NOAAGlobalTemp: A Global Reconstruction of Surface Temperature for 1880-Present

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Surface Temperature Data

Air temperature over land, sea surface temperature over ocean

Lots of Acronyms

It's a government product after all

- The land component is GHCN version 4 (Global Historical Climatology Network; Menne et al., 2018)
- The ocean component is ERSST version 5 (Extended Reconstructed Sea Surface Temperature; Huang et al., 2017)
  - ERSST uses ICOADS version 3 (International Comprehensive Ocean-Atmosphere Dataset; Freeman et al., 2016)

OAR/CPO has a sustained record of supporting GHCN, ICOADS, and NOAAGlobalTemp through the Applied Research Center.

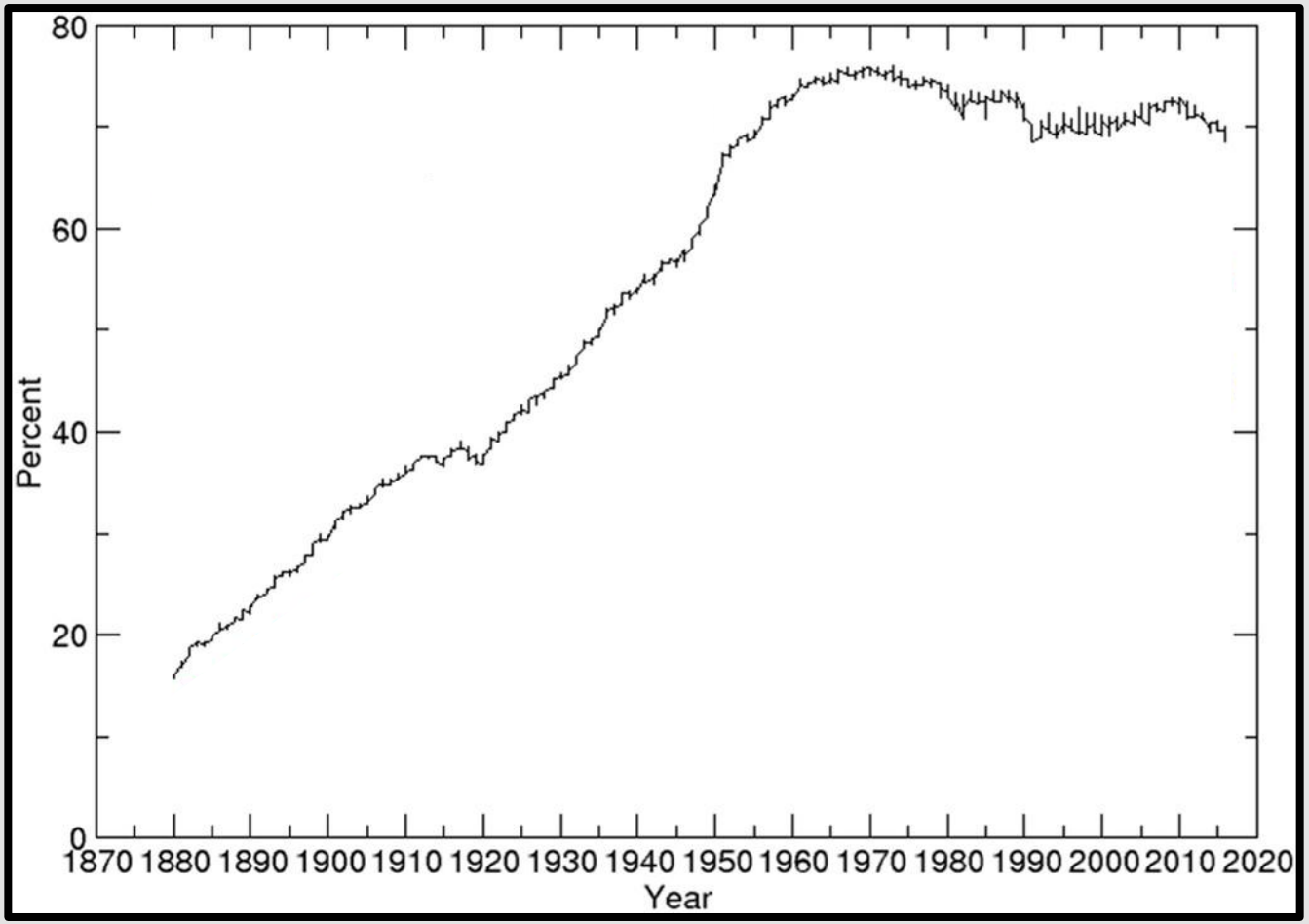
Other Datasets Used in Some Way

A vast oversimplification

- Construction process
  - Night marine air temperatures (HadNMAT2)
  - Sea ice concentration (NCEP, UK)
  - AVHRR and AMSR-E
  - Atmospheric reanalyses (development)
- Validation
  - Other global analyses (e.g., NASA) – all basically agree
  - Atmospheric reanalyses

