Response to Anonymous Referee # 1:

The authors would like to thank Referee # 1 on providing valuable feedback on the manuscript. We duly acknowledge the value of the comments of Referee # 1 and have incorporated changes in the manuscript and the supplementary section accordingly. The remaining portion of this document provides a specific account of the authors' responses to the comments provided by Referee # 1. Please note that comments of Referee # 1 are marked in red, and the corresponding responses are provided in black text.

The manuscript (essd-2019-178) aimed to developing a high-resolution Asia Pacific Weather Statistics (APWS) dataset in a format ready to be used in SWAT simulations. However, there have several issues in the ms as the requests of ESSD.

1. Authors should highlight why the APWS is an original research dataset? Because the current ms presented that the APWS dataset is only a repacking of APHRODITE for running the SWAT software. Besides, there has no description on the improvement of original dataset.

Response: The authors would like to clarify that APWS is not a weather time-series product that is an improvement over APHRODITE, but rather a new weather statistics dataset that may be used with a stochastic weather generator, for generating synthetic weather data for hydrologic modeling. Moreover, the statistical data embedded in APWS is derived from existing weather products, i.e., APHRODITE and CFSR.

Rainfall is the primary driver of hydrological cycle in majority of river basins in Asia Pacific region. Precise and gap-free rainfall data is thus needed for robust hydrological model setup. Soil and Water Assessment Tool (SWAT) is a widely established hydrological model, which uses an inherent weather generator (WXGN) to fill gaps in meteorological inputs. It is also possible to generate entirely new series of synthetic weather such as rainfall, maximum and minimum temperatures, relative humidity, wind speed and solar radiation, based on user-defined weather statistics in the WXGN. Currently, river basins in the contiguous US benefit from meteorological gap filling via availability of a First Order US stations weather statistics database, which is in-built within SWAT model. For river basins outside USA, user needs to specify the statistics manually using long-term daily observed data (20 years or more), which is cumbersome and error-prone, and mostly unavailable in data-scarce regions. Alternatively, SWAT modelers may use the existing CFSR database available at 0.38-degree spatial resolution, for specification of weather statistics to be used with WXGN. However, CFSR statistics are computed using reanalysis CFSR daily data, which has been reported to have inferior performance compared to APHRODITE in several river basins of Asia Pacific (please see lines 137-141 of the revised manuscript and references cited therein). Thus, daily data series of the APHRODITE product from 1981-2007 (more than 20 years) are used to derive rainfall-related weather statistics for APWS, across the Asia-Pacific region at 0.25-degree resolution.

Since APHRODITE is a rainfall-only product, rainfall-related weather statistics for APWS are derived from it and remaining weather statistics (that are required by the WXGN weather generator; see Table 1 of main manuscript for description of the statistics dataset) are interpolated from the CFSR database. For the convenience of potential SWAT modelers, APWS data is prepared in SWAT-ready format and disseminated via a web-platform to ensure easy access for any region of interest. As such, no other weather statistics dataset employing observed rainfall is available at the presented resolution for Asia Pacific region and thus the authors believe the presented APWS is a novel and important dataset.

Evaluation of performance of APWS in the context of hydrologic modeling (in scenarios where some observed precipitation records are missing) now includes both a comparison against the CFSR statistics dataset and the statistics derived from original observed station weather data (please refer to Section 4 of the revised manuscript (lines 190-207)). The superiority of APWS dataset over CFSR is evident from model performance at the selected two river basins of Asia, Narayani (Nepal) and Wangchhu (Bhutan) (see section 4.5, lines 279-341). Moreover, it is observed that performance of APWS is comparable to observed rainfall generated weather statistics.

Furthermore, the originality of APWS dataset has been highlighted in the revised manuscript at the end of Introduction section (e.g., see lines 98-99).

2. The evaluation of APWS dataset is not reasonable. The evaluation comparison between APWS and CFSR datasets is not necessary or in an inferior way. Authors should focus on the observed-based evaluations to indicate the original and quality-improved APHRODITE (i.e., APWS).

Response: The authors agree that hydrologic evaluation of APWS should include comparison against synthetic weather generation within SWAT, using rainfall statistics derived from observed data. Hence, in the revised manuscript, the evaluation has been extended to include missing data SWAT simulation scenarios that use synthetic weather generated from observed rainfall-based weather statistics. Consequently, for the two river basins selected for hydrologic modeling, i.e., Narayani (Nepal) and Wangchhu (Bhutan), 79 and 7 surface rainfall stations, respectively, were used to setup the hydrologic models. Observed rainfall data for these stations was used to derive rainfall statistics for this dataset (called OBS statistics dataset in the revised manuscript in Section 4), for use within the WXGN weather generator in SWAT.

Then, in order to hydrologically evaluate and compare performance of OBS, APWS and CFSR statistics, artificial gaps were created in observed rainfall data (with 1%-50% missing rainfall records) for both Narayani and Wangchhu SWAT models. It should be noted here that during simulation, SWAT uses its built-in weather generator (WXGN) to synthetically fill gaps in observed precipitation records, using a statistics dataset provided as inputs. In our hydrologic evaluation experiments (discussed in Section 4), we iteratively used OBS, APWS and CFSR statistics during SWAT simulations, for different scenarios where a percentage of actual precipitation records were missing. We subsequently compared the reconstructed rainfall simulated flows using OBS, APWS and CFSR statistics, with the SWAT simulation scenario with no missing rainfall data. Results revealed that APWS had similar performance to OBS and it outperformed CFSR statistics in reconstructing the rainfall and simulating the flows with them.

Since, many river basins in Asia Pacific are devoid of high-quality meteorological time-series data (i.e., longer, gap-free high-quality data at daily time-step), a high-quality weather statistics dataset like APWS is required for gap filling and synthetic weather generation using SWAT.

Based on the comments of the reviewer, we have revised the evaluation mechanism for APWS to better highlight the value of APWS. The revised evaluation is included in the revised manuscript in Section 4 (lines 190-207) and Section 4.5 (lines 278-341).

3. The construction of the ms should be improved. Current ms (introduction, method, result, and discussion) focused on the data repacking and devoted to performing the comparison with CFSR. Authors should reorganize the ms and focus on improving the quality of frequently used datasets for running the SWAT

Response: Following this suggestion from the reviewer, we have made significant changes to the structure and organization of the manuscript. Consequently, we have given more attention towards describing APWS and explaining how it is an improved weather statistics dataset for hydrologic modeling (using SWAT) for the Asia Pacific region.

The revised manuscript also highlights the fact that the comparison of APWS has not been done solely with CFSR statistics, but also with observed rainfall-based weather statistics. Structural revisions are made throughout the revised manuscript. However most key changes are made in Section 4 (lines 190-207) and Section 4.5 (lines 278-341).