

# Improvement of a Simultaneous Retrieval Algorithm for Atmospheric Aerosol Optical Properties using Multi-Wavelength and Multi-Pixel Satellite Observations

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We have developed a remote sensing algorithm for atmospheric aerosol optical properties using satellite observed radiances in several bands over a group of pixels with inter-pixel constraints. This method, called Multi-Wavelength and multi-Pixel Method (MWPM)[1] enable to derive aerosol and surface parameters simultaneously using multi-wavelength and multi-pixel information, which is assumed not significantly to change the aerosol distribution. It can be applied to the retrieval over complex terrain like megacities and adopted as the standard algorithm over land for GOSAT-2/CAI-2.

We have also developed the simultaneous retrieval method for atmospheric aerosol and water-leaving radiance, named SIRAW (SIMultaneous Retrieval of Aerosol and Water-leaving radiance) [2,3], with the same philosophy as MWPM. SIRAW is superior in the aerosol retrieval over coastal ocean, and adopted as the standard algorithm over ocean for GOSAT-2/CAI-2.

We updated the algorithm to improve accuracy further, which is called MWPM2. In this talk, we introduce these algorithms, recent updates, and demonstrate their performance in several validation cases with in-situ observations.

## References

- [1] Hashimoto, M., and T. Nakajima, 2017: Development of a remote sensing algorithm to retrieve atmospheric aerosol properties using multi-wavelength and multi-pixel information. *J. Geophys. Res.*, **122**, 6347–6378.
- [2] Shi, C., M. Hashimoto, and T. Nakajima, 2019: Remote sensing of aerosol properties from multi-wavelength and multi-pixel information over the ocean. *Atmos. Chem. Phys.*, **19**, 2461-2475
- [3] Sekiguchi, M., C. Shi, M. Hashimoto, and T. Nakajima, 2022: Analysis and validation of ocean color and aerosol properties over coastal regions from SGLI based on a simultaneous method. *J. Oceanography*, 78, <https://doi.org/10.1007/s10872-021-00627-0>.

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