NERC SCIENCE OF THE ENVIRONMENT

Modelling global atmospheric iodine.

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Tropospheric Iodine

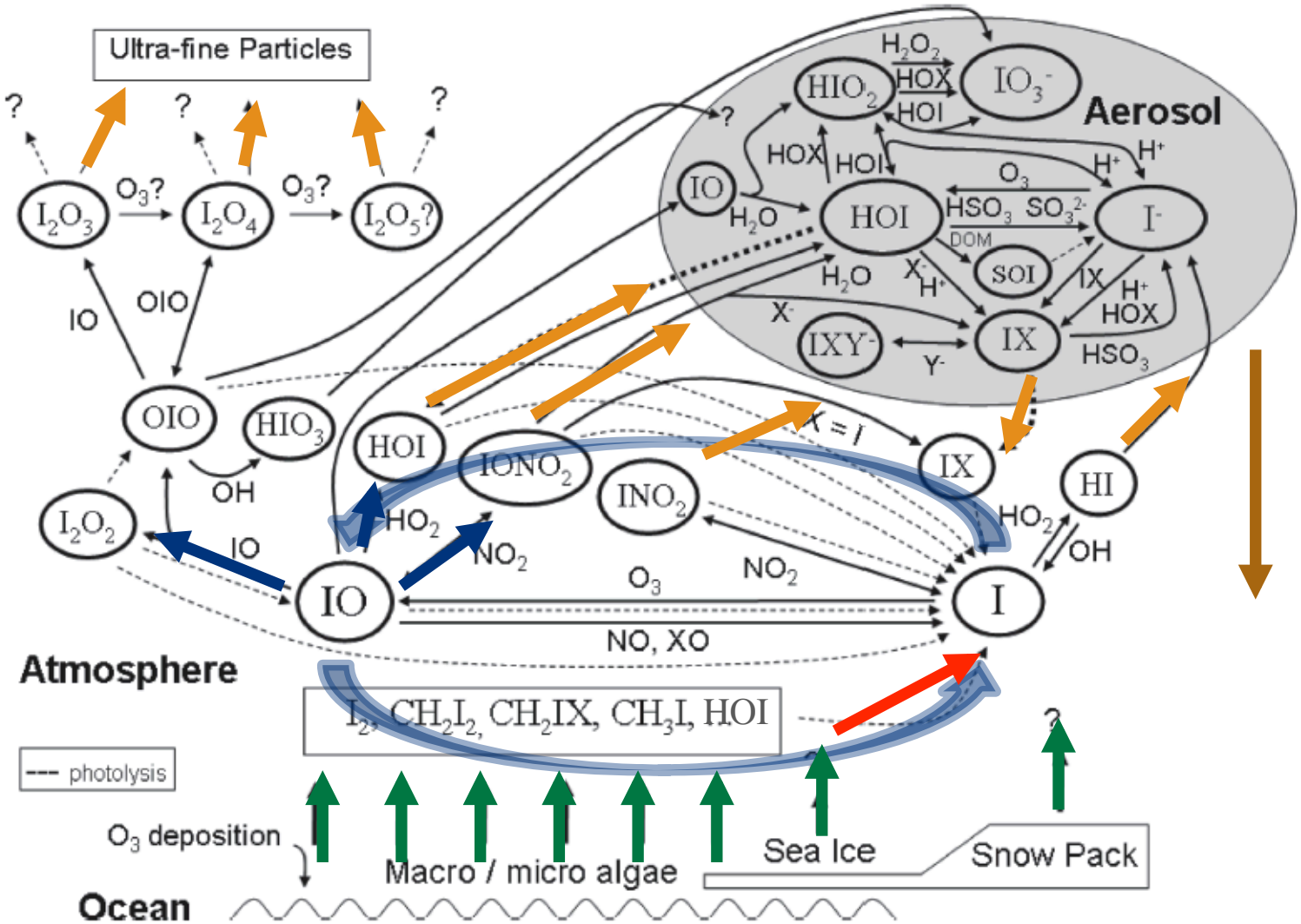

Image: Saiz-Lopez et al., 2012

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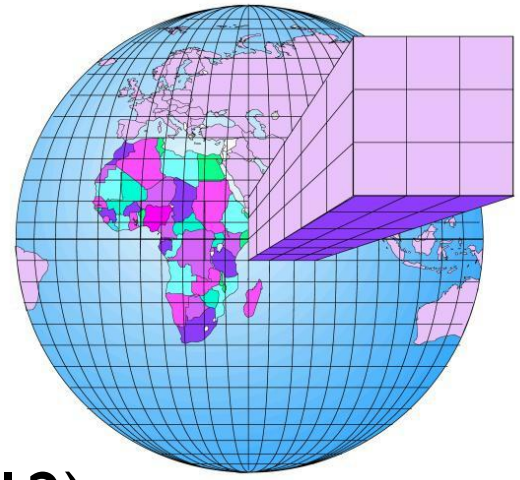
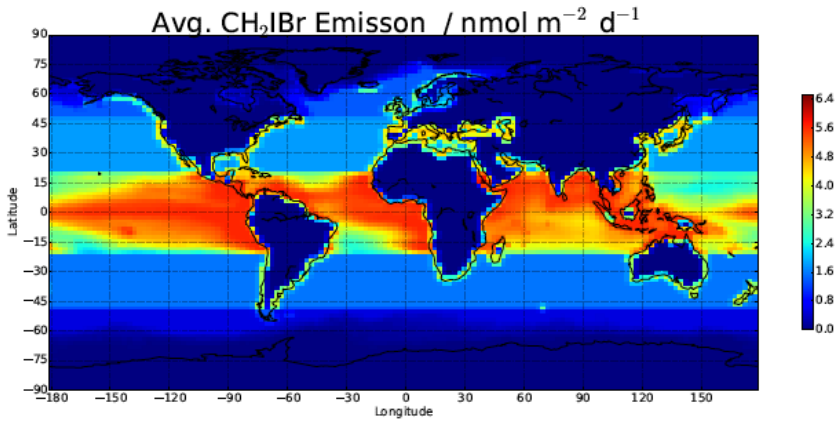
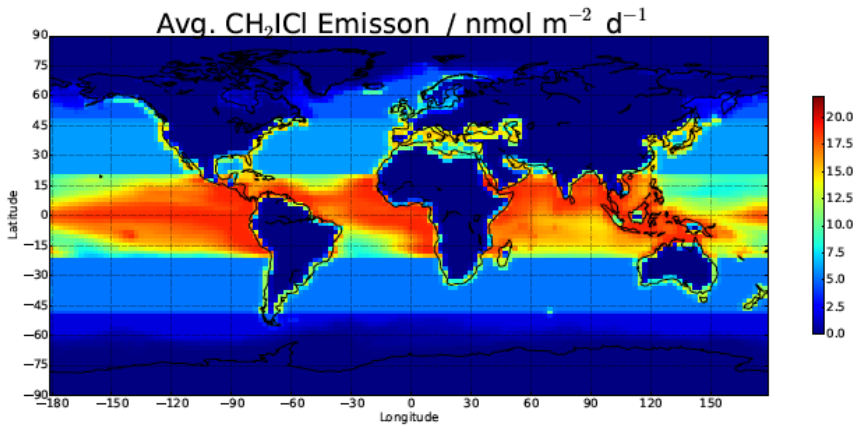
GEOS-Chem

