It is unique in that its collection of tsunami deposit information and DART® databases in forms suitable for tsunami modeling purposes is not available online anywhere else. Finally, the tsunami database is strengthened through integration with the other NGDC natural hazards data and the variety of standards-based access tools (http://www.ngdc.noaa.gov/hazard/hazards.shtml).

Future Challenges

NGDC faces many challenges in archiving and disseminating tsunami data. Some are challenges faced by any data center. For example, greatly increasing volumes of data require significant disk space and tape storage, and it is important to create standard metadata to ensure that scientists 50 years from now can understand and use the data. Further, the data center must continually evaluate new technologies to determine the best way to archive and disseminate data. These large data sets must be easily available to users with varying access capabilities.

Other challenges are particular to the tsunami data archive. The NGDC tsunami databases are dynamic collections, continually updated as new data and information become available. NGDC believes that these databases are a valuable resource for scientists, researchers, and policy makers, but it is important to understand that these databases are works in progress. Certain areas have benefited from more quality control, such as data on tsunamis affecting the U.S. coasts. The historical databases in particular provide unique challenges, including what to do with primary source documents that provide different information for the same event, how to resolve locations determined from written versus instrumental records for place names that may change throughout history, and how to compensate for the fact that different regions have written records that extend to different periods of time: For example, written records in the Mediterranean date from 2000 B.C.E., while records in North America date from the sixteenth century. NGDC continues to review and improve these databases and welcomes new contributions and suggestions.

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Hans Island: Meteorological Data From an International Borderline

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Just after midnight on 28 August 1871, the vessel *U.S.S. Polaris* of the North Polar Expedition, led by C. F. Hall, sailed past a small, uncharted island in the middle of Kennedy Channel [*Davis*, 1876]. This narrow channel is one of several such marine passages and sounds located between Canada's Ellesmere Island and Greenland that combined together, form Nares Strait. Because of the dense fog at the time, the extent of the island could not be gauged. On the vessel's return voyage almost a year later, on 13 August 1872, the *Polaris* again passed this island. Expedition notes [e.g., *Davis*, 1876] reveal that the island was given the name Hans Island, or Hans Ø in Danish, in honor of Hans Hendrik (1834–1889) [see *Hendrik*, 1878], a Greenlander who assisted the expedition and four others to the region (led by E. K. Kane, 1853–1855; I. I. Hayes, 1860–1861; G. S. Nares, 1875–1876; and N. A. E. Nordenskjöld, 1883).

Hans Island (80°49'35'N, 66°27'35'W) is a small sandstone landform that occupies an area of about 1.3 square kilometers and is 168 meters in height (Figure 1a). Also known as Tartupaluk (meaning "kidney-shaped place" in the Greenlandic language), the island's topography could be described as wedge shaped in that its northern face slopes gradually upward and its southern regions are dominated by steep cliffs rising out of the ocean.

The Nares Strait region plays a key role in the global hydrologic cycle by connecting the Arctic Ocean with the North Atlantic Ocean [*Melling et al.*, 2008]. Any changes in the ice and fresh water flux through Nares Strait may alter the volume and extent of ocean deep-water formation. This in turn could influence the Atlantic meridional overturning circulation and hence global climate [*Broecker,* 1987; *Lab Sea Group,* 1998]. *Gudmandsen* [2004] and *Samelson et al.* [2006] have independently suggested that winds provide an important, perhaps dominant, forcing mechanism for ice transport through the strait. The recent establishment of an automatic weather station (AWS) on Hans Island—which is claimed by both Canada and Denmark/Greenland—is, for the first time, allowing direct and continuous measurement of atmospheric conditions in the strait.

Ice, Water, and Winds

For a number of years, a series of oceanic moorings has measured the ice and oceanic properties in the strait [*Melling et al.,* 2008]. These measurements, and others that are ship based, provide a baseline understanding of the forces that influence the flow of ice and water through the strait [*Münchow et al.,* 2006]. However, atmospheric measurements have been a missing piece needed to complete this particular scientific jigsaw puzzle. Large-scale coupled models do not have the resolution to resolve the narrow, channel-like flow or the complex orographic features. Recently, efforts to resolve the atmospheric conditions in the region have progressed to using a high-resolution, multiply nested, regional atmospheric mesoscale model that is embedded in a global operational forecast model [*Samelson et al.,* 2006; *Samelson and Barbour,* 2008]. Because surface winds are believed to drive the ocean surface currents and the sea ice and iceberg motion, it is important to obtain regular in situ meteorological measurements to verify and calibrate current and future regional atmospheric models.

