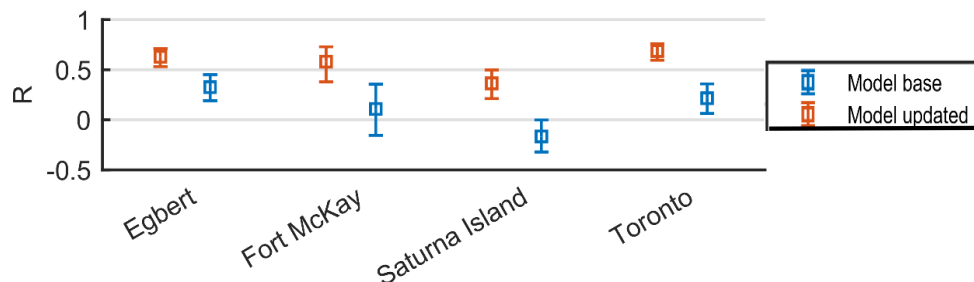
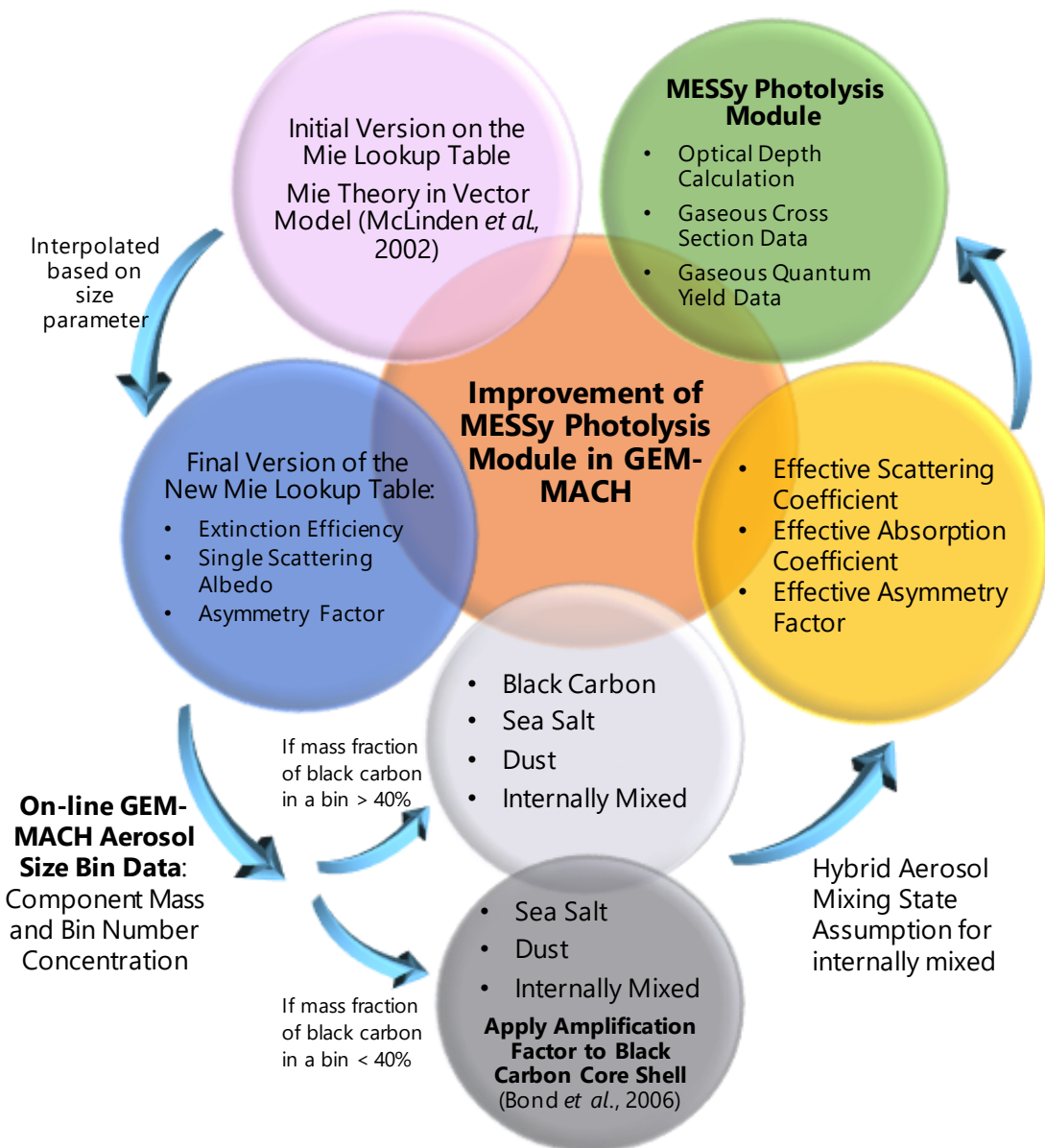


