The central role of air quality observations in NASA's GEOS composition forecasting model

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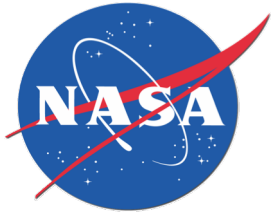
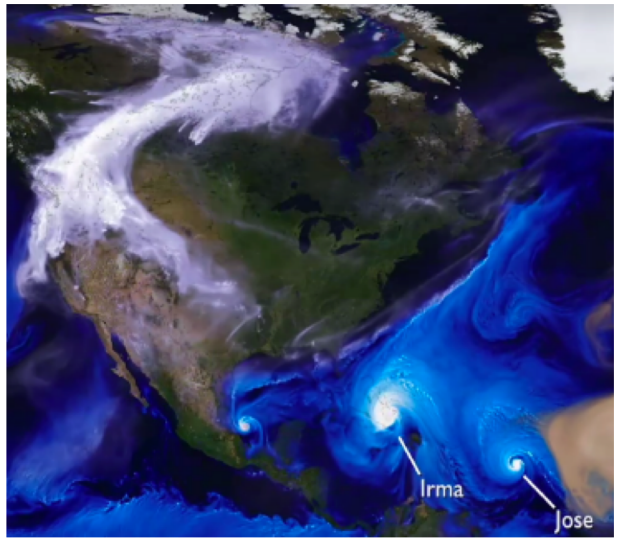
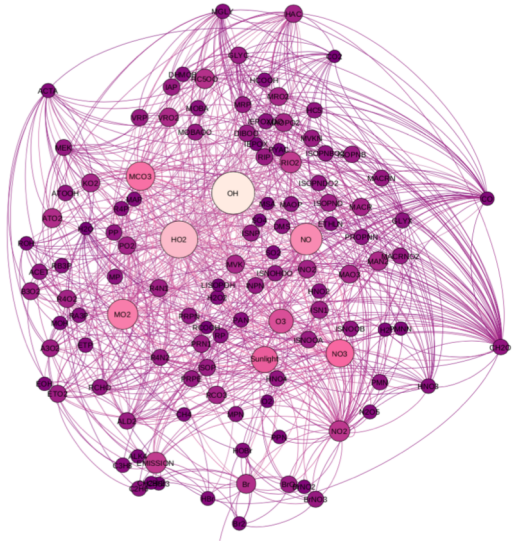
AGU Fall Meeting
13 December 2018



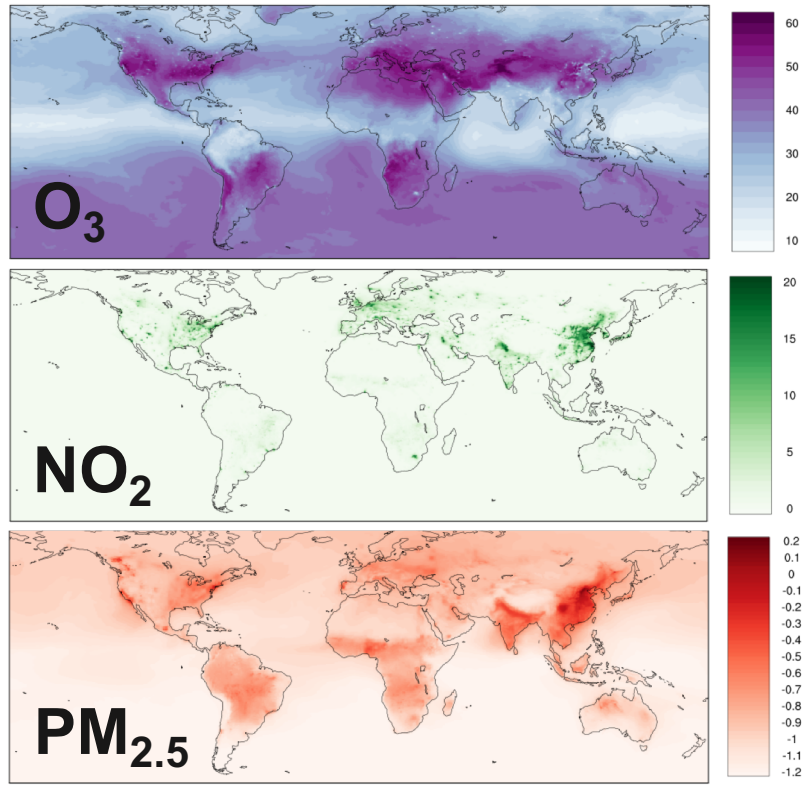
GEOS composition forecasting system (GEOS-CF)



