Communicating science to policy: Writing policy briefs on why your science matters

Athena Copenhaver, Brendan Kelly, and George Kling
Study of Environmental Arctic Change

Twila Moon and Matthew Druckenmiller
NNA Community Office

SEARCH Study of Environmental Arctic Change

NNA CO

The Study of Environmental Arctic Change (SEARCH) &
the Navigating the New Arctic Community Office (NNA-CO)
are separately supported by the
National Science Foundation

Communicating science to policy:
Writing policy briefs on why your science matters

Session 1 (virtual):	January 18, 2024, 11:00am-12:30pm MT
Session 2 (virtual):	February 15, 2024, 2:00-3:30pm MT
	Register: https://www.nna-co.org/upcoming-events
Session 3 (In-person):	During the NNA Annual Community Meeting George Washington University, Washington DC March 5-7, 2024 *Exact time TBD*
	Register: https://www.nna-co.org/nna-annual-community-meetings (open through February 27, 2024)

Communicating science to policy:
Writing policy briefs on why your science matters

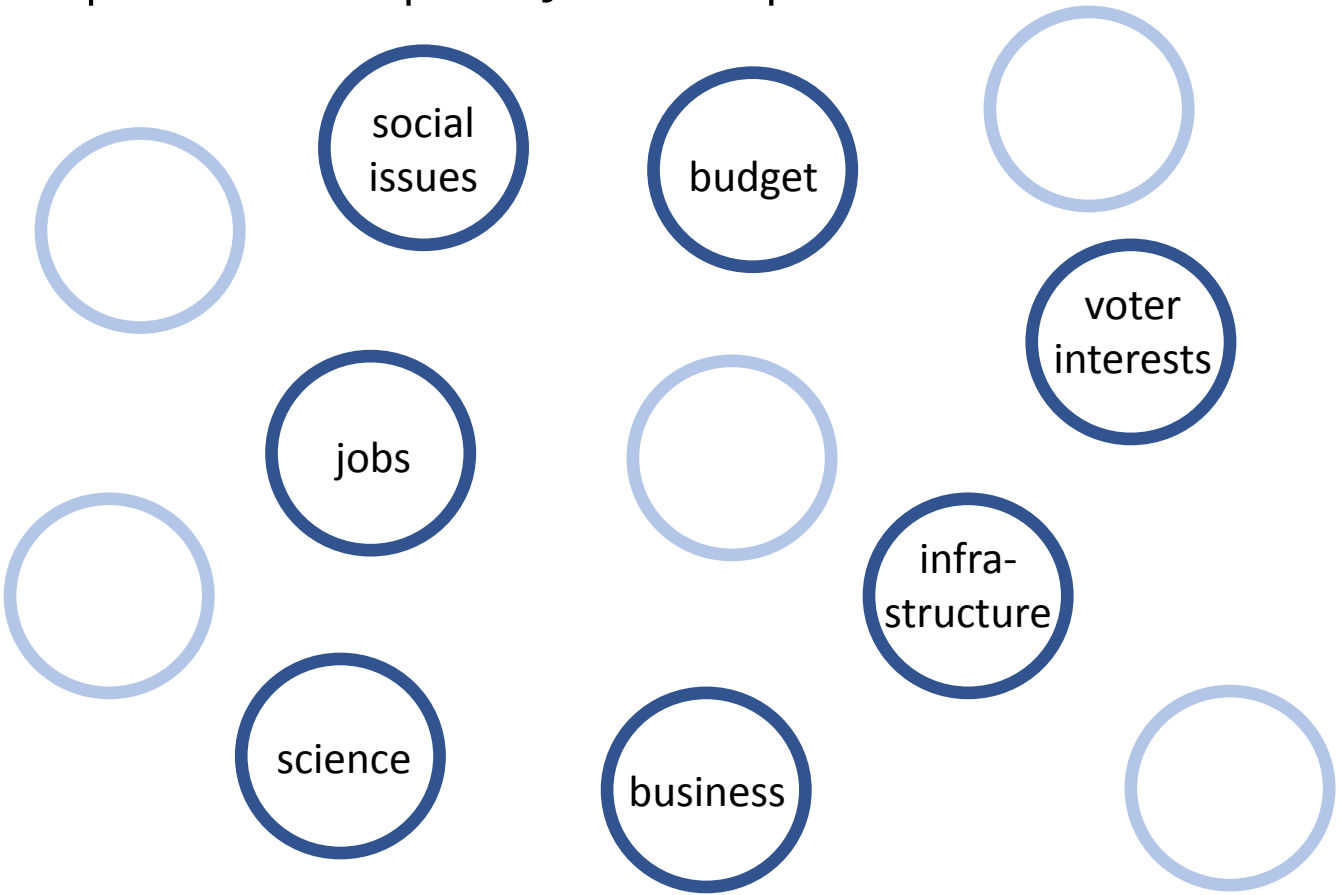
Agenda

- Why scholarly publications are necessary but not sufficient
- Arctic Answers - audiences, form, and function
- Breakout Group Exercise (~50 min)
  - Introductions
  - Draft statements of the issue and why it is important (Individual work time ~ 15 min)
  - Share drafts with one another
  - Provide constructive feedback to your colleagues
- Wrap-up and Next steps

Why isn’t my science paper enough?

- Much science remains behind paywalls & policymakers don’t subscribe
- Policymakers and staff members come from a range of expertise, many outside of science
    - Disciplinary jargon is a barrier to understanding
    - Acronyms confuse
    - Statistics and plots don’t tell a story on their own
- There is not time to read peer-reviewed literature, and it can be a challenge to understand context and implications

Science is a small part of the policymaker plate



Why isn't my science paper enough?

- Much science remains behind paywalls & policymakers don't subscribe
- Policymakers and staff members come from a range of expertise, many outside of science
  - Disciplinary jargon is a barrier to understanding
  - Acronyms confuse
  - Statistics and plots don't tell a story on their own
- There is not time to read peer-reviewed literature and it can be challenge to understand context and implications
- Science papers don't create personal relationships
