

Analisis Koreksi Bias Satelit ERA5 Untuk Peningkatan Akurasi Pemodelan Hidrologi Di Das Citanduy

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ABSTRAK

Data curah hujan merupakan parameter penting dalam analisis hidrologi di DAS Citanduy Hulu. Data reanalisis ERA5 memiliki cakupan spasial yang luas dan tersedia secara kontinu, namun masih mengandung bias terhadap data observasi sehingga memerlukan koreksi sebelum digunakan. Penelitian ini bertujuan menganalisis karakteristik bias data curah hujan ERA5, mengevaluasi kinerja metode Rasio Rata-Rata, Regresi Linier, Regresi Power dan *Distribution Mapping*, serta menentukan metode koreksi bias terbaik di DAS Citanduy Hulu periode 2020-2023. Data observasi dari 12 pos hujan diolah menjadi curah hujan wilayah menggunakan metode Poligon Thiessen dan dibandingkan dengan data ERA5 pada skala harian dan bulanan. Evaluasi dilakukan menggunakan parameter *Root Mean Square Error* (RMSE), *Mean Absolute Error* (MAE), *Nash-Sutcliffe Efficiency* (NSE) dan koefisien determinasi (R^2). Hasil penelitian menunjukkan bahwa data ERA5 masih mengalami *overestimate* dan *underestimate* terhadap data observasi. Keempat metode mampu meningkatkan kualitas data dengan tingkat keberhasilan yang berbeda. Berdasarkan hasil evaluasi, metode Regresi Linier memberikan kinerja terbaik pada skala harian maupun bulanan dengan nilai RMSE terendah dan NSE tertinggi dibandingkan metode lainnya. Selain itu, evaluasi pada skala bulanan menunjukkan hasil yang lebih baik dibandingkan skala harian karena proses agregasi mampu mengurangi fluktuasi curah hujan. Dengan demikian, metode Regresi Linier direkomendasikan sebagai metode koreksi bias yang paling sesuai untuk data curah hujan ERA5 di DAS Citanduy Hulu.

Kata kunci: curah hujan, ERA5, koreksi bias, Regresi Linier, DAS Citanduy Hulu.

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Bias Correction Analysis of ERA5 Satellite Data to Improve Hydrological Modeling Accuracy in the Citanduy Watershed

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ABSTRACT

Rainfall is a fundamental parameter in hydrological analysis. ERA5 reanalysis rainfall data provide extensive spatial coverage and continuous availability; however, they contain uncertainties that require bias correction to improve accuracy in hydrological modeling. This study aims to evaluate the performance of ERA5 rainfall data bias correction methods, including the Mean Ratio, Linear Regression, Power Regression, and Distribution Mapping methods, based on observations from 2020-2023 in the Upper Citanduy Watershed. Observed rainfall data from 12 rain gauge stations were processed using the Thiessen Polygon method to obtain areal rainfall and then compared with ERA5 data at both daily and monthly time scales. The evaluation was conducted using the Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Nash-Sutcliffe Efficiency (NSE) and coefficient of determination (R^2). The results indicate that ERA5 data still exhibit overestimation and underestimation of observed rainfall. Each bias correction method improved data quality with varying levels of effectiveness. Based on the evaluation results, the Linear Regression method showed the best performance for both daily and monthly data, producing the lowest RMSE and the highest NSE values compared to the other methods. Furthermore, daily rainfall data demonstrated higher sensitivity to rainfall fluctuations than monthly rainfall data. Therefore, the Linear Regression method is recommended as the most suitable bias correction approach for ERA5 rainfall data in the Upper Citanduy Watershed.

Keywords: Rainfall, ERA5, bias correction, Linear Regression, Upper Citanduy Watershed.

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