Land Coverage Through Time

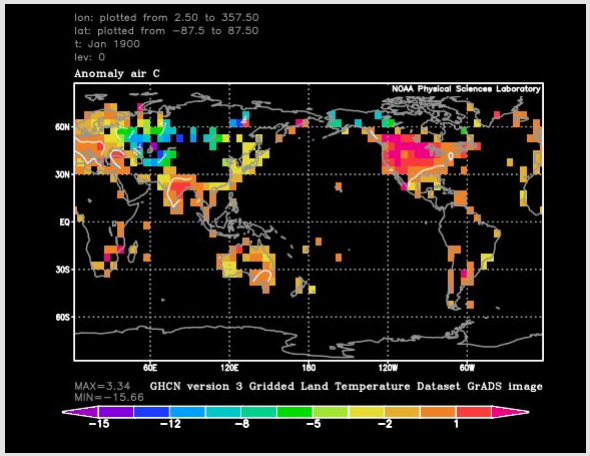
Plateaus in the 1960s



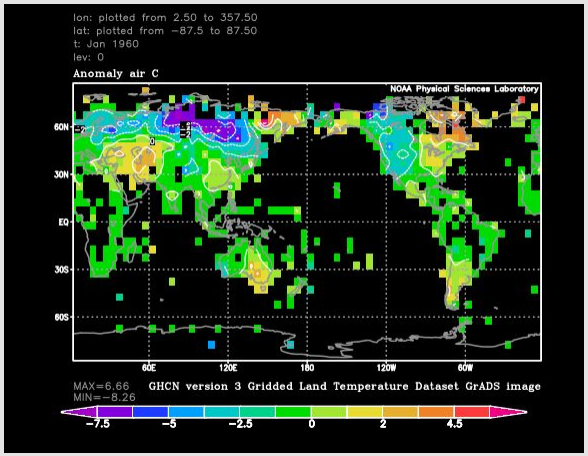
Land Coverage Through Time

Plateaus in the 1960s

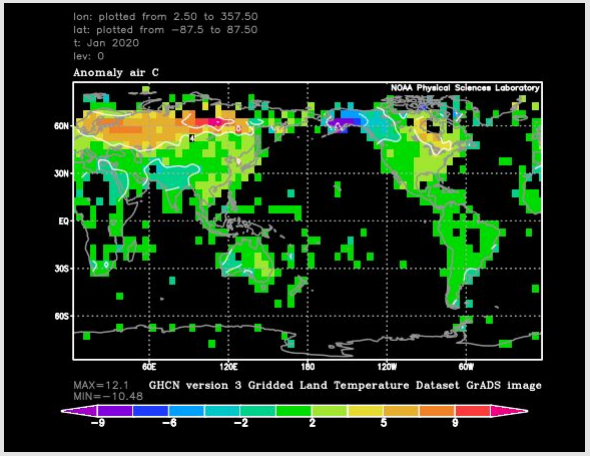
1900



1960

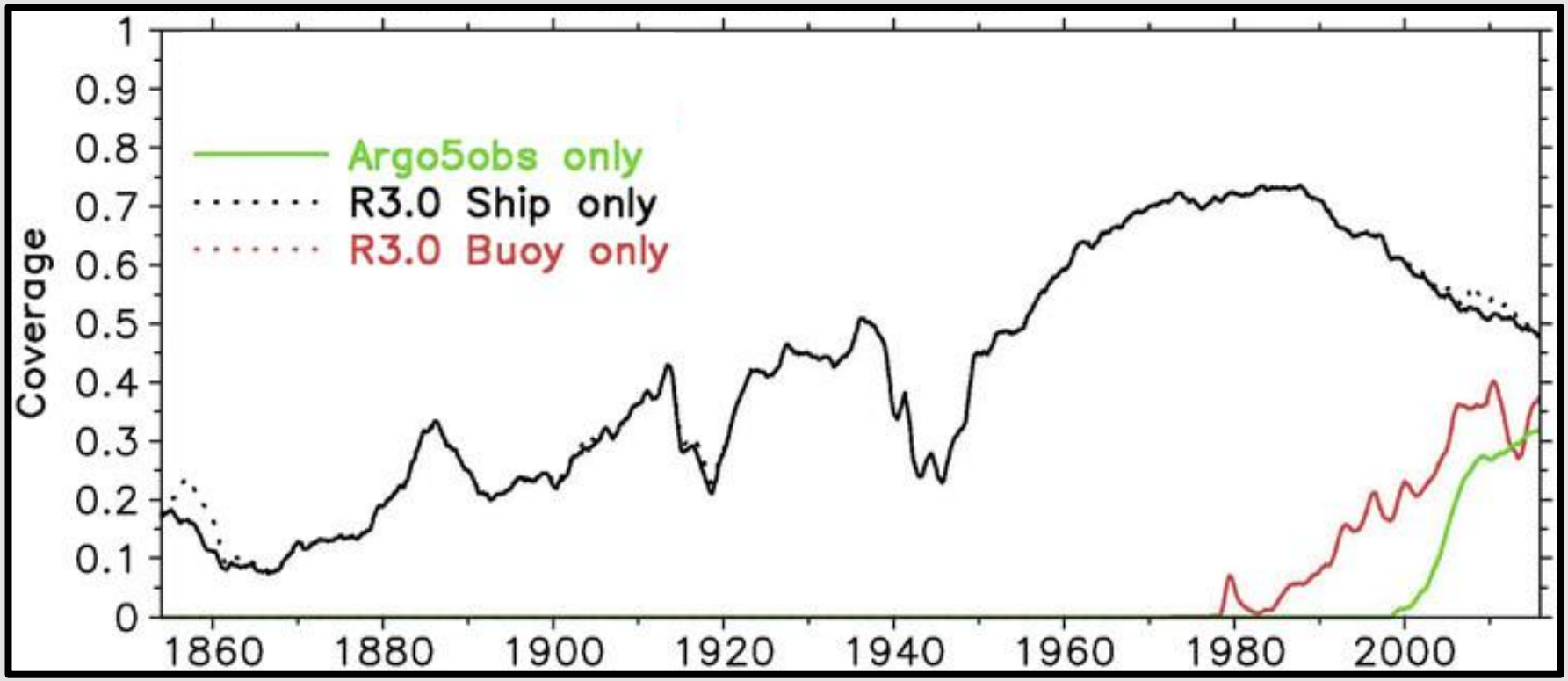


2020



Ocean Coverage Through Time

