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Introduction to Atmospheric Librarianship 101: Overview and Frequently Asked Reference Questions

February 18, 2021

Emily C. Wild, Chemistry, Geosciences and Environmental Studies Librarian
ewild@princeton.edu 609-258-5484



What is Atmospheric Science?

<https://eros.usgs.gov/image-gallery/earth-as-art>



Atmospheric science is the study of the physics and chemistry of clouds, gases, and aerosols (airborne particles) that surround the planetary bodies of the solar system. Research in atmospheric science includes such varied areas of interest as:

Climatology — the study of long-term weather and temperature trends.

Dynamic meteorology — the study of the motions of the atmosphere.

Cloud physics — the formation and evolution of clouds and precipitation.

Atmospheric chemistry — the chemical composition of the atmosphere.

Atmospheric physics — the study of processes such as heating and cooling of the atmosphere.

Aeronomy — the study of the upper atmosphere.

Oceanography — the study of the Earth's oceans and how they affect the atmosphere.

Most atmospheric scientists study the atmosphere of the Earth, while others study the atmospheres of the planets and moons in our solar system.

Quick Bio



Emily C. Wild

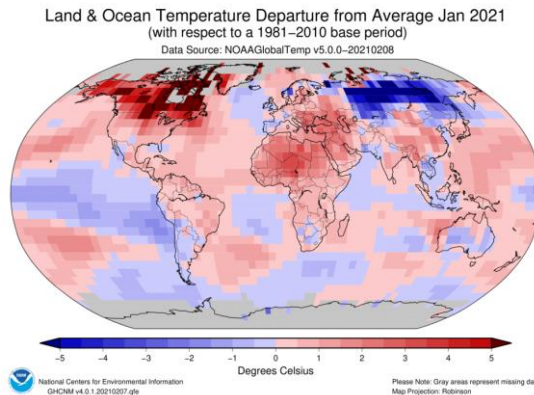
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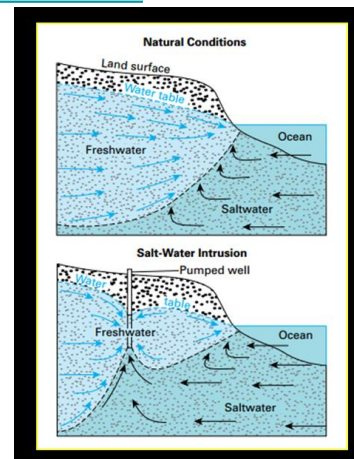
[Meet Our Specialists – Emily Wild](#)

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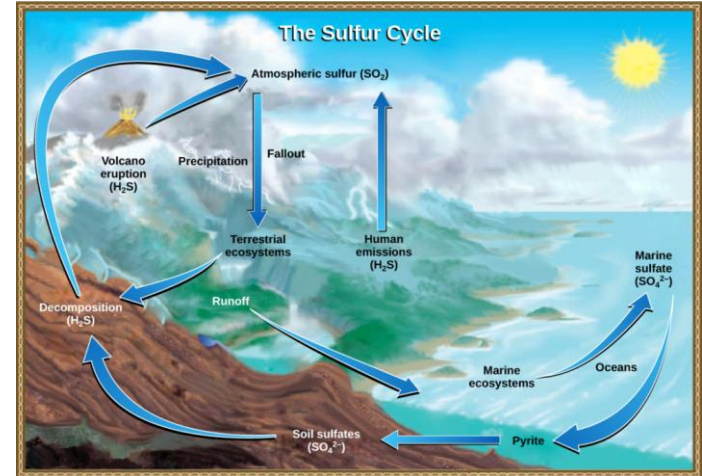
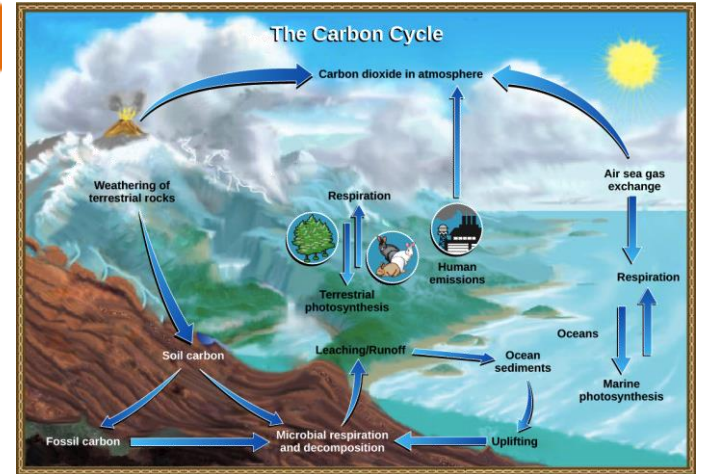
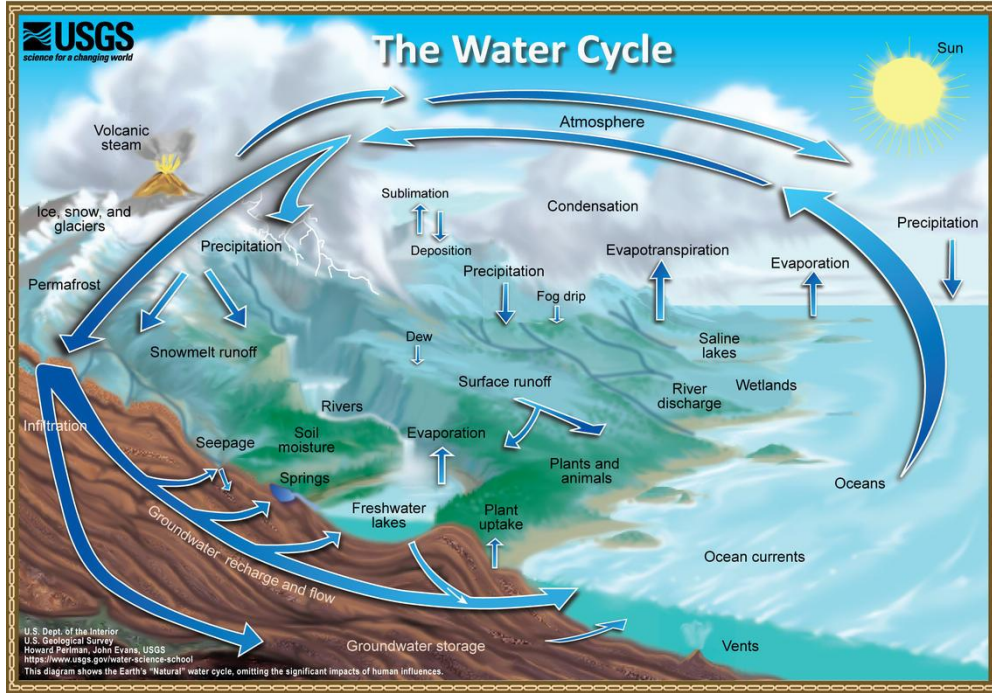
- U.S. Geological Survey: <https://www.usgs.gov/staff-profiles/emily-wild>
- Denver, Colorado : 2008-2018 - **Librarian (Physical Scientist)** : Water, Minerals, Energy & Hazards research services, instruction, and outreach
- NH-VT & MA-RI: 1996-2008 **Hydrologist**: Water Use, Surface Water, Groundwater, Water Quality, Coastal Waters, Bibliographic Databases, NWIS Groundwater Database Administrator ; **Saltwater Intrusion Project Bibliography** <https://pubs.usgs.gov/of/2002/ofr02235/>



<https://www.ncdc.noaa.gov/temp-and-precip/global-maps/>



Wait, hydrologists know about the Ocean & Atmosphere? Yes!



<https://www.usgs.gov/special-topic/water-science-school/science/water-cycle>

Atmosphere, Ocean, Climate

NY: Whiteface Mountain <https://www.albany.edu/asrc/wfm.php>

NH: NOAA Office of Coastal Management:
<https://coast.noaa.gov/states/new-hampshire.html>

VT: Climate Change in Vermont <https://climatechange.vermont.gov/our-changing-climate/dashboard/more-annual-precipitation>

MA: Woods Hole Oceanographic Institution <https://www.whoi.edu/> &
USGS Woods Hole Coastal and Marine Science Center
<https://www.usgs.gov/centers/whcmssc>

RI: URI's Graduate School of Oceanography (GSO)
<https://web.uri.edu/gso/> & NOAA Narragansett Lab:
<https://www.fisheries.noaa.gov/about/narragansett-laboratory> & EPA Lab
<https://www.epa.gov/greeningepa/atlantic-coastal-environmental-sciences-division-acesd-laboratory>

CO: NOAA Boulder Labs <https://www.boulder.noaa.gov/>
National Center for Atmospheric Research (NCAR)
<https://ncar.ucar.edu/who-we-are>
University Corporation for Atmospheric Research (UCAR)
<https://www.ucar.edu/>

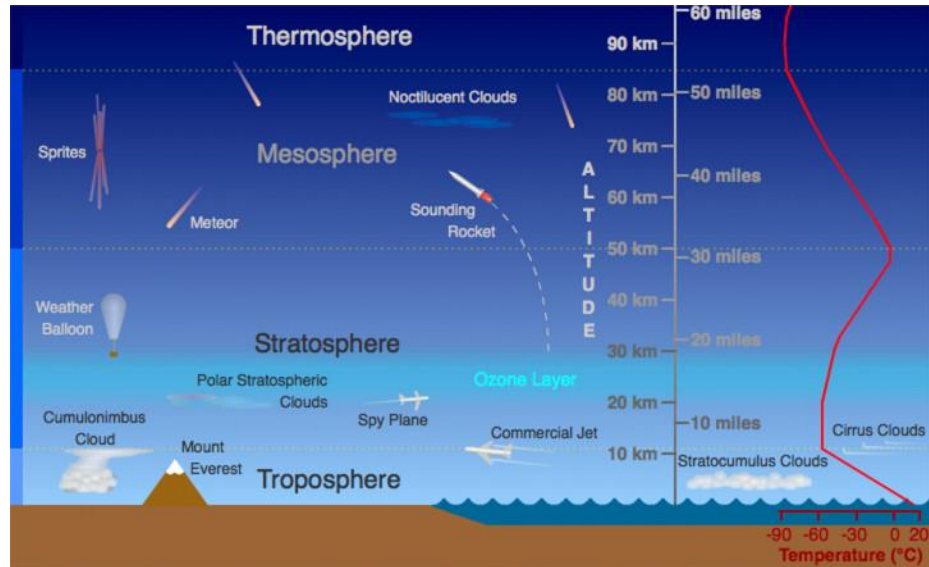
USGS Santa Cruz, CA <https://www.usgs.gov/centers/pcmssc>
USGS St. Petersburg, FL <https://www.usgs.gov/centers/spcmssc>

[NWS Home](#) > [Climate](#) > [NWS Philadelphia/Mount Holly](#) > [Climate Resources](#)

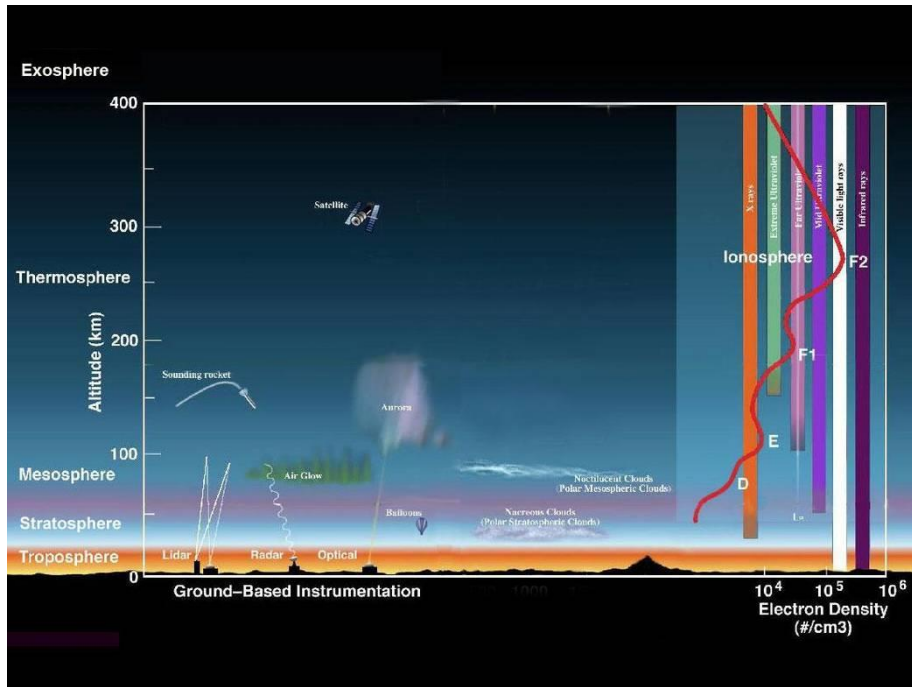
https://w2.weather.gov/climate/climate_resources.php?wfo=phi