GEOS NWP



GEOS - Chem



GEOS - CF

- 1-day analysis + 5-day forecast
- Aerosols & reactive trace gases

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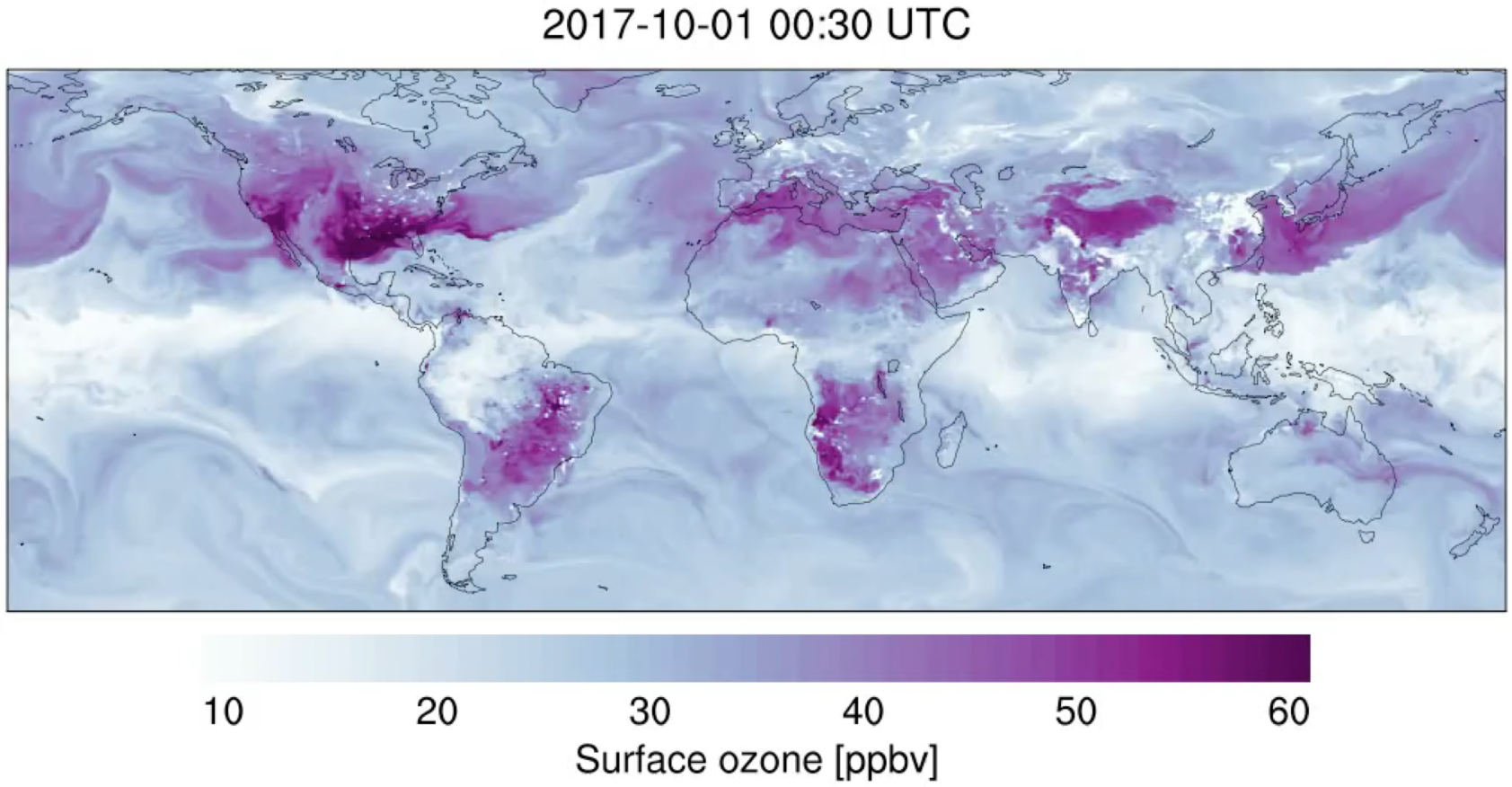
GEOS-CF produces air quality output at high temporal and spatial resolution



- 0.25° resolution (~ 25km), 72 levels, 282 chemical species

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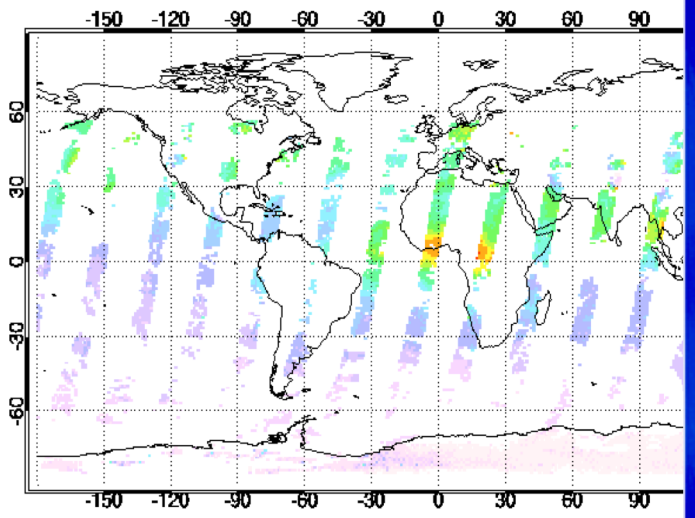
Satellites are currently not suitable for in-depth validation of GEOS-CF trace gas surface concentrations

Terra MOPITT (CO)