- Your translation to policymaker interests and language is needed!

Policy Briefs are a common tool & familiar format

CEEL EDUCATION AND POLICY BRIEF

No. 12 | October 2023

THE IMPACT OF THE BILINGUAL TEACHER PROFESSIONAL DEVELOPMENT PROGRAM: EXPANDING OPPORTUNITIES TO GROW THE PROFESSION

Linda Kaminski, Ed.D. — Director of Research and Policy, Affiliate Faculty
Magaly Lavadenz, Ph.D. — Leavey Presidential Chair of Ethics and Moral Leadership, Executive Director
Elvira G. Armas, Ed.D. — Director of CEEL, Affiliate Faculty

Yale School of Management

— MARCH 8, 2020 —

YALE Y-RISE

How is Covid-19 affecting gender inequality in low-income countries?

Madison Levine, Niccolo Meriggi, Ahmed Mushfiq Mobarak, Vasudha Ramakrishna, and Maarten Voors

Gender disparities in social and economic outcomes, already larger in the developing world than in the rich countries, have been exacerbated by the pandemic. Policy action is

What has been the e
low- and middle-incon

Globally, 40% of employed women
ments of manufacturing, such as g
been among the most adversely affe

Women also constitute a majority of
jobs characterized by limited prote
(International Labour Organization,
men to reduce their paid working ho
ing burdens of unpaid work — carin

Such gender disparities are likely t

Enhancing EU legal frameworks for AI & robotics

SIENNA project Policy Brief #1

December, 2020

Highlights

To support and ensure ethical and human-rights respectful design, development, deployment and use of AI and robotics technologies, we need policy-makers to:

Who is this for?

European Union (EU) institutions, particularly the European Commission, European Parliament, European Council, Council of the European Union, European Data Protection Board, European Data

Tool: Science Briefs

Arctic Answers
Science briefs from the Study of Environmental Arctic Change (SEARCH)
https://www.arcus.org/search-program/arctic-answers

How are melting Arctic sea ice and land ice linked to sea-level rise?

THE ISSUE. Gr
altering ocean cu

WHY IT MAT
an area equal to t
large areas of G
adding several hu
directly to sea-le
that human-indu
disappearing sea

STATE OF KN
experienced melt
2007, 2010, then
extensive, but it c
This year, both se

A key culprit in
Greenland melt s
north-flowing wi
warm, moist air
These wind p
associated wi
"blocking high,"
winds spin off an
of circulating air.
these blocks tend
days to weeks,
systems from pr
they normally
persistent patte
unusual weather
event.

