

Earth observation of aerosols over inland water bodies in relation to calibration and validation of sentinel 2/3

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Abstract:

Satellite remote sensing of inland water bodies has great potential for ensuring water quality and for obtaining reliable data which can be used for decision making. This is a rapidly evolving technology that is now widely utilized throughout the globe for providing a broad as well as detailed perspective on earth-system status and change. Inland water processes, such as eutrophication, may have a major impact on human life and can lead to environmental disasters. This study investigates the optical effect of atmospheric aerosols on remote sensing of the water-leaving radiance (L_w) at Roodeplaat dam. An in-situ measurement field campaign was performed at Roodeplaat dam (Pretoria) during the 2016 winter season, in relation to calibration and validation of Sentinel 2 and Sentinel 3 satellite data. In-situ measurements were performed simultaneously with the satellite overpasses at the dam. In-situ measurements included Aerosol Optical Thickness (AOT), water vapor column and downwelling spectral irradiance as well as the remote sensing spectral reflectance of the dam, R_{rs} . A radiative transfer code (Modtran) was used to predict the radiance at the Top of Atmosphere (TOA), compared to actual measurements from Sentinel 2 and 3. Sensitivity analysis demonstrated that retrieval of water-leaving radiance at small water bodies such as Roodeplaat dam was sensitive to aerosol optical properties as well as total column