[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG36]Satellite Earth Environment Observation

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In recent years, we cannot avoid facing issues on global environmental changes that occur in various spatiotemporal scales. The earth environmental observation data by satellites became the necessary basic data to tackle and solve those issues. Due to the recent advancement in the observation sensor technique and the data processing technique, the satellite observation has been showing rapid progress, and the time is changing from examining the accuracy of the observation sensor data to the advancement of the data application, leading to broaden potential users. In these days application became synergetic, so we comprehensively pick
up this topic in the Atmospheric and Hydrospheric Sciences Session of this Union Meeting that enables to comprise the atmospheric, oceanic and land sciences; by combining the intelligence and the knowledge of the party, we propose a session that aims to prompt further studies towards the issues on earth environmental change, the advancement in the data application and future plans of Earth Observation missions.

[ACG36-P14]Simultaneous determination of aerosol optical thickness and water leaving radiance from multispectral measurements in coastal waters

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Retrieval of aerosol optical properties and water leaving radiance over ocean is challenging since the latter mostly accounts for ~10% of the satellite observed signal and can be easily influenced by the atmospheric scattering. Such an effort would be more difficult in turbid coastal waters due to the existence of optically complex oceanic substances or high aerosol loading. In an effort to solve such problems, we present an optimization approach for the simultaneous determination of aerosol optical thickness (AOT) and normalized water leaving radiance (nL_w) from multi-spectral satellite measurements. In this algorithm, a coupled atmosphere-ocean radiative transfer model combined with a comprehensive bio-optical oceanic module is used to jointly simulate the satellite observed reflectance at the top of atmosphere and water leaving radiance just above the ocean surface. Then an optimal estimation method is adopted to retrieve AOT and nL_w iteratively. The algorithm is validated using Aerosol Robotic Network Ocean Color (AERONET-OC) products selected from eight OC sites distributed over different waters, consisting of observations that covered glint and non-glint conditions from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument. Results show a good consistency between retrieved and *in situ* measurements at each site. It is demonstrated that more accurate AOT are determined based on the simultaneous retrieval method, particularly in shorter wavelengths and sun glint conditions, where the averaged percentage difference (APD) of retrieved AOT generally reduced by approximate 10% in visible bands compared with those derived from the standard atmospheric correction

(AC) scheme, since all the spectral measurements can be used jointly to increase the information content in the inversion of AOT and the wind speed is also simultaneously retrieved to compensate the specular reflectance error estimated from the rough ocean surface model. For the retrieval of nL_w, over atmospheric correction can be avoided to have a significant improvement for the inversion of nL_w at 412 nm. Furthermore, generally better estimates of band ratios of $nL_w(443)/nL_w(554)$ and $nL_w(488)/nL_w(554)$ are obtained using simultaneous retrieval approach with less root mean square errors and relative differences than those derived from the standard AC approach in comparison to the AERONET-OC products, as a result that the APD value of retrieved Chl decreases by about 5%. On the other hand, the standard AC scheme yields a more accurate retrieval of nL_w at 488 nm, prompting a further optimization of oceanic bio-optical module of current model.