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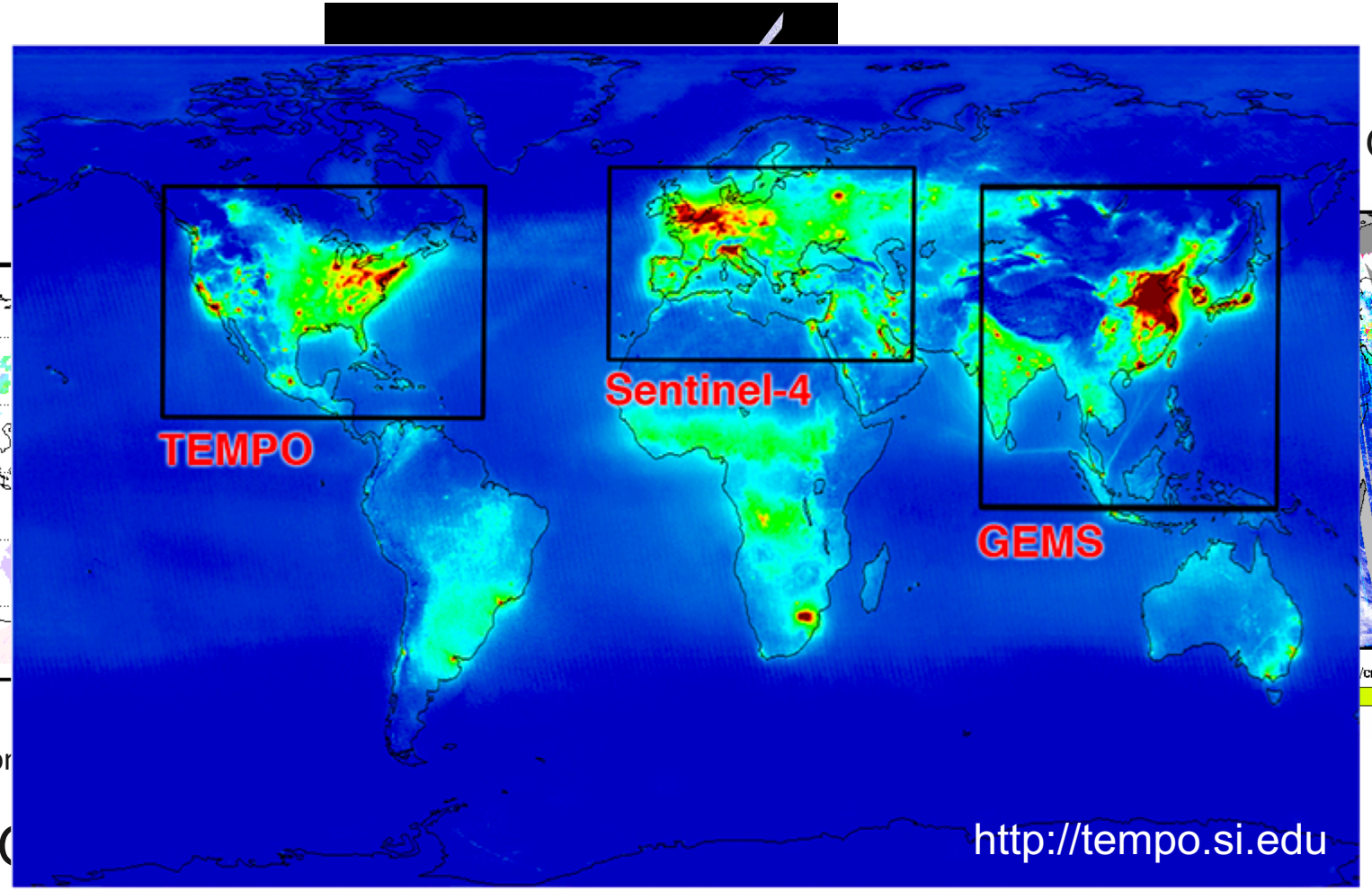

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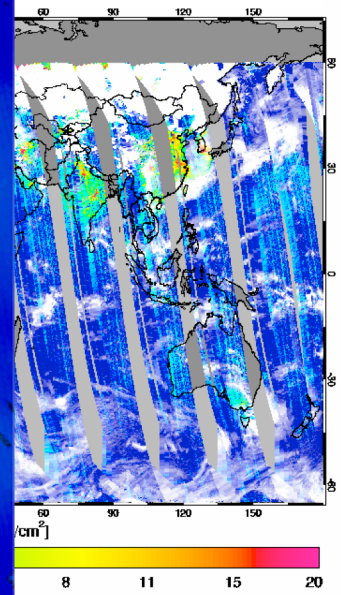

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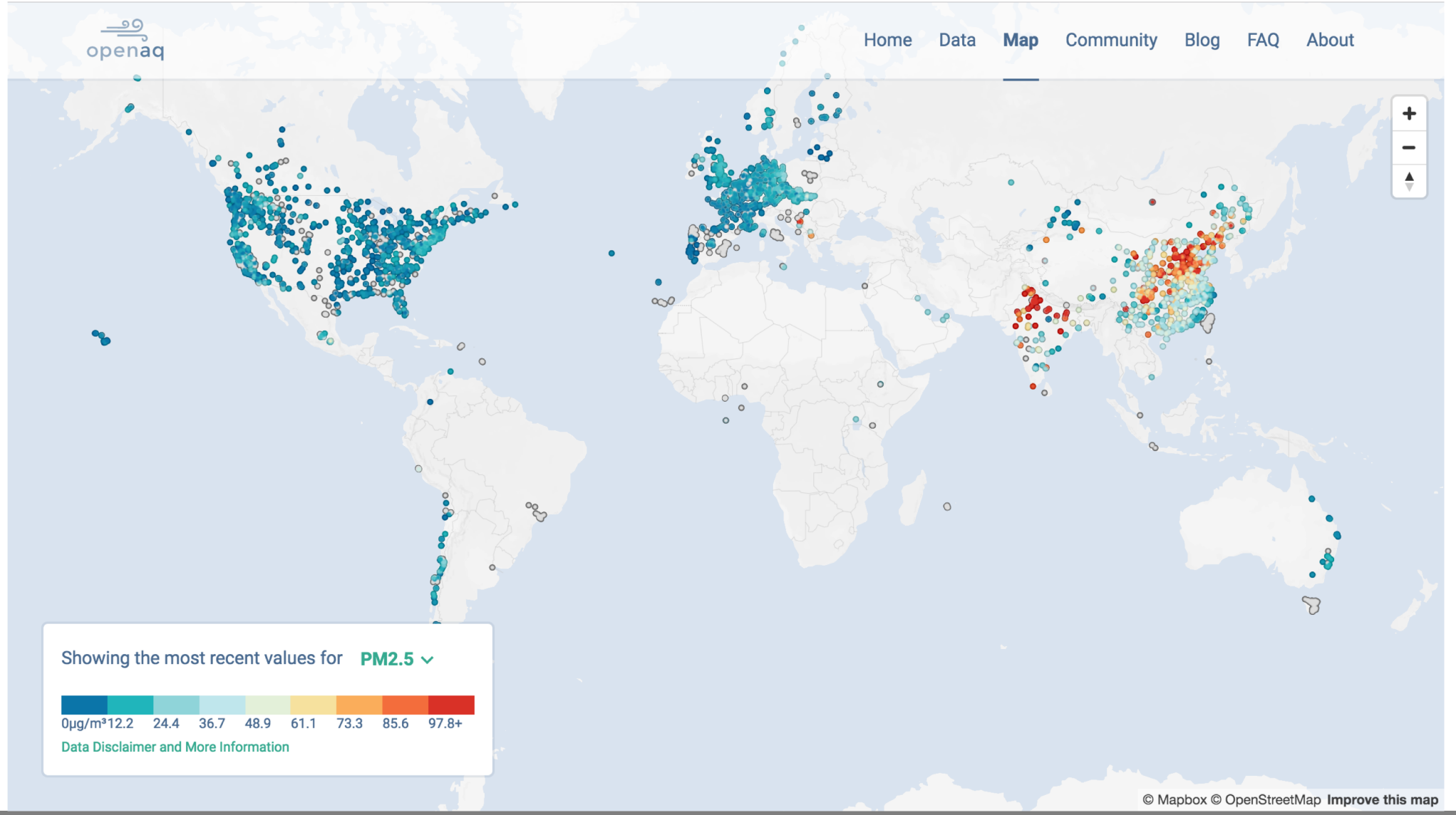
OpenAQ surface observation data base



