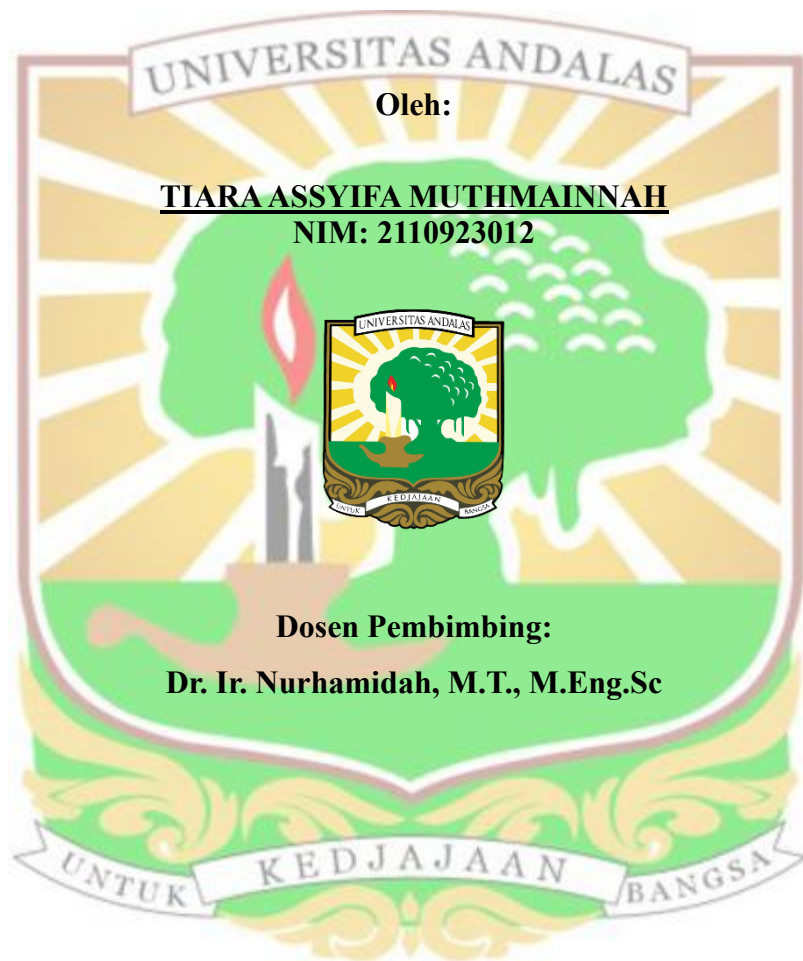


EVALUASI AKURASI CHIRPS TERHADAP *AUTOMATIC WEATHER STATION* (AWS) DALAM ESTIMASI CURAH HUJAN HARIAN

TUGAS AKHIR



Oleh:

TIARA ASSYIFA MUTHMAINNAH
NIM: 2110923012

Dosen Pembimbing:

Dr. Ir. Nurhamidah, M.T., M.Eng.Sc

**PROGRAM STUDI SARJANA TEKNIK SIPIL
DEPARTEMEN TEKNIK SIPIL
FAKULTAS TEKNIK
UNIVERSITAS ANDALAS**

**PADANG
2025**

ABSTRAK

Ketersediaan data curah hujan yang akurat dan merata masih menjadi tantangan signifikan dalam pengelolaan sumber daya air di Sumatera Barat. Salah satu upaya pemenuhan kebutuhan data dilakukan melalui penggunaan Automatic Weather Station (AWS) yang mampu mencatat data secara otomatis. Namun, AWS memiliki keterbatasan, seperti biaya operasional yang tinggi, cakupan spasial yang terbatas, serta kerentanan terhadap gangguan teknis. Sebagai alternatif, produk satelit Climate Hazards Group InfraRed Precipitation with Station Data (CHIRPS) menawarkan cakupan spasial yang luas dan resolusi temporal yang tinggi, namun tetap memerlukan validasi terhadap data observasi. Penelitian ini bertujuan untuk mengevaluasi akurasi data curah hujan harian CHIRPS dengan membandingkannya terhadap data AWS Ambient Weather WS-2902 yang terpasang di Fakultas Teknik Universitas Andalas. Analisis dilakukan untuk periode September 2023 hingga Maret 2025 menggunakan pendekatan point-to-pixel dan parameter statistik berupa Koefisien Korelasi (CC), Standar Deviasi, serta Centered Root Mean Square Difference (cRMSD). Koreksi bias diterapkan melalui tiga metode: Linear Scaling (LS), Local Intensity Scaling (LOCI), dan Empirical Quantile Mapping (EQM). Hasil menunjukkan bahwa CHIRPS cenderung underestimate terhadap curah hujan dengan intensitas tinggi, namun cukup akurat untuk hujan ringan hingga sedang. Koreksi bias, khususnya metode LOCI, mampu meningkatkan akurasi secara signifikan ($CC = 0.8$, $cRMSD = 30.39$ mm). Evaluasi kinerja deteksi menunjukkan performa yang baik, dengan nilai POD sebesar 0.90, FAR sebesar 0.10, dan CSI sebesar 0.80. Berdasarkan temuan tersebut, CHIRPS yang telah dikoreksi dapat dimanfaatkan sebagai sumber data curah hujan alternatif di wilayah dengan keterbatasan data observasi. Kendati demikian, penggunaannya tetap perlu mempertimbangkan unsur ketidakpastian, khususnya pada kejadian hujan ekstrem. Temuan ini memberikan dasar yang kuat dalam pemilihan produk satelit yang sesuai untuk mendukung aplikasi hidrometeorologi di Indonesia.

Kata kunci: CHIRPS, AWS, Validasi Data, Curah Hujan, Hidrologi.



ABSTRACT

The availability of accurate and evenly distributed rainfall data remains a significant challenge in water resource management in West Sumatra. One approach to addressing this need involves the use of Automatic Weather Stations (AWS), which can record meteorological data automatically. However, AWS systems have limitations, such as high operational costs, limited spatial coverage, and susceptibility to technical disturbances. As an alternative, the Climate Hazards Group InfraRed Precipitation with Station Data (CHIRPS) satellite product offers broad spatial coverage and high temporal resolution, although validation against ground observations is still required. This study aims to evaluate the accuracy of daily rainfall data from CHIRPS by comparing it with AWS Ambient Weather WS-2902 data installed at the Faculty of Engineering, Andalas University. The analysis covers the period from September 2023 to March 2025, using a point-to-pixel approach and statistical parameters including Correlation Coefficient (CC), Standard Deviation, and Centered Root Mean Square Difference (cRMSD). Bias correction was applied using three methods: Linear Scaling (LS), Local Intensity Scaling (LOCI), and Empirical Quantile Mapping (EQM). The results show that CHIRPS tends to underestimate high-intensity rainfall but is fairly accurate for light to moderate rainfall. Bias correction, particularly using the LOCI method, significantly improved accuracy (CC = 0.80; cRMSD = 30.39 mm). Rainfall detection performance was also strong, with a Probability of Detection (POD) of 0.90, False Alarm Ratio (FAR) of 0.10, and Critical Success Index (CSI) of 0.80. Based on these findings, corrected CHIRPS data can be used as an alternative source of rainfall information in areas with limited observational data. Nevertheless, its application should consider uncertainties, especially during extreme rainfall events. These findings provide a solid foundation for selecting appropriate satellite products to support hydrometeorological applications in Indonesia.

Keywords: CHIRPS, AWS, data validation, Rainfall, hydrology.