- [Climate Information Outside the Local Office Area](#)
- [Climate Information Outside the Local Office Area](#)
- [Regional Climate Centers](#)
- [State Climate Offices](#)
- [National Centers for Environmental Information \(NCEI\)](#)
- [National Climate Information](#)
- [National Temperature and Precipitation Summary for Selected Cities](#)
- [National Operational Hydrologic Remote Sensing Center](#)
- [NOAA's Climate Page](#)
- [National Centers for Environmental Information \(NCEI\)](#)
- [Climate of the U.S.](#)
- [Climate Prediction Center](#)
- [Earth System Research Laboratory \(ESRL\)](#)
- [NOAA's El Niño and La Niña Pages](#)
- [NOAA's Drought Monitoring Page](#)
- [NOAA's Storm Event Archives](#)
- [U.S. Hazards Outlook](#)
- [International Climate Information](#)
- [World Meteorological Organization](#)
- [World Climate](#)
- [Global Climate Extremes](#)
- [Global Climate Change](#)
- [Global Climate Observing System](#)
- [Climate Data Online \(CDO\)](#)

Atmosphere Layers



<https://scied.ucar.edu/atmosphere-layers>



https://www.nasa.gov/mission_pages/sunearth/science/atmosphere-layers2.html

The screenshot shows the USGS National Water Dashboard interface. At the top, the USGS logo and "National Water Dashboard" are displayed. Below this, a dark blue header contains the text "NATIONAL WATER DASHBOARD" and "DATA SOURCES FROM" followed by logos for USGS, National Weather Service, IEM, NIDIS, and RealEarth. The main content area features a map of New Jersey with numerous colored circular markers representing water stations. To the right of the map, there are two panels: "USGS Stations" with a "STREAMS" filter set to 7956, and a "Streams: Flow" legend. The legend lists three flow categories: "0 cubic feet per second" (yellow), "> 0 - 10 cubic feet per second" (green), and "> 10 - 100 cubic feet per second" (blue). A red arrow points to the "Legend" button in the legend panel. Text callouts are overlaid on the map and legend panels, providing instructions on how to toggle map layers and view detailed map symbology.

USGS National Water Dashboard

USGS science for a changing world

NATIONAL WATER DASHBOARD

DATA SOURCES FROM

USGS science for a changing world

NATIONAL WEATHER SERVICE

IEM

NIDIS

RealEarth

View over 13,000 USGS real-time stream, lake, reservoir, precipitation, water quality, & groundwater stations in context with current weather & hazard conditions.

Data are refreshed every minute.

USGS Stations

1

STREAMS 7956

Flow status

Map layers can be toggled on or off from the Layers menu.

Streams: Flow

Legend 2

- 0 cubic feet per second
- > 0 - 10 cubic feet per second
- > 10 - 100 cubic feet per second

Detailed map symbology is used to quickly & clearly convey conditions.

USGS National Water Dashboard
science for a changing world

Overview Layers 6 Legend 7 Tools

EXPERIMENTAL

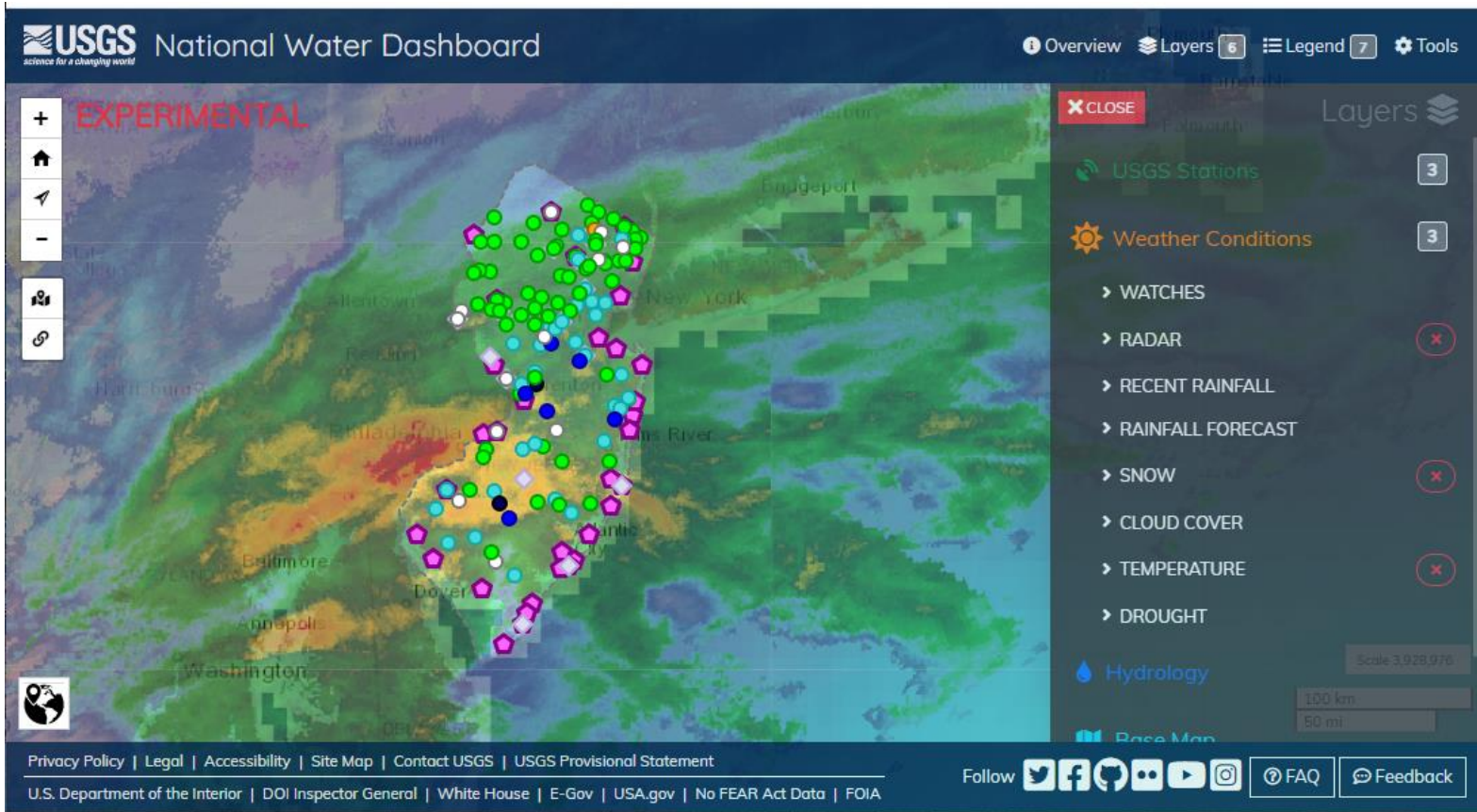
Layers

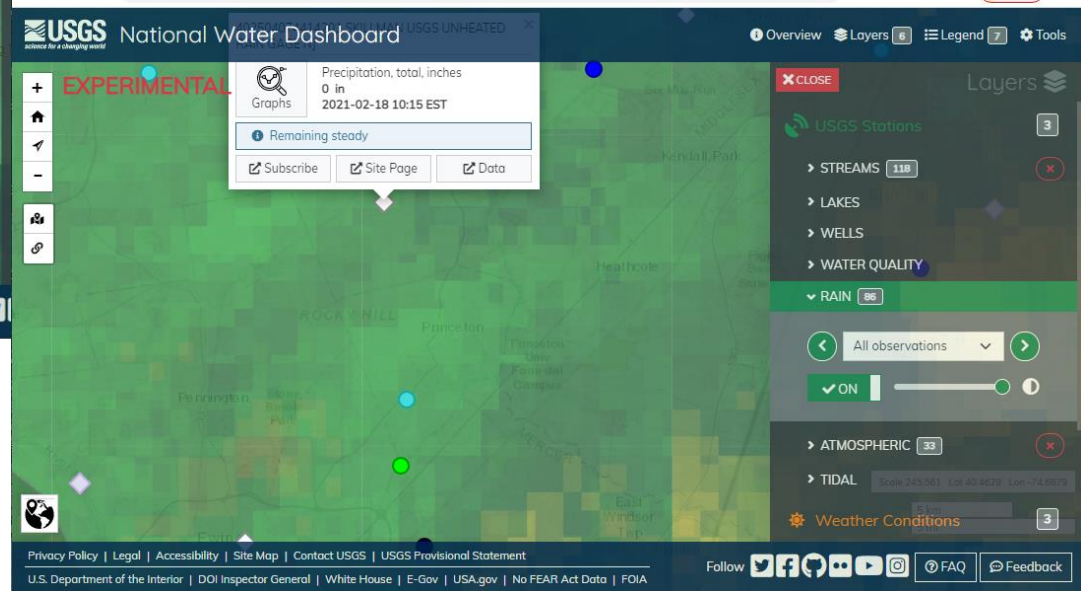
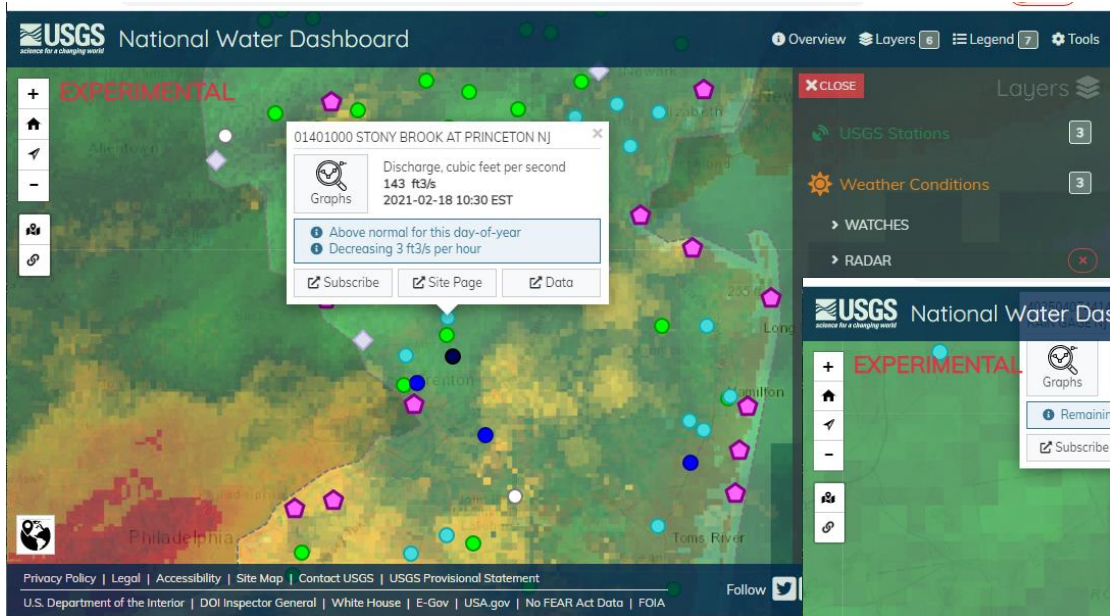
- USGS Stations 3
- STREAMS 118
- LAKES
- WELLS
- WATER QUALITY
- RAIN 16
- ATMOSPHERIC 33
- TIDAL
- Weather Conditions 3
- Hydrology
- Base Map

Scale 3,028,976
100 km
50 mi

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weather.gov/phi/

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by city, ST or ZIP code
Enter location ... Go
[Location Help](#)

News Headlines

- [Snowfall reports past 24 hours \(graphical\)](#)
- [The latest briefing on the Winter Weather expected this week](#)
- [February 7th Snowfall Reports](#)

MY FORECAST
Mount Holly NJ

NWS Forecast Office Philadelphia/Mt Holly
[Weather.gov > Philadelphia/Mt Holly](#)

Philadelphia/Mt Holly
Weather Forecast Office

Current Hazards Current Conditions Radar Forecasts Rivers and Lakes Climate and Past Weather Local Programs

Click a location below for detailed forecast.