New research sug
region in summe
be a crucial facto
larger northward
of heat and moi
increase, so shou

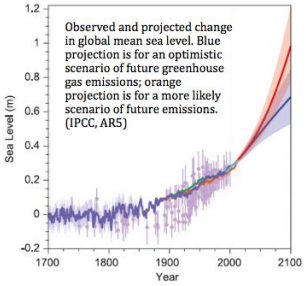
Blocking is not on
both sides of the
lead to flooding.

Arctic Answers
Science briefs from the Study of Environmental Arctic Change (SEARCH)
https://www.arcus.org/search-program/arctic-answers

How fast is sea level rising?

THE ISSUE. Rising sea level is a direct consequence of our warming climate. Increasing rates of warming have accelerated the rate of sea level rise, particularly in this century, and increased the frequency of coastal flooding.

WHY IT MATTERS. Flooding is the most common and most expensive natural disaster. Sea level changes tend to be gradual, but serve as the "launching pad" for storm surges, tides, and waves, allowing them to drive water farther inland, increasing damage to ecosystems and coastal infrastructure and threatening human life.



STATE OF KNOWLEDGE. Sea level has been rising since the end of the last ice age (~20,000 years ago). During periods of rapid ice sheet loss, sea level rose in excess of 40 mm/yr. During the 20th century, the rate averaged 1.5-1.9 mm/yr, due primarily to warming of the upper ocean (thermal expansion) but with a similar contribution from glacier loss [1]. More recently, the rate of sea level rise has increased to a present value of about 3.4 mm/yr due to increasing losses from glaciers and the Greenland ice sheet [1]. The globally averaged rate of sea level rise is projected to continue to increase as the oceans continue to warm and glaciers and ice sheets shrink faster. Estimates of globally averaged sea level by 2100 are likely in the range of 0.26 to 0.82 m higher than during the years 1986-2005, depending on the actual emissions of greenhouse gases by continued global development [1,2]. Sea level increases in this range will cause extensive damage in the US, particularly along the Atlantic and Gulf coasts.

Local changes of sea level can differ markedly from these globally averaged rates [3]. Three major factors affect these local variations, each of which have unique geographic variability; each is discussed in separate briefs. **Warming of the ocean causing the water to expand** and, thus, sea level to rise. Changes in surface winds and air-sea fluxes of heat and freshwater change ocean circulation and regional sea level. As warmer temperatures both melt more ice and increase ice flow into the

Arctic Answers
Science briefs from the Study of Environmental Arctic Change
https://www.searcharcticscience.org/arctic-answers

How does land motion influence sea level rise?

THE ISSUE. Loca
the ocean, but also
vertical land motio

WHY IT MATT
expected to rise, h
communities. Chan
Tectonics (e.g., earl
of water and ice a
"vertical land motio
contribute to very

Vertical land motio
absence of present
vertical land motio
in making sea-level

STATE OF KNO
vertical land motio
events, such as ear
motion.

A second source of
are constructed o
ground beneath c
extraction of oil an
sea level rise that a

A third source of v
sheets and glaciers
uplift, forming bulg
bulges subside. Th
time scales. Vertica
(20,000 years ago)
last ice age (Figur
Sheet, West Antarc
motion.

WHERE THE S
accessible Global P
motion due to the
GPS stations have b

Arctic Answers
Science briefs from the Study of Environmental Arctic Change
https://www.searcharcticscience.org/arctic-answers

How fast is the Greenland Ice Sheet melting?

THE ISSUE. The Greenland Ice Sheet and the glacier-covered areas of Alaska and other Arctic lands are losing ice at a

WHY IT MAT
these losses are
increasing more
remains importa
Given these tren
warming), the Ar

STATE OF KN
increased five-fol
mm in sea level r
per year[5-6]. Thes
changes, elevatio
the combination

In total, the Arcti
level each year, p
(0.4 mm) is adde
are 3.0 mm per y

Slightly cooler su
strong melting in
melting, and tem
to seasonal weat
outflow.

The trend over th
surface melting[9].
grown dramatica
accelerate as rap
to three times th
2015, and 2016 b

WHERE THE
Arctic land ice, b
which in turn is
impurities at the
energy absorbed
decrease in reflec
Greenland shows
the century[10,11,
the surface by m

Arctic Answers
Science briefs from the Study of Environmental Arctic Change
https://www.searcharcticscience.org/arctic-answers

How will coastal communities be affected by climate change?

