Geophysical Research Abstracts
Vol. 21, EGU2019-18859, 2019
EGU General Assembly 2019
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Projected drought severity changes in Southeast Asia under medium and extreme climate change

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The El Nino-Southern Oscillation (ENSO) is the main driver of seasonal conditions in the Southeast Asia region. We analysed the impact of reduced rainfall and the extreme high temperatures associated with EN events on drought conditions, by comparing the drought conditions of EN 1982 and EN 1997 as strong EN events, with EN 2015 as a moderate EN that had extreme warm temperatures by calculating the self-calibration Palmer drought severity index (scPDSI). With the trend of increasing temperatures in the future and the associated increased atmospheric water demand (the “thirst of the atmosphere”), the same drought severity level, such as EN 1997, can occur even with lower precipitation anomaly. To look into this issue, Coordinated Regional Climate Downscaling Experiment (CORDEX) Southeast Asia (CORDEX-SEA) simulation is analysed. The empirical quantile mapping (eQM) method was selected to bias corrected CORDEX-SEA dataset using gridded observation dataset (SA-OBS), we found that the method performed better compared to scaling and gamma quantile mapping (gQM) methods. Assuming EN 1997 as the driest period and representing it as a 30-year return period event in the model data, we show that such droughts will be common in the far future (2070-2100) period under extreme climate change. Furthermore, the results show that not only drought will be more severe in the future, but also that more areas will be affected by drought. The driest year in the future is documented in this thesis, and it is likely that under extreme climate change in far future period that in the driest year almost half of the region will be affected by extreme drought. In general, areas around the equator, like most of Indonesian regions, will have a higher drought severity change in the future compared to other areas.