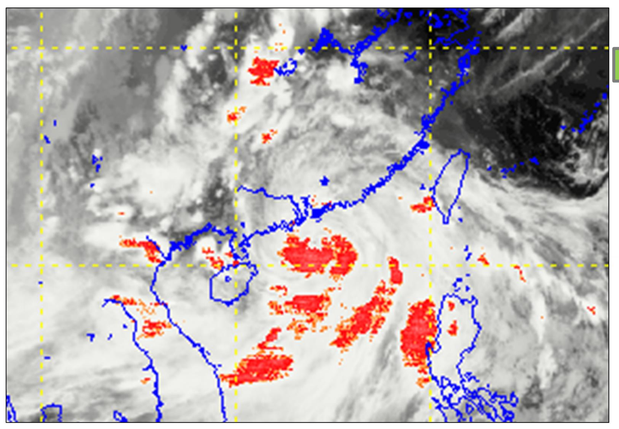
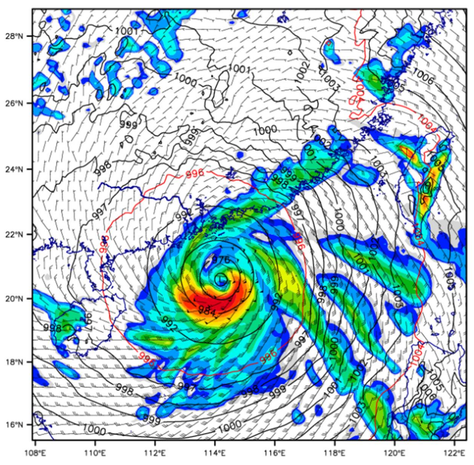
Performance of forecast deep convection objects as inferred from ECMWF simulated infrared radiances

K.K. Hon, HKO
(*kkhon@hko.gov.hk*)

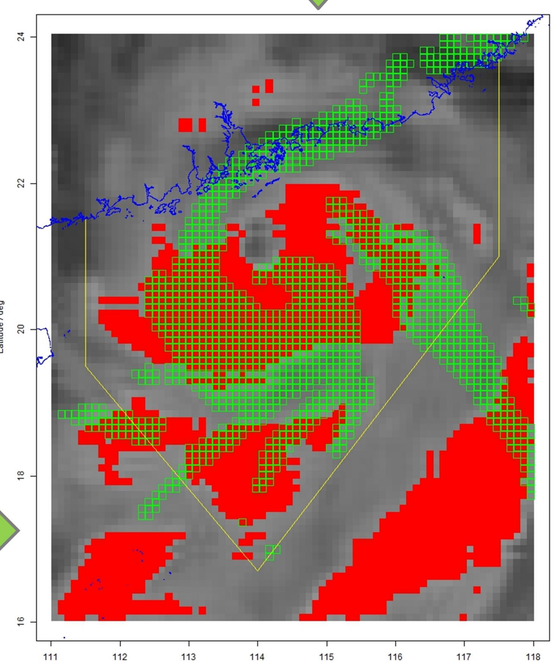
Deep convection, with its associated hazards of lightning, convective turbulence and possibly hail, is one of the aviation-impact weather phenomena for which SIGMET warnings are issued operationally. Due to a lack of radar observations over vast ocean areas, a commonly-accepted means of identifying regions of significant convection on a regional/global scale would be through combination of sensitive frequency channels of infrared sounders on geostationary satellites.



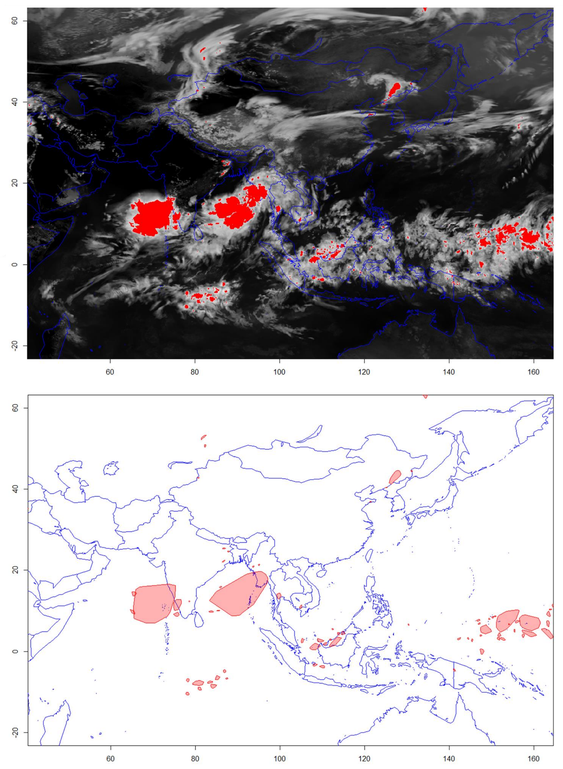
Deep convection "pixels" as inferred from infrared channels of geostationary satellites



