## Datasets and methods:

### Temperature

Six datasets (cited below) were used in the calculation of regional temperature. Regional mean temperature anomalies were calculated relative to the 1961–1990 and 1991–2020 baselines using the following steps:

- 1. Read the gridded dataset;
- 2. Regrid the data to 1°latitude×1°longitude resolution. If the gridded data are higher resolution, take a mean of the grid boxes within each 1°×1°grid box. If the gridded data are lower resolution, copy the low-resolution grid box value into each 1°×1°grid box that falls inside the low-resolution grid box;
- 3. For each month, calculate the regional area average using only those 1°×1°grid boxes whose centres fall over land within the region;
- 4. For each year, take the mean of the monthly area averages to get an annual area average;
- 5. Calculate the mean of the annual area averages over the periods 1961–1990 and 1991–2020;
- 6. Subtract the 30-year period average from each year to obtain the anomalies relative to that base period.

The following six datasets were used:

Berkeley Earth – Rohde, R. A.; Hausfather, Z. The Berkeley Earth Land/Ocean Temperature Record. Earth System Science Data **2020**, *12*, 3469–3479. <u>https://doi.org/10.5194/essd-12-3469-2020</u>. The data are available <u>here</u>.

ERA5 – Hersbach, H.; Bell, B.; Berrisford, P. et al. The ERA5 Global Reanalysis. *Quarterly Journal of the Royal Meteorological Society* **2020**, *14*6 (730), 1999–2049. <u>https://doi.org/10.1002/qj.3803</u>. The data are available <u>here</u>.

GISTEMP v4 – GISTEMP Team. *GISS Surface Temperature Analysis (GISTEMP), version 4*. NASA Goddard Institute for Space Studies, 2022. <u>https://data.giss.nasa.gov/gistemp/</u>. Lenssen, N.; Schmidt, G.; Hansen, J. et al. Improvements in the GISTEMP Uncertainty Model. *Journal of Geophysical Research: Atmospheres* **2019**, *124* (12), 6307–6326. <u>https://doi.org/10.1029/2018JD029522</u>. The data are available <u>here</u>.

HadCRUT.5.0.2.0 – Morice, C. P.; Kennedy, J. J.; Rayner, N. A. et al. An Updated Assessment of Near-Surface Temperature Change From 1850: The HadCRUT5 Data Set. *Journal of Geophysical Research: Atmospheres* **2021**, *126*. <u>https://doi.org/10.1029/2019JD032361</u>. HadCRUT.5.0.2.0 data were obtained from <u>http://www.metoffice.gov.uk/hadobs/hadcrut5</u> on 17 January 2025 and are © British Crown Copyright, Met Office 2024, provided under an Open Government Licence, <u>http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/</u>.

JRA-3Q – Kosaka, Y.; Kobayashi, S.; Harada, Y.; Kobayashi, C.; Naoe, H.; Yoshimoto, K.; Harada, M.; Goto, N.; Chiba, J.; Miyaoka, K.; Sekiguchi, R.; Deushi, M.; Kamahori, H.; Nakaegawa, T.; Tanaka, T. Y.; Tokuhiro, T.; Sato, Y.; Matsushita, Y.; Onogi, K. The JRA-3Q Reanalysis. J. Meteorol. Soc. Jpn. Ser II **2024**, 102 (1), 49–109. <u>https://doi.org/10.2151/jmsj.2024-004</u>.

NOAAGlobalTemp v6 – Huang, B., X. Yin, M. J. Menne, R. Vose, and H. Zhang, NOAA Global Surface Temperature Dataset (NOAAGlobalTemp), Version 6.0.0. NOAA National Centers for Environmental Information. <u>https://doi.org/10.25921/rzxg-p717</u>

# Precipitation

In situ precipitation data from National Meteorological and Hydrological Services were used.

### Glaciers

Glacier data comes from the State of the Cryosphere Report 2024: Mountain Glaciers and Snow by ICCI-International Cryosphere Climate Initiative (ICCI 2024) -<u>https://www.un-glaciers.org/en/articles/state-cryosphere-report-2024</u>),

### Sea-surface temperature

Sea-surface temperature anomalies were processed by CIIFEN using the <u>NOAA OI SST V2 High</u> <u>Resolution Dataset</u>.

## Sea level

Regional sea-level trends are based on gridded C3S altimetry data averaged from 50 km offshore to the coast by the Laboratory of Space Geophysical and Oceanographic Studies (LEGOS).

## Floods

Data from National Meteorological and Hydrological Services of LAC countries, CEMADEN (www.cemaden.gov.br), United Nations organizations and <u>https://floodlist.com/</u> and <u>https://reliefweb.int/</u>

# Drought

The Integrated Drought Index (IDI) developed by CEMADEN uses Standardized Precipitation Index (SPI) data calculated using Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) and the Vegetation Health Index from the Center for Satellite Applications and Research (STAR/NOAA).

Drought data were also provided by the United States Drought Monitor (USDM): <u>https://droughtmonitor.unl.edu/;</u> from CEMADEN (<u>www.cemaden.gov.br</u>) from Brazil, and for the Southern South American region by SISSA (<u>sissa.crc-sas.org</u>).

### Wildfires

Burned area data for South America come from the Laboratory for Environmental Satellite Applications of the Federal University of Rio de Janeiro (<u>https://alarmes.lasa.ufrj.br/</u>).

### Cold and heat waves

In situ data from National Meteorological and Hydrological Services were used.

### **Climate Services**

Checklist for Climate Services Implementation (Climate Services Dashboard).