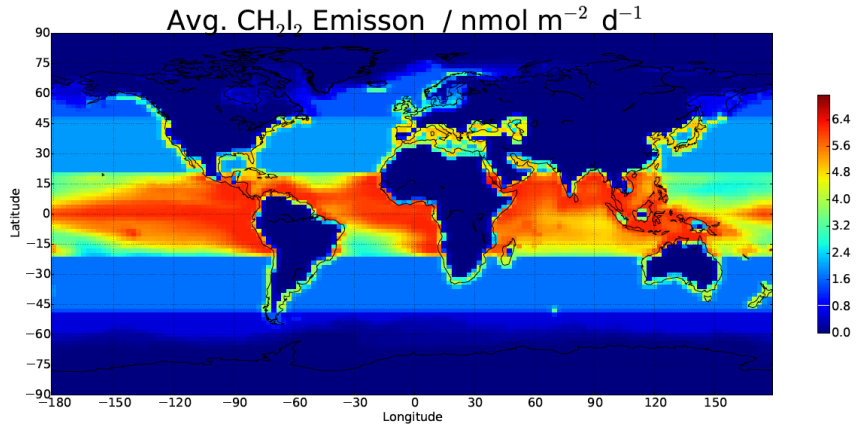


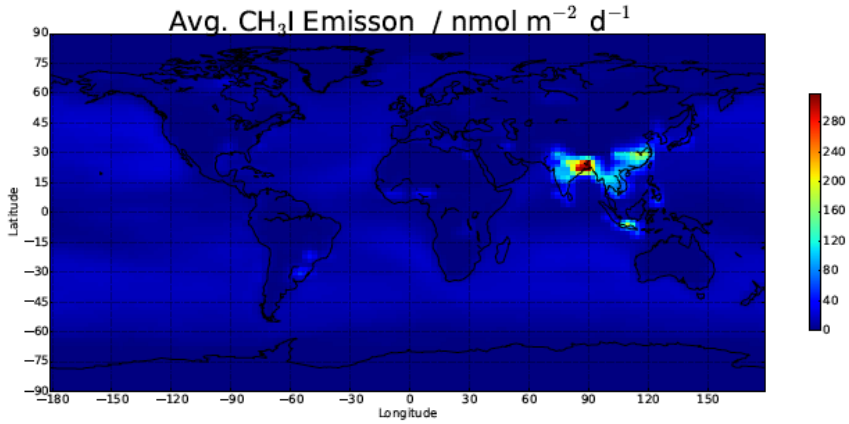
- GEOS-Chem v9-2
- Standard 66 tracers
- Chemistry ~270 reactions
- 47 Levels up to ~80 km
- Bromine chemistry scheme (Parrella, 2012)
- NB Not with Johan's updates
- **New work included emissions, chemistry, deposition of I**

Organic emissions









Ordonez et al., 2012

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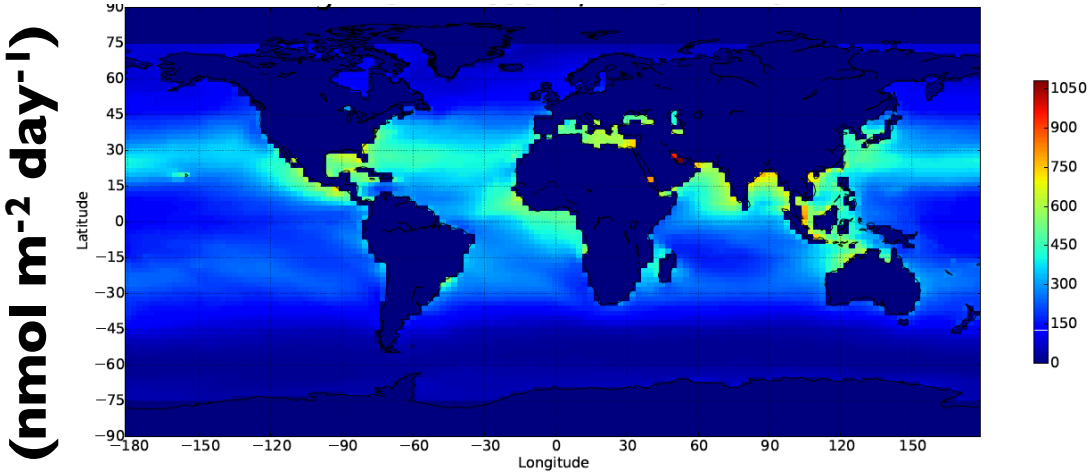
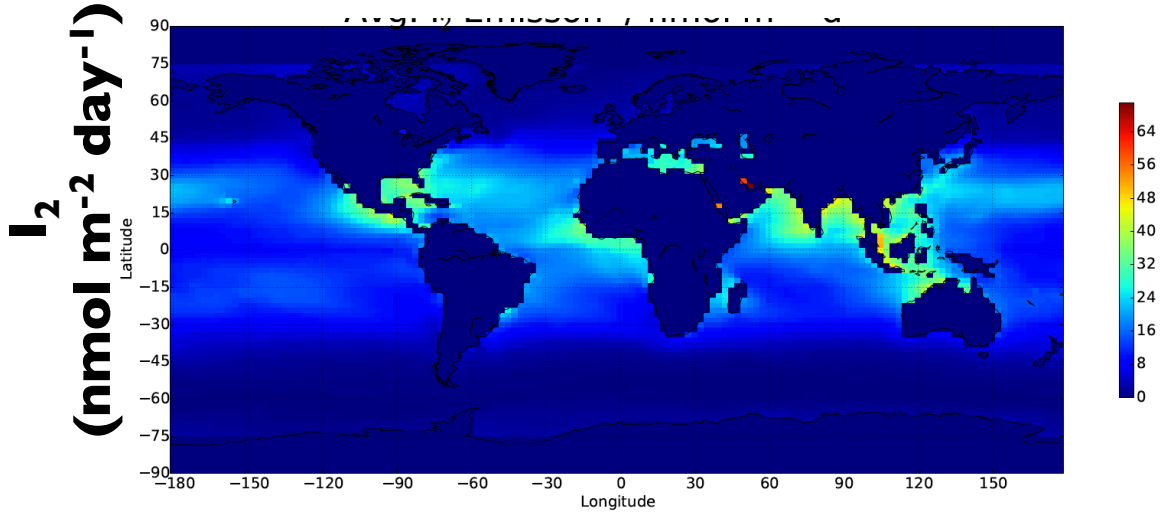
Inorganic emissions

Ocean emission of HOI and I_2
(Carpenter et al., 2013)

Parameterized using O_3, 10m wind, oceanic iodide from SST
(Chance et al., 2014)





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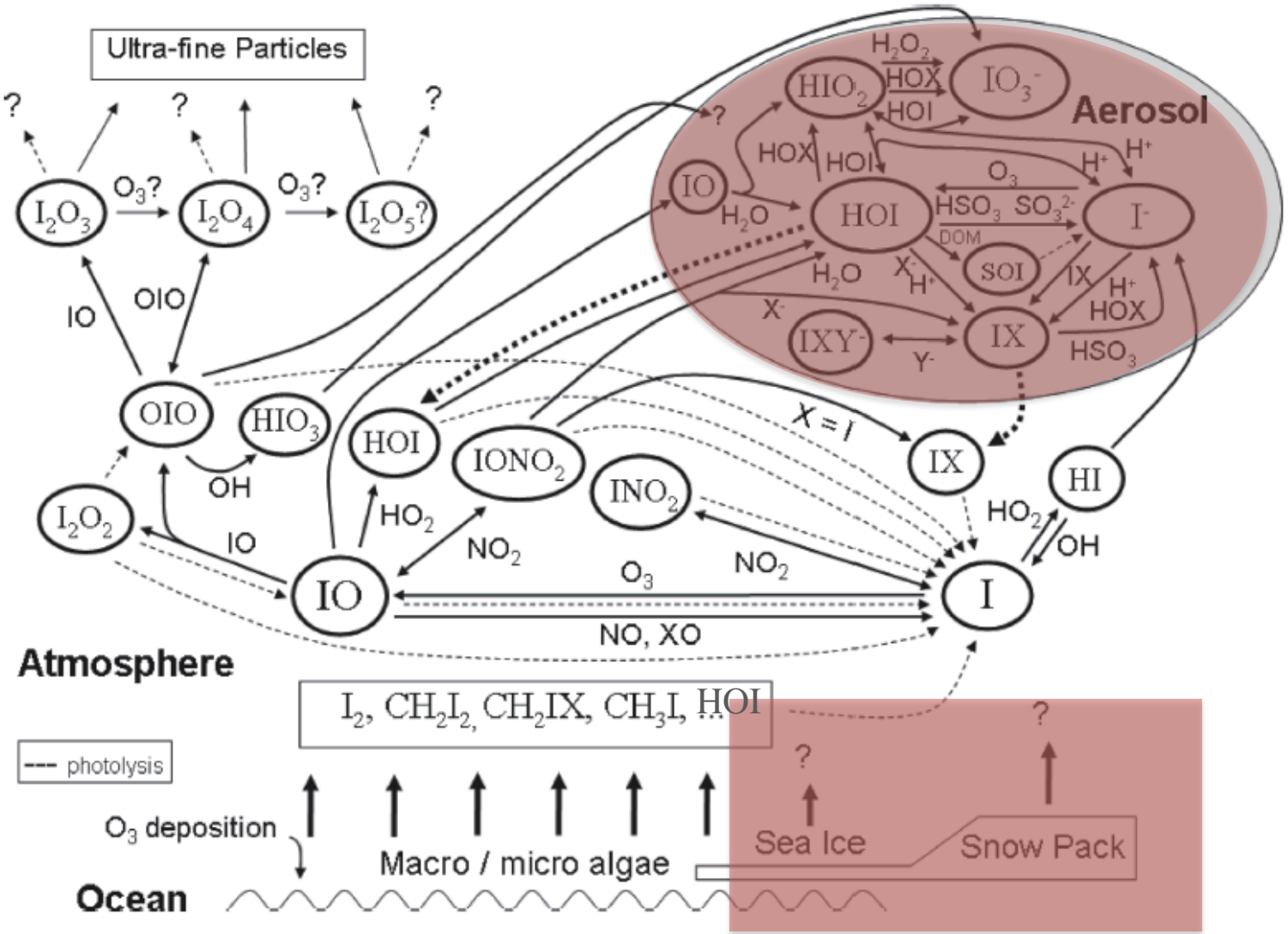
Chemistry



