Impact of VASS radiance of FY3 assimilation on numerical typhoon prediction

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A set of transmittance coefficients of IRAS (InfRared Atmospheric Sounder), MWTS (MicroWave Temperature Sounder) and MWHS (MicroWave Humidity Sounder) used in RTTOV7 has been build by multivariate linear regression analysis in line-by-line radiative transfer models. Comparison of 43 profiles of the channel radiance from these line-by-line models and those from RTTOV7 shows that bias are less than 0.7K for all the 20 infrared channels of IRAS and are less than 0.3K for all the 9 channels of MWTS and MWHS. With RTTOV7 and the new transmittance coefficients, a new satellite data assimilation module has been set up to directly assimilate VASS (Atmospheric Vertical Sounding System) radiance of FY3 into GRAPES 3DVar system. Because the radiance bias of infrared channels are less than 3K while those for microwave channels are less than 0.03K between ATOVS and VASS, quality control of the radiance and bias correction to simulated VASS radiance have been introduced in terms of ATOVS radiance assimilation. Radiance of ATOVS have been use to generate VASS radiance based on the spectral characteristics of the VASS instruments in a typhoon case. Then, new initial temperature, water vapor and wind fields for GRAPES model can be produced by directly assimilating these VASS radiance. Numerical tests show positive effect on typhoon track prediction by using those satellite data in GRAPES.