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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 18O and 2H2.6.10 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