THE ISSUE. Rising sea level and the expected increases in the frequency and severity of strong storms make coastal areas and their residents among the most vulnerable to natural hazards from a changing climate.

WHY IT MATTERS. Extreme weather events cause billions of dollars in damage, scores of deaths and injuries, and thousands of disrupted lives each year. Coastal areas are among the most developed regions in the world. In the United States, 23 of the 25 most densely populated counties are on the coast; globally, 19 of the 20 emerging mega cities are coastal. Damages from flooding exceed those from any other natural disaster.

STATE OF KNOWLEDGE. Steadily rising sea level threatens coastal communities around the world. While local rates of sea level rise vary, the sea today is nearly one-foot higher (globally) than 100 years ago. It is estimated that had Superstorm Sandy occurred without this increase, the damage would have been $2 billion less and flooding would have been less severe[1]. As sea levels rise, flooding events of all magnitudes are more likely to occur than in the past. Many areas have already experienced a sharp increase in "sunny day" flooding from predictable tidal patterns like spring tides and king tides[2]. Due to the expansion of warming ocean water and melting land ice in places like the Arctic, sea level is very likely to continue to rise through to the end of the century, with predictions only varying in the details regarding how much and how fast it will occur[3]

Exposure to natural hazards, particularly during sea-level extremes driven by events like hurricanes and intense rainfall, increases property damage and threatens lives. The lower atmospheric pressures of storms act to raise water levels—a drastic decrease in air pressure, which typically accompanies hurricanes and other severe weather systems, can cause an additional one-foot increase in sea level. These episodic weather events are expected to increase in frequency, intensity, and duration as global temperatures continue to increase. The intense wind and low pressure that accompany these events can exacerbate storm surges and produce larger, more damaging waves, thus increasing the risks and impacts from coastal flooding and erosion.

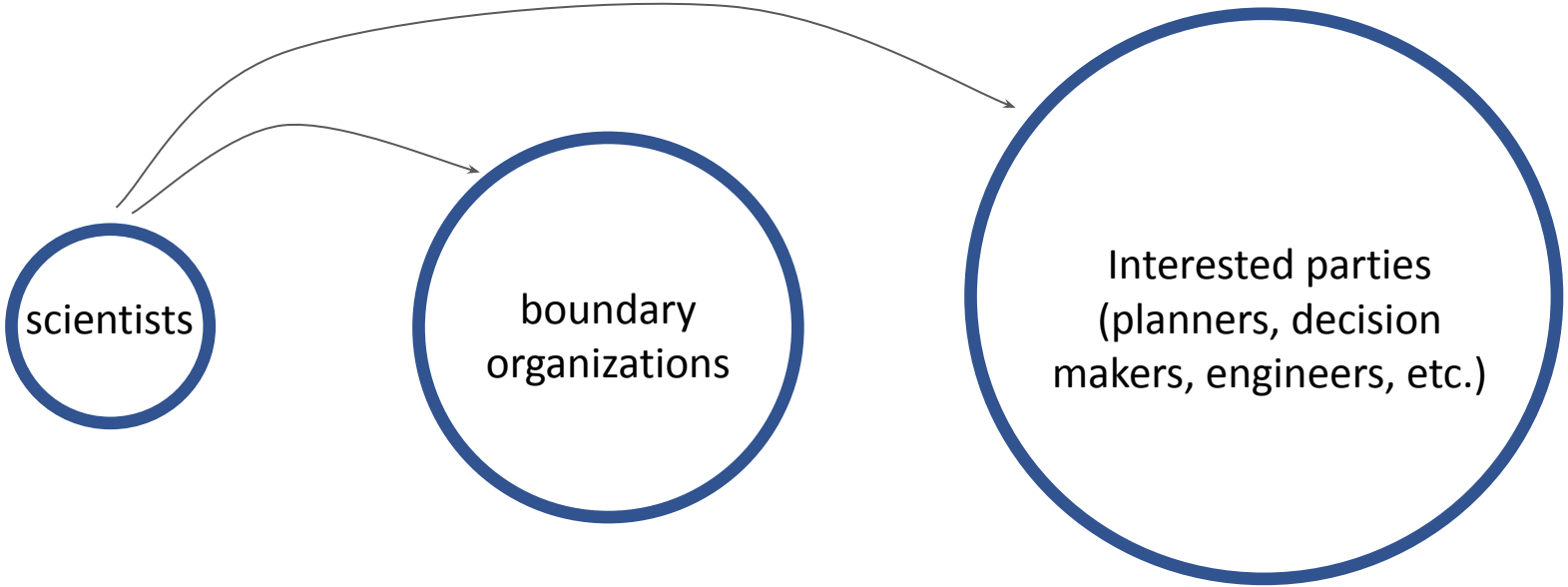
Briefs can be useful tools in many contexts

