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c-disort: a versatile tool for radiative transfer in coupled media like the atmosphere-ocean system

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A versatile code for radiative transfer in coupled media like the atmosphere-ocean system is described. The code has the following features: (i) it allows for a user-specified number of layers in the atmosphere and water to adequately resolve the vertical variation in inherent optical properties; (ii) it computes upward and downward irradiances, scalar irradiances, and diffuse attenuation coefficients at user-specified optical depths in the atmosphere and water; (iii) it computes radiances in user-specified directions at user-specified optical depths in the atmosphere and water. The required input parameters are layer-by-layer optical depths and inherent optical properties (IOPs) consisting of absorption and scattering coefficients as well as expansion coefficients of the scattering phase function. The IOPs can be either user-specified or selected from a suite of IOPs based on published models and data, including IOP models for open ocean (Case 1) and turbid coastal (Case 2) waters. The IOPs of the clear-sky atmosphere include molecular scattering and gaseous absorption. Standard models for aerosol scattering and absorption will be made available to the user. This coupled code is designed to be a versatile tool for researchers in the ocean optics, climate research, and remote sensing communities. It is expected to address the needs of researchers interested in analyzing irradiance and radiance measurements in the field and laboratory as well as those interested in making simulations of top-of-the-atmosphere irradiances or radiances in support of remote sensing algorithm development or climate research.