DATASHEET: Global Land-Ocean Temperature Index (L-OTI), 1880-2022

INTRODUCTION

Dataset Name
Global Land-OceanTempIndex.xlsx (1880-2022)
Datasheet Author
NASA Office of STEM Engagement Note: This datasheet follows the format of the Educator-Facing Datasheet for Derivative Datasets. (see also Datasets for K-12 Data Science, Datasheets for Datasets)
Date Datasheet Created
1/30/2023
Context
The Land-Ocean Temperature Index (L-OTI) is a measure of how global average temperatures have changed over long periods of time estimated by NASA's Goddard Institute for Space Studies (GISS). L-OTI reflects temperature anomalies. A temperature anomaly is how much warmer or cooler a particular year was compared to a 30-year average. The U.S. National Weather Service uses a three-decade period to define "normal" or average temperature. Normals are computed for various 30-year periods. For this data set, the 30-year average is computed for the period 1951-1980. Global temperature records start around 1880 because observations did not sufficiently cover enough of the planet prior to that time. The temperature anomaly is computed using observations from weather stations for land data. Ocean data is obtained from ship and buoy temperature reports. The GISS temperature analyses incorporates surface temperature measurements from more than 20,000 weather stations, ship- and buoy-based observations of sea surface temperatures, and temperature measurements from Antarctic research stations. These *in situ* measurements are analyzed using an algorithm that considers the varied spacing of temperature stations around the globe and urban heat island effects. Vital Signs of the Planet: Global Temperature GISS Surface Temperature Analysis

1. ORIGIN

Where can the original dataset be found?
Vital Signs of the Planet: Global Temperature

Select “Get Data” under the heading: GLOBAL LAND-OCEAN TEMPERATURE INDEX and GISS Surface Temperature Analysis (GISTEMP v4) **Credit:** NASA/GISS Users are referred back to the original dataset for the most recent temperature values. The original dataset for this derived datasheet is duplicated as a tab in “Global Land-OceanTempIndex.xlsx”

2. METADATA

Column Name	Description
Col A Year	Year
Col B Temperature Anomaly (deg C)	Change in global average surface temperature compared to the long-term average from 1951-1980 in degrees Celsius.
Col C Smoothed Temperature Anomaly (deg C)	Change in global average surface temperature (deg C) compared to the long-term average from 1951-1980 with five-year LOWESS (locally weighted scatterplot smoothing) applied. LOWESS creates a smooth line through a time series.

3. MOTIVATION

For what purpose was the **original** dataset created?
To create a climate data record and monitor how global average temperature is changing over time.
For what purpose was the **derived** dataset created?
To simplify the dataset to serve as an entry point for data analysis of Earth system datasets for the K-12 classroom.
Who created the **original** dataset?
NASA’s Goddard Institute for Space Studies (GISS)
Who created the **derived** dataset?
NASA Office of STEM Engagement

Who funded the creation of the **original** dataset?
National Aeronautics and Space Administration (NASA)
Who funded the creation of the **derived** dataset?
National Aeronautics and Space Administration (NASA)

4. COMPOSITION

What does a row in the dataset represent?
How much warmer or colder a given year was compared to the 1951-1980 average value.
How many rows are in the dataset, in total?
143 rows covering 1880 to 2022. Original dataset is updated as more recent data becomes available.
Does the dataset contain all possible rows or is it a sample of rows from a larger dataset?
All possible rows as of date of datasheet creation.
If it's a sample, describe your sampling process (random, weighted, etc). Is the sample representative of the larger set (e.g., geographic coverage)?
n/a

5. DERIVATION PROCESS

Who was involved in the data derivation process and how were they compensated?
NASA Office of STEM Engagement.
What processes (e.g. cleaning, filtering, labeling) did the derivation process perform?
Added Column Headings. Parsed string into columns.
If software was used to perform the derivation, is it available? If so, please point to a link or other access point.
n/a
What information was removed or transformed during derivation that might influence the findings of an analysis (e.g., deleting rows due to missing data, a sampling mechanism that over-samples from a particular group, etc.)?
n/a

6. USES

Are there real-world applications of the dataset that an educator should be aware of?
• Create a climate data record of global average temperature change. • Advance scientific understanding of global climate change. • Validate climate models. • Compare NASA temperature analysis to other independent temperature analyses. • Provide global temperature data that can be used by the public, researchers, and policy and decision makers.

7. EDUCATOR'S GUIDE

Are there recommended subsets to be explored?
NASA studies long term trends. All data points are needed to compile a comprehensive time series to better understand Earth-system phenomena.
Are there outliers or unusual observations to be pointed out?
• The past nine years have been the warmest since recordkeeping began and 2022 is the fifth warmest year on record (Ref). • The relative stand-still of global temperature during the time-period between 1940-1975 is generally attributed to an approximate balance of aerosol cooling and greenhouse gas warming during a period of rapid growth of fossil fuel use with little control on particulate air pollution. This has not been quantified, however, because of the absence of adequate aerosol measurements (Ref). • Each decade since the 1970s has been warmer than the previous decade.
Are there any correlations in the derivative dataset to be pointed out?
n/a
Does the data embody any computing or statistical learning goals (e.g., columns have a particular skew, correlations demonstrate Simpson's Paradox, etc.)?
n/a
What potential threats to validity would be worth discussing?
n/a
Suggestions for student activities
• Calculate decadal rates of change. • Graphing Global Temperature Trends Classroom Activity • Access similar datasets from GISS Surface Temperature Analysis to investigate temperature trends across time and geospatial scales (monthly, seasonal, hemispheric, zonal).