The Challenges of Nowcasting Convection over the Ocean

Huaqing Cai, Cathy Kessinger, Nancy Rehak, Daniel Megenhardt, Matthias Steiner

National Center for Atmospheric Research Boulder, CO

caihq@ucar.edu

Abstract

The importance of oceanic convection nowcasting to the aviation community has been highlighted after several recent oceanic aviation incidents/accidents. However, nowcasting convection over the ocean poses more challenges than over the land, owing partly to the lack of surface-base observational network such as WSR-88D radars. Instead of using radar data to represent convection, which has been widely used over the land, satellite-based observations are processed to create an interest field based on a fuzzy logic algorithm to represent convection over the ocean. The convective diagnosis and nowcasting components consist the two major parts in the Oceanic Convection Diagnosis and Nowcasting system developed at National Center for Atmospheric Research (NCAR) funded by NASA. This paper will focus on the nowcasting component which produces short-term predictions of future locations of oceanic convection. There are a number of different nowcasting techniques available at NCAR; however, a complete comparison study of those techniques has not yet been done. In this paper, we are focused on four different nowcasting techniques, namely, persistence, the Thunderstorm Identification, Tracking, Analysis and Nowcasting (TITAN) object-based tracking system, gridded forecasts created using a motion vector field derived from TITAN and the Global Forecast System (GFS) numerical model steering level winds, and the random forecast technique. The persistence forecast serves as a base line for the other three techniques. Traditional verification scores such as the Critical Success Index (CSI) are used in the process of evaluation. Each technique will be described in detail and their pros and cons discussed. It is anticipated that some of the nowcasting convective products will be uplinked to the cockpit in the future.