Provided by T. Iizumi: January 18, 2017

S14 Temperature and Precipitation Extremes Indices (S14 indices data set)

1. Brief description of the data set

The S14 indices data set offers the global 0.5-degree annual (or monthly for some indices) time series of 15 temperature and 12 precipitation indices in the historical and future periods. Most of the indices are based on the indices recommended by WMO CCl/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). Some of the indices are based on those used in Donat et al. (2013).

These indices in the historical period are derived using five different meteorological forcing data sets. These include the S14 project forcing data set (S14FD) (Iizumi et al., in review), the Princeton's global meteorological forcing data set (PFD) (Sheffield et al., 2006), the Water and Global Change project forcing data set (WATCH) (Weedon et al., 2011), WATCH Forcing Data methodology applied to ERA-Interim data (WFDEI) (Weedon et al., 2014) and the Global Risk Assessment toward Stable Production of Food (GRASP) project forcing data set (GRASP) (Iizumi et al., 2014). The time coverage varies by the forcing data set (the S14FD, 1958-2013; PFD, 1948-2008; WATCH, 1958-2001, WFDEI, 1979-2012; and GRASP, 1961-2010).

The indices in the future period are derived using the two databases of the bias-corrected five CMIP5 Global Climate Models (GCMs) outputs separately provided by the two projects: the Inter-Sectoral Impact Model Intercomparison Project (ISI-MIP) (Hempel et al., 2013) and S14 (the Strategic Research on Global Mitigation and Local Adaptation to Climate Change, http://s-14.iis.u-tokyo.ac.jp/eng/). The five GCMs include GFDL-ESM2M, IPSL-CM5A-LR, MIROC-ESM-CHEM, HadGEM2-ES and NorESM1-M. The data for four Representative Concentration Pathways (RCPs, 2.6, 4.5, 6.0 and 8.5 W m^{-2}) are available for the period 2006-2100 (2006-2098 for one GCM, HadGEM2-ES) as well as the historical period (1961-2005). The indices data derived from the ISI-MIP database cover the period 2006-2099 (except HadGEM2-ES). Note that the temperature indices data are available only for two GCMs (GFDL-ESM2M and IPSL-CM5A-LR) in the ISI-MIP database. Different bias-correction methods are used for the two projects (see Iizumi et al., in review for details). The indices data derived from the ISI-MIP database use the WATCH as the reference climatology, whereas those derived from the S14 database use three forcing data sets (the S14FD, PFD and WATCH) as the reference climatology.

2. List of the indices

A set of 27 temperature and precipitation indices selected from the indices recommended by the ETCCDI [a] and used in Donat et al. (2013).

Labels	Names	Definitions	Units
TXx	Hottest day	Annual maximum value of daily maximum temperature (T_{max}) [b]	°C
TNx	Warmest night	Annual maximum value of daily minimum temperature (T_{min}) [b]	°C
TXn	Coldest day	Annual minimum value of T_{max} [b]	°C
TNn	Coldest night	Annual minimum value of T_{min} [b]	°C
TN10p	Cool nights	Percentage of time when T_{min} <10th percentile	%
TX10p	Cool days	Percentage of time when T_{max} <10th percentile	%
TN90p	Warm nights	Percentage of time when T_{min} >90th percentile	%
TX90p	Warm days	Percentage of time when T_{max} >90th percentile	%
DTR	Diurnal temperature range	Annual mean difference between T_{max} and T_{min} [b]	°C
ID	Icing days	Annual count when T_{max} <0 °C	days
FD	Frost days	Annual count when T_{min} <0 °C	days
SU	Summer days	Annual count when T_{max} >25 °C	days
TR	Tropical nights	Annual count when T_{min} >20 °C	days
WSDI	Warm spell duration index	Annual count when at least six consecutive days of T_{max} >90th percentile	days
CSDI	Cold spell duration index	Annual count when at least six consecutive days of T_{min} <10th percentile	days
Rx1day	Maximum 1-day precipitation amount	Annual maximum 1-day precipitation [b]	mm
Rx5day	Maximum 5-day precipitation amount	Annual maximum consecutive 5-day precipitation [b]	mm
SDII	Simple daily intensity index	The ratio of annual total precipitation to the number of wet days (≥1 mm)	mm
R10mm	Number of heavy precipitation days	Annual count when daily precipitation (Pr) ≥10 mm	days

R20mm	Number of very heavy precipitation days	Annual count when *Pr* ≥20 mm	days
CDD	Consecutive dry days	Maximum number of consecutive days when *Pr* <1 mm	days
CWD	Consecutive wet days	Maximum number of consecutive days when *Pr* ≥1 mm	days
R95p	Very wet days	Annual total precipitation from days with *Pr* >95th percentile	mm
R99p	Extremely wet days	Annual total precipitation from days with *Pr* >99th percentile	mm
PRCPTOT	Annual total wet day precipitation	Annual total precipitation in wet days (≥1 mm)	mm
R95pTOT	Contribution from very wet days	R95p / PRCPTOT * 100	%
R99pTOT	Contribution from extremely wet days	R99p / PRCPTOT * 100	%

[a] see http://etccdi.pacificclimate.org/list_27_indices.shtml for details.

[b] Monthly data are available.

3. Directories

Indices calculated using five forcing data sets

```
indices_FD
    |--S14FD
        |--CDD
        |--
        |--WSDI
    |--PFD
    |--WATCH
    |--WFDEI
    |--GRASP
```

The indices calculated the ISI-MIP database (ISI-MIP bias-correction method with the reference climatology of the WATCH)

```
indices_CMIP5
    |--ISIMIP_ISIMIP_WATCH
```

|--GFDL-ESM2M
|--historical
|--CDD
|--
|--WSDI
|--rcp26
|--rcp45
|--rcp60
|--rcp85
|--IPSL-CM5A-LR
|--MIROC-ESM-CHEM
|--HadGEM2-ES
|--NorESM1-M

The indices calculated using the S14 database (the bias-correction method of CDFDM with the reference climatology of the S14FD, PFD and WATCH)

indices_CMIP5
|--S14_CDFDM_S14FD
|--GFDL-ESM2M
|--historical
|--CDD
|--
|--WSDI
|--rcp26
|--rcp45
|--rcp60
|--rcp85
|--S14_CDFDM_PFD
|--S14_CDFDM_WATCH

4. Access:

ftp_s14fd@h08.nies.go.jp (the long-in password will be provided upon request to the corresponding author)

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6. Data usage:

These data sets are provided for research purposes only. No warranty is given as to their suitability for user applications. No liability is accepted by the authors for any errors or omissions in the data or associated information and/or documentation. If publishing using the S14 indices data set, please cite Iizumi et al. (in review).

7. References:

Donat, M. G., et al. (2013), Updated analyses of temperature and precipitation extreme indices since the beginning of the twentieth century: The HadEX2 dataset, J. Geophys. Res. Atmos., 118, 2098-2118, doi:10.1002/jgrd.50150.

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Sheffield, J., G. Goteti, and E. F. Wood (2006), Development of a 50-year high-resolution global dataset of meteorological forcings for land surface modeling, J. Clim., 19, 3088-3111, doi: 10.1175/JCLI3790.1.

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