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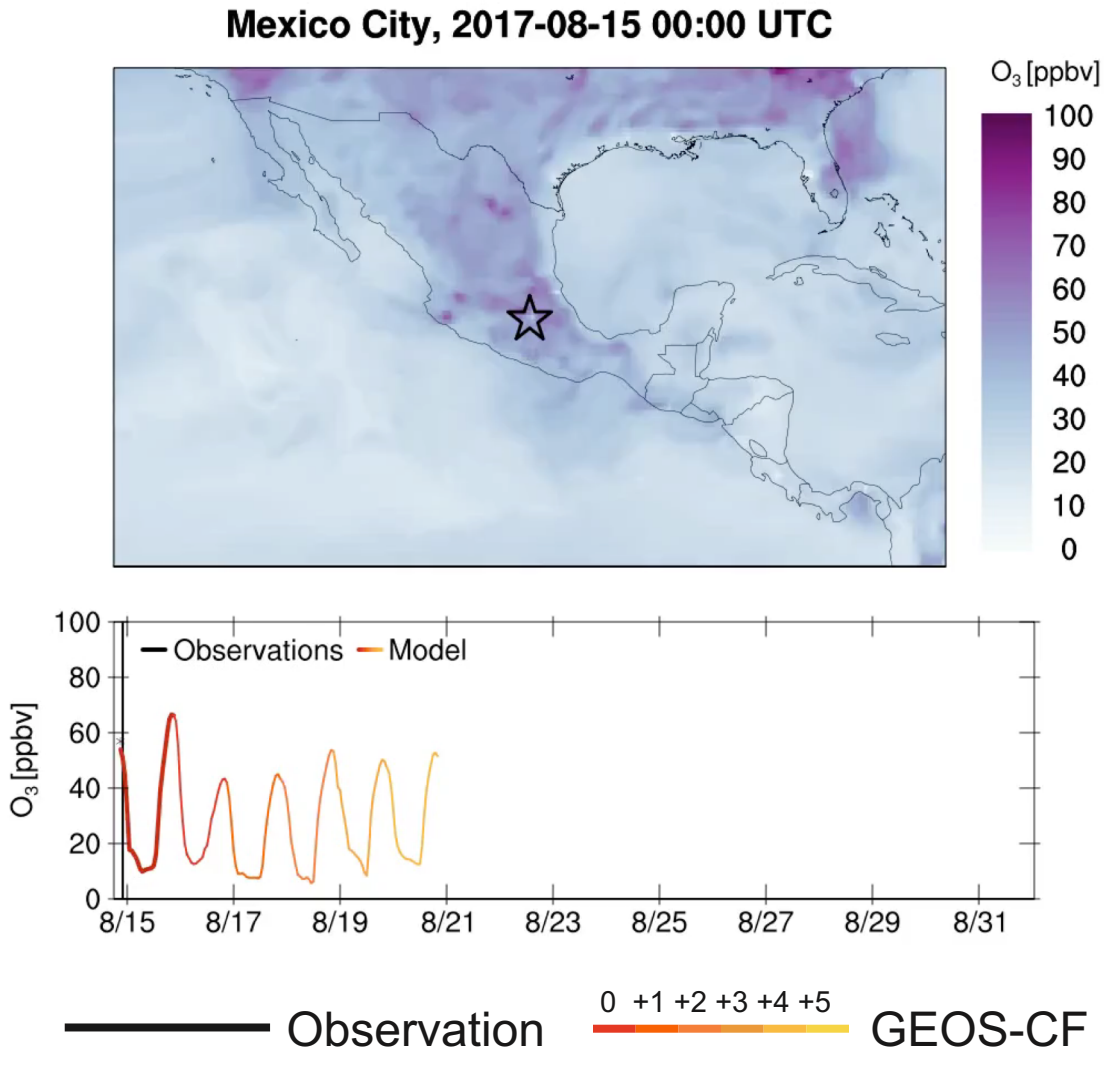
Ozone forecast against surface observations for Mexico City



