

OCEAN OPTICS XXIV

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Wednesday, October 10

Poster Session 3

16:00–18:00

Poster 230

FAST MONTE-CARLO RADIATIVE TRANSFER IN THE ATMOSPHERE AND OCEAN USING SMART-G

Monte-Carlo radiative transfer solvers are a powerful tool by their flexibility and ability to take into account virtually any physical process, but their applicability is generally limited by their demands in terms of processing power. The SMART-G (Speed-Up Monte-Carlo Advanced Radiative Transfer code with GPU) uses GPGPU (General-purpose processing on graphics processing units) technology through the CUDA framework to implement a fast code that simulates the propagation of light in the atmosphere, through the wavy sea-surface and in the ocean. This code accounts for polarization and works in either plane-parallel or spherical shell geometry. For typical simulations, an acceleration factor of several hundreds is obtained compared with CPU calculation. Advanced variance reduction techniques have been implemented. We present this code, its domain of application, cross-comparison with other reference radiative transfer simulations and two examples of fast sensitivity studies: one on the effect of the atmosphere sphericity on the Rayleigh polarized reflectances and one on the influence on nearby land on the observed ocean reflectances at the TOA, the so-called “adjacency effects”. We describe also the way SMART-G handles spectral computations (band models, k-distribution or high spectral resolution absorption) including inelastic scattering and fluorescence and the way we produce also Jacobians of outgoing radiation versus oceanic, atmospheric and surface parameters.

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