

An Enterprise Environmental Data Fusion and Assimilation System for Nowcasting Applications

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A new Enterprise Environmental Data Fusion (EDF) system has been developed at NOAA/NESDIS/STAR with the objective of providing half-hourly, global, high-resolution analyses which unifies together remote sensing and in-situ observations with forecast model fields. The EDF concept involves a preprocessing framework developed to integrate remote sensing algorithms to precondition a background forecast, executing an enhanced global data assimilation (DA) system, and a post-processing framework developed to integrate remote sensing algorithms which derive products from the DA analysis. The result is a comprehensive, 4D cube EDF analysis where all environmental parameters are physically consistent with both the input observations as well as model dynamic and thermodynamic fields. In this study, we will present the methodology of the preprocessing using the Multi-Instrument Inversion and Data Assimilation Preprocessing System (MIIDAPS) algorithm which preconditions the background forecast by performing a displacement correction of temperature, water vapor, and cloud fields, and also provides quality control (QC) and other variable constraints (e.g. surface emissivity) to the DA system; as well as show the impacts on the DA analysis from the preprocessing. Additionally, the benefits for operational nowcasting will be illustrated. This includes demonstrating the comprehensive suite of environmental data products with consistent and well-defined QC and error characteristics; and the consistency between EDF analysis parameters themselves, the model fields, and the input satellite observations which span both the LEO and GEO constellations.