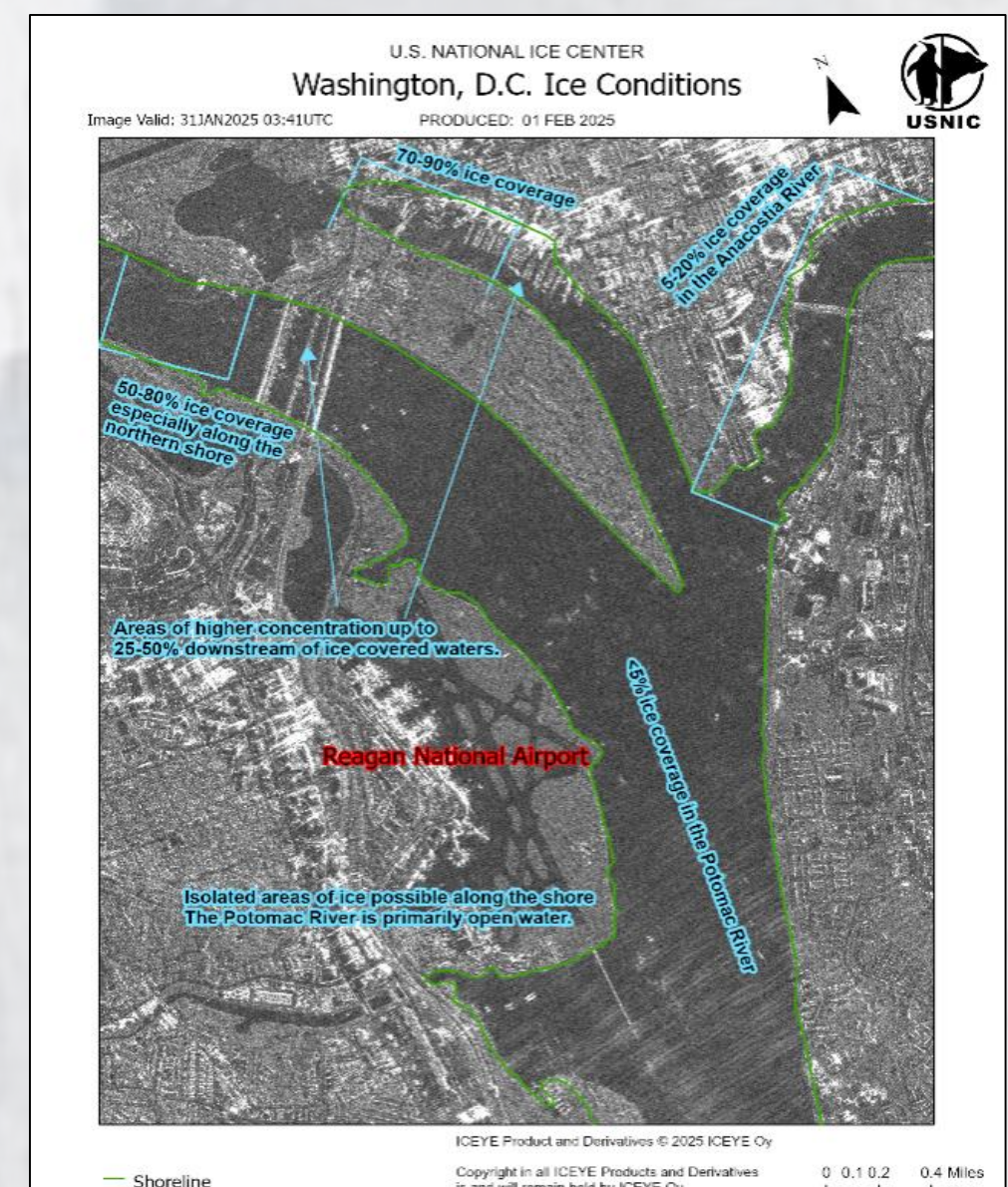
Between January 16th and 21st, 2025, the USNIC provided high-resolution imagery and ice analysis to the USCG in support of Presidential Inauguration operations. Annotated ICEYE products identified ice coverage on the Potomac and Anacostia Rivers, delivering critical information for planning and response. Although originally scheduled through January 30th, support was extended through February 2nd to assist emergency services responding to the mid-air collision near Ronald Reagan Washington National Airport. This support was especially important due to the lack of ice-capable vessels in the area, making accurate ice analysis essential for emergency response.



A 15 meter resolution ICEYE image showing 80-100% ice coverage in the Potomac River, with new ice formation occurring in the Anacostia River on the day of the Presidential Inauguration.