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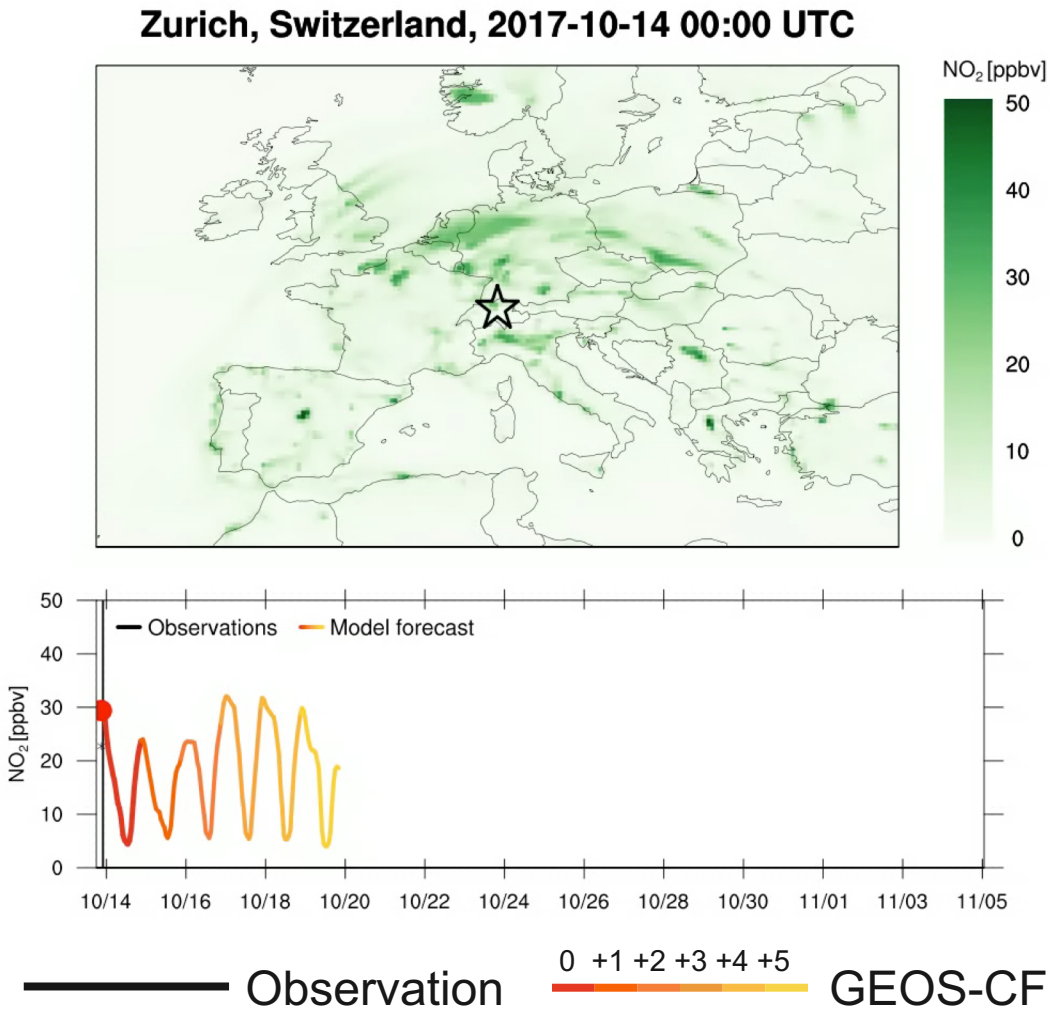
Local evaluation of NO_2: model captures diurnal and weekly variations



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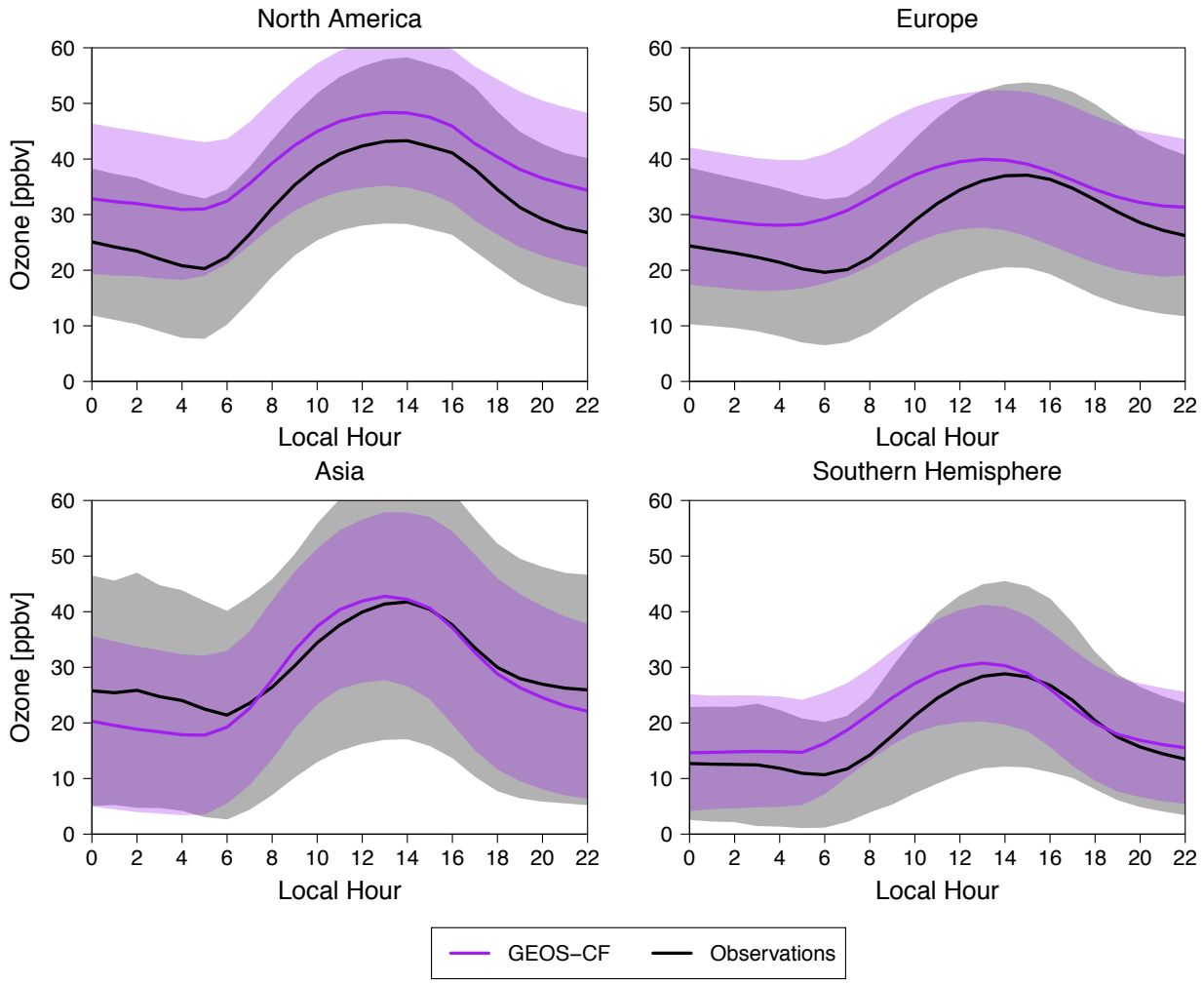
Diurnal profiles reveal that model – observation mismatch is most pronounced in early morning



