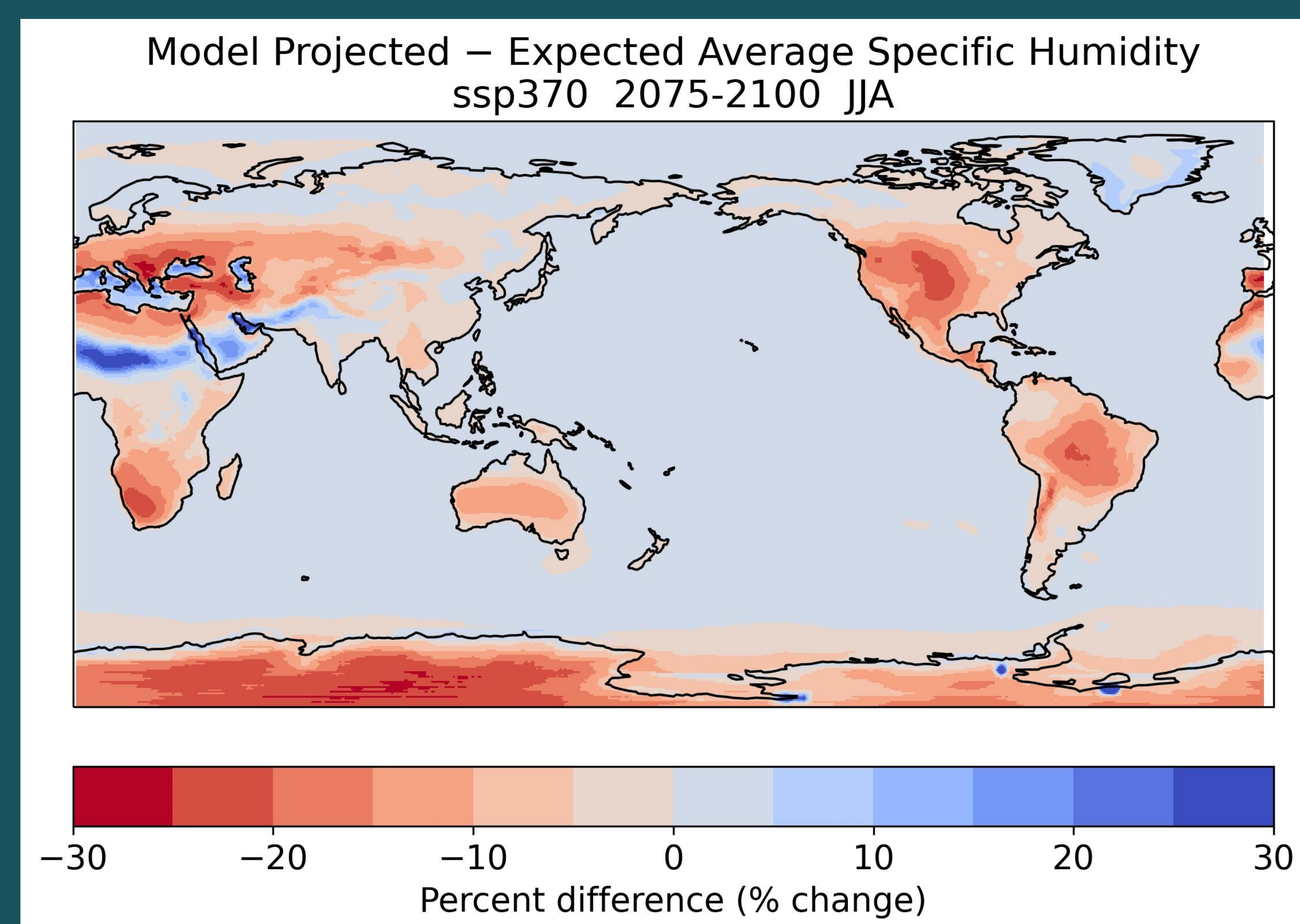# Projected changes in specific humidity from CMIP6 are drier than expected.

- **Based on fixed relative humidity plus temperature changes**
- **Extreme low RH days increase by 5-10x over many regions**