Watches, Warnings & Advisories

- Winter Storm Warning
- Gale Warning
- Winter Weather Advisory
- Small Craft Advisory
- Special Weather Statement
- Hazardous Weather Outlook

Light Snow Freezing Fog
26°F
-3°C Get Detailed info
Today
100%
Wintry Mix
High: 30°F

Last Map Update: Thu, Feb. 18, 2021 at 11:20:29 am EST

<https://www.weather.gov/phi/>

ndbc.noaa.gov

National Oceanic and Atmospheric Administration
National Data Buoy Center
Center of Excellence in Marine Technology

Home About Us Contact Us Search NDBC Web Site

Station ID Search: Go

Station List: Recent Data Historical Data Show Labels Map Type: Oceans Bookmark This Link to Save Current Map View

Data Access: Mobile Access Classic Maps Recent DARTO Obs Search Ship Obs Report Buoy/CAMS TAO DODS OceanSITES HF Radar OSMC Dial-A-Buoy RSS Feeds Web Widget Web Data Guide Maintenance Schedule Station Status Report

Program Filter: NDBC Meteorological/Ocean International Partners IOOS Partners

Owner Filter: NDBC Alaska Ocean Observing System Amerasia Hess

Station 44065
NDBC
Location: 40.369N 73.703W
Date: Thu, 18 Feb 2021 16:10:00 UTC
Winds: NNE (30°) at 17.5 kt gusting to 21.4 kt
Atmospheric Pressure: 30.38 in
Water Temperature: 38.5 F
[View Details](#) [View History](#)

Wind Speed/Air Pressure at 44065
Image Credit: NDATA/NIS/NDBC

35
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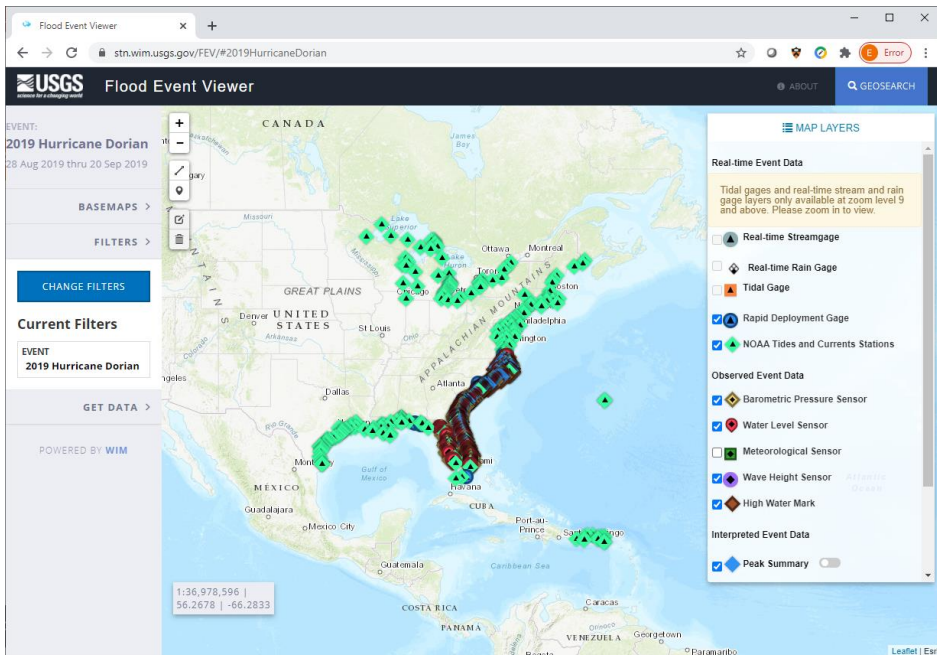
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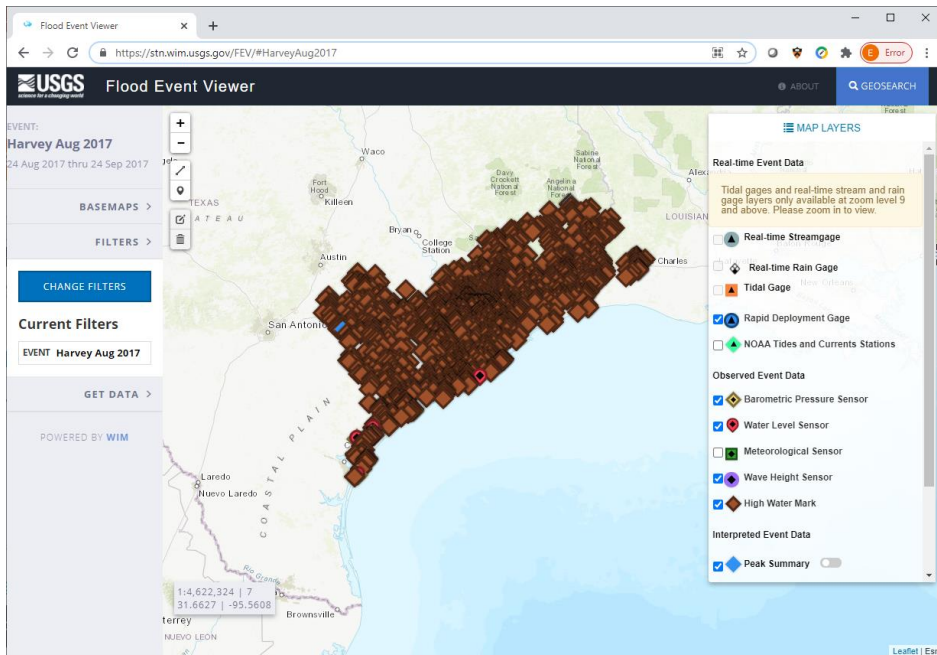
Wind Speed Wind Gust Air Pressure

<https://www.weather.gov/phi/marine>

<https://www.ndbc.noaa.gov/>



<https://stn.wim.usgs.gov/FEV/#2019HurricaneDorian>

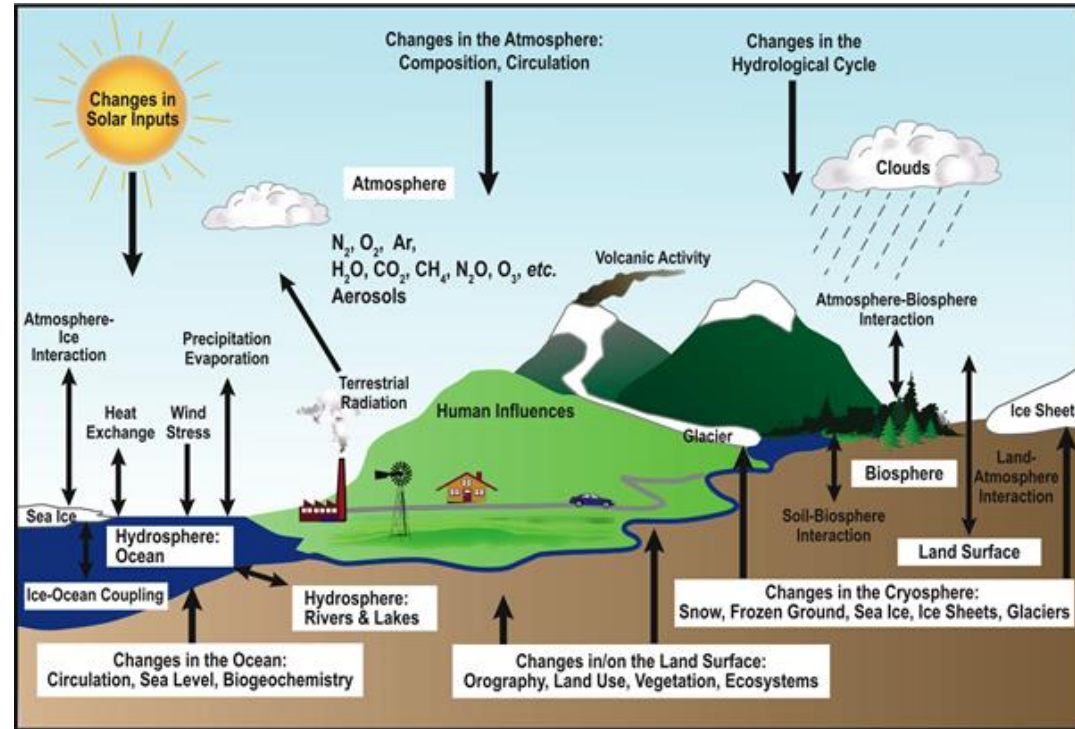


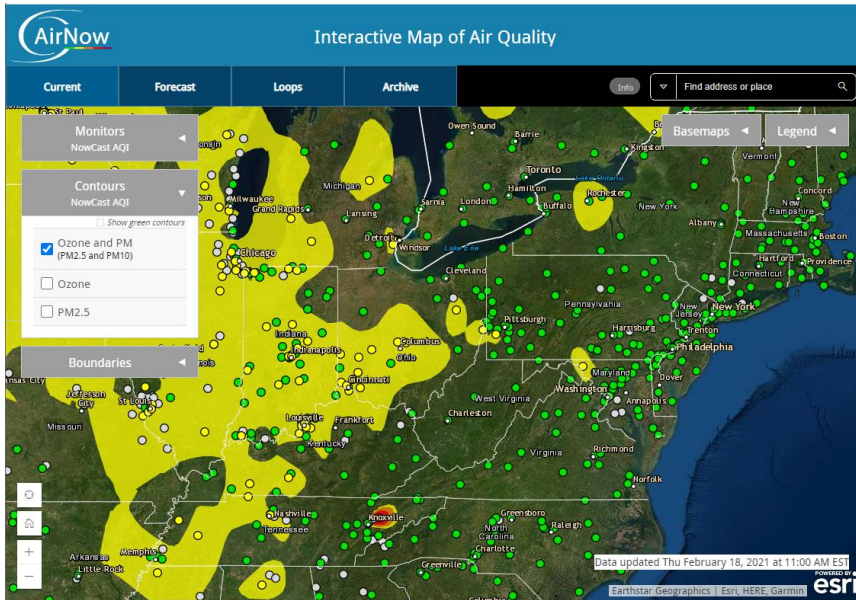
<https://stn.wim.usgs.gov/FEV/#HarveyAug2017>

What is the difference between Climate & Weather?

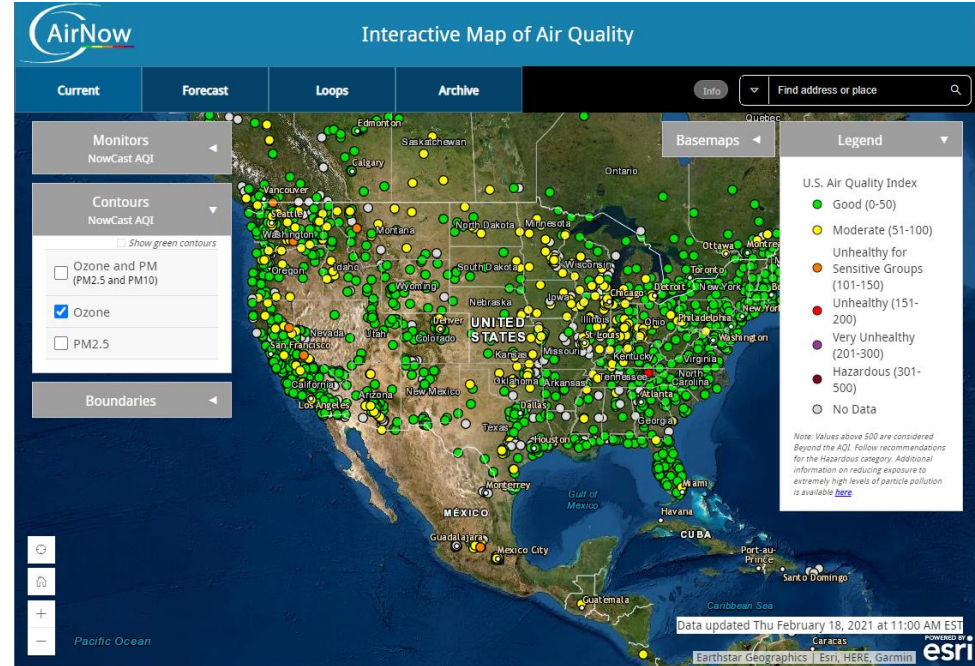
Weather is defined as the state of the atmosphere at a given time and place, with respect to variables such as temperature, moisture, wind speed and direction, and barometric pressure.