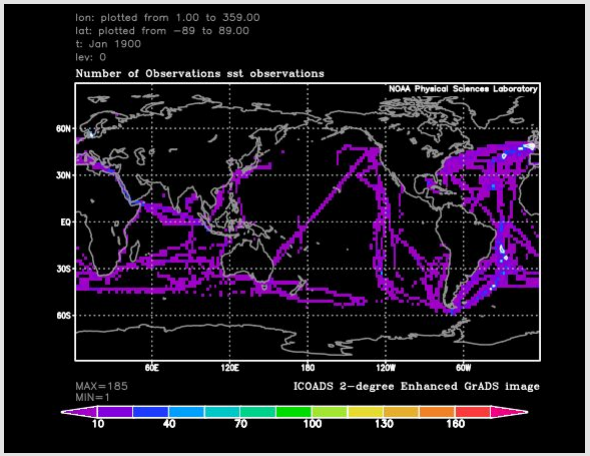
Dominated by ships until recent decades



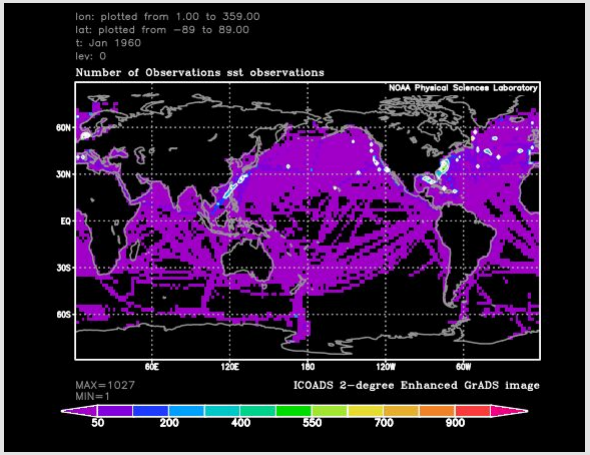
Ocean Coverage Through Time

Generally improves but maybe not quite as good as maps suggest

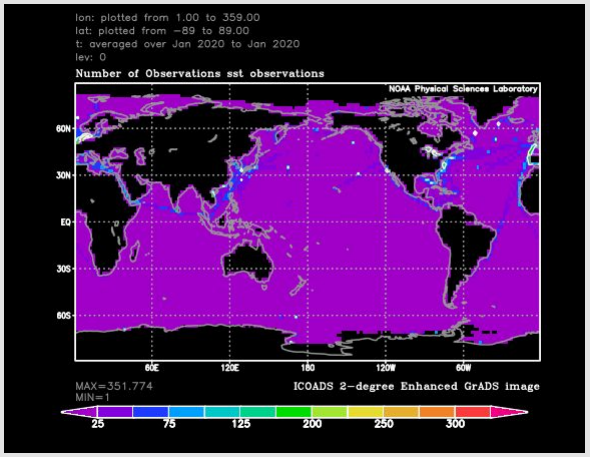
1900



1960



2020



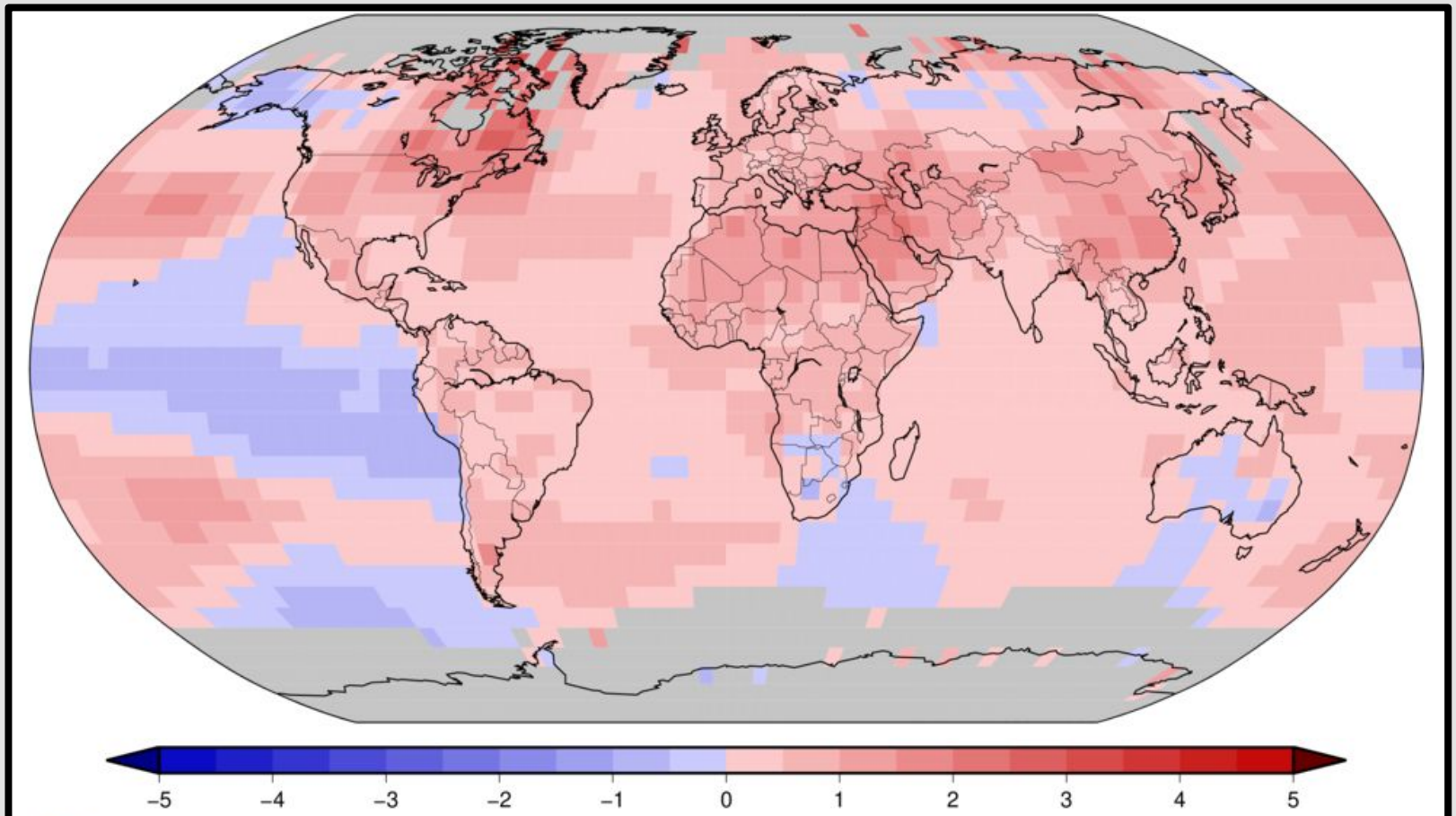
