

ABSTRAK

PERANCANGAN *EDDY COVARIANCE AERIAL SYSTEM* SEBAGAI WAHANA *REMOTE SENSING* KONSENTRASI GAS KARBON

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Metode pengukuran *Eddy covariance (EC)* melalui udara merupakan salah satu metode yang paling efektif untuk mengukur secara langsung fluks dan konsentrasi gas di udara. Pada umumnya implementasi metode *eddy covariance* berupa stasiun tetap (stationary tower atau disebut juga eddy tower) dimana hanya dapat ditempatkan di lokasi tertentu dan tidak mudah dipindahkan. Hal ini membatasi pengukuran, rentan terhadap kerusakan, serta memerlukan biaya yang signifikan dalam instalasi dan pemeliharaannya. Penelitian ini, mengembangkan sistem *EC* berbasis pesawat tanpa awak (*UAV*) yang dapat dioperasikan untuk mengukur fluks dan konsentrasi gas karbon dioksida. Uji penerbangan dari sistem *EC* berbasis *UAV* yang dikembangkan di dilakukan pada bulan Desember 2023 – Januari 2024 di lingkungan Universitas Lampung. Dilakukan satu kali uji penerbangan, dan membandingkan hasil pengukuran dengan hasil dari data pengukuran Eddy Station Tower yang ada di dratan. Hasil dari uji coba penerbangan menunjukkan bahwa sistem ini dapat melakukan akuisisi data konsentrasi gas karbon dengan baik. Hasil dari penelitian ini mengungkapkan adanya potensi besar metode *EC* berbasis *UAV* dapat melakukan *Remote Sensing* fluks dan konsentrasi gas karbon di atmosfer.

Kata kunci: *Eddy covariance, Remote Sensing, Konsentrasi Karbon, UAV, Mobile Eddy Station, Air Flux*

ABSTRACT

DESIGN OF EDDY COVARIANCE AERIAL SYSTEM AS A REMOTE SENSING PLATFORM FOR CARBON GAS CONCENTRATION

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The *Eddy covariance* (EC) measurement method through the air is one of the most effective methods for directly measuring the flux and concentration of gases in the air. In general, the implementation of the *eddy covariance* method is in the form of a fixed station (stationary tower or also called an eddy tower) which can only be placed in certain locations and cannot be easily moved. This limits measurements, is susceptible to damage, and requires significant costs in installation and maintenance. This research develops an unmanned aircraft (UAV) based EC system that can be operated to measure the flux and concentration of carbon dioxide gas. The flight test of the UAV-based EC system developed in was carried out in December 2023 – January 2024 at the University of Lampung. One flight tests were carried out, and the measurement results were compared with the results from the Eddy Station Tower measurement data on the mainland. The results of flight trials show that this system can perform carbon gas concentration data acquisition well. The results of this research reveal the great potential of the UAV-based EC method for Remote Sensing the flux and concentration of carbon gas in the atmosphere.

Keywords: *Eddy covariance*, Remote Sensing, Carbon Concentration, UAV, Mobile Eddy Station, Air Flux