Advancing Cyclone Path and Intensity Prediction through Time-Series Analysis of TRMM Satellite Data Using Kalman Filtering

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SUMMARY

Abstract

Associated with the potential destructive winds and heavy rains cyclones primarily pose a threat to life and property to coastal zones. There early identification would allow precautions to be put in place that would minimize the associated risks to people's life and properties. Cyclone forecasting is an important but difficult task. In recent years more and more research efforts have been involved in tropical cyclone forecasting, and lots of prediction methods have been proposed to simulate the intensities of a variety of tropical cyclones, including statistical models, Statistical-dynamical models and dynamic models. This prediction system is also related with South Asian region, even near to Sri Lanka. Kalman Filter is the main tracking algorithm for   detecting the moving objects. As such, this algorithm could be also applied for cyclone as well. The official Cyclone predictions are done by Indian Meteorological department in this region.

In this study, we developed a new cyclone identification and tracking system based on Kalman filter. A hybrid method is used   with satellite data and visually identifies the cyclone prone areas. Then it is improved to identify cyclone center. Level 3B42, eight datasets were   provided by TRMM satellite per a day. Filtered data used to identify cyclone center. Cyclone prone areas   can be identified by a manual method .In here, it is   used iterative method to tracking the cyclone. PPS Orbit Viewer software provides a RGB image with cluster of clouds. These cloud patterns are identified   and filtered by MATLAB. Image analyzing tools and image processing functions are used. Connected component analysis is used to isolate correct cyclone centers. This output filtered data is processed with Kalman tracking algorithm and output path was taken. Curve fitting algorithms are   used for smoothen the detected path .The performance of the method is validated, by comparing the manually extracted cyclone path with the automatically detected paths at the same

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image space. But both paths are not coincided each other.

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