INTRODUCTION

The Eddy Covariance method is a micrometeorological technique of high-speed flux measurements of water, gas, heat, and momentum transport within the atmospheric boundary layer, above the soil surface, plant canopy, or industrial and urban terrains.

Fluxes, emission and exchange rates could be carefully characterized from a single-point in-situ measurements using the permanent or mobile tower, or moving platforms such as automobile, helicopter, airplane, ship, boat, bus, etc.

Eddy Covariance is widely used by micrometeorologists all over the globe. However, a number of scientists from related disciplines may not be familiar enough with this technique to assess its usefulness within their research.

Modern instruments and software can expand the use of this method beyond micrometeorology and prove valuable for plant physiology, hydrology, biology, ecology, entomology. The new book presents guidelines for the Eddy Covariance technique of high-speed measurements of water, gas, heat, and momentum fluxes within the atmospheric boundary layer.

WHY EDDY COVARIANCE?

The Eddy Covariance method is one of the most straight and defensible ways to measure and calculate ecosystem fluxes, emissions, and exchange rates of gas and energy inside the defensible ways to measure and calculate ecosystem fluxes, emissions, and exchange rates of gas and energy inside the atmospheric boundary layer.

- Nearly direct way to measure transport in the atmosphere
- Observes scales from 20-40 times per second to years
- Represents exchange over area, and not at a single spot
- Represents entire ecosystem exchange, not just soil layer
- Very flexible set-up to fit wide range of scientific goals
- Instrumental systems are available and ready-to-use
- World-wide network available: data sharing and integration
- Challenges include mathematical complexity, care during system design for specific goal, and data processing

PHYSICAL MEANING

Air flow can be imagined as a horizontal flow of numerous rotating eddies of various sizes

Each eddy has 3D components, including a vertical wind component

Diagrams chaotic but components can be measured from the tower, including gas concentration, temperature and humidity

MAJOR ASSUMPTIONS

- Measurements at a point can represent an upwind area
- Measurements are done inside boundary layer of interest
- Footprint is adequate: fluxes are from an area of interest
- Flux is fully turbulent; most of the transfer is by eddies
- Terrain is horizontal, uniform, with steady-state flow
- Atmospheric pressure, air density fluctuations negligible
- Convergence and divergence of the air flow are negligible
- Instruments can detect small changes at high frequency

ACCESS TO RESOURCES

Book on the key aspects of Eddy Covariance methodology for non-micrometeorologists can be accessed online at www.licor.com/eddycovariance. Two editions are available:

- Free Electronic Resource - Adobe PDF Book
- Traditional Resource - Papercopy Textbook

The information covered in the book may be especially useful to the following groups studying, using, or supporting the Eddy Covariance method, or utilizing its results:

- Undergraduate students in micrometeorology course
- Non-meteorology graduate students using the method
- Field technicians, research assistants and student help, supporting flux data collection and processing
- Non-micrometeorology scientists and faculty interested in applying the method for their research
- Facility managers from industrial areas (landfills, feed lots, etc.) interested in quantifying the emissions
- Regulating bodies (environmental protection agencies, state and local air quality boards, etc.) interested in using Eddy covariance as an official method

Authors intend to keep the content of this book dynamic and current. Please send your suggestions and updates to george.burba@licor.com with subject “EC Book”

ADDITIONAL INFORMATION