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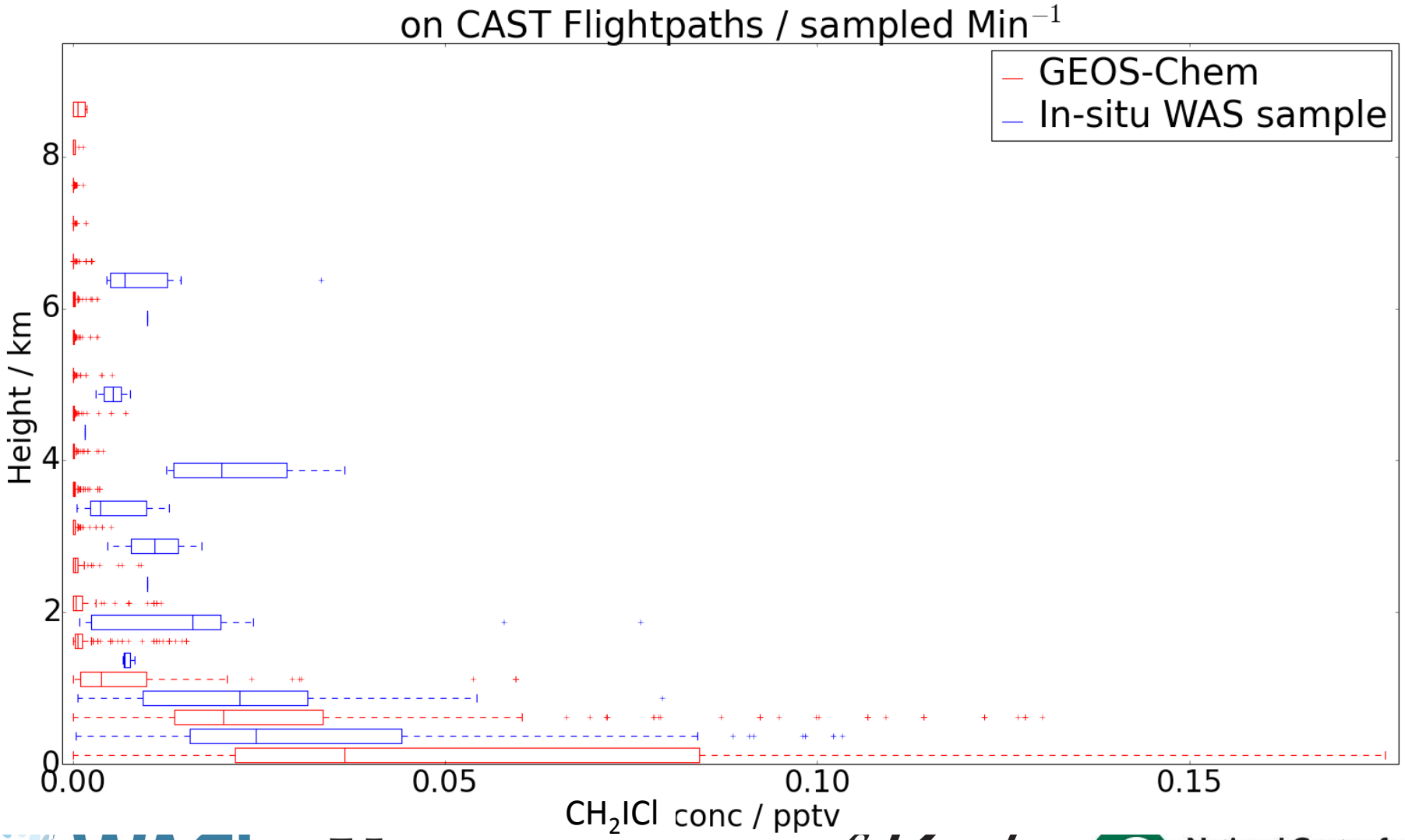
Precursor gases: CH_2ICl



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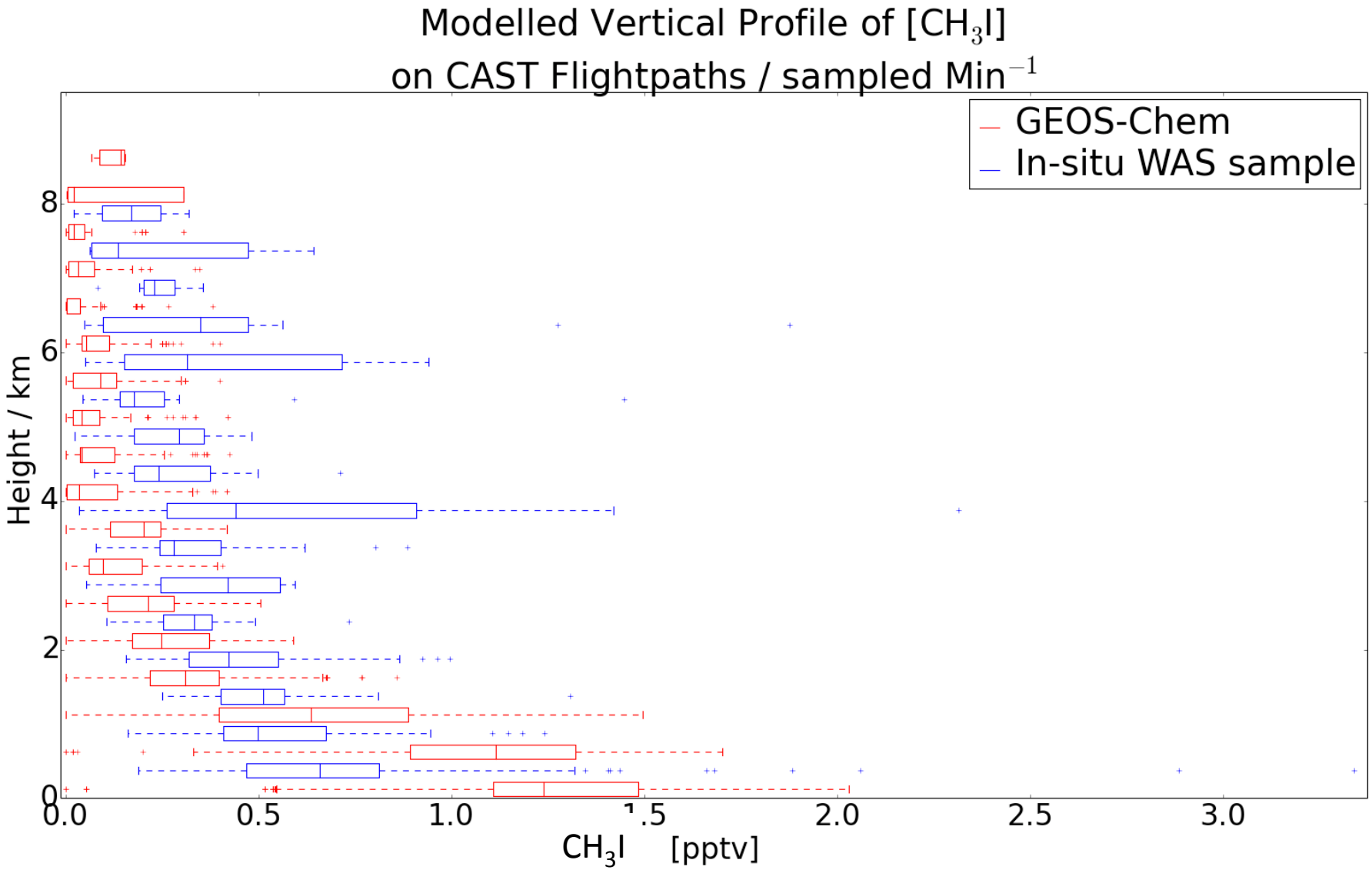
Precursor gases: CH_3I