Prior to the establishment of the Hans Island AWS, there have been no such regular in situ measurements available with which model results can be compared. The two closest meteorological stations—at the Canadian Forces Station Alert on the Arctic shore of Ellesmere Island, and at the U.S. Air Force Base Thule on the sheltered north coast of Baffin Bay—are situated outside of Nares Strait, and data collected at those two locations are not representative of the local wind conditions, which are strongly affected by the severe local topography of the channel. *Samelson et al.* [2006] and *Samelson and Barbour* [2008] have recently suggested, on the basis of results from the atmospheric

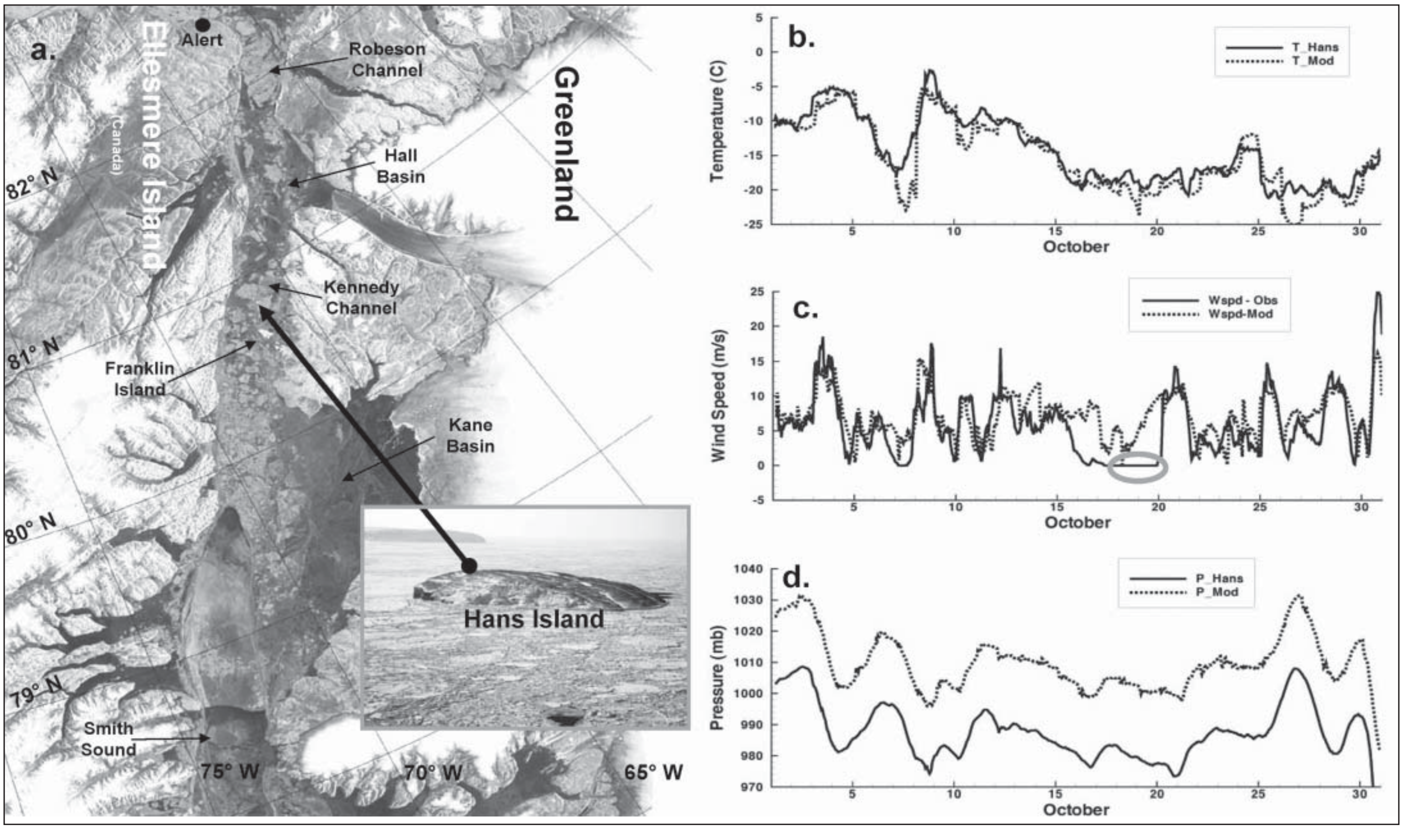

Fig. 1. (a) ENVISAT advanced synthetic aperture radar image from 23 April 2008 with an inset picture of Hans Island on the day of the automatic weather station (AWS) deployment (the black dot on the island indicates the AWS location; Franklin Island is visible on the horizon). (b–d) Examples of AWS output (solid curve) and mesoscale model output (dashed curve) for the month of October (air temperature, Figure 1b; wind speed, Figure 1c; air pressure, Figure 1d). While not perfect, model results show good correlations with the observations. Note that the model output shown is from the lowest model grid point, located 8 meters above a flat bottom boundary, while the anemometer is 2.5 meters above local ground level at the 168-meter elevation of the top of the island; the constant offset in pressure between the two records arises from this difference in elevation of the model output and the AWS. The shaded ellipse (around 18 October) in Figure 1c indicates a short period when the anemometer data were apparently affected by icing.

model, that the pressure difference between the two stations could be used as a proxy for wind speed in the strait. However, observations sufficient to test these hypotheses have thus far been lacking. Only continuous in situ observations, which until the establishment of the AWS had not been available, will allow for understanding and correctly modeling the atmospheric flow through the region.

Automatic Weather Station