Methodological Bits

A vast oversimplification

- Land: QC, correct for historical changes in station location, temperature instrumentation, observing practice
- Ocean: QC, correct for historical changes in observing practice -- e.g., from buckets to engine intakes, ships to buoys
- Trivia: corrections lower the long-term trend
- Land+Ocean: address gaps in space and time with retro machine learning methods

An Example of the Final Blended Product

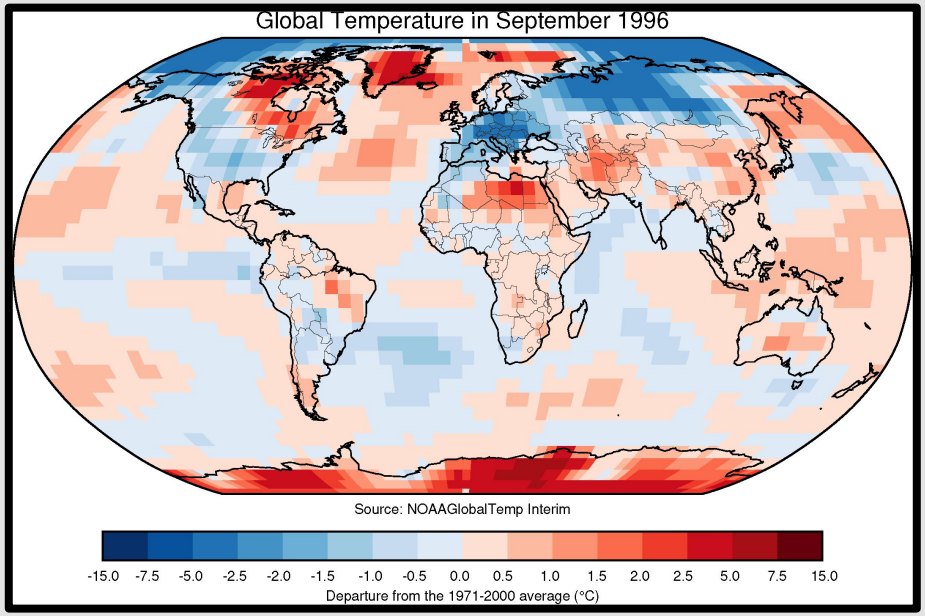
Temperature anomalies in 2021

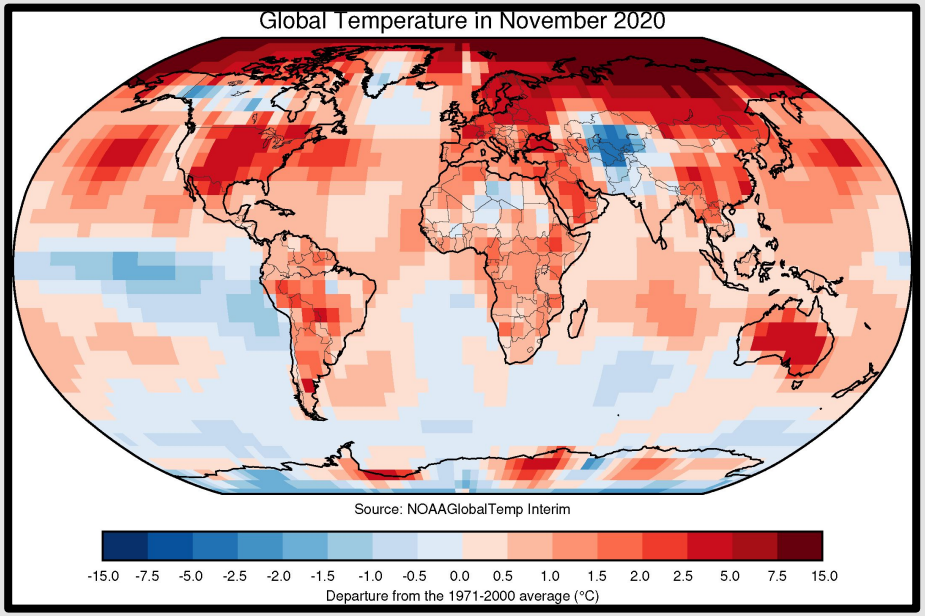


Departure from 1981-2010 baseline (°C)