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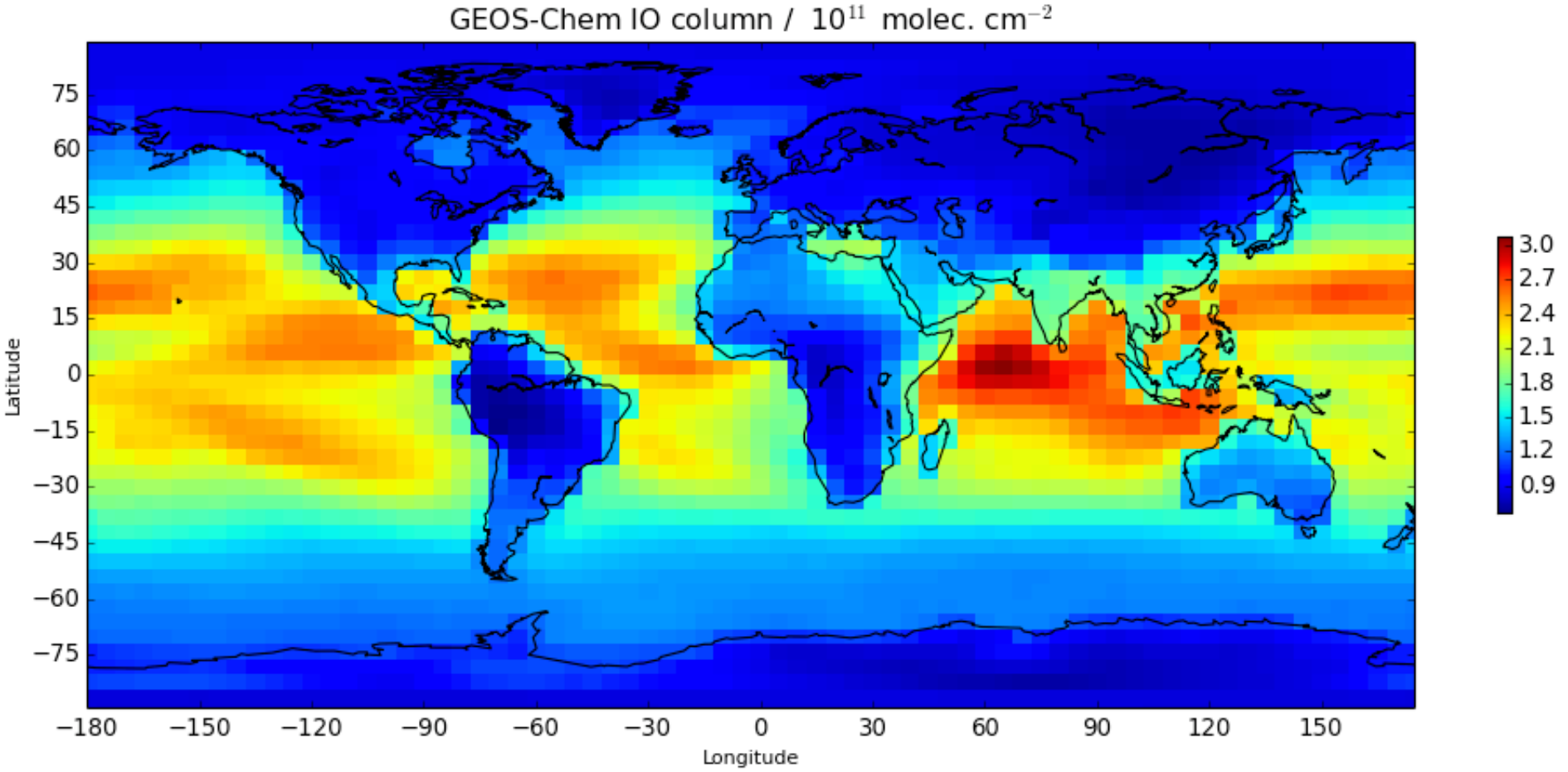
Column IO



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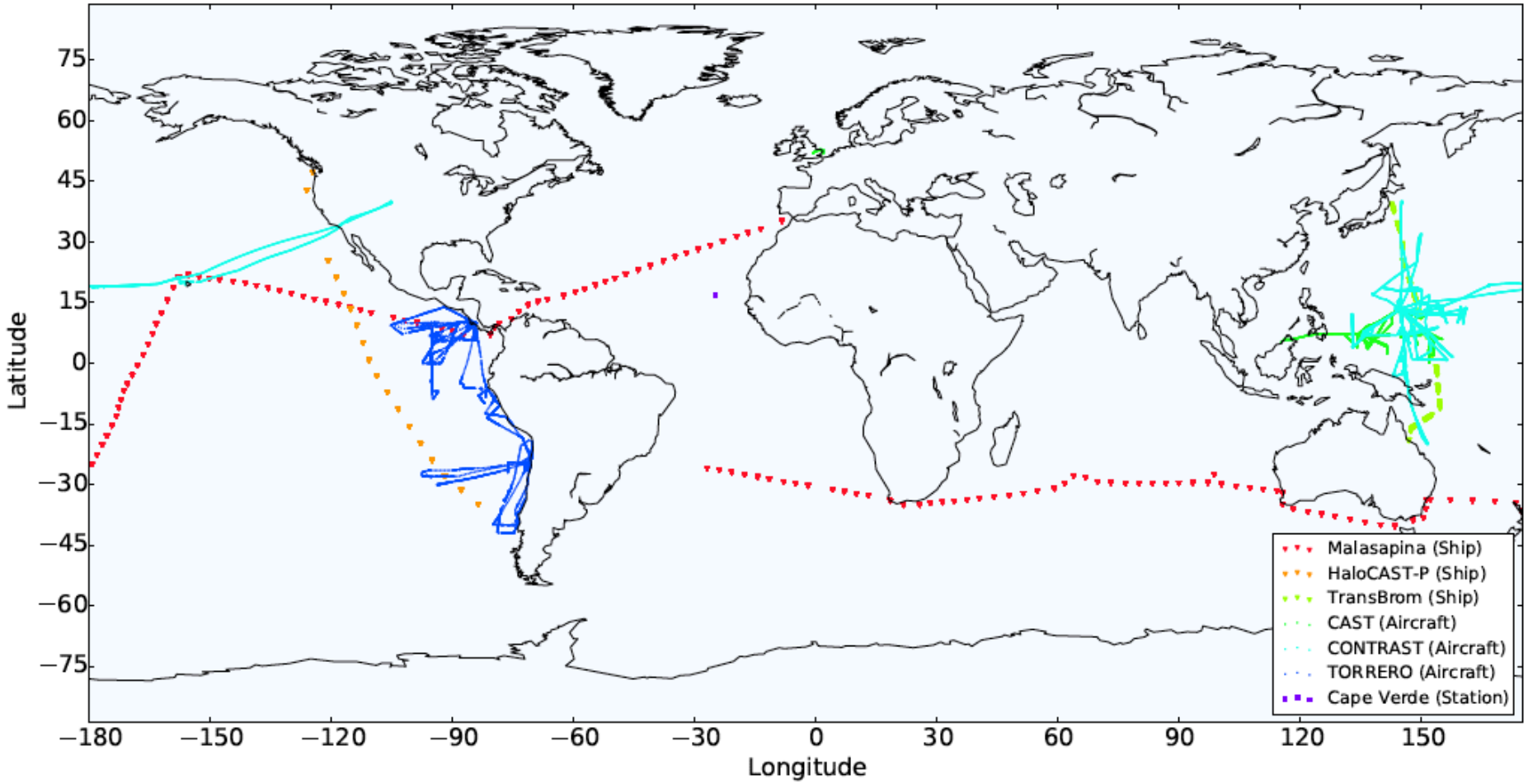
Observations Reactive Iodine