Hans Island is at an ideal location to observe the meteorological conditions in the upper section of Nares Strait. Despite this ideal location, activities on the island are subject to diplomatic difficulties because Canada and Denmark/Greenland have not been able to agree on the sovereignty of the island, which was left unresolved when the border was drawn down the strait in 1973. A 2005 dispute over the island even led to the symbolic dispatch of warships to the region. However, the two governments have since agreed that the politically sensitive island may be used for joint scientific research activities. Thus, a collaboration between scientists at the University of Manitoba and the Technical University of Denmark led to the formulation of a memorandum of understanding (MOU) worked out with the support of the ministries of foreign affairs in Canada and Denmark.

On the basis of this MOU, an AWS was successfully placed into operation on Hans Island on 4 May 2008, an encouraging example of international collaboration and cooperative diplomacy in support of geophysical science. Since then, the AWS has transmitted half-hourly meteorological data (wind speed and direction, humidity, air temperature, air pressure, snow depth, and solar radiation, both incoming and outgoing). During its operation, short periodic storm events, a total solar eclipse, and large swings in air pressure and temperature have been witnessed. Near–real time data from the Hans Island AWS are available online at http://dalriada.sams.ac.uk/aws_hans/.

The real-time data are important not only to the modeling community but also to field personnel in the region, due to the possibility of intense wind events that presently cannot be predicted and can have disastrous consequences [*Samelson and Barbour,* 2008]. The AWS already has witnessed a number of these storm events, suggesting that they may not be uncommon. Initial comparisons of wind speed obtained from the AWS and the model output show good correlations (Figure 1b). More evaluation is needed to understand the differences between observed and modeled conditions, and to identify and, if possible, correct the inaccuracies of the model.

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NEWS

Proposed National Science Foundation Budget on Target to Double

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The Obama administration's proposed fiscal year (FY) 2010 budget for the U.S. National Science Foundation (NSF) is US$7.05 billion, $555 million (8.5%) above its FY 2009 budget, and is in addition to $3 billion in stimulus funding from the 2009 American Recovery and Reinvestment Act (ARRA). The proposed funding, which represents strong support from the administration for NSF and for science and technology, would put the foundation on track to double its budget between 2006 and 2016 (see *Eos*, *90*(10), 83, 2009; *90*(20), 175, 2009; and *90*(21), 183, 2009).

