1. Record Nr. UNINA9910779981603321 Autore Monteith John L Titolo Principles of environmental physics: plants, animals, and the atmosphere / / John L. Monteith and Mike H. Unsworth Pubbl/distr/stampa Oxford, England, : Academic Press, c2013 Oxford:,: Academic Press,, 2013 **ISBN** 0-12-386993-5 Edizione [4th ed.] Descrizione fisica 1 online resource (xix, 401 pages): illustrations (some color) Collana Gale eBooks Disciplina 574.191 Soggetti **Biophysics Ecology** Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Note generali Previous ed.: 2008. Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Half Title; Title Page; Copyright; Contents; Preface to the Fourth Edition; Preface to the Third Edition: Acknowledgments: Symbols: 1 The Scope of Environmental Physics; 2 Properties of Gases and Liquids; 2.1 Gases and Water Vapor; 2.1.1 Pressure, Volume, and Temperature; 2.1.2 The Hydrostatic Equation; 2.1.3 The First Law of Thermodynamics, and Specific Heats; 2.1.4 Latent Heat; 2.1.5 Lapse Rate; 2.1.6 Potential Temperature; 2.1.7 Water Vapor and its Specification; 2.1.7.1 Vapor Pressure; 2.1.7.2 Dew-Point Temperature; 2.1.7.3 Saturation Vapor Pressure Deficit; 2.1.7.4 Mixing Ratio 2.1.7.5 Specific and Absolute Humidity2.1.7.6 Virtual Temperature: 2.1.7.7 Relative Humidity; 2.1.7.8 Wet-Bulb Temperature; 2.1.7.9 Summary of Methods for Specifying Water Vapor Amount; 2.1.8 Other Gases; 2.1.8.1 Specifying Trace Gas Concentrations; 2.2 Liquid; 2.2.1 Water Content and Potential; 2.2.2 Liquid-Air Interfaces; 2.3 Stable

Isotopes; 2.4 Problems; 3 Transport of Heat, Mass, and Momentum; 3.1 General Transfer Equation; 3.2 Molecular Transfer Processes; 3.2.1 Momentum and Viscosity; 3.2.2 Heat and Thermal Conductivity; 3.2.3

3.3.1 Resistances to Transfer3.3.1.1 Alternative Units for Resistance and Conductance; 3.4 Diffusion of Particles (Brownian Motion); 3.5 Problems; 4 Transport of Radiant Energy; 4.1 The Origin and Nature of Radiation; 4.1.1 Absorption and Emission of Radiation; 4.1.2 Full or

Mass Transfer and Diffusivity; 3.3 Diffusion Coefficients

Black Body Radiation; 4.1.3 Wien's Law; 4.1.4 Stefan's Law; 4.1.5 Planck's Law; 4.1.6 Quantum Unit; 4.1.7 Radiative Exchange: Small Temperature Differences; 4.2 Spatial Relations; 4.2.1 Cosine Law for Emission and Absorption; 4.2.2 Reflection; 4.2.3 Radiance and Irradiance; 4.2.4 Attenuation of a Parallel Beam 4.3 Problems5 Radiation Environment; 5.1 Solar Radiation; 5.1.1 Solar Constant; 5.1.2 Sun-Earth Geometry; 5.1.3 Spectral Quality; 5.2 Attenuation of Solar Radiation in the Atmosphere; 5.3 Solar Radiation at the Ground; 5.3.1 Direct Radiation; 5.3.2 Diffuse Radiation; 5.3.3 Angular Distribution of Diffuse Radiation; 5.3.4 Total (Global) Radiation; 5.3.4.1 Spectrum of Total Solar Radiation; 5.4 Terrestrial Radiation; 5.4.1 Terrestrial Radiation from Cloudless Skies; 5.4.2 Terrestrial Radiation from Cloudy Skies; 5.5 Net Radiation; 5.6 Problems 6 Microclimatology of Radiation (i) Radiative Properties of Natural

6 Microclimatology of Radiation (i) Radiative Properties of Natural Materials6.1 Radiative Properties of Natural Materials; 6.1.1 Water; 6.1.1.1 Reflection; 6.1.1.2 Transmission; 6.1.2 Soils, Metals, and Glass; 6.1.3 Leaves; 6.1.4 Canopies of Vegetation; 6.1.5 Animals; 6.2 Problems; 7 Microclimatology of Radiation Opt (ii) Radiation Interception by Solid Structures; 7.1 Geometric Principles; 7.1.1 Direct Solar Radiation; 7.1.1.1 Shape Factors; 7.1.2 Diffuse Radiation; 7.1.2.1 Shape Factors; 7.2 Problems; 8 Microclimatology of Radiation (iii) Interception by Plant Canopies and Animal Coats 8.1 Interception of Radiation by Plant Canopies

## Sommario/riassunto

Principles of Environmental Physics: Plants, Animals, and the Atmosphere, 4e, provides a basis for understanding the complex physical interactions of plants and animals with their natural environment. It is the essential reference to provide environmental and ecological scientists and researchers with the physical principles, analytic tools, and data analysis methods they need to solve problems. This book describes the principles by which radiative energy reaches the earth's surface and reviews the latest knowledge concerning the surface radiation budget. The processes of radiation,