- Government
- Tribal
- Federal
- State
- Local (e.g. county, town)
- International

- Non-profit
- Corporation (big & small)

- Organization
- Community group

Consider direct and indirect connections



Decision makers want:

- local information from local/regional sources
- information updates that connect with planning timelines
- ~settled science

Your Brief can facilitate direct scientist & decision maker relationship building

- Think of your Brief as your science business card
- Establish yourself as a topical expert & contact
- Determine your primary point of contact & check-in when you have new briefs
- Think broadly about who will be most interested in your work
- Ask questions about what is most helpful & needed

Know your audience
Respect your audience

Form follows function


Research evolves over long periods
Policy challenges evolve rapidly

Writing an Arctic Answers Brief

Arctic Answers
Science briefs from the Study of Environmental Arctic Change (SEARCH)
https://www.arcus.org/search-program/arctic-answers

How is land ice changing in the Arctic, and what is the influence on sea level?

THE ISSUE. The Arctic has warmed far faster than the rest of the globe. It has already reached the +2°C warming ceiling set by the Paris Accord. As a result, ice in the Arctic is melting rapidly, and shrinking Arctic land ice is contributing a large fraction of the current rate of sea level rise. Understanding where Arctic land ice is being lost and how quickly it will retreat in the future is key to projecting the rates of sea level rise around the globe.

WHY IT MATTERS. Sea level rise, even at present rates (~3.5 mm/yr), exacerbates coastal flooding and erosion, groundwater infiltration, and wetlands degradation. Melting land ice, particularly in the Arctic and Alaska, now contributes more than 60% of total global sea level increase each year. Land ice areas – glaciers, small ice caps, and the Greenland and Antarctica ice sheets – are responding in complex ways to Earth's rapidly warming climate and ocean. They are not just melting, but also accelerating and thinning along coasts where thick ice and warmer ocean waters meet. Land ice loss is projected to increase as warming increases, accelerating sea level rise.

Globally, glaciers are losing 260 billion tons of ice per year (equal to 0.7 mm sea level rise) and Arctic land ice accounts for 75% of this. If completely melted, glaciers would raise sea level 50 cm (18 inches). This contribution will begin to decrease late in this century as glaciers disappear. The Greenland Ice Sheet, which represents about 7 meters (23 feet) of total sea level rise (see Figure 1), will continue to increase its contribution, currently at 285 billion tons per year.

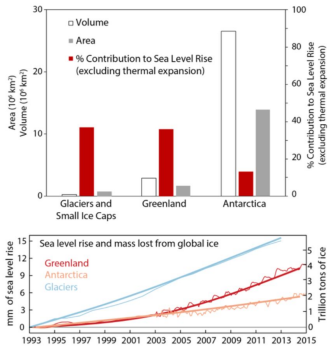


Figure 1. *Top*: land ice volume and area show potential for future sea level rise, with current contributions in red [NSIDC]. *Bottom*: Ice mass loss and sea level rise from land ice [Chen et al. 2017].

STATE OF KNOWLEDGE. Arctic glaciers and land ice caps are sometimes subdivided according to the environment where the ice ends: on land, or in a lake, or the ocean. These differences have an influence on how the glacier or ice sheet responds to changes in air and water temperatures.

Examples of the observed changes the warmer Arctic climate and ocean have caused:

- Abnormal and widespread retreat of glaciers across the Arctic, including Alaska (see Figure 2), Canada, and Greenland. Some glaciers have disappeared entirely.