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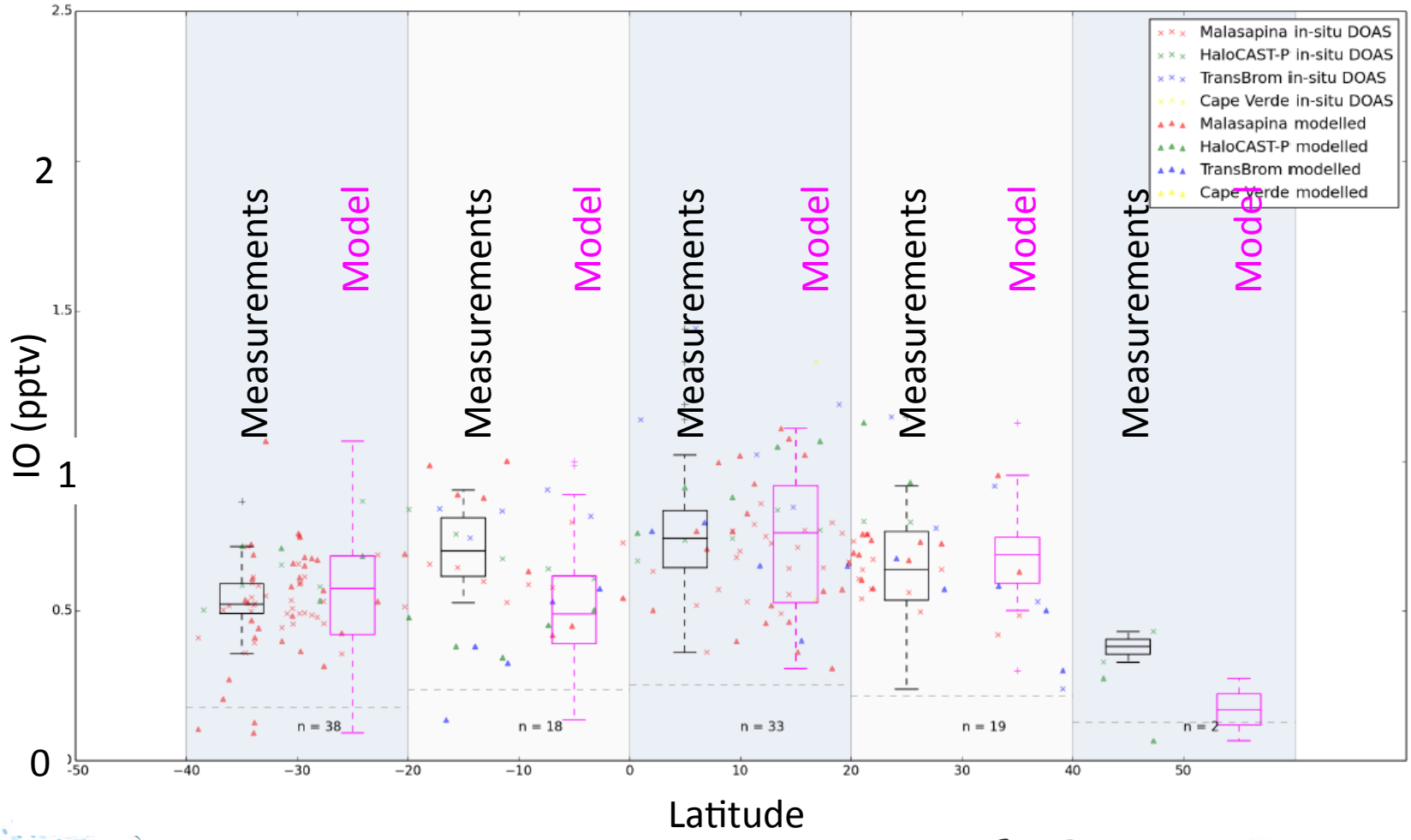
Surface IO



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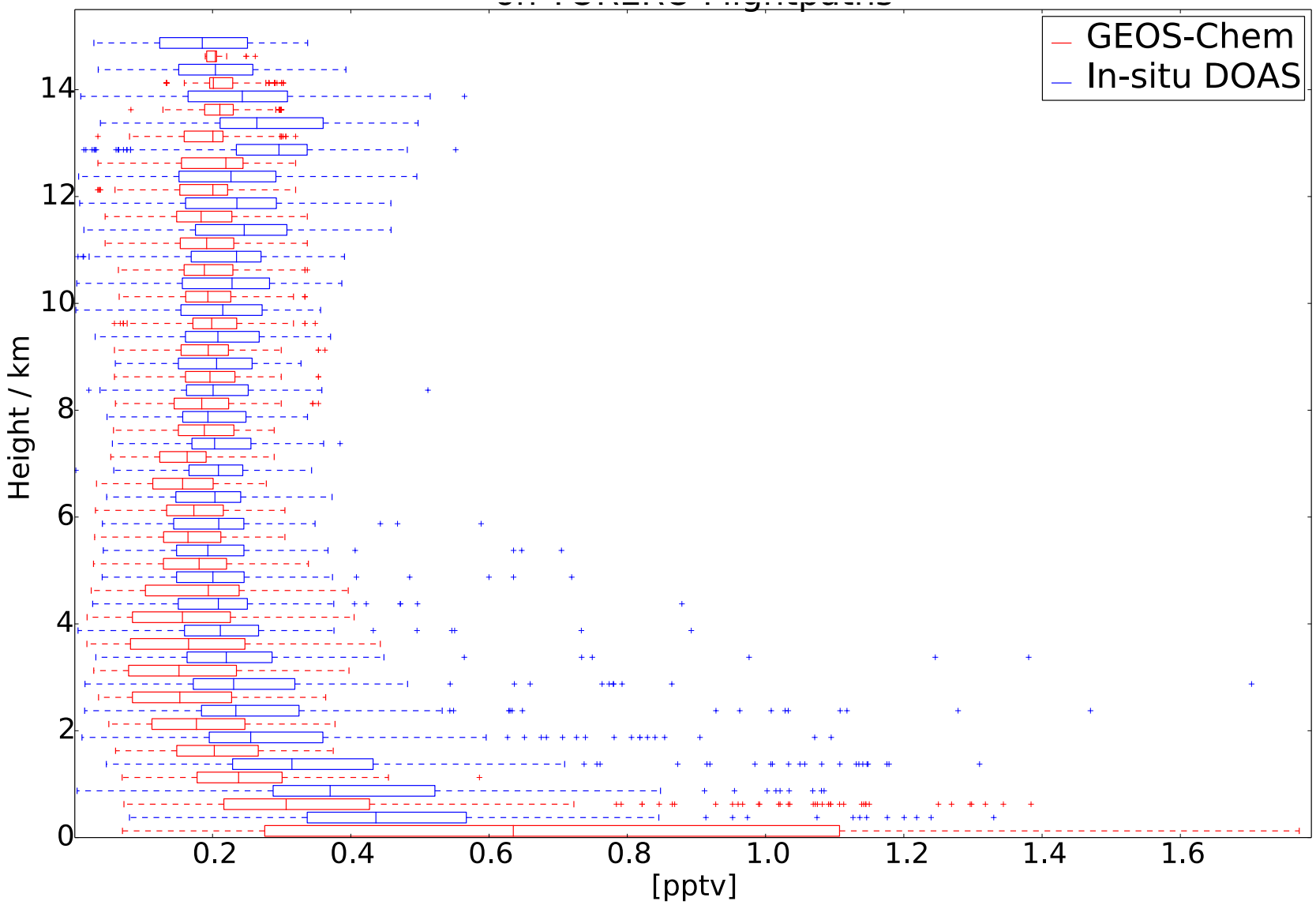
Vertical IO TORERO



