Title	Deep Learning Emulation of Atmospheric Correction for Geostationary Sensors

Authors	Email	Last Name, First Name	Employer/Affiliation
	duffy.m.kate@gmail.com	Duffy, Kate	Northeastern University
	thomas.vandal@nasa.gov	Vandal, Thomas	Bay Area Environmental Research Institute (BAERI)
	lishuangfirst@gmail.com	Li, Shuang	Bay Area Environmental Research Institute (BAERI)
	rama.nemani@nasa.gov	Nemani, Ramakrishna R.	NASA
	a.ganguly@northeastern.edu	Ganguly, Auroop	Northeastern University

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Abstract	New generation geostationary satellites make reflectance observations available at a continental scale with unprecedented spatiotemporal resolution and spectral range. Generating Earth monitoring products from these observations requires retrieval of the basic parameter, surface reflectance (SR), by atmospheric correction (AC). Algorithms for atmospheric correction, including Multi-Angle Implementation of Atmospheric Correction (MAIAC), are adapted for each sensor and are too computationally complex to be run in real time, relying instead on look-up tables with precomputed values. Machine learning methods, including convolutional neural networks, have demonstrated performance in learning complex, nonlinear mappings and extracting insight from high-dimensional remote sensing data. In this work, we present a deep learning emulator of MAIAC to retrieve both SR and cloud products. Using this adaptation of deep learning-based emulation to remote sensing, we demonstrate stable SR retrieval over a variety of land covers and viewing conditions and accurate cloud detection. Further, a comparison of computation time suggests emulation as a compelling alternative for expensive physical simulation, especially for applications benefited by near-real time data, such as agricultural management and disaster response.

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