- Increases in surface melt on ice caps and the Greenland Ice Sheet. Surface melting on Arctic land ice leads to meltwater runoff via streams, rivers, or directly into the ocean. In Greenland increased warming is also exposing darker (dirtier) ice, which absorbs more heat and accelerates meltwater production.
- Faster ice flow in many glaciers across the Arctic. Speed up and glacier retreat are especially dramatic for glaciers that end in the ocean.

Based on direct observations and continuing study with computer simulations, the basic causes and mechanisms of land ice loss are well understood. Using this knowledge, computer simulations project future changes in land ice. These research efforts indicate that land ice loss will accelerate significantly. In particular, loss due to surface melt in Greenland, and continued high losses in areas where deep ice contacts the ocean, are forecast.

Figure 2. Dramatic retreat between 1941 and 2004 of the Muir Glacier in Glacier Bay National Park and Preserve, Alaska. This pattern of glacier retreat has now been observed across the world [NSIDC Photo Archive].

WHERE THE SCIENCE IS HEADED. Land ice loss in the Arctic will continue. However, estimates of sea level rise from land ice loss have larger uncertainties than other sources of sea level rise. Reducing these uncertainties requires focused research on glacier and ice sheet processes, particularly involving the details of ice interactions with ocean and atmosphere. A primary goal is to use observational studies to improve computer simulations and further constrain the range of sea level rise expected over the next centuries.

KEY REFERENCES

1. Huss, M., & Hock, R. (2015). A new model for global glacier change and sea-level rise. Frontiers in Earth Science, 3(September), 1–22. http://doi.org/10.3389/feart.2015.00054.
2. Chen, X., X. Zhang, J. A. Church, C. S. Watson, M. A. King, D. Monselesan, B. Legresy, and C. Harig (2017), The increasing rate of global mean sea-level rise during 1993–2014, Nature Climate Change, 7(7), 492–495, doi: 10.1038/nclimate3325.

SEARCH: Study of Environmental Arctic Change
Advancing knowledge for action in a rapidly changing Arctic
https://www.arcus.org/search-program

Contacts for further information:
Ted Scambos,
National Snow and Ice Data Center
teds@nsidc.org
Twila Moon
National Snow and Ice Data Center
twila.moon@nsidc.org

SEARCH activities are supported by a collaborative grant from the National Science Foundation to the International Arctic Research Center (PLR-1331100) and the Arctic Research Consortium of the U.S. (PLR-1331083).

Writing an Arctic Answers Brief

The Issue

Why It Matters

State of Knowledge

Where the Research is Headed

References & Expert Contacts

Arctic Answers
Science briefs from the Study of Environmental Arctic Change (SEARCH)
https://www.arcus.org/search-program/arctic-answers

How is land ice changing in the Arctic, and what is the influence on sea level?

THE ISSUE. The Arctic has warmed far faster than the rest of the globe. It has already reached the +2°C warming ceiling set by the Paris Accord. As a result, ice in the Arctic is melting rapidly, and shrinking Arctic land ice is contributing a large fraction of the current rate of sea level rise. Understanding where Arctic land ice is being lost and how quickly it will retreat in the future is key to projecting the rates of sea level rise around the globe.

WHY IT MATTERS. Sea level rise, even at present rates (~3.5 mm/yr), exacerbates coastal flooding and erosion, groundwater infiltration, and wetlands degradation. Melting land ice, particularly in the Arctic and Alaska, now contributes more than 60% of total global sea level increase each year. Land ice areas – glaciers, small ice caps, and the Greenland and Antarctica ice sheets – are responding in complex ways to Earth's rapidly warming climate and ocean. They are not just melting, but also accelerating and thinning along coasts where thick ice and warmer ocean waters meet. Land ice loss is projected to increase as warming increases, accelerating sea level rise.

Globally, glaciers are losing 260 billion tons of ice per year (equal to 0.7 mm sea level rise) and Arctic land ice accounts for 75% of this. If completely melted, glaciers would raise sea level 50 cm (18 inches). This contribution will begin to decrease late in this century as glaciers disappear. The Greenland Ice Sheet, which represents about 7 meters (23 feet) of total sea level rise (see Figure 1), will continue to increase its contribution, currently at 285 billion tons per year.