Improving Spatial Coverage

Stay tuned





NCEI Monthly Climate Reports

Typically released mid-month

Climate Monitoring

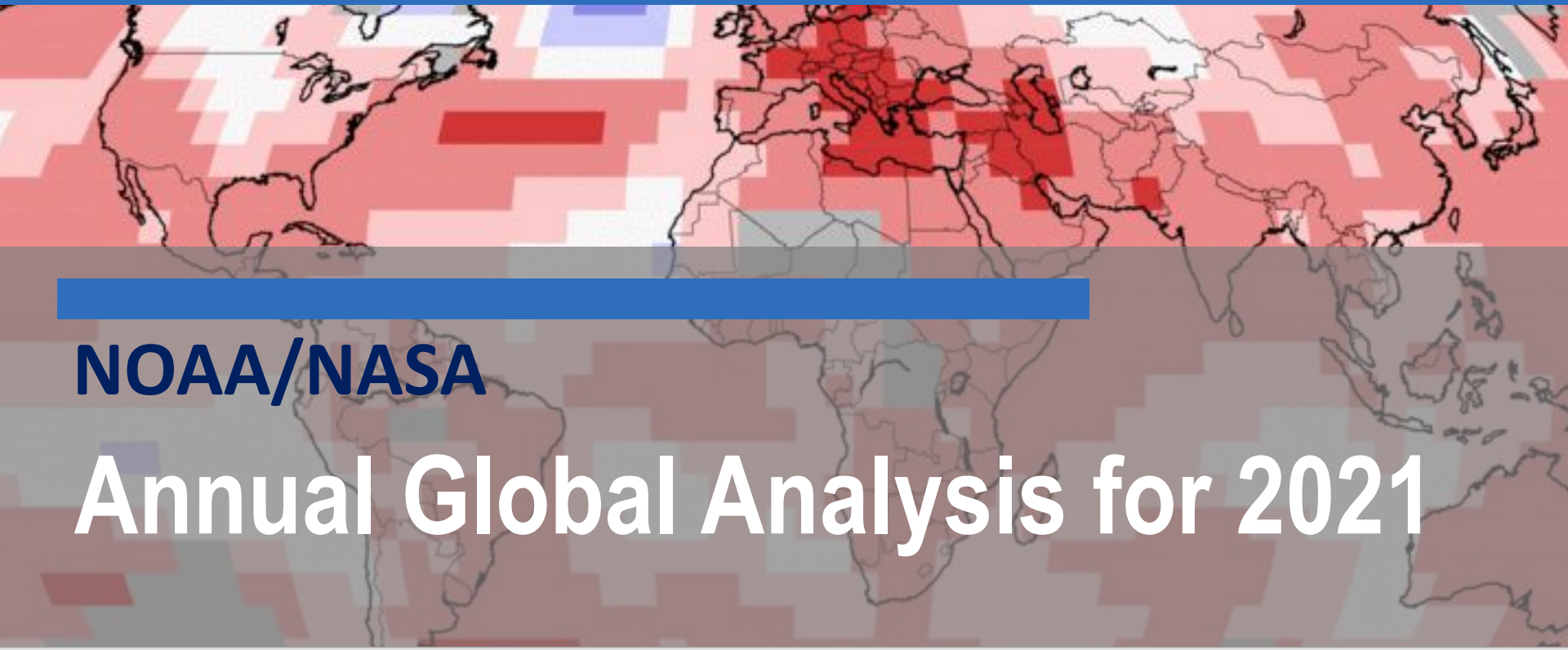
NCEI maintains a suite of monitoring services that track key climate indicators using objective methods to provide historical context for current environmental conditions. Climate Monitoring services supply detailed information about temperature and precipitation, snow and ice, drought and wildfire, storms and wind, and weather patterns.

