NOAA ROSES Semi-Annual Report

Reporting Period: September 2020 – February 2021 (1st report)

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Project Title:
GeoRing-ProxyVisible Satellite Imagery: Turning Night into Day with Machine Learning

Executive Summary
Visible satellite imagery is routinely and widely used by operational forecast centers for marine, tropical and extratropical cyclone analysis and forecasting [e.g., at National Hurricane Center (NHC), Central Pacific Hurricane Center (CPHC), Ocean Prediction Center (OPC), Weather Prediction Center (WPC), Joint Typhoon Warning Center (JTWC)]. This project's goal is to develop the new geostationary satellite product Geo-Ring ProxyVisible Imagery (GRPV) to address the lack of nighttime visible imagery by replicating visible imagery at night-time using advanced machine learning techniques. GRPV will work with multiple next generation geostationary satellites including GOES-16, GOES-17, Himawari, and Geo-KOMPSAT-2A. The project team will work closely with NHC forecasters and use feedback for product development. GRPV will be made available in real-time for NHC's Advanced Weather Interactive Processing System (AWIPS2), and online for operational forecaster's evaluation and feedback.

Progress toward FY20 Milestones and Relevant Findings (with any Figs)

This is a new project that started in October 2020. Multiple preliminary tasks have been accomplished. The main focus was on collecting and pre-processing training data, as well as the development of preliminary testing versions of the algorithm. Several preliminary versions of GRPV imagery have been developed, and work is in progress on evaluation and comparison of different versions. Some of the new versions have been tested on the internal version of RAMMB-CIRA SLIDER (https://rammb-slider.cira.colostate.edu). After the initial evaluation, the experimental GRPV imagery will be made available to NHC forecasters for evaluation and feedback. Fig. 1 shows an example of the main and experimental versions of ProxyVisible imagery.

Plans for Next Reporting Period

Complete the development of the baseline models and begin developing the composite GOES-16/-17 imagery. In addition, work is in progress on setting up real-time demonstration of the current version of ProxyVisible imagery for Himawari.
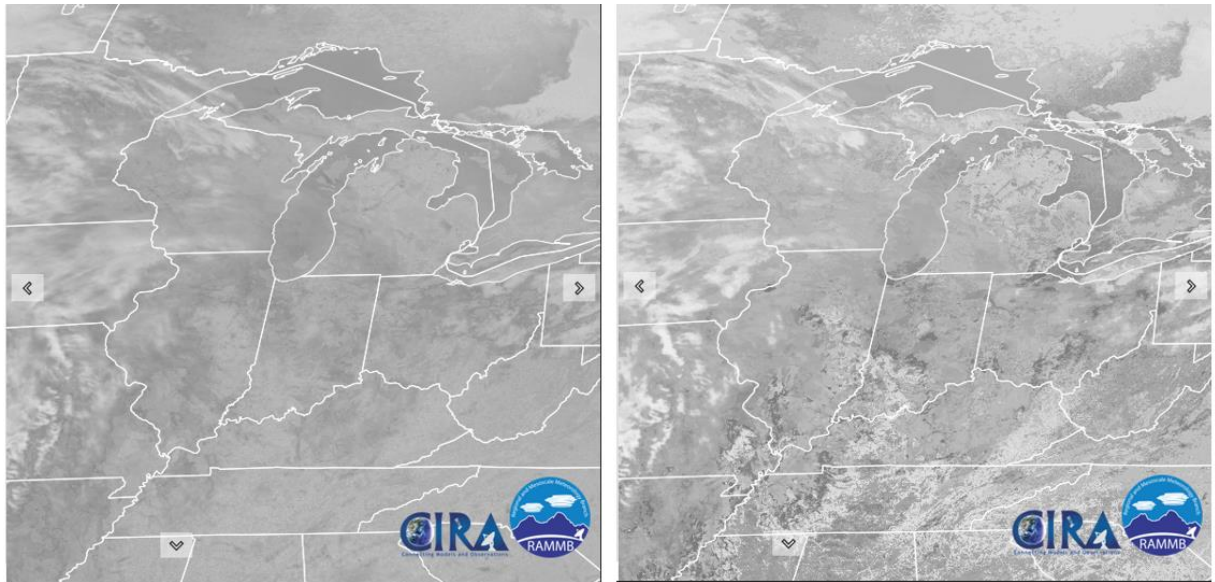
Figure 1. Main (left) and experimental (right) versions of GRPV on March 3, 2021, as displayed on the experimental RAMMB-CIRA SLIDER.