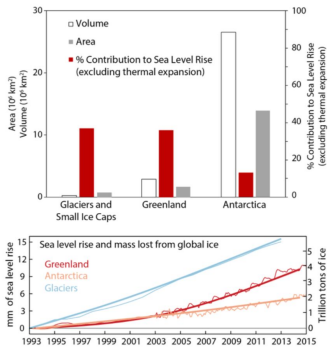


Figure 1. *Top*: land ice volume and area show potential for future sea level rise, with current contributions in red [NSIDC]. *Bottom*: Ice mass loss and sea level rise from land ice [Chen et al. 2017].

STATE OF KNOWLEDGE. Arctic glaciers and land ice caps are sometimes subdivided according to the environment where the ice ends: on land, or in a lake, or the ocean. These differences have an influence on how the glacier or ice sheet responds to changes in air and water temperatures.

Examples of the observed changes the warmer Arctic climate and ocean have caused:

- Abnormal and widespread retreat of glaciers across the Arctic, including Alaska (see Figure 2), Canada, and Greenland. Some glaciers have disappeared entirely.

June 2017

- Increases in surface melt on ice caps and the Greenland Ice Sheet. Surface melting on Arctic land ice leads to meltwater runoff via streams, rivers, or directly into the ocean. In Greenland increased warming is also exposing darker (dirtier) ice, which absorbs more heat and accelerates meltwater production.
- Faster ice flow in many glaciers across the Arctic. Speed up and glacier retreat are especially dramatic for glaciers that end in the ocean.

Figure 2. Dramatic retreat between 1941 and 2004 of the Muir Glacier in Glacier Bay National Park and Preserve, Alaska. This pattern of glacier retreat has now been observed across the world [NSIDC Photo Archive].

Based on direct observations and continuing study with computer simulations, the basic causes and mechanisms of land ice loss are well understood. Using this knowledge, computer simulations project future changes in land ice. These research efforts indicate that land ice loss will accelerate significantly. In particular, loss due to surface melt in Greenland, and continued high losses in areas where deep ice contacts the ocean, are forecast.

WHERE THE SCIENCE IS HEADED. Land ice loss in the Arctic will continue. However, estimates of sea level rise from land ice loss have larger uncertainties than other sources of sea level rise. Reducing these uncertainties requires focused research on glacier and ice sheet processes, particularly involving the details of ice interactions with ocean and atmosphere. A primary goal is to use observational studies to improve computer simulations and further constrain the range of sea level rise expected over the next centuries.

KEY REFERENCES

1. Huss, M., & Hock, R. (2015). A new model for global glacier change and sea-level rise. Frontiers in Earth Science, 3(September), 1–22. http://doi.org/10.3389/feart.2015.00054.
2. Chen, X., X. Zhang, J. A. Church, C. S. Watson, M. A. King, D. Monselesan, B. Legresy, and C. Harig (2017), The increasing rate of global mean sea-level rise during 1993–2014, Nature Climate Change, 7(7), 492–495, doi: 10.1038/nclimate3325.

SEARCH: Study of Environmental Arctic Change
Advancing knowledge for action in a rapidly changing Arctic
https://www.arcus.org/search-program

Contacts for further information:
Ted Scambos,
National Snow and Ice Data Center
teds@nsidc.org
Twila Moon
National Snow and Ice Data Center
twila.moon@nsidc.org

SEARCH activities are supported by a collaborative grant from the National Science Foundation to the International Arctic Research Center (PLR-1331100) and the Arctic Research Consortium of the U.S. (PLR-1331083).

Writing an Arctic Answers Brief

SUPPLEMENTAL MATERIAL for
ARCTIC, ANTARCTIC, AND ALPINE RESEARCH
2021, VOL. 53, NO. 1, pp. 223-224
https://doi.org/10.1080/15230430.2021.1946242.

Arctic Answers Knowledge Pyramid

"Arctic Meltdown and Unruly Tropical Storms: Are They Connected?"

by J. A. Francis

Arctic Answers Briefs answer questions about Arctic environmental change that are framed for policy makers. Each Brief concisely conveys the state of the science. The **Knowledge Pyramid** of the state of the science and knowledge is presented below with the Arctic Answers Brief at the apex, built upon layers of references of increasingly more technical information: summaries, synthesis papers, and the building blocks of detailed basic research and technical academic studies.