Monthly Climate Reports

NCEI Monthly Climate Reports summarize recent conditions and events, with an emphasis on providing historical context. There are two reports each month: one for the U.S. and the other for the globe. We generally release both reports in the second week of each month, the national report preceding its global counterpart by several days. The reports are part of the suite of climate services NOAA provides to government, business, academia, and the public to support informed decision-making.

RSS Feed

View Monthly Climate Reports



NOAA/NASA

Annual Global Analysis for 2021

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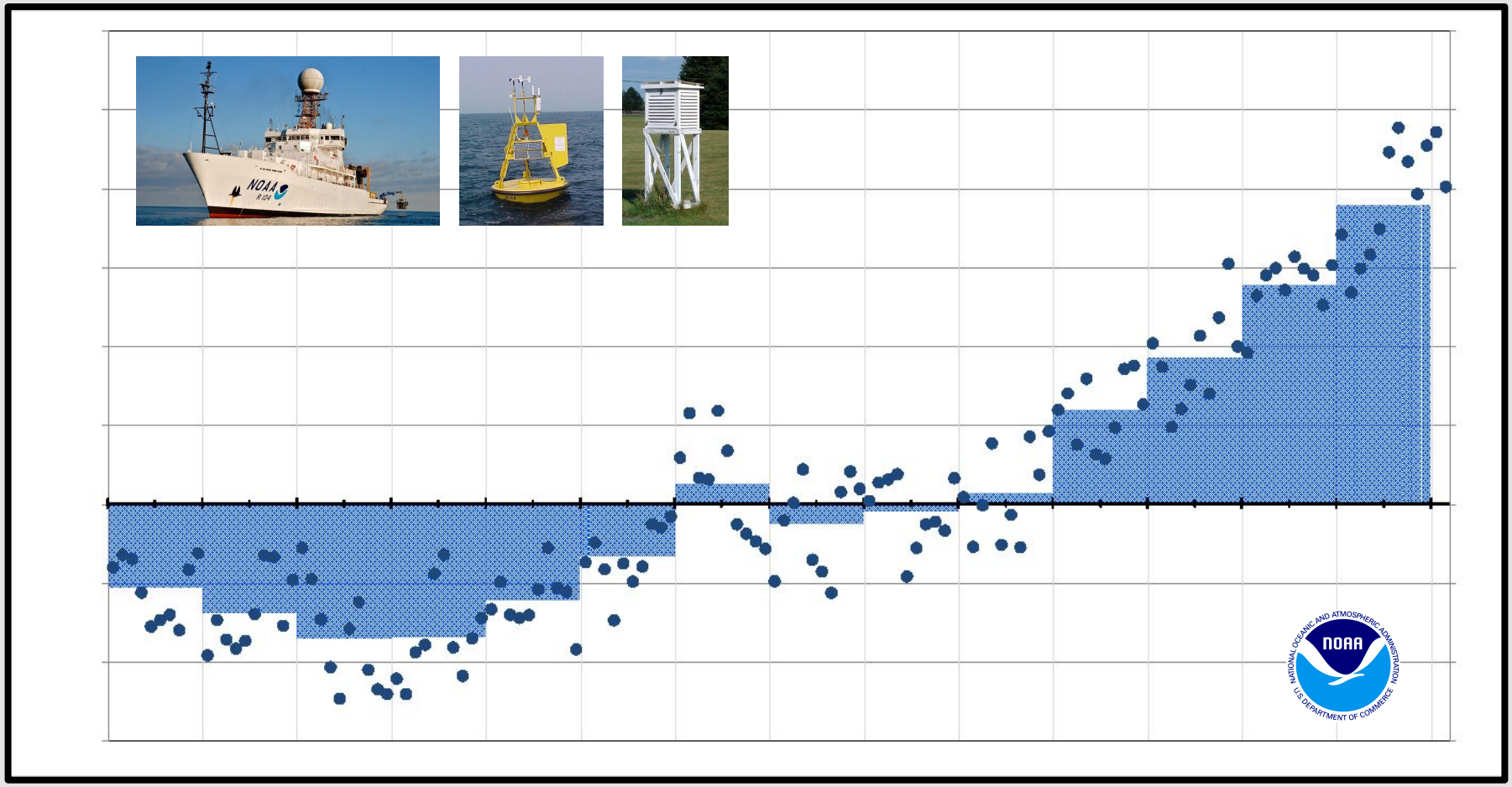
January 2022