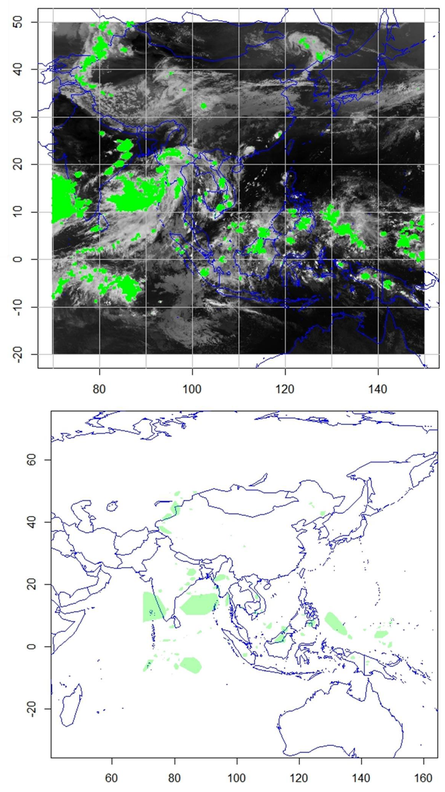
Forecast areas of sig. convection based on thresholding of rainfall



Performance statistics as derived from grid-by-grid comparison of observed and forecast sig. convection "pixels"



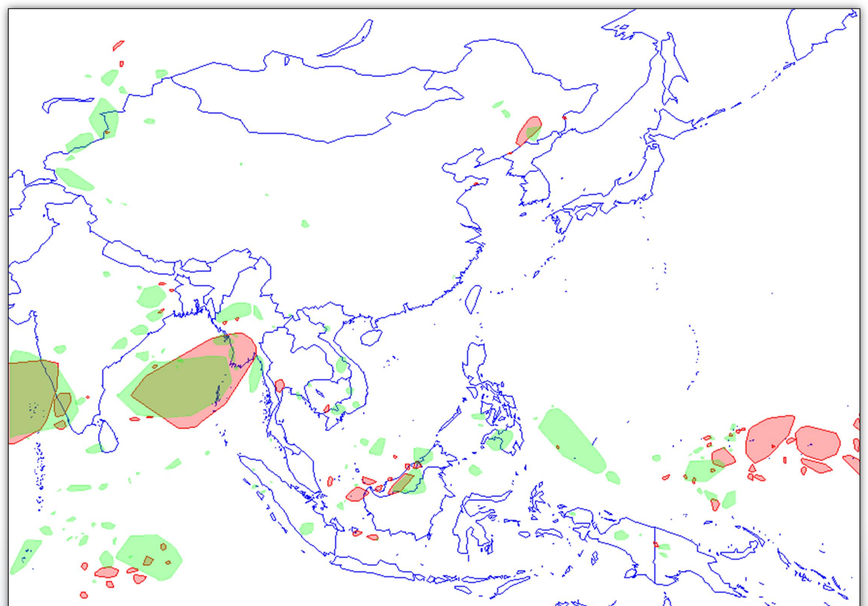
Forecast SIGMET-style polygons as derived from ECMWF simulated IR1/IR3



Verifying extent of sig. convection based on Himawari-8 AHI infrared channels

Traditional methods for verification of spatial features often rely on grid-by-grid comparison between forecast and observed "fields" of binary occurrences

This study verifies the forecast deep convection "objects" as inferred from IR1 and IR3 channels of the ECMWF-IFS simulated radiance output against corresponding observations from the Advanced Himawari Imager (AHI) of the Himawari-8 satellite over the East Asia and western North Pacific regions (right).



Reference

[1] Murata H., M. Takahashi and Y. Kosaka, 2015. VIS and IR bands of Himawari-8/AHI compatible with those of MTSAT-2/Imager. Technical Report No. 60**. Meteorological Satellite Centre, Japan Meteorological Agency.**

[2] Saunders, R.W., M. Matricardi and P. Brunel, 1999. An improved fast radiative transfer model for assimilation of satellite radiance observations. **Q. J. R. Meteorol. Soc. 125: 1407–1426.**

[3] Hon, K.K., 2018: Simulated Satellite Imagery at Sub-kilometre Resolution by the Hong Kong Observatory. Weather, 26, 189-206.

[4] Ng, Y.L., H.F. Law, J.C.W. Lee, K.K. Hon, L.O. Li and P.W. Li, 2017: Satellite Detection and Nowcasting High-altitude Ice Crystals. WMO Aeronautical Meteorology Scientific Conference 2017, 6-10 November 2017, Toulouse, France.

[5] Cheung, P., C.C. Lam and T.K.H. Ng, 2011: Development of Satellite-based Significant Convection Nowcasting Product in Support of Air Traffic Flow Management in Hong Kong. 15th Conference on Aviation, Range, and Aerospace Meteorology; Los Angeles, CA, 1-4 August 2011

[6] K.K. Hon, 2015: First experiments on mesoscale ensemble prediction over the South China coastal areas. **29th Guangdong-Hong Kong-Macau Seminar on Meteorological Technology, 20-22 January 2015, Macau.**

香港天文台
HONG KONG OBSERVATORY