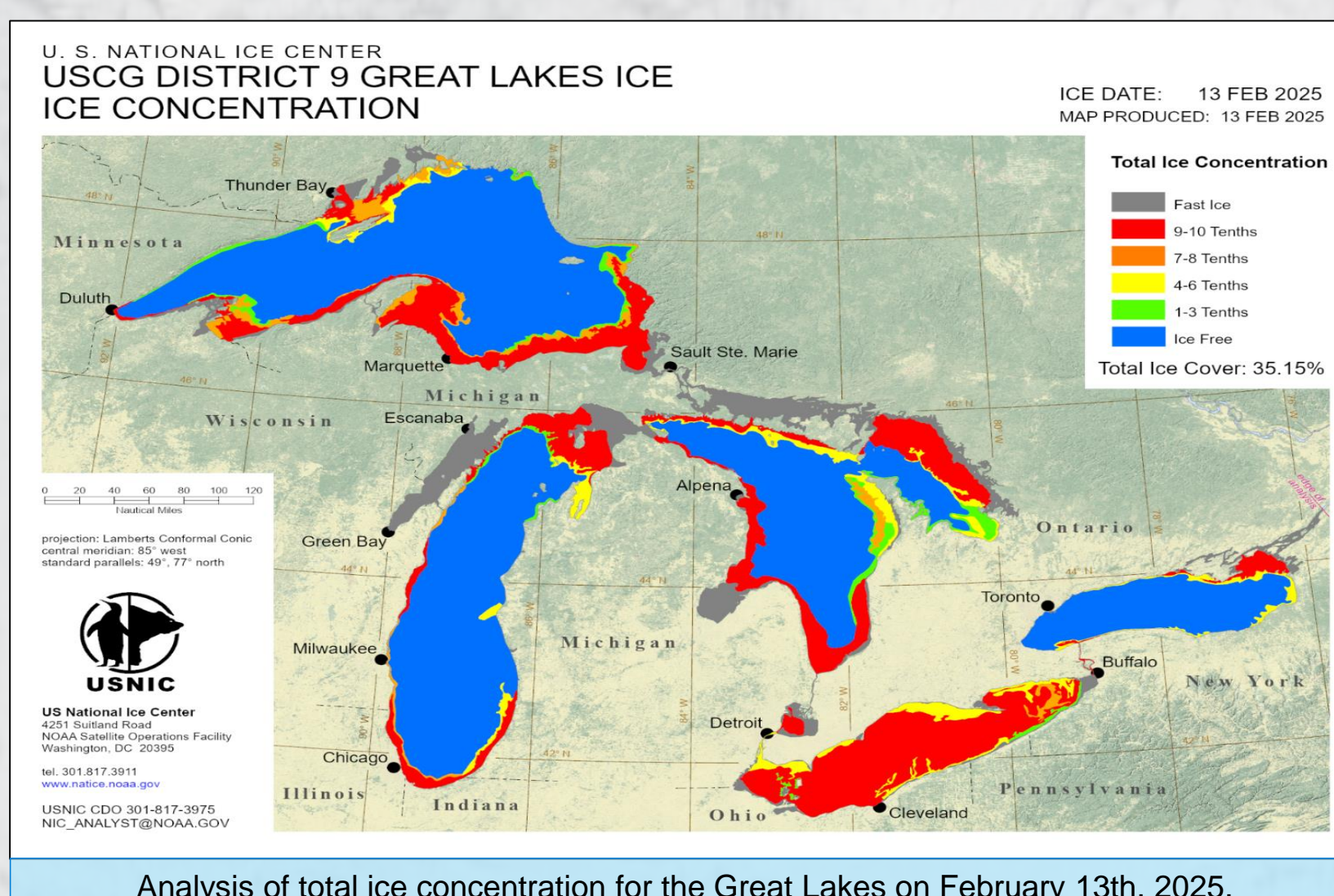
A 15 meter resolution ICEYE image associated with the Ronald Reagan Airport mid-air collision, showing 70-100% ice coverage in the Anacostia River and 80-100% ice coverage in the Potomac River.



A 1 meter resolution ICEYE image produced for the Ronald Reagan mid-air collision event, showing less than 5% ice coverage in the Potomac River and 5-20% ice coverage in the Anacostia River.

Conclusion

The 2024-25 winter season brought persistent cold temperatures that contributed to extensive ice accumulation across Lake Erie. This created an increased demand for monitoring and support, especially in the Buffalo region, where landfast ice posed potential operational and navigational concerns. In response, the USNIC rapidly provided enhanced situational awareness for the U.S. Coast Guard. These efforts not only demonstrated the USNIC's ability to pivot between data sources but also highlighted its operational flexibility and responsiveness under pressure. The ability to deliver timely, accurate ice products in a dynamic environment reinforces the USNIC's commitment to mission success and showcases its readiness to meet emerging needs. While high-resolution satellite imagery provides valuable data for ice monitoring and analysis, it presents operational challenges in regions like the Great Lakes. One such challenge was the limited temporal availability of RCM imagery, which was not consistently accessible during key periods of product generation. As a result, the USNIC adapted by utilizing Sentinel imagery to maintain continuity in ice analysis and product delivery.



Analysis of total ice concentration for the Great Lakes on February 13th, 2025.

"This is very helpful. Thank you!"

