

Handbook of Hydrologic Measurement Methods

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The major content areas of the Handbook will include surface and subsurface water hydrology and hydraulics, atmospheric water, and water quality. Due to the importance of measurements of mass, energy, and momentum fluxes within and between compartments in the hydrosphere, emphasis will be given to methods that describe the measurement of precipitation, evaporation/evapotranspiration, infiltration/exfiltration, and surface water transport.

The TOC is a vehicle for providing a unified, logically organized, searchable compendium of the best available methods. Therefore, the precise contents and organization of the TOC is an important attribute of the Handbook. Here, we provide a working draft of the TOC.

- a. Quantifying subsurface flow and transport
 - i. Aquifer characterization
 - 1. Flow direction and magnitude
 - 2. Concentration and mass flux
 - 3. Conductivity, storativity, transmissivity
 - 4. Geophysical methods
 - ii. Vadose zone characterization
 - 1. Physical properties – including density, retention, conductivity
 - 2. Soil moisture and tension, psychrometry
 - 3. Solute sampling
 - a. Direct – porewater
 - b. Indirect – bulk soil, e.g., EM
 - 4. Soil heat
 - 5. Geophysical methods
 - iii. Groundwater-surface water exchange
 - 1. Flow
 - 2. Concentration and mass flux
 - 3. Conductivity
- b. Quantifying surface water flow and transport
 - i. Water discharge measurements
 - 1. Direct streamflow measurements
 - 2. Indirect streamflow measurements
 - 3. Special discharge measurements
 - a. Pressurized pipe flow
 - b. Gravity pipe flow
 - 4. Emerging methods for water discharge measurement
 - 5. Uncertainty analysis
 - ii. Flow and transport properties using tracer techniques
 - iii. Chemical fluxes
 - iv. Sediment transport and erosion
 - 1. Suspended-sediment transport and deposition
 - 2. Bedload sediment transport and deposition

3. Geomorphic assessments of stream and watershed
 - a. Bed and bank material assessment
 - b. Erosion of channel and uplands
 4. Emerging methods of measurement of sediment transport, erosion, and deposition
 - v. Stream-aquifer exchange
- c. Quantifying hydrologic exchange at the land-atmospheric boundary
- i. Infiltration
 1. Local measurements
 2. Landscape
 - ii. Precipitation
 1. Bulk rain events
 2. snow, hail and ice
 3. dew, mist and fog
 - iii. Evaporation
 1. from water surfaces
 2. from plant surfaces
 3. through the boundary layer
 - iv. Transpiration
 1. natural ecosystems
 2. agronomic ecosystems
 - v. Turbulent flux measurements
 1. Eddy covariance (momentum and heat flux)
 2. Scintillometry
 3. Other
 - vi. Uncertainty analyses
- d. Remote sensing of hydrologic processes
- i. Land based sensors
 - ii. Airborne Sensors
 - iii. Satellite sensors
- e. Water quality¹
- i. Discrete sample collection
 - ii. In-situ and continuous monitoring methods
 - iii. Physical Measurements (includes sediment concentration)
 - iv. Collection of Samples to quantify Organic Compounds
 - v. Collection of Samples to quantify Inorganic Compounds
 - vi. Analysis of aqueous Organic Compounds
 - vii. Analysis of aqueous Inorganic Compounds
 - viii. Microbiological Sampling and analysis

¹ The emphasis here will be on new and different methods that have particular relevance for hydrologists and water resources engineers. Methods similar to those described in Standard Methods, Methods in Soil Analysis, NEMI, and elsewhere will not be included.