

# Forecast Impact Assessment of AI-based Data Assimilation using NOAA's Global Forecasting System

Eric S. Maddy<sup>1</sup>, Sid A. Boukabara<sup>2</sup>

<sup>1</sup>Riverside Technology, inc at NOAA/NESDIS/STAR

<sup>2</sup>NOAA/NESDIS/OSAAP

In this study we present assessments of large-volume satellite and conventional data assimilation (DA), based entirely on modern Machine Learning (ML)/Artificial Intelligence (AI) techniques. Our AI-based DA technique leverages image-to-image translation methods to fuse satellite observations (projected into geophysical representations) with forecast background information and to produce a global, high spatial resolution (30km) analyses of thermodynamical fields, which include temperature, moisture, and wind profiles from near the surface to the tropopause. We assess the impact of our AI-based analysis on forecasts by 1) assimilating the AI-based analyzed fields as pseudo-sounding observations in the NOAA Global Data Assimilation System (GDAS), and 2) running forecast experiments using FV3GFS initialized with those observations. To identify the impact of our AI-based assimilations we compare the forecast skill of several experiments where GDAS is driven with and without AI-based pseudo-observations.