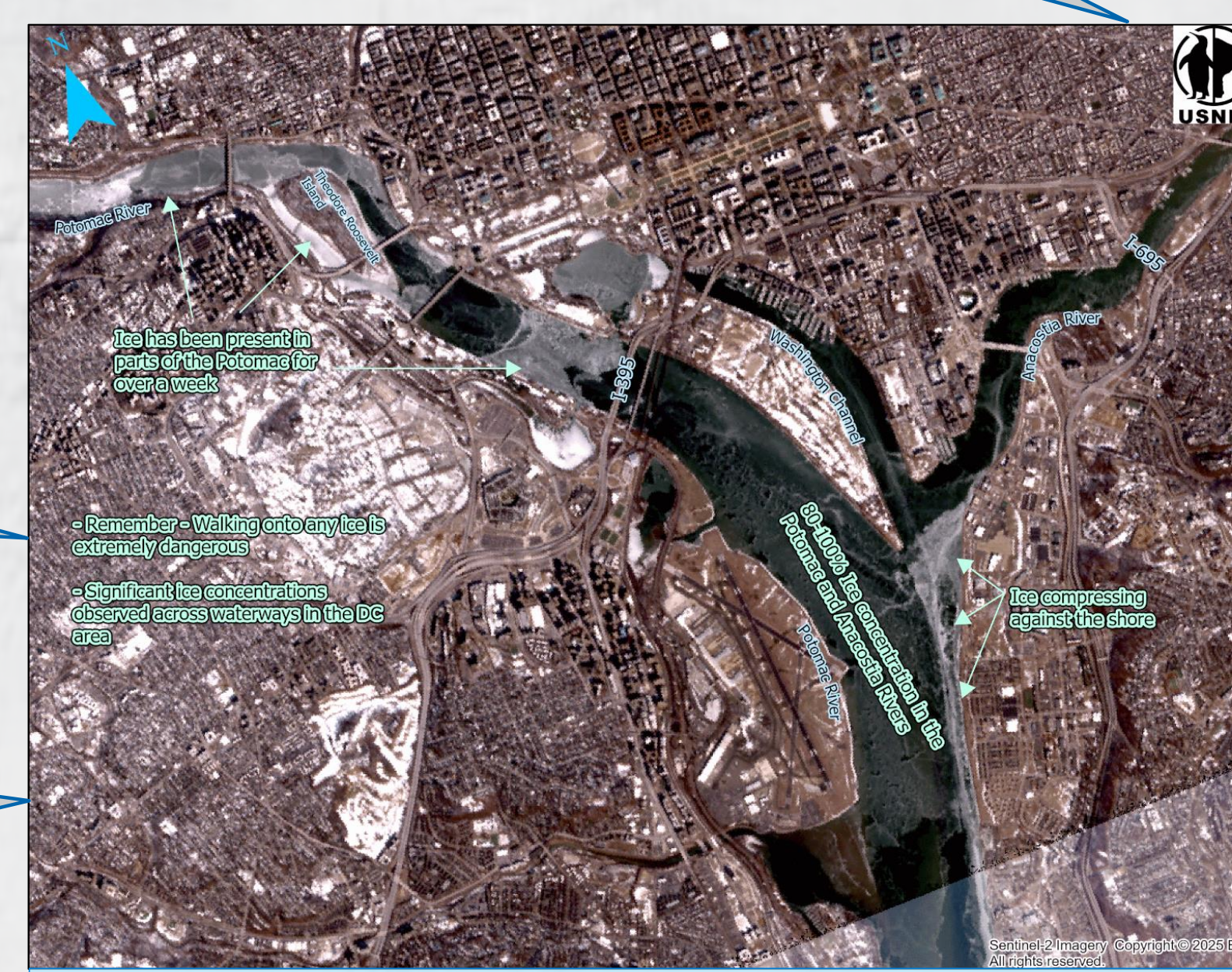
- USCG Sector Maryland-National Capital Region

"The product has been exactly what we were looking for. We would request to continue reports until 1/30/25 as best as imagery would be available."

- Washington, D.C. Fire & EMS Department

"Thanks for the products! It was helpful to our Command to utilize that imagery and analysis over the weekend through Tuesday."

- U.S. Army Reserve



Visible 10 meter resolution Sentinel-2 imagery of ice present on January 22nd, 2025 within the Potomac and Anacostia rivers.

Support products developed for the Mid-Atlantic region proved to be both successful and valuable across multiple agencies. Positive feedback was received from key stakeholders, including the U.S. Army Reserve, the Washington, D.C. Fire and EMS Department, and the U.S. Coast Guard Sector Maryland-National Capital Region. This showcased the usefulness and operational impact of the products, even in the face of several technical and environmental challenges. Working with high resolution imagery in mid-latitude regions posed specific difficulties, particularly in ordering appropriate imagery swaths and in interpreting disrupted or low-clarity images. Identifying precise ice features under these conditions required additional analytical effort. The products remained critical given the shortage of ice-capable vessels operating in the area at the time. High-resolution imagery played a key role in providing situational awareness, successfully capturing varying extents of ice coverage along both the Potomac and Anacostia rivers. These insights supported decision-making and emergency planning during a period when on-the-water verification was limited. Ultimately, this experience emphasizes the USNIC's capability to generate additional, high-quality products on short notice, ensuring ongoing support to maritime partners and national stakeholders.