Climate is defined as the expected frequency of specific states of the atmosphere, ocean, and land including variables such as temperature (land, ocean, and atmosphere), salinity (oceans), soil moisture (land), wind speed and direction (atmosphere), current strength and direction (oceans). Climate encompasses the weather over different periods of time and also relates to mutual interactions between the components of the earth system (e.g., atmospheric composition, volcanic eruptions, changes in the earth's orbit around the sun, changes in the energy from the sun itself).



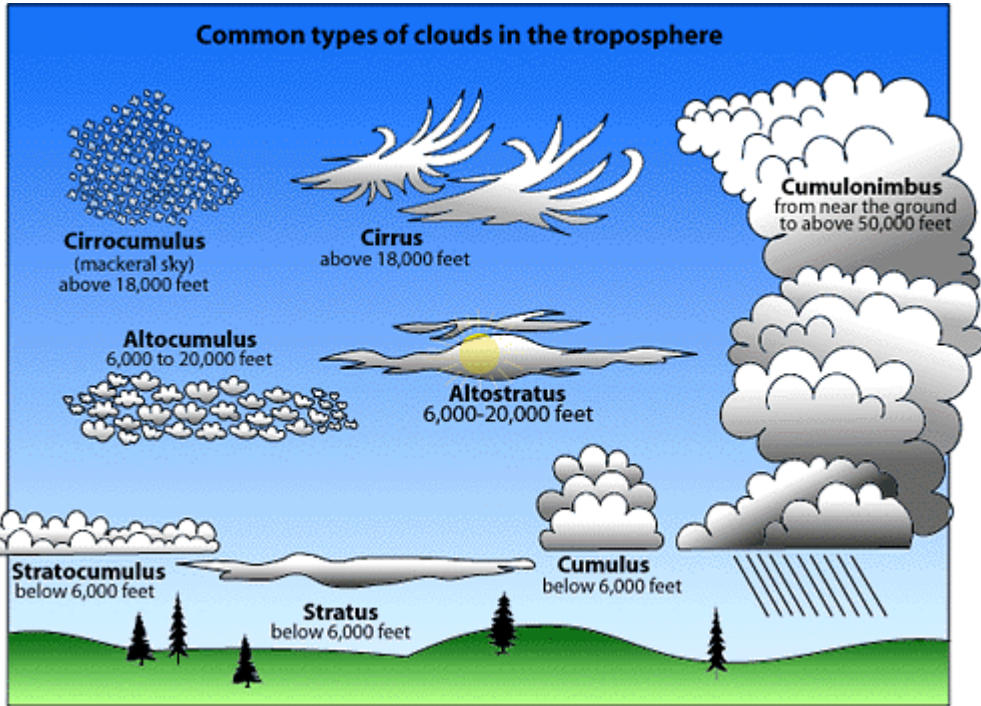


<https://gispub.epa.gov/airnow/?xmin=-9047698.164059745&ymin=4446800.557518414&xmax=-7575215.251174109&ymax=5388504.745991786&clayer=none&mlayer=ozonepm>



<https://www.airnow.gov/airnow-app/>

Common types of clouds in the troposphere



Cumulus clouds have vertical growth. They are puffy white or light gray clouds that look like floating cotton balls. Cumulus clouds have sharp outlines and a flat base at a height of 1000m. They are generally about one kilometer wide which is about the size of your fist or larger when you hold up your hand at arm's length to look at the cloud. Cumulus clouds can be associated with fair or stormy weather. Watch for rain showers when the cloud's tops look like cauliflower heads.

<https://scied.ucar.edu/learning-zone/clouds/cloud-types>

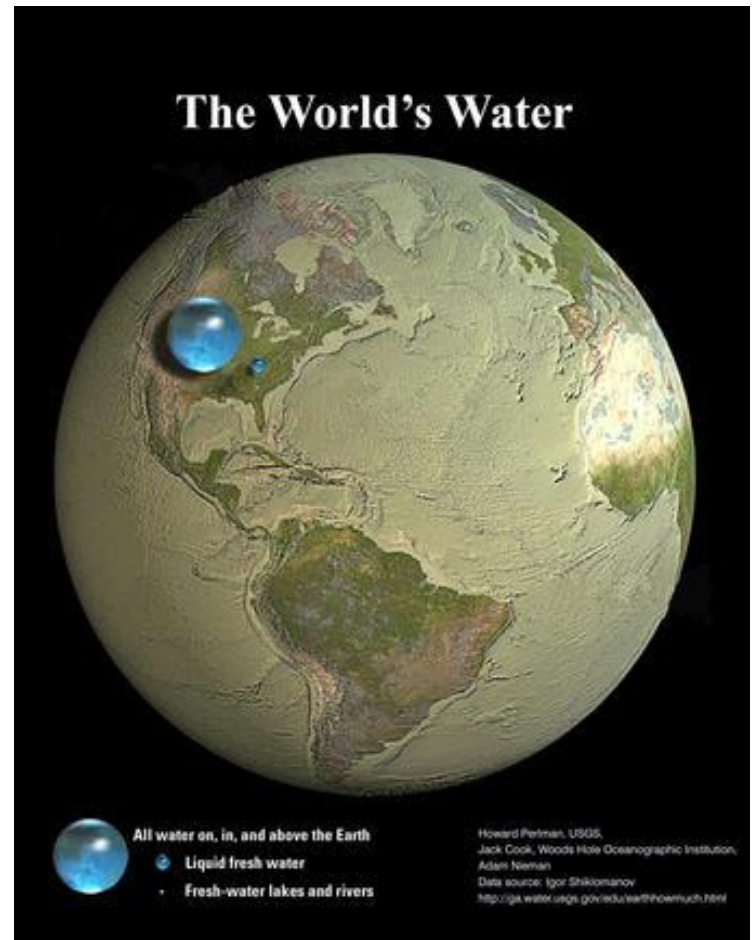
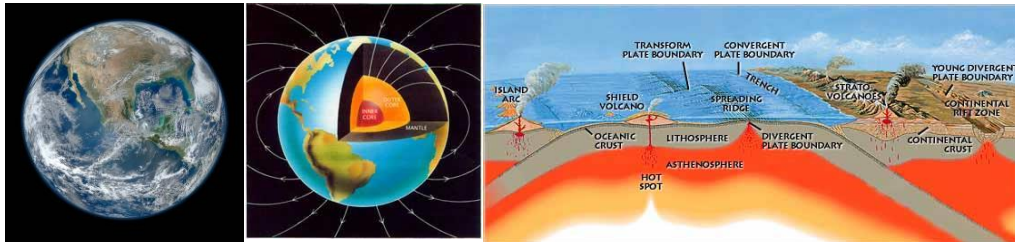
The Water on Earth

<https://www.usgs.gov/media/images/all-earths-water-a-single-sphere>

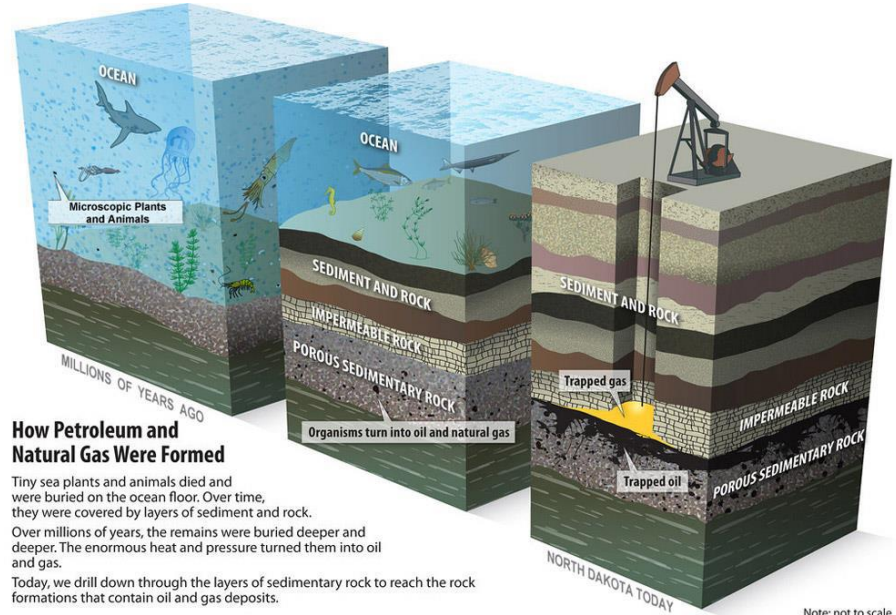
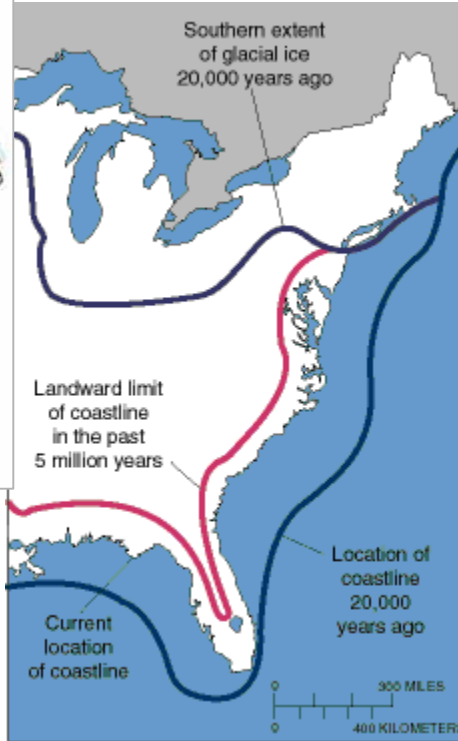
All Earth's freshwater, liquid fresh water, and water in lakes and rivers

Spheres showing:

- (1) All water (sphere over western U.S., 860 miles in diameter)
- (2) Fresh liquid water in the ground, lakes, swamps, and rivers (sphere over Kentucky, 169.5 miles in diameter), and
- (3) Fresh-water lakes and rivers (sphere over Georgia, 34.9 miles in diameter).



Oceans – Oil and Gas



Climate: Tropical Storm & Volcanic Eruptions

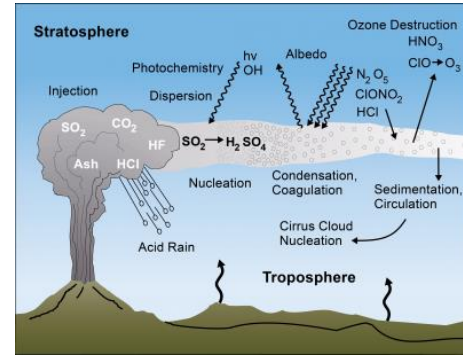
https://volcanoes.usgs.gov/vhp/gas_climate.html

 **NWS Mount Holly** 
@NWS_MountHolly

#TropicalStormFay has just made landfall near Little Egg Harbor Inlet in Ocean County, NJ. The remaining heavy rain is well removed north and west from the center. The rain and windy conditions will end slowly from south to north into tonight. #NJwx



5:16 PM · Jul 10, 2020 



Busy Atlantic hurricane season predicted for 2020

Multiple climate factors indicate above-normal activity is most likely

<https://www.noaa.gov/media-release/busy-atlantic-hurricane-season-predicted-for-2020>

<https://pubs.usgs.gov/pinatubo/>

The Atmospheric Impact of the 1991 Mount Pinatubo Eruption <https://pubs.usgs.gov/pinatubo/self/>



This 1969 photograph shows AOS Senior Scientists Kirk Bryan (left) and Suki Manabe talking with GFDL Director Joseph Smagorinsky, who brought GFDL to Princeton because of the intellectual environment and computer resources available here.