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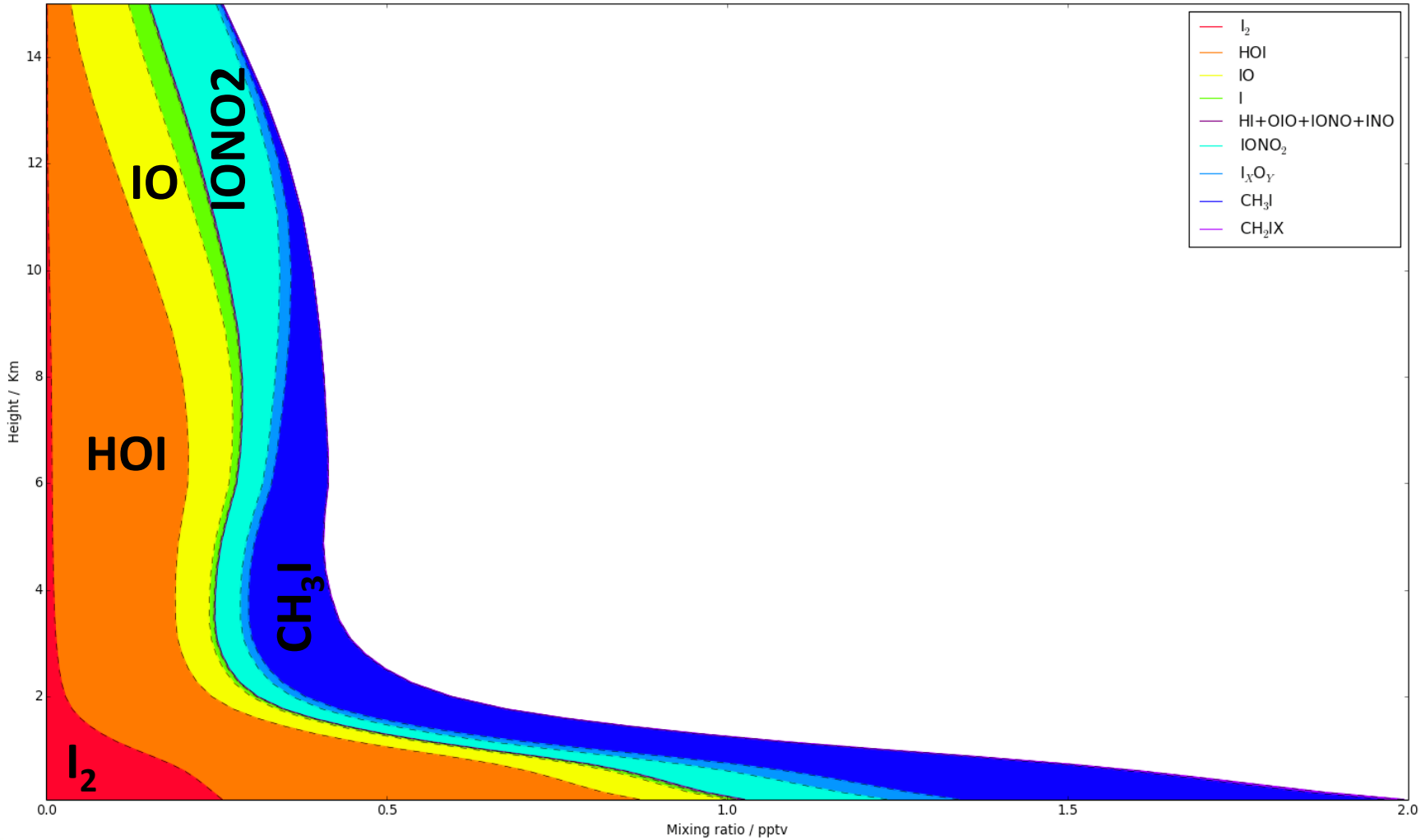
Vertical iodine composition