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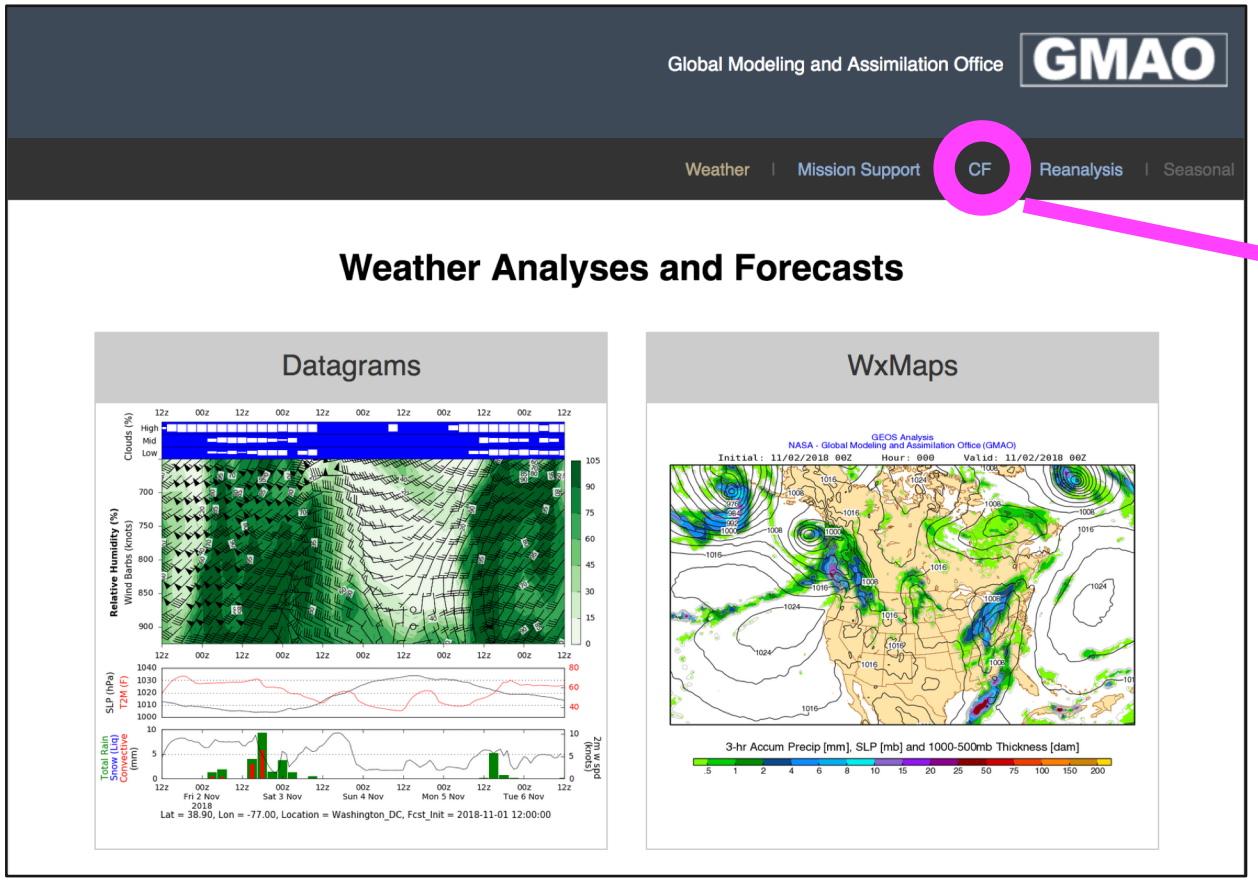
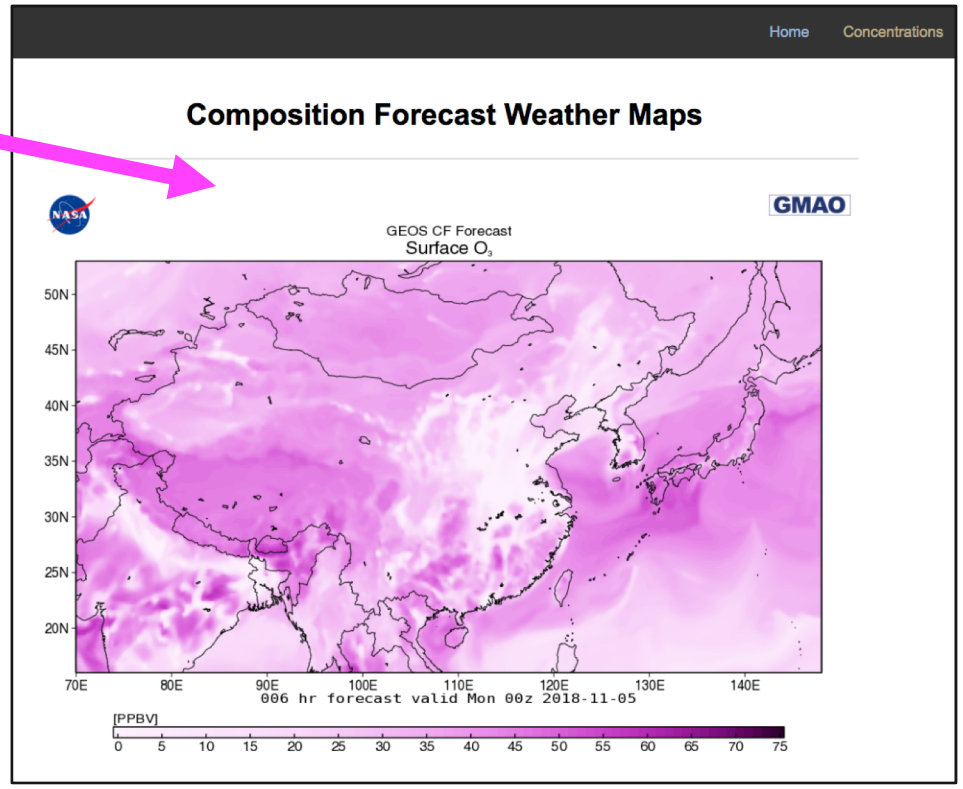
Near real-time forecasts available at fluid.nccs.nasa.gov