Photo courtesy of the Geophysical Fluid Dynamics Laboratory

In 2007, the Nobel Peace Prize was awarded jointly to Al Gore and the IPCC. Eleven [Princeton faculty members](#) — including Held, Oppenheimer and Sarmiento — and many alumni contributed to the IPCC reports cited in the prize.

[Michael Celia](#), [Leo Donner](#), [Anand Gnanadesikan](#), [Isaac Held](#), [Gabriel Lau](#), [Denise Mauzerall](#), [Michael Oppenheimer](#), [Venkatachalam Ramaswamy](#), [Jorge Sarmiento](#), [Robert Socolow](#) and [Robert Williams](#) have contributed to panel reports over the years. For example, Oppenheimer was lead author of a report presented to the United Nations this past April, and Mauzerall contributed to an IPCC report issued in 2001.

When/where was the first climate model created?

In the late **1960s**, **NOAA's Geophysical Fluid Dynamics Laboratory** in **Princeton, New Jersey**, developed the first-of-its-kind general circulation climate model that combined both oceanic and atmospheric processes. Scientists were now able to understand how the ocean and atmosphere interacted with each other to influence climate. The model also predicted how changes in the natural factors that control climate such as ocean and atmospheric currents and temperature could lead to climate change. The model still stands today as a breakthrough of enormous importance for climate science and weather forecasting. Earlier knowledge of the oceanic and atmospheric circulation, and their interactions, was based purely on theory and observation.

Climate models are computer-based simulations that use mathematical formulas to re-create the chemical and physical processes that drive Earth's climate. This pioneering model included all the basic components of climatic factors (atmosphere, ocean, land, and sea ice), but covered only one-sixth of the earth's surface, from the North Pole to the equator and 120 degrees of longitude east to west.

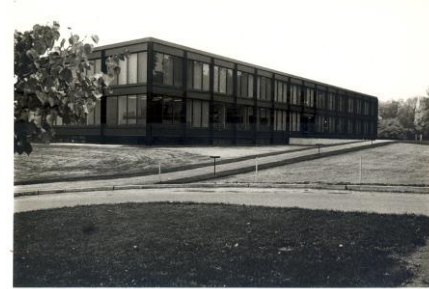
https://celebrating200years.noaa.gov/breakthroughs/climate_model/welcome.html#model

<https://www.gfdl.noaa.gov/>

<https://www.gfdl.noaa.gov/bibliography/>

<https://aos.princeton.edu/>

<https://geosciences.princeton.edu/>



<https://recap.princeton.edu/>

1967 Climate Model Paper

Thermal Equilibrium of the Atmosphere with a Given Distribution of Relative Humidity

<https://journals.ametsoc.org/jas/article/24/3/241/17328/Thermal-Equilibrium-of-the-Atmosphere-with-a-Given>

1520-0469(1967)024_0241_teatow_2_0_co_2.pdf

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MAY 1967 SYUKURO MANABE AND RICHARD T. WETHERALD 259

naulichen Observatorium bei Lindenberg, Vol. 15, Braunschweig, Germany, Friedl, Vieweg and Sohn, 1-24.

Herring, W. S., and T. R. Borden, Jr., 1965: Mean distributions of ozone density over North America, 1963-1964. Environmental Research Papers, No. 162, AFCRL-65-913, Air Force Cambridge Research Laboratories, Bedford, Mass., 19 pp.

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Fig. 31. Radiative convective equilibrium of the atmosphere from the 9- and 18-level models. See text for discussion.

2b is used for both of these computations. The coincidence between the two equilibrium solutions is reasonable.

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PRINCETON UNIVERSITY

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Scholar

Thermal Equilibrium of the Atmosphere with a Given Distribution of Relative Humidity

YEAR

[PDF] Thermal equilibrium of the atmosphere with a given distribution of relative humidity [PDF] ametsoc.org

S Manabe, RT Wetherald - Journal of the Atmospheric ..., 1967 - journals.ametsoc.org

Radiative convective equilibrium of the atmosphere with a given distribution of relative humidity is computed as the asymptotic state of an initial value problem. The results show that it takes almost twice as long to reach the state of radiative convective equilibrium for the atmosphere with a given distribution of relative humidity than for the atmosphere with a given distribution of absolute humidity. Also, the surface equilibrium temperature of the former is almost twice as sensitive to change of various factors such as solar constant, CO₂ ...

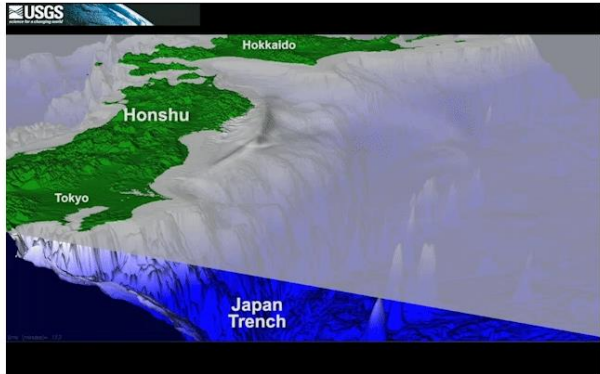
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Preliminary simulations of the 2011 Japan tsunami

Viewpoint north. Simulation shows first 2 hours of tsunami propagation.



https://www.usgs.gov/centers/pcmssc/science/tsunami-and-earthquake-research?qt-science_center_objects=0#qt-science_center_objects

https://www.usgs.gov/centers/pcmssc/science/preliminary-simulations-recent-tsunamis?qt-science_center_objects=0#qt-science_center_objects

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<https://www.usgs.gov/centers/spcmssc>

<https://www.usgs.gov/centers/pcmssc>



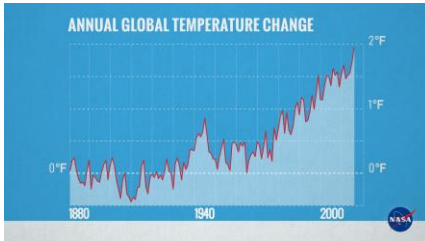
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<https://water.usgs.gov/owq/deephorizonoilspill/>

What is Climate Change?

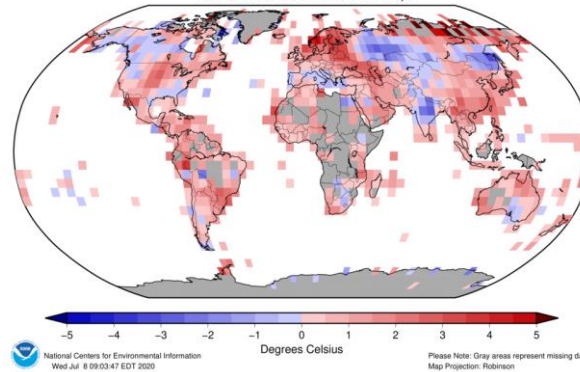
Climate change describes a change in the average conditions — such as temperature and rainfall — in a region over a long period of time. NASA scientists have observed Earth's surface is warming, and many of the warmest years on record have happened in the past 20 years.

<https://climatekids.nasa.gov/climate-change-meaning/>

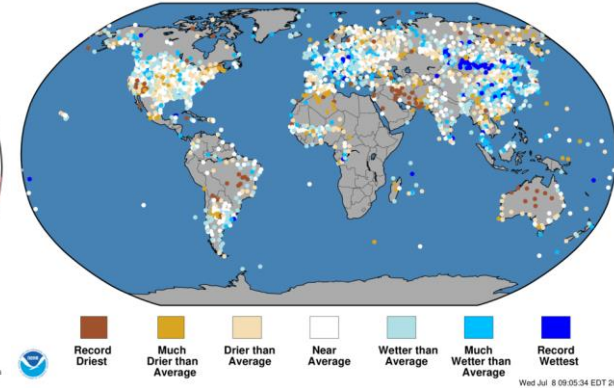


Alaska's Muir glacier in August 1941 and August 2004. Significant changes occurred in the 63 years between these two photos. Credit: USGS

Land-Only Temperature Departure from Average Jun 2020
(with respect to a 1981–2010 base period)
Data Source: GHCNM v4.0.1.20200706.gfe



Land-Only Precipitation Percentiles Jun 2020
NOAA's National Centers for Environmental Information
Data Source: GHCN-M version 4beta



<https://www.ncdc.noaa.gov/temp-and-precip/global-maps/>

Who is an Atmospheric Scientist? Oceanographer? Climate Scientist?

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George Philander

Biography

Professor and atmospheric scientist S. George Philander was born on August 25, 1942 in Calendon, Republic of South Africa. His father was the noted Afrikaans poet and the headmaster of the Belgravia High School in Athlone. Philander received his B.S. degree in applied mathematics and physics from the University of Cape Town in 1962. When apartheid laws were sanctioned in South Africa, his family decided to move to New York City. He went on to attend Harvard University and graduated in 1980 with his Ph.D. degree in applied mathematics.

Following graduation, Philander was awarded a post-doctoral fellowship at the Massachusetts Institute of Technology in the department of meteorology. He then became a research associate in the Geophysical Fluid Dynamics Program at Princeton University, and was promoted in 1978 to senior research oceanographer of the program. Philander held the position for eleven years until he was appointed as a full professor of geosciences and director of the program in atmospheric and oceanic studies at Princeton University in 1990. He served as chair of the Department of Geosciences at Princeton University from 1994 to 2001 and was then named the Knox Taylor Professor of Geosciences at Princeton University in 2005. Throughout his career, Philander has served as a consultant to the World Meteorological Organization in Geneva, Switzerland and as a visiting professor at the Museum National d'Histoire Naturelle in Paris, France. His research on oceanic and meteorological changes have resulted in the publication of over one hundred academic papers, nine chapters in books, and three books on such topics as El Niño, the Southern Oscillation, and global warming. In 2007, he finally returned to South Africa and joined the University of Cape Town as a research professor.

Interview Date
March 8, 2013

Profession
ScienceMakers

Occupation(s)
Atmospheric Scientist

<https://www.thehistorymakers.org/biography/george-philander>

Why Global Warming Is Controversial
<https://science.sciencemag.org/content/294/5549/2105/tab-article-info>

Our Affair with El Niño: How We Transformed an Enchanting Peruvian Current into a Global Climate Hazard & Is the Temperature Rising?: The Uncertain Science of Global Warming
<https://press.princeton.edu/our-authors/philander-s-george>

Google Scholar search [How to search with Google Scholar](#)

Authors:

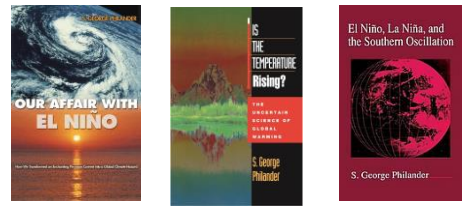
Publication name:

Title words:

Keywords:

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	Cites	Per year	Rank	Authors	Title
Publication years: 1891-2018					
Citation years: 129 (1891-2020)					
Papers: 69					
Citations: 5780					
Cites/year: 44.81					
Cites/paper: 83.77					
Authors/paper: 1.58					
h-index: 17					
g-index: 69					
hI,norm: 16					
hI,annual: 0.12					
Papers with ACC >= 1,2,5,10,20: 18,16,9,6,3					
<input checked="" type="checkbox"/>	h 3222	103.94	1	SG Philander	El Niño, La Niña, and t...
<input checked="" type="checkbox"/>	h 761	38.05	2	AV Fedorov, SG Ph...	Is El Niño changing?
<input checked="" type="checkbox"/>	h 300	15.79	3	AV Fedorov, SG Ph...	A stability analysis of t...
<input checked="" type="checkbox"/>	h 229	13.47	4	SG Philander, AV F...	Role of tropics in chan...
<input checked="" type="checkbox"/>	h 144	12.00	5	G Philander, SG P...	Encyclopedia of global...
<input checked="" type="checkbox"/>	h 131	5.04	6	P Chang, SG Phila...	A coupled ocean-atm...
<input checked="" type="checkbox"/>	h 126	63.00	7	SG Philander	Is the temperature risi...
<input checked="" type="checkbox"/>	h 126	7.41	8	SG Philander, A Fe...	Is El Niño sporadic or c...
<input checked="" type="checkbox"/>	h 106	3.42	16	G Philander	El Niño and La Niña
<input checked="" type="checkbox"/>	h 80	5.71	10	SG Philander	Our affair with El Niño:...
<input checked="" type="checkbox"/>	h 78	2.23	9	G Philander, D Hal...	Long waves in the equ...
<input checked="" type="checkbox"/>	h 72	2.06	11	SG Philander, EM ...	The southern oscillatio...



