

1. Record Nr.	UNINA9910809275303321
Titolo	Airborne measurements for environmental research : methods and instruments // edited by Manfred Wendisch and Jean-Louis Brenguier
Pubbl/distr/stampa	Weinheim, : Wiley-VCH, 2013
ISBN	9783527653232 3527653236 9783527653218 352765321X 9783527653249 3527653244
Edizione	[1st ed.]
Descrizione fisica	1 online resource (689 p.)
Collana	Wiley series in atmospheric physics and remote sensing
Altri autori (Persone)	WendischManfred BrenguierJean-Louis
Disciplina	551.511028
Soggetti	Atmosphere - Measurement
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Airborne Measurements for Environmental Research; Contents; Preface; A Tribute to Dr. Robert Knollenberg; List of Contributors; 1 Introduction to Airborne Measurements of the Earth Atmosphere and Surface; 2 Measurement of Aircraft State and Thermodynamic and Dynamic Variables; 2.1 Introduction; 2.2 Historical; 2.3 Aircraft State Variables; 2.3.1 Barometric Measurement of Aircraft Height; 2.3.2 Inertial Attitude, Velocity, and Position; 2.3.2.1 System Concepts; 2.3.2.2 Attitude Angle Definitions; 2.3.2.3 Gyroscopes and Accelerometers; 2.3.2.4 Inertial-Barometric Corrections 2.3.3 Satellite Navigation by Global Navigation Satellite Systems 2.3.3.1 GNSS Signals; 2.3.3.2 Differential GNSS; 2.3.3.3 Position Errors and Accuracy of Satellite Navigation; 2.3.4 Integrated IMU/GNSS Systems for Position and Attitude Determination; 2.3.5 Summary, Gaps, Emerging Technologies; 2.4 Static Air Pressure; 2.4.1 Position Error; 2.4.1.1 Tower Flyby; 2.4.1.2 Trailing Sonde; 2.4.2 Summary; 2.5 Static Air Temperature; 2.5.1 Aeronautic Definitions of Temperatures; 2.5.2 Challenges of Airborne Temperature Measurements; 2.5.3 Immersion

Probe; 2.5.4 Reverse-Flow Sensor  
2.5.5 Radiative Probe2.5.6 Ultrasonic Probe; 2.5.7 Error Sources; 2.5.7.1 Sensor; 2.5.7.2 Dynamic Error Sources; 2.5.7.3 In-Cloud Measurements; 2.5.8 Calibration of Temperature Sensors; 2.5.9 Summary, Gaps, Emerging Technologies; 2.6 Water Vapor Measurements; 2.6.1 Importance of Atmospheric Water Vapor; 2.6.2 Humidity Variables; 2.6.3 Dew or Frost Point Hygrometer; 2.6.4 Lyman-Absorption Hygrometer; 2.6.5 Lyman- Fluorescence Hygrometer; 2.6.6 Infrared Absorption Hygrometer; 2.6.7 Tunable Laser Absorption Spectroscopy Hygrometer; 2.6.8 Thin Film Capacitance Hygrometer 2.6.9 Total Water Vapor and Isotopic Abundances of  $^{18}\text{O}$  and  $^{2}\text{H}$ 2.6.10 Factors Influencing In-Flight Performance; 2.6.10.1 Sticking of Water Vapor at Surfaces; 2.6.10.2 Sampling Systems; 2.6.11 Humidity Measurements with Dropsondes; 2.6.12 Calibration and In-Flight Validation; 2.6.13 Summary and Emerging Technologies; 2.7 Three-Dimensional Wind Vector; 2.7.1 Airborne Wind Measurement Using Gust Probes; 2.7.1.1 True Airspeed (TAS) and Aircraft Attitude; 2.7.1.2 Wind Vector Determination; 2.7.1.3 Baseline Instrumentation; 2.7.1.4 Angles of Attack and Sideslip; 2.7.2 Errors and Flow Distortion 2.7.2.1 Parameterization Errors2.7.2.2 Measurement Errors; 2.7.2.3 Timing Errors; 2.7.2.4 Errors due to Incorrect Sensor Configuration; 2.7.3 In-Flight Calibration; 2.8 Small-Scale Turbulence; 2.8.1 Hot-Wire/Hot-Film Probes for High-Resolution Flow Measurements; 2.8.2 Laser Doppler Anemometers; 2.8.3 Ultrasonic Anemometers/Thermometers; 2.8.4 Measurements of Atmospheric Temperature Fluctuations with Resistance Wires; 2.8.5 Calibration of Fast-Response Sensors; 2.8.6 Summary, Gaps, and Emerging Technologies; 2.9 Flux Measurements; 2.9.1 Basics; 2.9.2 Measurement Errors  
2.9.3 Flux Sampling Errors

---

#### Sommario/riassunto

This first comprehensive review of airborne measurement principles covers all atmospheric components and surface parameters. It describes the common techniques to characterize aerosol particles and cloud/precipitation elements, while also explaining radiation quantities and pertinent hyperspectral and active remote sensing measurement techniques along the way. As a result, the major principles of operation are introduced and exemplified using specific instruments, treating both classic and emerging measurement techniques. The two editors head an international community of eminent scientists

---