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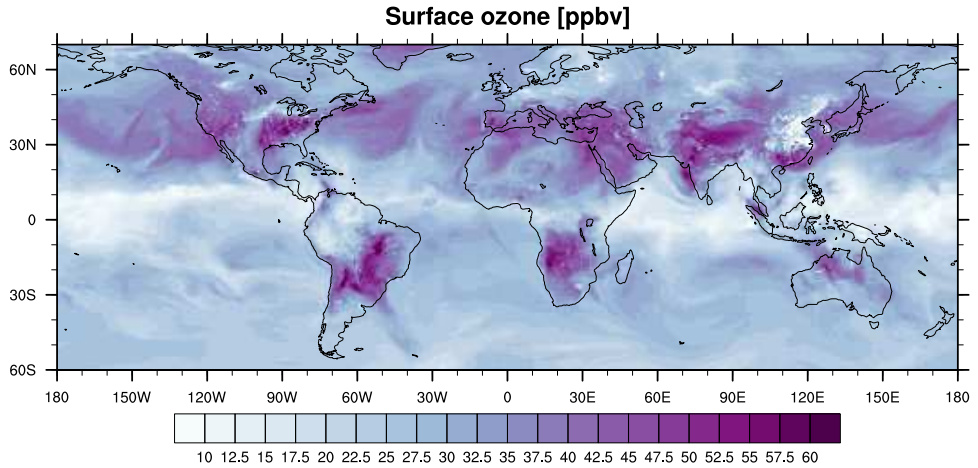
Summary

- GEOS-CF produces daily global composition forecasts (25 km)
- Near real-time observations are critical for model validation and improvement
- Open-source platforms significantly simplify data access, but they often lack meta-data information



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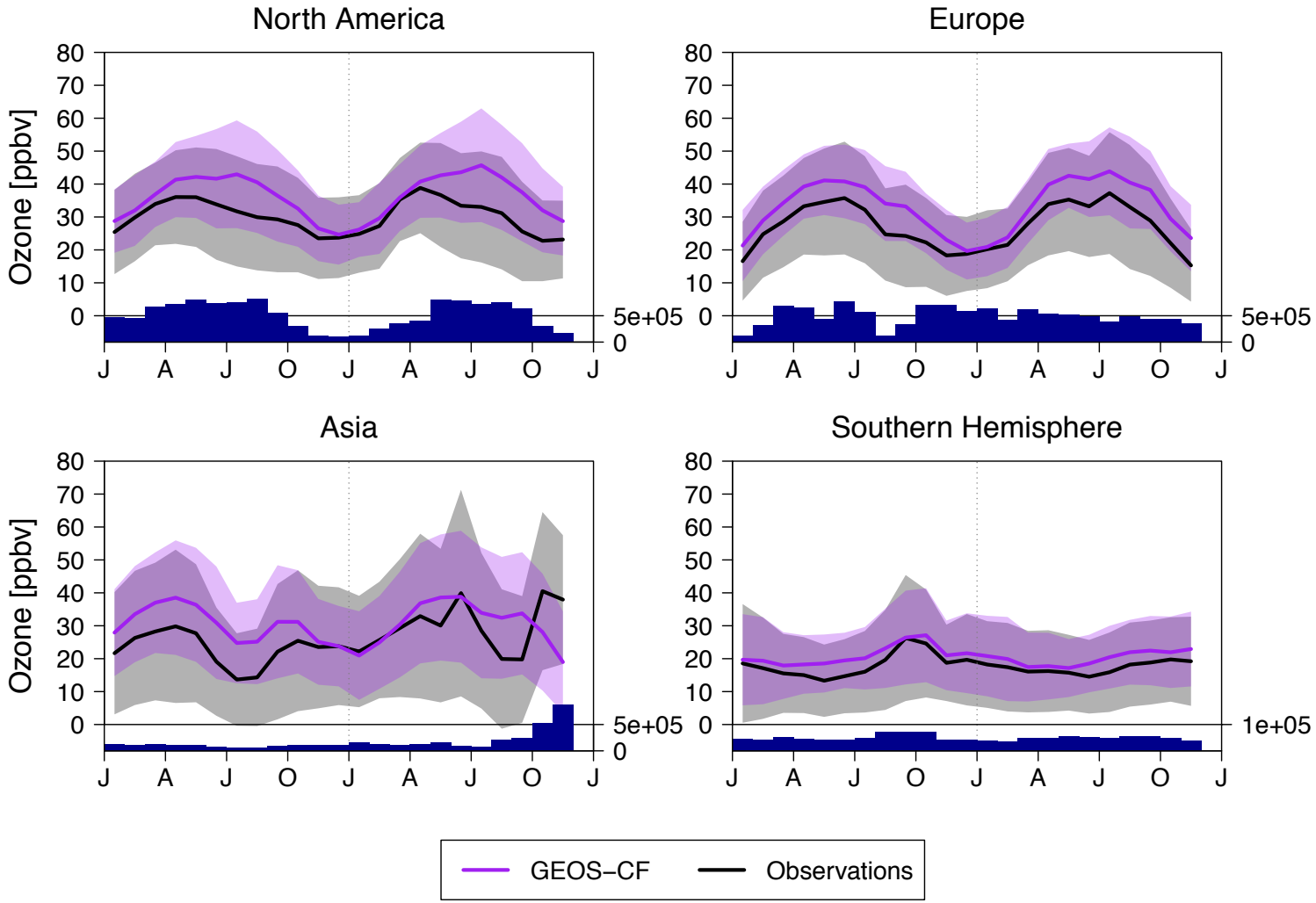
GEOS-CF overestimates summertime ozone compared to OpenAQ observations