<https://www.worldcat.org/search?q=bn%3A+0125532350&qt=advanced&dblist=638>

<https://science.sciencemag.org/content/288/5473/1997.abstract>

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<https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/>

Position Classification Standards for White Collar Work

<https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/#url=Standards>

1300 – Physical Sciences Group

<https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/#url=1300>

Example Job Searches:

Physical Scientist:

<https://www.usajobs.gov/Search/Results?jt=Physical%20Scientist>

NOAA: <https://www.usajobs.gov/Search/Results?jt=Physical%20Scientist&a=CM54&p=1>

Pathways: <https://www.usajobs.gov/Search/Results?k=Pathways>

- Series Covered:1301, General Physical Science
 - 1306, Health Physics
 - 1310, Physics
 - 1313, Geophysics
 - 1315, Hydrology**
 - 1320, Chemistry
 - 1321, Metallurgy
 - 1330, Astronomy and Space Science
 - 1340, Meteorology
 - 1350, Geology
 - 1360, Oceanography
 - 1370, Cartography
 - 1372, Geodesy
 - 1373, Land Surveying
 - 1380, Forest Products Technology
 - 1382, Food Technology
 - 1384, Textile Technology
 - 1386, Photographic Technology
- <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/standards/1300/gS1300p.pdf>

Research at Princeton University

Susceptible supply limits the role of climate in the COVID-19 pandemic

<https://www.medrxiv.org/content/10.1101/2020.04.03.20052787v1>

Local climate unlikely to drive the early COVID-19 pandemic

<https://vecchi.princeton.edu/news/local-climate-unlikely-drive-early-covid-19-pandemic>

Why are big storms bringing so much more rain? Warming, yes, but also winds

<https://www.princeton.edu/news/2019/10/29/why-are-big-storms-bringing-so-much-more-rain-warming-yes-also-winds>

PEI Faculty Seminar: "Climatic Influences on Tropical Cyclones and Their Severity"

<https://vecchi.princeton.edu/news/pei-faculty-seminar-climatic-influences-tropical-cyclones-and-their-severity>

Princeton University – Geosciences Dept., Climate Science

<https://geosciences.princeton.edu/research/climate-science>

[Cooperative Institute for Modeling the Earth System](#)

A Princeton University and Geophysical Fluid Dynamics Laboratory Collaboration

Princeton University – Princeton Environmental Studies (PEI):

Climate Futures Initiative

<https://scholar.princeton.edu/cfi/home>

Climate Change and Infectious Disease

<https://environment.princeton.edu/research/climate-change-and-infectious-disease/>

Princeton Environmental Forum — Full Conference

<https://environment.princeton.edu/videos/princeton-environmental-forum-full-conference/>

Attribution of the Australian bushfire risk to anthropogenic climate change

<https://www.worldweatherattribution.org/bushfires-in-australia-2019-2020/>

Rapid attribution of the extreme rainfall in Texas from Tropical Storm Imelda

<https://www.worldweatherattribution.org/rapid-attribution-of-the-extreme-rainfall-in-texas-from-tropical-storm-imelda/>

Human contribution to the record-breaking July 2019 heatwave in Western Europe

<https://www.worldweatherattribution.org/human-contribution-to-the-record-breaking-july-2019-heat-wave-in-western-europe/>

<https://www.worldweatherattribution.org/>

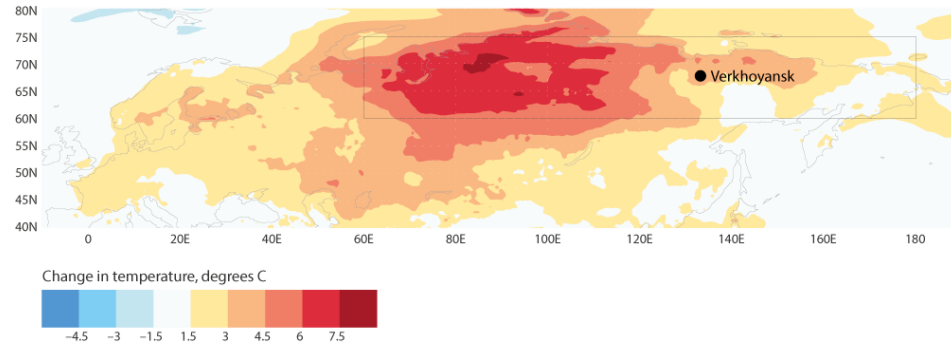


Figure 1: Prolonged Siberian heat: January – June 2020 average temperatures compared to normal (1981-2010) over the Siberian region used in the study (box), and the location of the town of Verkhoyansk that experienced the record June daily temperature within the Arctic circle.

Siberian heatwave of 2020 almost impossible without climate change

<https://www.worldweatherattribution.org/siberian-heatwave-of-2020-almost-impossible-without-climate-change/>

Professional Societies, Organizations, Companies

The American Geosciences Institute (AGI)
<https://www.americangeosciences.org/about>

Workforce: <https://www.americangeosciences.org/workforce/>

Geoscience COVID-19 Survey
<https://www.americangeosciences.org/workforce/covid19>

COVID-19 and Employment of Recent Geoscience Graduates
<https://www.americangeosciences.org/geoscience-currents/covid-19-and-employment-recent-geoscience-graduates>

COVID-19 Impacts to Geoscience Business Operations
<https://www.americangeosciences.org/geoscience-currents/covid-19-impacts-geoscience-business-operations>

Impacts of the COVID-19 Pandemic on Ocean Science Activities
<https://www.americangeosciences.org/geoscience-currents/impacts-covid-19-pandemic-ocean-science-activities>

COVID-19 Impacts to Research Activities in Spring 2020
<https://www.americangeosciences.org/geoscience-currents/covid-19-impacts-research-activities-spring-2020>

Geoscience Information Society

<http://www.geoinfo.org/>

Listserv: <http://www.geoinfo.org/e-mail-list/>

Or email me: ewild@princeton.edu

And an AGI Member Society:

<https://www.americangeosciences.org/member-societies>

GSA Associated Society:

https://www.geosociety.org/GSA/About/Who_We_Are/Associated_Societies/GSA/About/Associated_Societies.aspx

Atmospheric Science Librarians International

<http://www.aslionline.org/wp/>

Listserv: <http://www.aslionline.org/wp/about/asli-listserv/>

AMS Society Conference Boston 2020

<https://ams.confex.com/ams/2020Annual/meetingapp.cgi/Index/Recording~1/Program/1418>

CSA Ocean Sciences Inc. (CSA)

<https://www.csaocean.com/portfolio>

Press Releases: <https://www.csaocean.com/press-releases>

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Careers	Global Warming	Mercury	Radon	Technology	Wetlands
Clean Air Act	Grants	Mold	Recycling	Test Methods	More...

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New Orleans drop-off for electronics recycling
Dec 1 - On Saturday, December 3, consumers in the New Orleans area can drop off electronics damaged due to Katrina, at a one-day, free recycling event.

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Manufacturers invited to join global PFOA stewardship Jan 25 - Participating companies will be asked to commit to reducing PFOA from emissions and product content by 95 percent by 2010, and work toward eliminating these exposure sources by 2015. PFOA is

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 - indoor air issues like asbestos
 - air quality research and data
 - emissions, greenhouse gases
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 - how EPA handles spills
 - safer chemicals, TSCA
 - databases such as IRIS and SRS
- Environmental Information by Location**
 - conditions in your state or community
 - nearby facilities or cleanup sites
- Greener Living**
 - sustainable energy
 - transportation choices
 - food waste and recycling
 - home and business
- Health**
 - effects of common pollutants
 - risk and exposure studies
 - asthma, children in school buildings
- Land, Waste, and Cleanup**
 - landfills
 - hazardous waste
 - plastic and waterways
 - superfund, cleanups
- Science**
 - methods, modeling, data and tools
 - research grants and opportunities
- Water**
 - drinking water quality
 - watersheds and rivers
 - wastewater, stormwater, runoff

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Environmental Protection Agency

<https://web.archive.org/web/20170119081239/https://www.epa.gov/environmental-topics>

Google Scholar title searches

“Climate Change” 1980-2020 = 138,000

https://scholar.google.com/scholar?as_q=%22Climate+Change%22+&as_epq=&as_oq=&as_eq=&as_occt=title&as_sauthors=&as_publication=&as_ylo=1980&as_yhi=2020&hl=en&as_sdt=0%2C31

“Global Change” 1980-2020 = 16,400

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C31&as_ylo=1980&as_yhi=2020&q=allintitle%3A+%22Global+Change%22&btnG=

“Global Warming” 1980-2020 = 19,500

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C31&as_ylo=1980&as_yhi=2020&q=allintitle%3A+%22Global+Warming%22&btnG=

“Climate Change” 1970-2010 = 61,100

https://scholar.google.com/scholar?as_q=%22Climate+Change%22+&as_epq=&as_oq=&as_eq=&as_occt=title&as_sauthors=&as_publication=&as_ylo=1970&as_yhi=2010&hl=en&as_sdt=0%2C31

“Global Change” 1970-2010 = 11,600

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C31&as_ylo=1970&as_yhi=2010&q=allintitle%3A+%22Global+Change%22&btnG=

“Global Warming” 1970-2010 = 15,600

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C31&as_ylo=1970&as_yhi=2010&q=allintitle%3A+%22Global+Warming%22&btnG=

Reports

The Intergovernmental Panel on Climate Change

<https://www.ipcc.ch/>

<https://www.ipcc.ch/reports/>

[Methodology Report on Short-lived Climate Forcers](#)

[The Ocean and Cryosphere in a Changing Climate](#)

[Climate Change and Land](#)

[Global Warming of 1.5°C](#)

[Climate Change: The IPCC 1990 and 1992 Assessments](#)

[FAR Climate Change: The IPCC Response Strategies](#)

<https://www.globalchange.gov/>

About Fifth National Climate Assessment (NCA5)

<https://www.globalchange.gov/nca5>

Fourth National Climate Assessment Vol I + II

<https://www.globalchange.gov/nca4>

2nd State of the Carbon Cycle Report (SOCCR2)

<https://www.globalchange.gov/content/about-soccr-2>



CLIMATE CHANGE AND ECOSYSTEMS



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ROYAL
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CLIMATE CHANGE EVIDENCE & CAUSES



UPDATE 2020

An overview from the Royal Society and the
US National Academy of Sciences



THE
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NCHRP

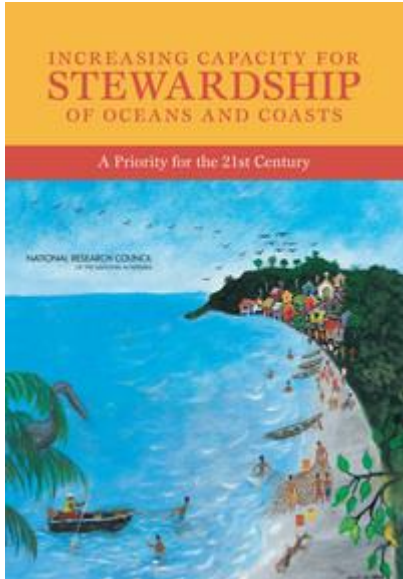
RESEARCH REPORT 938

NATIONAL
COOPERATIVE
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RESEARCH
PROGRAM