# Interactive Aerosol Feedbacks on Photolysis Rates in the GEM-MACH Air Quality Model in Canadian Urban and Industrial Areas

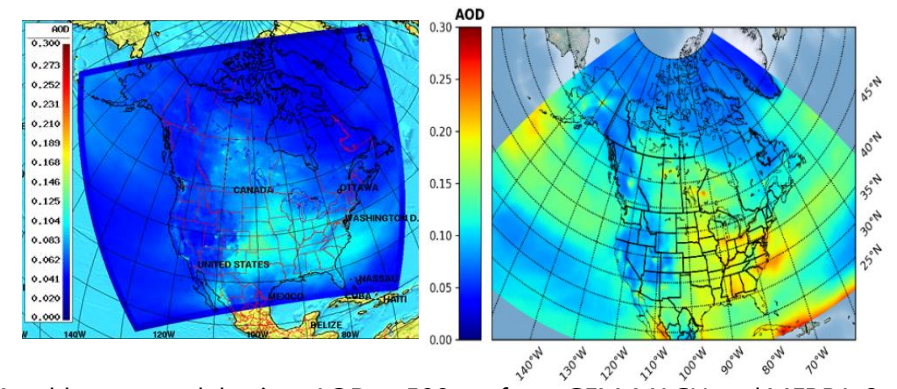
Mahtab Majdzadeh, Craig A. Stroud, Christopher Sioris, Paul A. Makar, Ayodeji Akingunola, Chris McLinden, Xiaoyi Zhao, Michael D. Moran, Ihab Abboud, Jack Chen



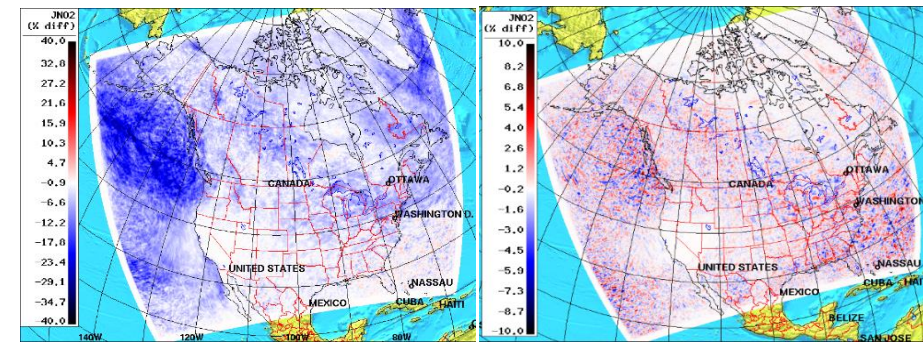
GEM-MACH AOD with the previous (base) and the improved version of MESSy-JVAL versus AERONET AOD at 580 nm, on June 2018.

significant improvements in the model performance with the implementation of the new photolysis module.

The predicted monthly averaged AOD from the improved photolysis module follows the spatial patterns of MERRA-2 re-analysis, with an overall under-prediction of AOD over the common domain.



Monthly averaged daytime AOD at 580 nm from GEM-MACH and MERRA-2 model



Monthly averaged  $J(\text{NO}_2)$  %difference

The domain-wide impact of direct and indirect effect aerosol feedbacks on the photolysis rates from meteorological changes are greater than the direct aerosol optical effect on the photolysis rate calculations