Key References ← Key References

Key References: ***Selected references that provide state-of-the-art synthesis information needed to answer policy-relevant questions about rapid Arctic change.***

Duan, L., L. Cao, and K. Caldeira. 2019. Estimating contributions of sea ice and land snow to climate feedback. *Journal of Geophysical Research: Atmospheres* 124:199-208. https://doi.org/10.1029/2018JD029093.

Greene, C.H., J.A. Francis, and B.C. Monger. 2013. Superstorm Sandy: A series of unfortunate events? *Oceanography* 26 (1):8–9. http://dx.doi.org/10.5670/oceanog.2013.11.

Knutson, T. R., M.V. Chung, G. Vecchi, J. Sun, T.-L. Hsieh, and A.J.P. Smith. 2021. ScienceBrief Review: Climate change is probably increasing the intensity of tropical cyclones. In: *Critical Issues in Climate Change Science,* eds. C. Le Quéré, P. Liss, and P. Forster. https://doi.org/10.5281/zenodo.4570334.

Kossin, J.P. 2018. A global slowdown of tropical-cyclone translation speed. *Nature* 558:104–107. https://doi.org/10.1038/s41586-018-0158-3.

Mann, M.E., S. Rahmstorf, K. Kornhuber, B.A. Steinman, S.K. Miller, and D. Coumou. 2017. Influence of anthropogenic climate change on planetary wave resonance and extreme weather events. *Nature Scientific Reports* 7. https://doi:10.1038/srep45242.

Voosen, P. 2021. Arctic ice loss not a big culprit in harsh winters. *Science* 372 (6543):668-669. https://doi:10.1126/science.372.6543.668.

Woolings, T., D. Barriopedro, J. Methven, S.-W. Son, O. Martius, B. Harvey, J. Sillmann, A.R. Lupo, and S. Seneviratne. 2018. Blocking and its response to climate change. *Current Climate Change Reports* 4:287-300. https://doi.org/10.1007/s40641-018-0108-z.

Summaries ← Summaries

Summaries: ***Accessible summaries of main findings, critical questions, and societal importance.***

Harvey, C. 2021. Hurricanes Are Hitting Maximum Strength Closer to Land. *Scientific American*, E&E News, Natural Disasters, 29 January 2021. https://www.scientificamerican.com/article/hurricanes-are-hitting-maximum-strength-closer-to-land/.

Knutson, T.R., M.V. Chung, G. Vecchi, J. Sun, T.-L. Hsieh, and A.J.P. Smith. 2021. Climate change is probably increasing the intensity of tropical cyclones. *ScienceBrief Review* 26 March 2021. https://news.sciencebrief.org/cyclones-ar2021/.

SUPPLEMENTAL MATERIAL for
ARCTIC, ANTARCTIC, AND ALPINE RESEARCH
2021, VOL. 53, NO. 1, pp. 223-224
https://doi.org/10.1080/15230430.2021.1946242.

ARCTIC ANSWERS
KNOWLEDGE PYRAMID

Syntheses: ***Resources for a comprehensive understanding of the issue and how different concepts interrelate.*** ← Syntheses

Overland, J.E., T. J. Ballinger, J. Cohen, J.A. Francis, E. Hanna, R. Jaiser, B.-M. Kim, S.-J. Kim, J. Ukita, and T. Vihma. 2021. *Environmental Research Letters* 16:043002. https://doi.org/10.1088/1748-9326/abdb5d.

Building Blocks: ***Technical studies with details and foundational information about individual concepts.*** ← Building Blocks

Coumou, D., J. Lehmann, and J. Beckmann. 2015. The weakening summer circulation in the Northern Hemisphere mid-latitudes. *Science* 348 (6232):324–327. https://doi:10.1126/science.1261768.

Tachibana, Y., K.K. Komatsu, V.A. Alexeev et al. 2019. Warm hole in Pacific Arctic sea ice cover forced mid-latitude Northern Hemisphere cooling during winter 2017–18. *Scientific Reports* 9:5567. https://doi.org/10.1038/s41598-019-41682-4.

Information Classification: General
SEARCH: https://www.searcharcticscience.org/

Tips for writing successful policy briefs

- Focus!
- Focus mostly on what we do know and information that can be used for actionable decision making
- Carefully consider what this audience needs to know for making decisions
- Avoid jargon
- Use impactful images
- Identify research contacts who are prepared to respond promptly