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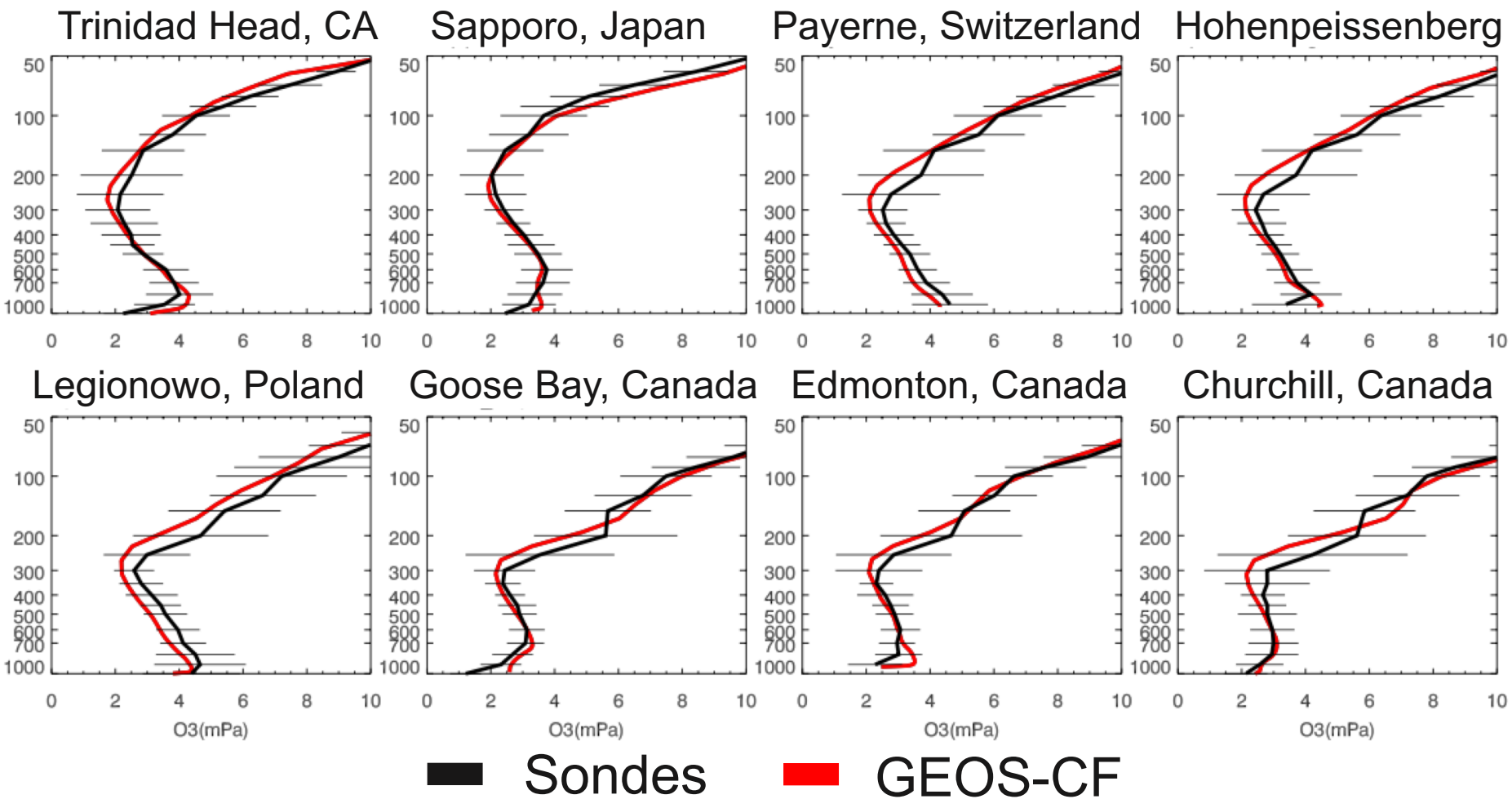
GEOS-CF ozone compares well against balloon sondes



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