Model Projected − Expected Average Specific Humidity
ssp370 2075-2100 JJA

Background

Humidity has many important impacts on climate (such as drought, wildfire risk, plant and animal life) and on human health. What do future projections from the latest generation of climate models (CMIP6) look like?
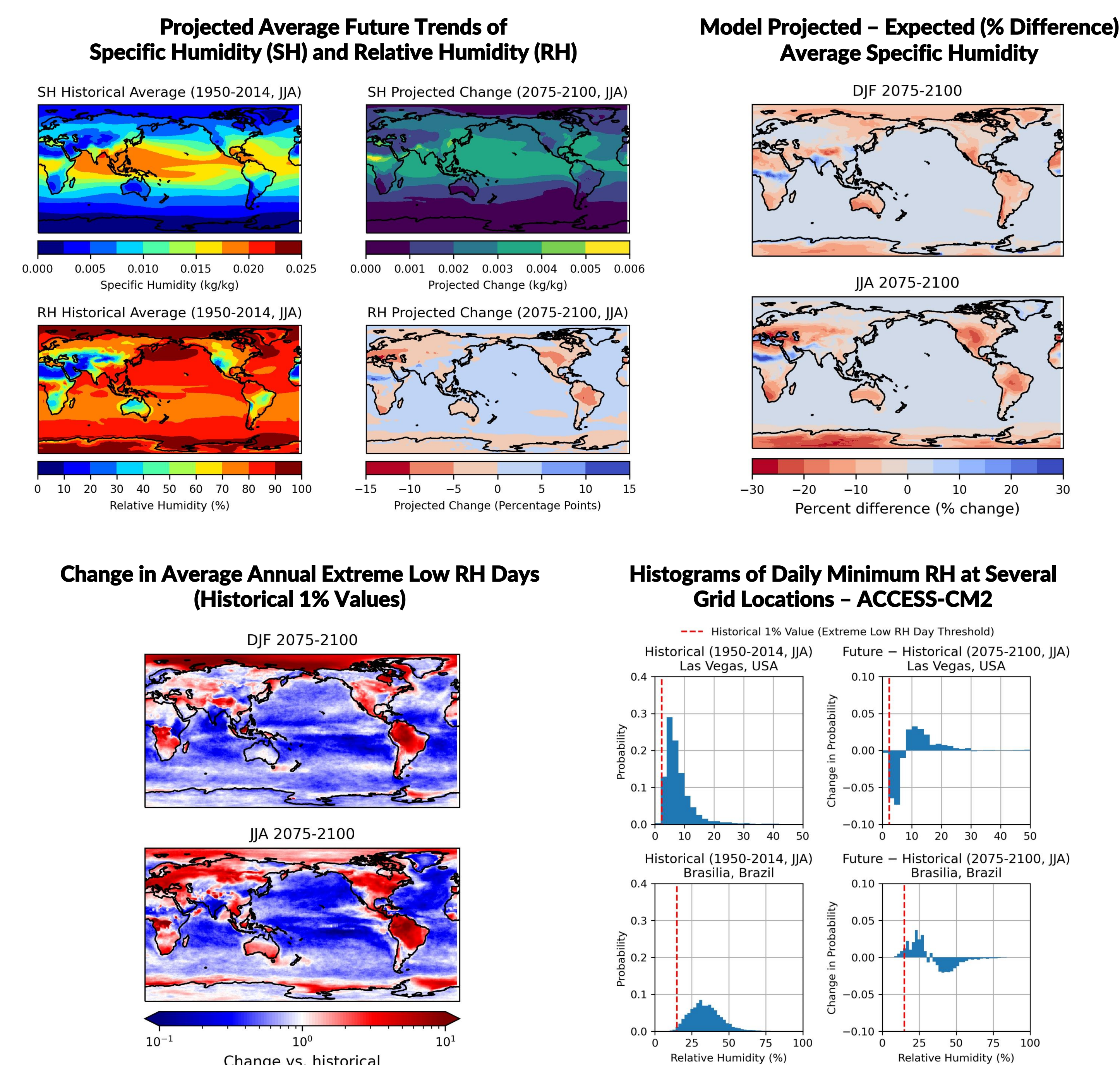
Methods

Daily climate projections from an ensemble of twelve* CMIP6 GCMs regridded to 0.5 degree x 0.5 degree resolution were included in the study. Future projections from 2015-2100 were divided into early (2015-2044), mid (2045-2074), and late century (2075-2100) and by season: included are DJF (December, January, February) and JJA (June, July, August). All projections are based on the ssp370 experiment, which represents the medium to high end of plausible future forcing pathways based on SSP3 and RCP7.0.

*ACCESS-CM2, ACCESS-ESM1-5, CNRM-CM6-1, CanESM5, EC-Earth3, EC-Earth3-Veg, FGOALS-g3, INM-CM4-8, INM-CM5-0, MPI-ESM1-2-HR, MPI-ESM1-2-LR, MRI-ESM2-0

Main Findings

1. **Model projections of average specific humidity tend to be drier than the expected values explained by projected temperature changes.** Expected specific humidity was calculated from historical averages (1950-2014) of relative humidity and surface pressure and future projected values of temperature.

2. **These differences vary by season and by location.** For example, much of North and South America and Europe is projected to become drier than expected in JJA, while parts of India and the African Sahel are projected to become more humid than expected.

3. **The frequency of extreme low relative humidity days is projected to change in the future** – for example by upwards of 5 to 10x more summer (JJA) extreme low RH days across Europe each year by late century.

Projected Average Future Trends of Specific Humidity (SH) and Relative Humidity (RH)

Model Projected – Expected (% Difference) Average Specific Humidity

Change in Average Annual Extreme Low RH Days (Historical 1% Values)

Histograms of Daily Minimum RH at Several Grid Locations – ACCESS-CM2

Note: all figures are based on experiment ssp370. All figures except histograms represent ensemble averages.

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