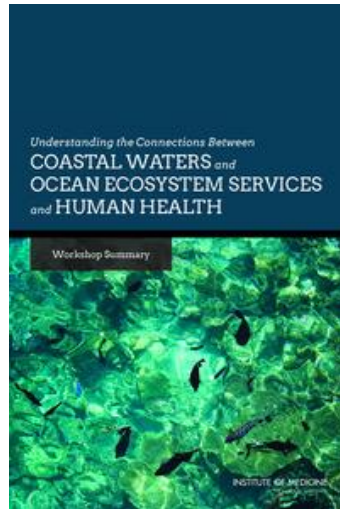
**Incorporating the Costs and
Benefits of Adaptation Measures
in Preparation for Extreme
Weather Events and Climate
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SCIENCES • ENGINEERING • MEDICINE
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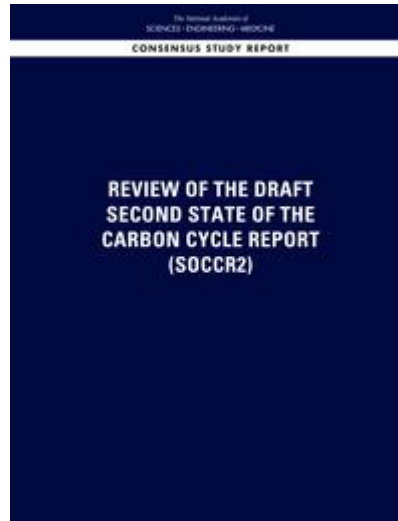
100 YEARS



Understanding the Connections Between Coastal Waters and Ocean Ecosystem Services and Human Health: Workshop Summary (2014)



Review of the Draft Second State of the Carbon Cycle Report (SOCCR2) (2018)



The Role of Research and Technology in the Changing Ocean Economy: Proceedings of a Workshop in Brief (2020)



<https://pubs.geoscienceworld.org/search-results?page=1&quicknav=1&q=%22Climate%20Change%22>

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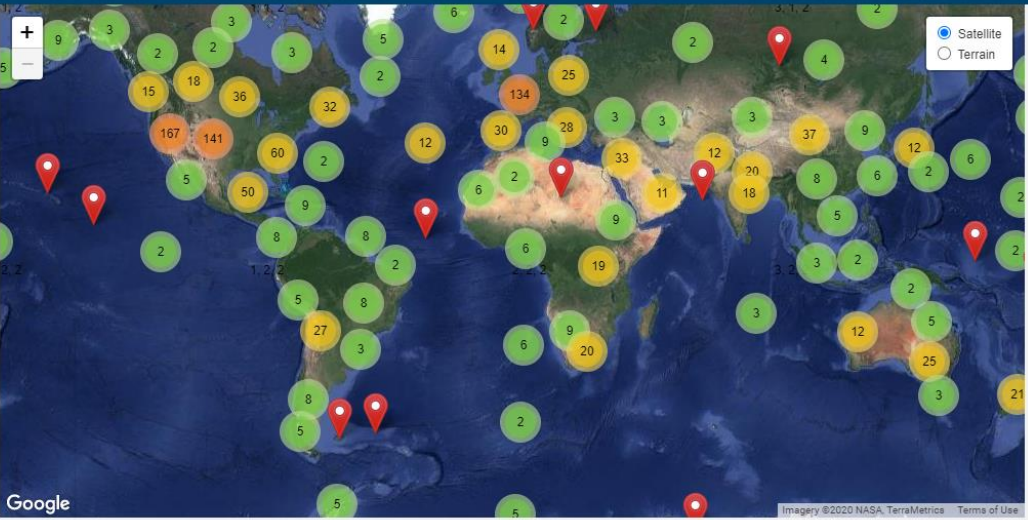
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- Book (18)

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- Introduction (11)
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- Geology (1985)



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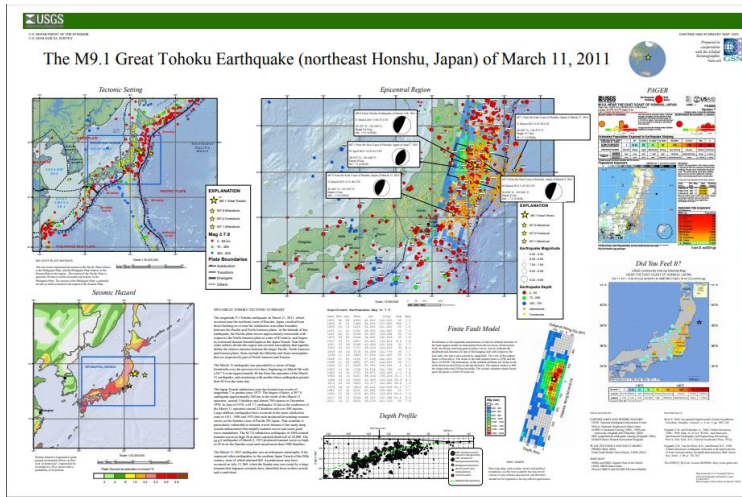
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Atmospheric deposition samples were collected using the National Atmospheric Deposition Program / National Trends Network (NADP/NTN) at 6 sites in the Denver-Boulder urban corridor and 2 adjacent sites in the Colorado Front Range. Weekly wet-only atmospheric deposition samples collected at these sites during winter-summer of 2017 were filtered (0.45 micrometers, polyethersulfone) to obtain particulates washed from the atmosphere (washout). Plastics were identified on over 90 percent of the filters.



M 9.1 - 2011 Great Tohoku Earthquake, Japan

https://earthquake.usgs.gov/earthquakes/eventpage/official20110311054624120_30/executive



[Open-File Report 2011-1277](#)
Fission Products in National Atmospheric Deposition Program Wet Deposition Samples Following the Fukushima Dai-ichi Nuclear Power Station Incident, March 8 - April 5, 2011. U.S. Geological Survey Open-File Report 2011-1277, 2011, 34p., Gregory A. Wetherbee, Timothy M. Debey, Mark A. Nilles, David A. Gay, and Christopher M.B. Lehmann. [Environmental Science and Technology](#)

Wet Deposition of Fission-Product Isotopes to North America from the Fukushima Dai-ichi Incident, March 2011, Environmental Science and Technology, doi:10.1021/es203217u, March 6, 2012, Gregory A. Wetherbee, David A. Gay, Timothy M. Debey, Christopher M.B. Lehmann, and Mark A. Nilles.

<https://earthquake.usgs.gov/archive/product/poster/20110311/us/1552332847859/poster.pdf>

https://www.usgs.gov/ecosystems/climate-research-and-development-program/science/usgs-benchmark-glacier-project?qt-science_center_objects=0#qt-science_center_objects

<https://www2.usgs.gov/landresources/lcs/glacierstudies/mbbmark.asp>



Mass Balance Data

USGS Benchmark Glaciers

Direct field measurements are combined with weather data and imagery analyses to calculate the seasonal and annual mass balance of each glacier. This data release includes seasonal and annual glacier-wide mass balance, and the input point measurements and elevation data used for these calculations. Files are described in detail within the release.

Glacier-Wide Mass Balance and Input Data

- Glacier-Wide Mass Balance
- Compiled Point Mass Balance
- Daily Temperature, Precipitation
- Glacier Hypsometry

Point Raw Glaciological Data

- Ablation Stake Measurements
- Snow Pit Density and Depth Measurements

Weather Data

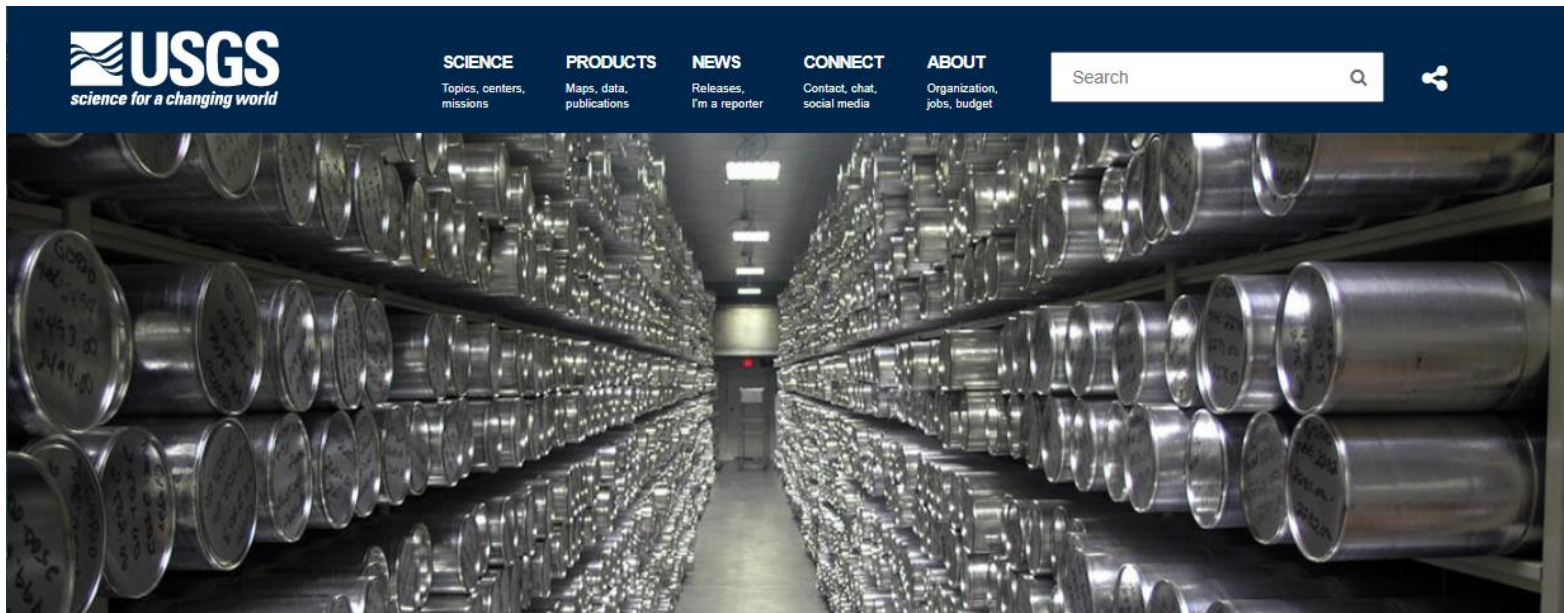
- Temperature, Precipitation, and Other Meteorological Measurements
- Multiple Weather Stations per Glacier for Wolverine and Gulkana
- Sub-Daily Data; Multiple Levels of Quality Control

Geodetic Data

- Glacier Outlines
- Digital Elevation Models (DEMs)
- Orthophotos

Collection Metadata





National Science Foundation - Ice Core Facility

The National Science Foundation Ice Core Facility (NSF-ICF) is located at the Denver Federal Center in Colorado. The Facility is managed and operated by the U.S. Geological Survey for the National Science Foundation.

