Data Set Name: *uqpipeline_precip_metrics.dat*

Purpose: Given Latin hypercube samples of 22 climate model input parameter values, determine the parameter value combinations that cause ensemble variability in precipitation metrics related to the diurnal cycle and spatial distribution in 7 regions.

Source: This data was constructed using LLNL's UQ Pipeline, was created under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344, was funded by the US DOE's Office of Science, and is released under UCRL number LLNL-MI-662154.

Relevant Information: This dataset contains values of precipitation metrics computed from climate model uncertainty quantification (UQ) ensembles. Ensemble members were constructed using a Latin hypercube method in LLNL's UQ Pipeline software system to sample the uncertainties of 22 model parameters within the version 5 Community Atmosphere Model component of the Community Earth System Model (CESM). The dataset contains six ensemble studies and 1145 simulations. There are five separate Latin hypercube ensembles, each containing 220 ensemble members, and a one-parameter-at-a-time (OAT) set of 45 simulations. UQ methods can be used to predict precipitation metrics from input parameter values, and to use sensitivity analysis, feature selection, and dimensional reduction techniques to determine the causes of ensemble variability.

Attribute Information:
Column 1: Ensemble study ID (Latin hypercube studies uq_nond01-05 + OAT study uq_oat2)
Column 2: simulation ID per ensemble (run####)
Columns 3-24: values of 22 CAM5 parameters scaled in the interval [0, 1]
Column 25+: precipitation metrics

Metric labels:
There are two types of precipitation metrics, quantiles of spatial distributions and components of the diurnal cycle.

Quantiles of spatial distributions are labeled REG0[**x**]_[**y**]_PDF_Q[**z**], where
x refers to regions 1-7,
y refers to time average (annual and four seasons), and
z refers to the percentile (25th, 50th, 75th, and 95th).

Diurnal cycles are labeled REG0[**w**]_[**x**]_HARM0[**y**]_[**z**], where
w refers to regions 1-7,
x refers to time average (annual and four seasons),
y refers to the harmonic number (1-4), and
z refers to the magnitude (MAG), phase (PHASE), or variability (VAR) of the cycle.

Acknowledgments:
Please cite the following related reports and papers.

- Generating CESM ensembles using the UQ Pipeline – Lucas, D. D. et al., Geosci. Model Dev., 6, 1157-1171, doi:10.5194/gmd-6-1157-2013, 2013.
- Sensitivity analysis of precipitation metrics in CAM – Johannesson, G. et al, Sandia Natl. Lab. Tech. Report SAND2014-0829, 2014.
- Detecting structural errors in CAM – Johannesson, G. and Lucas, D. D., Lawrence Livermore Natl. Lab. Tech Report LLNL-TR-652027, 2014.
- Sensitivity of precipitation in CAM5 – Qian, Y. et al., manuscript 2014MS000354 under review in Journal of Advances in Modeling Earth Systems, 2014.