NOAA: 2021 Ranked 6th Warmest

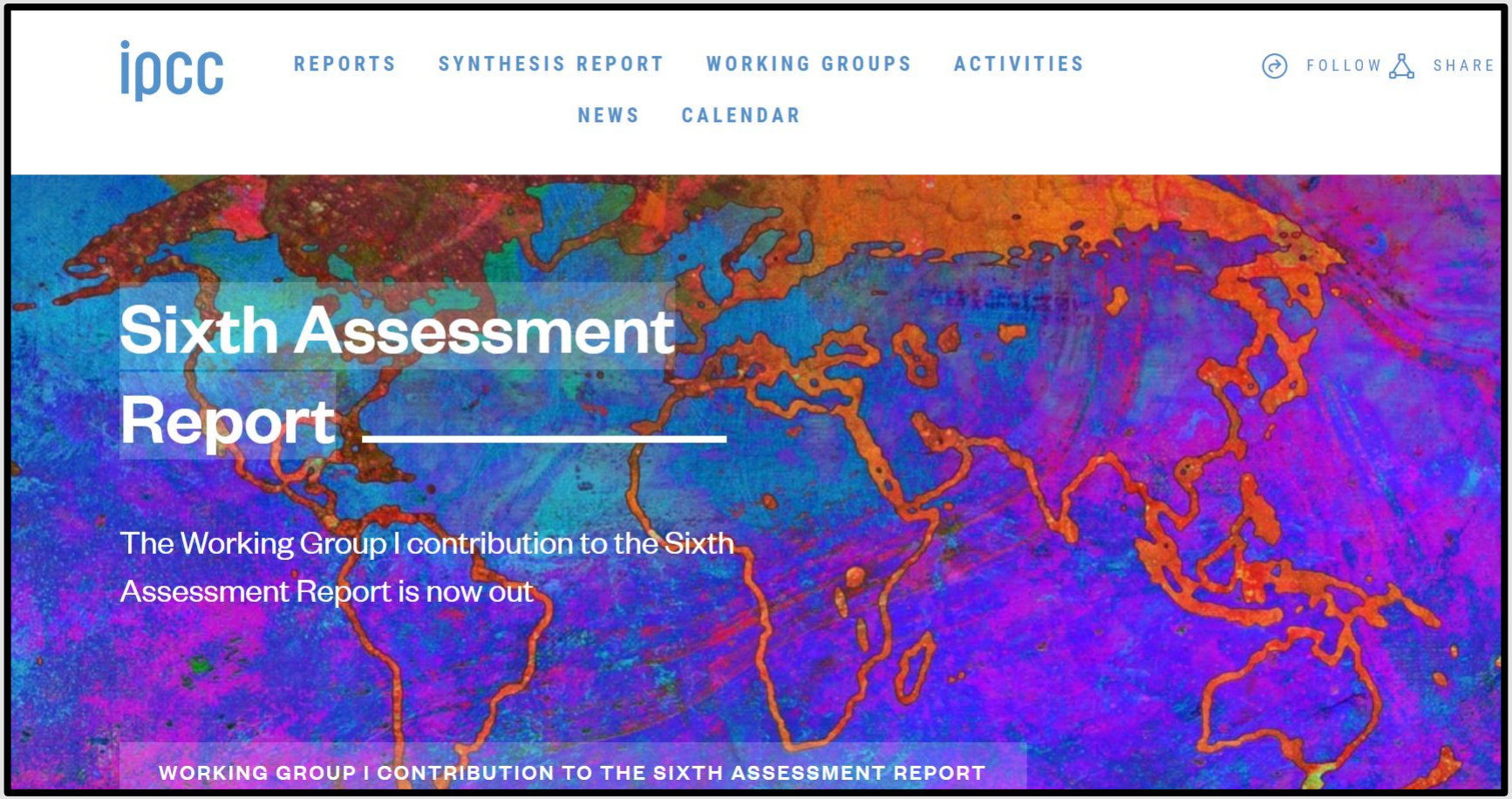
0.84ºC (1.51ºF) above 1901-2000 baseline*, slightly warmer than 2018



*NOAA uses 1901-2000 as the baseline in its monthly reports.
For reference purposes, 2021 was 0.81°C (1.46°F) above the 1951-1980 baseline.

Intergovernmental Panel on Climate Change

As well as the National Climate Assessment



Needs to Improve the Global Average

A few thoughts

- Almost always helps to rescue old data
- Improve reporting in parts of Africa, South America
- Increase observations in the Arctic and Antarctic
- Support observations that feed reanalyses