Agency-wide, the FY 2010 request would increase most appropriations accounts. Research and Related Activities would receive $5.73 billion, up $550.1 million (10.6%) compared with the FY 2009 budget. Education and Human Resources would register a slight rise to $857.8 million, up $12.5 million (1.5%). Major Research Equipment and Facilities Construction (MREFC) would dip to $117.3 million, down $34.7 million (22.8%). The MREFC account would include $46.3 million for the Advanced Laser Interferometer Gravitational Wave Observatory, $42.8 million for the Atacama Large Millimeter Array (down from $82.3 million), $14.3 million for the Ocean Observatories Initiative (which received $105.9 million in stimulus funding), and $0.95 million for IceCube (down from $11.3 million in its final year of funding).

The proposed budget includes an investment by NSF of $299.9 million to the federal interagency Climate Change Science Program (CCSP), an increase of $80.3 million (37%) above the FY 2009 budget. The budget also includes related requests for $197.3 million in new funding for interdisciplinary climate research and $10 million to launch the Climate Change Education Program. The proposed NSF climate research budget "is a leadership-scale investment on the part of the foundation, with funding in a number of directorates," NSF director Arden Bement Jr. said in a 14 May briefing.

Funding of $147.1 million would be slated for the Experimental Program to Stimulate Competitive Research (EPSCoR), an increase of $14.1 million (10.6%) above the FY 2009 level of $133 million. The National Nanotechnology Initiative would receive $423 million, an increase of $25.8 million (6.5%). Of that amount, Environment, Health, and Safety would receive $29.9 million, an increase of $2 million (7.1%). "You have the regulatory agencies that deal with regulations and standards in this area, but they need to be informed by the science," Bement explained.

Administration Priorities

Bement told *Eos* that with the new administration, things have been "very lively." He said the administration came in with "a pretty active agenda and started implementing it right from the very beginning. The administration is generally supportive of science, and they are trying to make up for flat funding or even negative funding over the past few years."

The administration has specific areas and priorities it wants to address, including providing funding for younger investigators ($203.8 million (up 11.6%) for NSF's Faculty Early Career Development Program (CAREER) and $122 million (up 6%) for the Graduate Research Fellowship Program), promoting interdisciplinary research, funding potentially transformative and high-risk research ($92 million), and focusing on clean energy, environmental, and climate research, he said.

"Fortunately, NSF is very well prepared and very well aligned with these priorities. We have been a 'go-to' agency right from the beginning" of the Obama administration, Bement told *Eos*, noting the agency's ability to marshal the talents of the academic community for initiatives such as the administration's recent 60-day cyber-security review.

Bement said NSF works in close coordination with other agencies on a number of interagency initiatives including climate change, energy, and nanotechnology. "We are developing the science base the other agencies are interested in," Bement said, noting that NSF is "focusing on the larger scientific issues, the grand challenge issues."

Polar and Education Programs

The budget for NSF's Office of Polar Programs (OPP) would go to $516 million, up $45.3 million, or 9.6% above the FY 2009 level of $470.7 million. Within the office, Arctic Sciences would increase 10.6% to $108.7 million, Antarctic Sciences would jump 11.1% to $72.5 million, and Antarctic Infrastructure and Logistics would increase 10.8% to $273.6 million. Plans call for committees of visitors to review these and other areas within OPP in FY 2009.

NSF's Education and Human Resources account would rise 1.5% to $857.75 million. It would include a 1.3% increase to $229.5 million for Research on Learning in Formal and Informal Settings and a 2.4% increase to $289.9 million for Undergraduate Education.

Geosciences Budget Would Increase 12.6%

The budget for the Directorate for Geosciences (GEO), which received more than $600 million in ARRA funding ($347 million plus appropriations for MREFC items related to the geosciences), would increase to $909 million, up $101.9 million (12.6%) from its $807.1 million budget for FY 2009. The budget includes funding for many of NSF's priorities, including climate research, collaborative activities, the CAREER program, and transformative and high-risk research.

NSF assistant director for geosciences Tim Killeen told *Eos* the FY 2010 budget proposal for GEO is "unprecedented" and would preserve the momentum behind the president's plan for science and innovation. "This is big news for NSF and for the geosciences. We've never had anything like it."

Within the GEO budget, funding for Atmospheric and Geospace Sciences (AGS) would increase to $269.2 million, $24.6 million (10%) above the FY 2009 budget of $244.6 million. Research and Education Grants would increase 10.6% to $259.4 million, and funding