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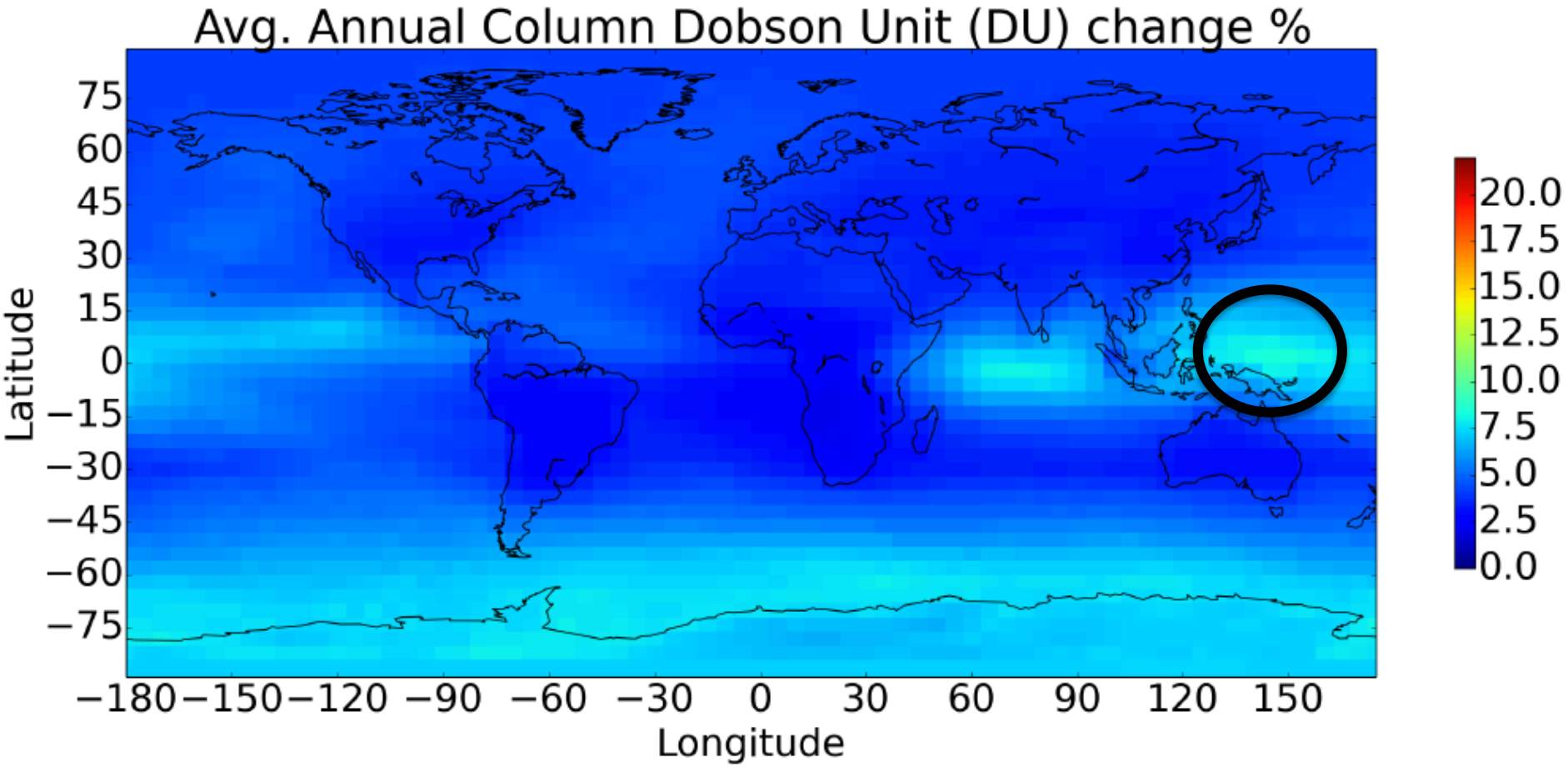
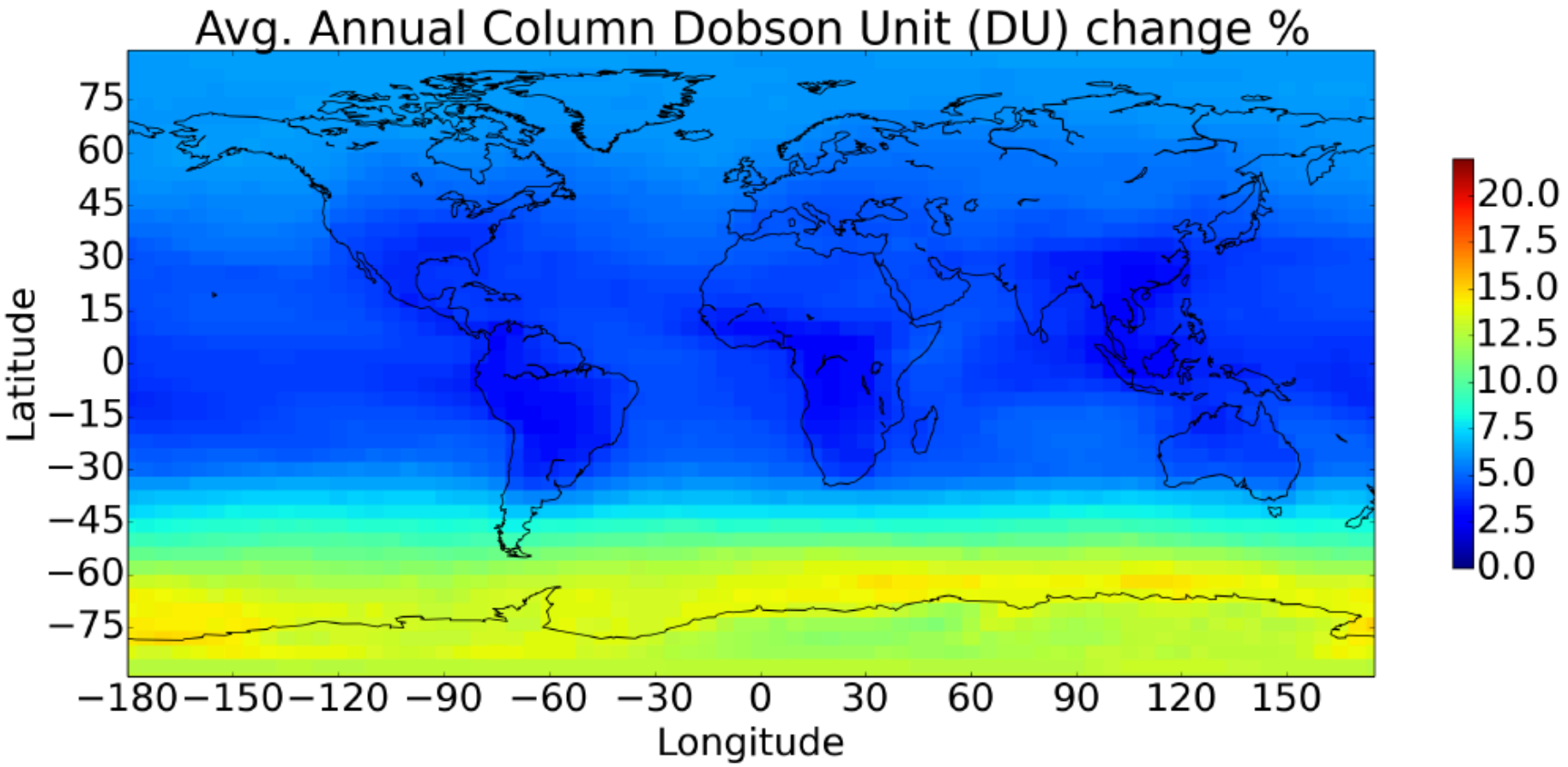
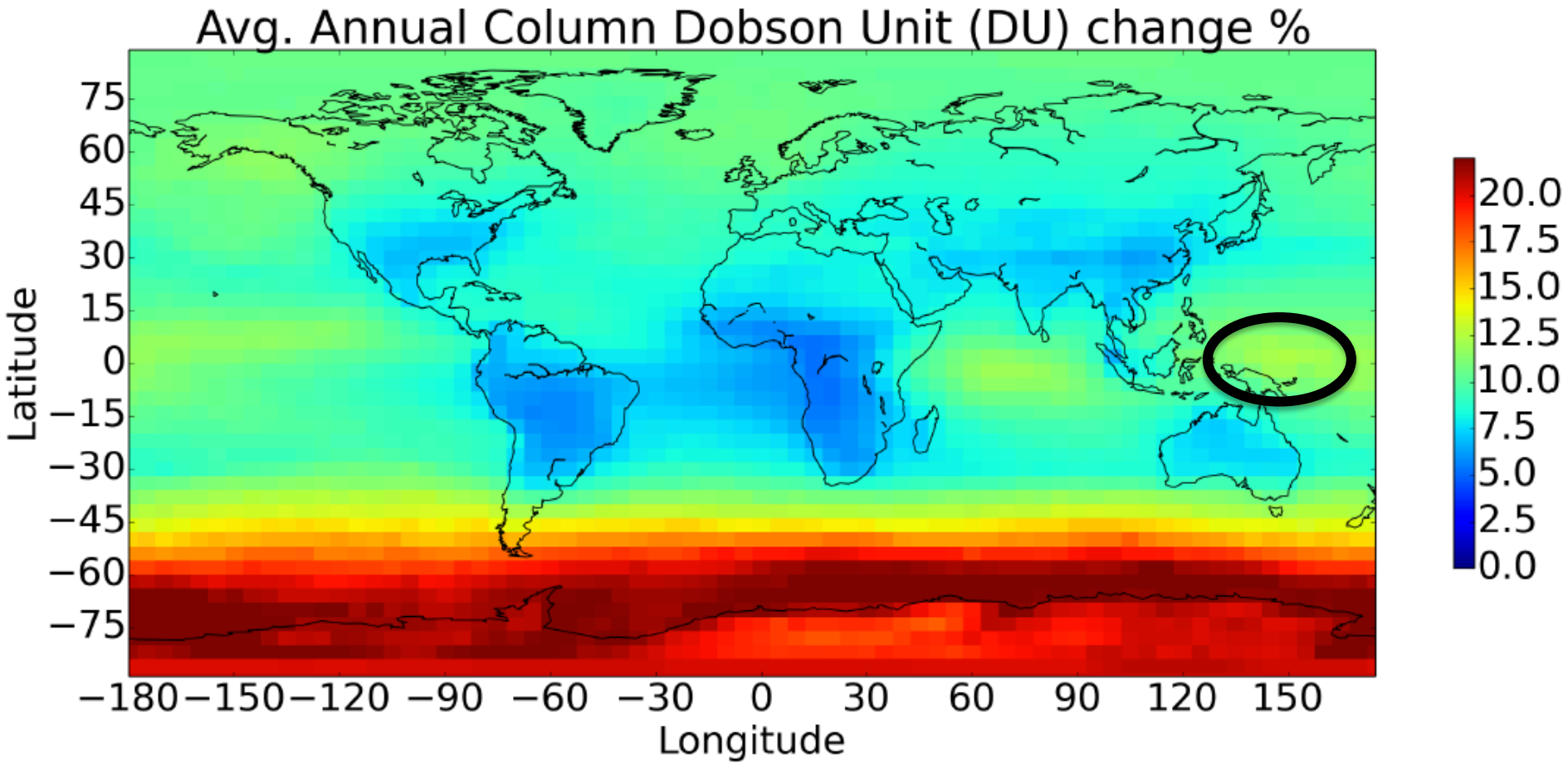
O_3 Change with just iodine



