

Virtual Event: ECMWF-ESA Workshop on Machine Learning for Earth System Observation and Prediction



Contribution ID: 37

Type: **Oral presentation**

Leveraging Modern AI/ML Techniques in NWP Including Data Fusion/Assimilation

Monday, 5 October 2020 14:30 (30 minutes)

In this presentation we will attempt to demonstrate that adopting modern AI techniques, including ML, has the potential to optimize the Numerical Weather Prediction (NWP) process and ultimately, the Earth System Model of the future, when all components of the Environment become coupled at the assimilation and forecasting levels. In this presentation, we will highlight some of the results of an incubator effort done in NOAA's center for satellite applications and research, where the initial work has focused on the aspect of satellite data exploitation. The study covers (1) instrument calibration error correction, (2) pre-processing of satellite data and quality control, (3) parameterization of radiative transfer modeling, (4) data fusion and data assimilation, as well as (5) post-processing of NWP outputs to correct for systematic and geophysically-varying errors and finally (6) Spatial and Temporal resolutions enhancement.

We will assess the quality of the analyses obtained using an entirely AI-based system, by checking the inter parameters correlation matrix, the spatial variability spectrum and the mass conservation. A first step shown in this study is to ensure that we can perform similar steps currently done in NWP without loss of accuracy and without introducing artefacts, but with significant efficiency increase. This will allow us to assimilate and exploit a higher volume of data and to begin exploiting other sources of environmental data such as IoT, smallsats, near-space platforms, etc.

We will also discuss the potential of AI/ML beyond the efficiency aspect, and the limitations that should be circumvented in order to achieve the full potential of AI/ML in NWP.

Thematic area

1. Machine Learning for Earth System Observations - Including Retrieval Algorithms, Fast/Improved/New Forward Models, Advanced Quality Control, De-biasing Techniques

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Session Classification: Session 2: ML for Earth System Observations

Track Classification: ECMWF-ESA Workshop on Machine Learning for Earth System Observation and Prediction