Princeton Ice Core Research



<https://www.princeton.edu/news/2016/03/14/princeton-researchers-go-end-earth-worlds-oldest-ice>

Two million-year-old ice cores provide first direct observations of an ancient climate

<https://www.princeton.edu/news/2019/11/21/two-million-year-old-ice-cores-provide-first-direct-observations-ancient-climate>



USGS Denver Library - Photos



<https://library.usgs.gov/photo/#/item/51dd9358e4b0f72b4471d061>

<https://library.usgs.gov/photo/#/item/51dc2d9ae4b0f81004b79bda>

<https://library.usgs.gov/photo/#/>

<https://library.usgs.gov/photo/#/?category1=glaciers>



USGS Geographic Names

<https://www.usgs.gov/core-science-systems/ngp/board-on-geographic-names>



<https://lima.usgs.gov/>

Antarctica Query Results

Click the feature name for details and to access map services
Click any column name to sort the list ascending ▲ or descending ▼

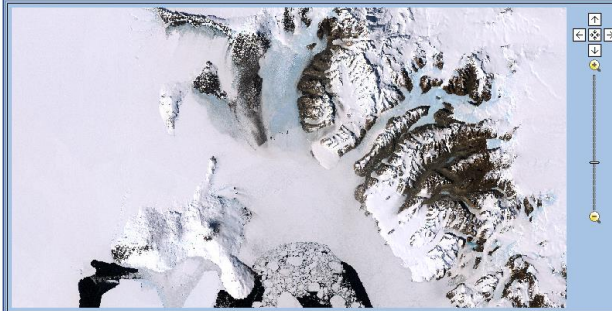
Feature Name ▲	Antarctica ID	Class	Latitude	Longitude	Elevation (m)	Decision Year	Date Last Modified
Aagaard Glacier	2	Glacier	664600S	0643100W	-	31-DEC-1952	30-Mar-2010
Aaron Glacier	19050	Glacier	850800S	0904000W	-	31-DEC-1962	30-Mar-2010
Abbotsmith Glacier	9	Glacier	530600S	0732400E	-	01-JAN-1957	-
Academy Glacier	36	Glacier	841500S	0610000W	-	01-JAN-1968	-
Acosta Glacier	18334	Glacier	715800S	1005500W	-	01-JAN-2003	-
Adams Glacier	66	Glacier	665000S	1094000E	-	01-JAN-1960	-
Adams Glacier	67	Glacier	780700S	1633800E	-	01-JAN-1955	-
Admiralen Glacier	19633	Glacier	620600S	0583100W	-	17-OCT-2017	-
Aeronaut Glacier	110	Glacier	731600S	1633600E	-	01-JAN-1964	-
Ahern Glacier	141	Glacier	814700S	1591000E	-	01-JAN-1966	-
Ahlmann Glacier	142	Glacier	675200S	0654500W	-	01-JAN-1952	-
Ahmsbrak Glacier	148	Glacier	794800S	0821800W	-	01-JAN-1966	-
Aiken Glacier	17468	Glacier	773816S	1632420E	-	01-JAN-1998	-
Airy Glacier	157	Glacier	691300S	0662000W	-	01-JAN-1962	-
Aitkenhead Glacier	160	Glacier	635700S	0584400W	-	01-JAN-1964	-

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row(s) 1 - 15 of 1672 ▼



Landsat Image Mosaic Of Antarctica (LIMA)



In support of the International Polar Year (IPY 2007-2008), LIMA brings the coldest continent on Earth alive in greater detail than ever before through this virtually cloudless, seamless, and high resolution satellite view of Antarctica.

The U.S. Geological Survey (USGS), the British Antarctic Survey (BAS), and the National Aeronautics and Space Administration (NASA), with funding from the National Science Foundation (NSF), created LIMA from more than 1,000 Landsat ETM+ scenes.

As the first major scientific outcome of the IPY, LIMA truly fulfills the IPY goals. LIMA is an international effort, supports current scientific polar research, encourages new projects, and helps the general public visualize Antarctica and changes happening to this southernmost environment. Researchers and the general public can download LIMA and all of the component Landsat scenes at no charge.

Fun to view the continent and zoom in to see the stunning detail of this Natural-Color, Pan-Sharpened LIMA (bands 3, 2, 1). LIMA covers the entire continent except from the South Pole at 90 degrees south to 82.5 degrees south latitude, where Landsat has no coverage because of its near-polar orbit. To provide a continental view, the image above has LIMA 3, 2, 1 overlaying the MODIS Mosaic of Antarctica (MOA).

The opening view includes McMurdo Station, the largest research base in Antarctica. Located at the tip of Hut Point Peninsula on Ross Island, McMurdo has been continually operated by the United States of America since 1956. Ross Island is roughly 72 km (45 mi) across. The flat, white areas are the Ross Ice Shelf and other sea ice off the coast of Antarctica. Also visible are the Erebus Glacier Tongue, Koettlitz and Ferrar Glaciers, and the Royal Society Range.



- View LIMA
- Download Mosaics and Landsat Scenes
- Download Customized Area
- Download LIMA Poster, Maps, and More from BAS
- Interactive Atlas
- Order USGS Maps, Posters, and Wall Art
- Browse the Digital Library
- Locate GIS Resources

LANDSAT IMAGE MOSAIC OF ANTARCTICA

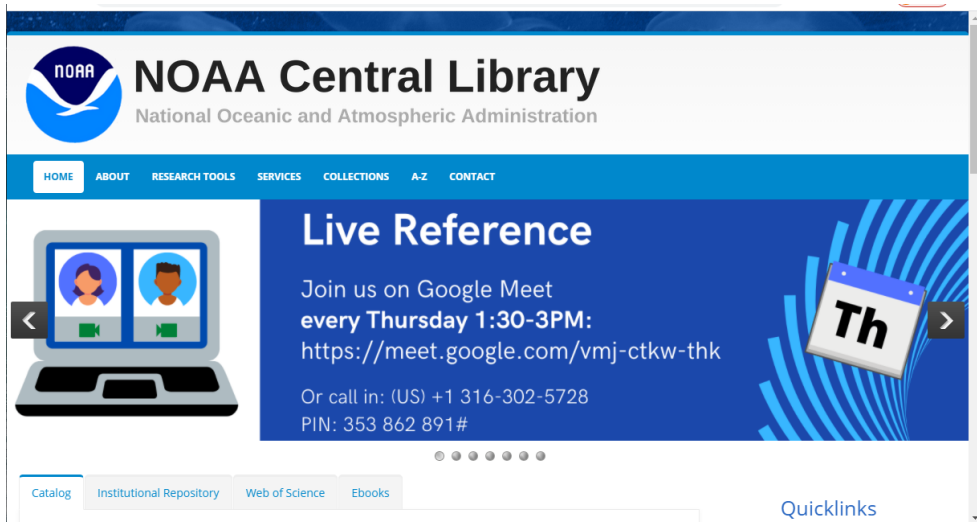
Created for the International Polar Year 2007-2008
Sponsored by the U.S. Geological Survey, National Science Foundation,
National Aeronautics and Space Administration, and the British Antarctic Survey.

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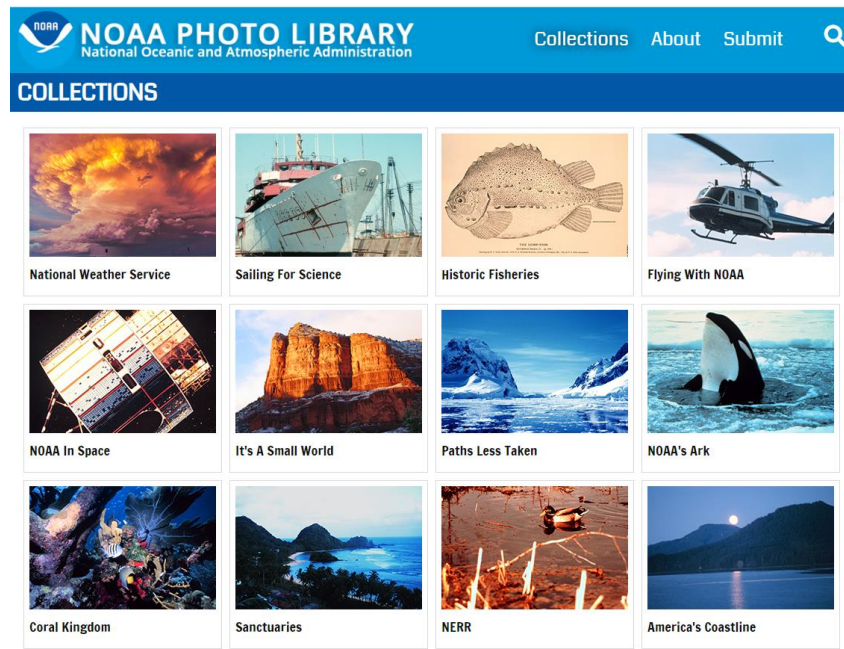
<https://www.usgs.gov/core-science-systems/ngp/board-on-geographic-names/antarctic-names>

NOAA Library



The screenshot shows the NOAA Central Library homepage. At the top left is the NOAA logo. The main header reads "NOAA Central Library" and "National Oceanic and Atmospheric Administration". Below this is a navigation bar with links for HOME, ABOUT, RESEARCH TOOLS, SERVICES, COLLECTIONS, A-Z, and CONTACT. The central banner features a "Live Reference" section with a laptop icon showing a video call, a calendar icon for Thursday, and the text: "Join us on Google Meet every Thursday 1:30-3PM: https://meet.google.com/vmj-ctkw-thk Or call in: (US) +1 316-302-5728 PIN: 353 862 891#". At the bottom, there are quicklinks for Catalog, Institutional Repository, Web of Science, and Ebooks, along with a "Quicklinks" button.

<https://library.noaa.gov/>



The screenshot shows the NOAA Photo Library homepage. At the top left is the NOAA logo. The main header reads "NOAA PHOTO LIBRARY" and "National Oceanic and Atmospheric Administration". To the right are links for Collections, About, and Submit, along with a search icon. Below this is a "COLLECTIONS" section with a grid of 12 photo thumbnails, each with a caption: National Weather Service, Sailing For Science, Historic Fisheries, Flying With NOAA, NOAA In Space, It's A Small World, Paths Less Taken, NOAA's Ark, Coral Kingdom, Sanctuaries, NERR, and America's Coastline.

<https://photolib.noaa.gov/>

NOAA GFDL publications

<https://repository.library.noaa.gov/gsearch?collection=&terms=GFDL&x=0&y=0>

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The GFDL Finite-Volume Cubed-Sphere Dynamical Core: Release 201912

Personal Author: Harris, Lucas; Zhou, Linjiang; Chen, Xi; Chen, Jan-Huey;

Corporate Authors: Geophysical Fluid Dynamics Laboratory (U.S.)

Published Date: 2020

Series: NOAA technical memorandum OAR GFDL ; 2020-001

Description: This technical note explains updates to the GFDL Finite-Volume Cubed-Sphere Dynamical Core, abbreviated FV3 or FV[superscript 3], and the Split GFDL Microphysics. It does not repeat the contents of earlier documentation, especially publications. A li...

File Type: [PDF - 169.54 KB]

The GFDL Global Atmosphere and Land Model AM4.0/LM4.0:1. Simulation Characteristics With Prescribed SSTs

Personal Author: Zhao, M.; Golaz, J. C.; Held, I. M.; Guo, H.; Balaji, V.; Benson, R.; Chen, J. H.; Chen, X.; Donner, L. J.; Dunne, J. P.; Dunne, K.; Durachta, J.; Fan, S. M.; Freidenreich, S. M.; Garner, S. T.; Ginoux, P.; Harris, L. M.; Horowitz, L. W.; Krasting, J. P.; Langenhorst, A. R.; Liang, Z.; Lin, P.; Lin, S. J.; Malyshev, S. L.; Mason, E.; Milly, P. C. D.; Migne, Y.; Naik,

Verification Metrics for National Center for Environmental Prediction (NCEP) Models Bibliography

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1 of 44 Automatic Zoom

Verification Metrics for National Center for Environmental Prediction (NCEP) Models

Bibliography

Jamie Roberts, Librarian, NOAA Central Library

NCRL subject guide 2019-04
<https://doi.org/10.25923/8e9n-9n28>

May 2019

Earth As Art!

Earth As Art 1 : <https://eros.usgs.gov/image-gallery/earth-art-1>

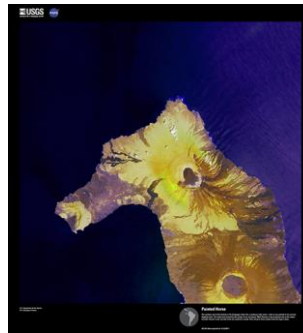
Earth As Art 2 : <https://eros.usgs.gov/image-gallery/earth-art-2>

Earth As Art 3 : <https://eros.usgs.gov/image-gallery/earth-art-3>

Earth As Art 4 : <https://eros.usgs.gov/image-gallery/earth-art-4>

Earth As Art 5 : <https://eros.usgs.gov/image-gallery/earth-art-5>

Earth As Art 6 : <https://eros.usgs.gov/image-gallery/earth-art-6>



Thank You!



<https://public.wmo.int/en/media/news/sand-and-dust-storm-hits-europe>

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ewild@princeton.edu

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