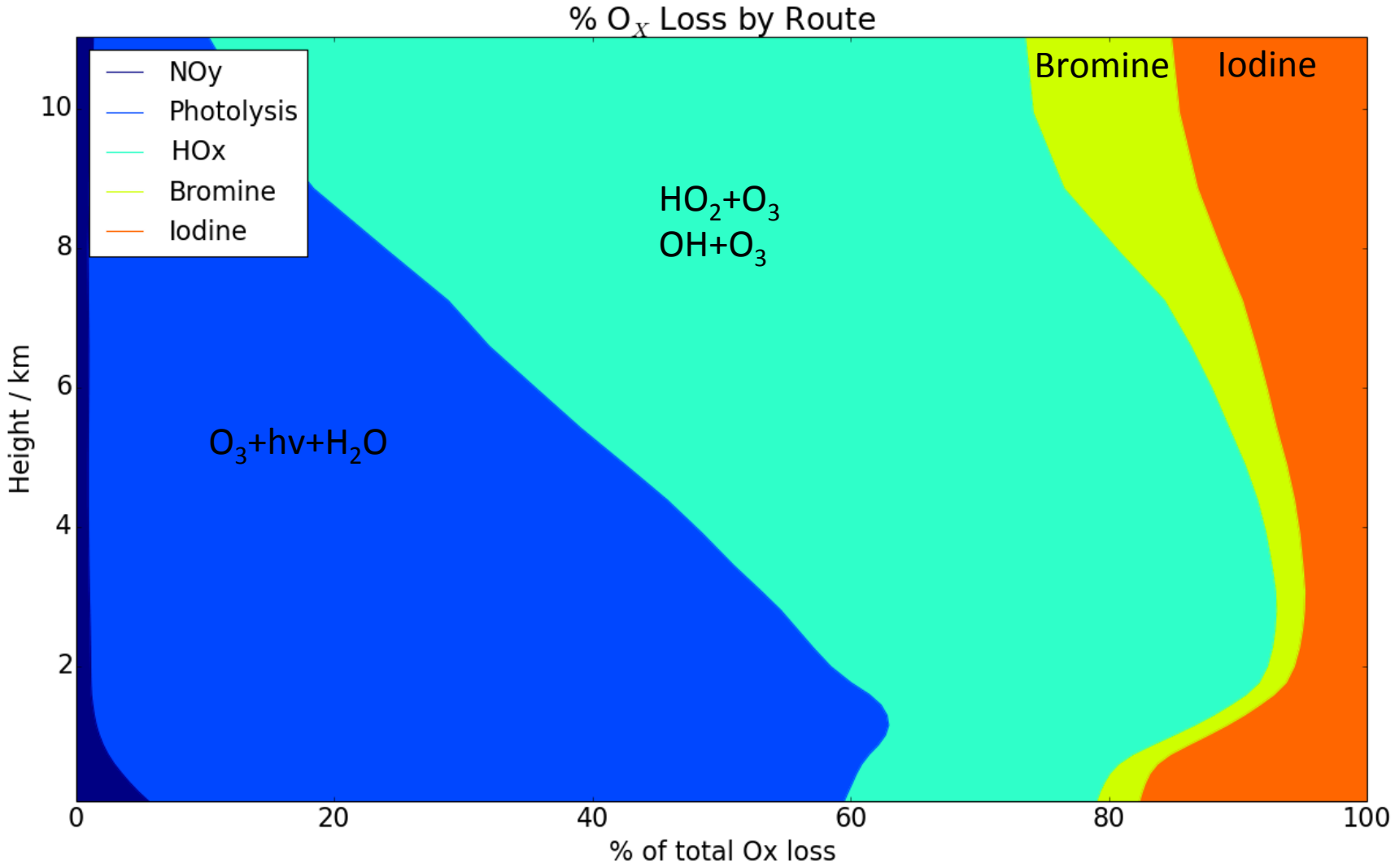
O_3 Change with just bromine



O_3 Change with halogens



Global ozone loss



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Impact of halogens on global oxidation

Two influencers

O_3 ↓ OH↓

$XO+HO_2 \rightarrow HOX+h\nu \rightarrow OH+X$ OH↑

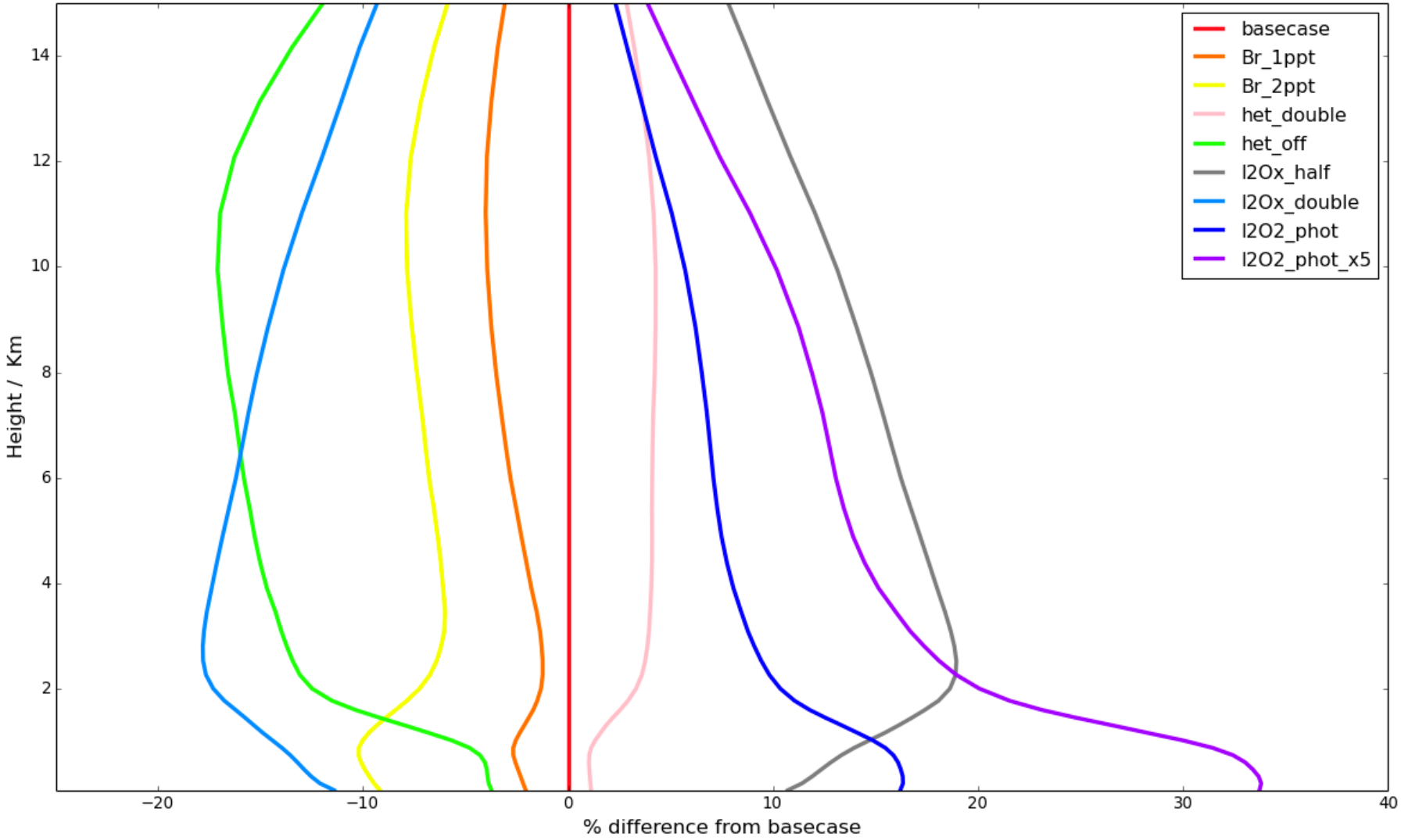
OH Mass weighted global

Just	Br	-2.7%
Just	I	+0.1%
Both		-2.5%

CH_4 lifetime

Just Br	+2.8%
Just I	-0.04%
Both	+2.6%

Chemical uncertainties: IO



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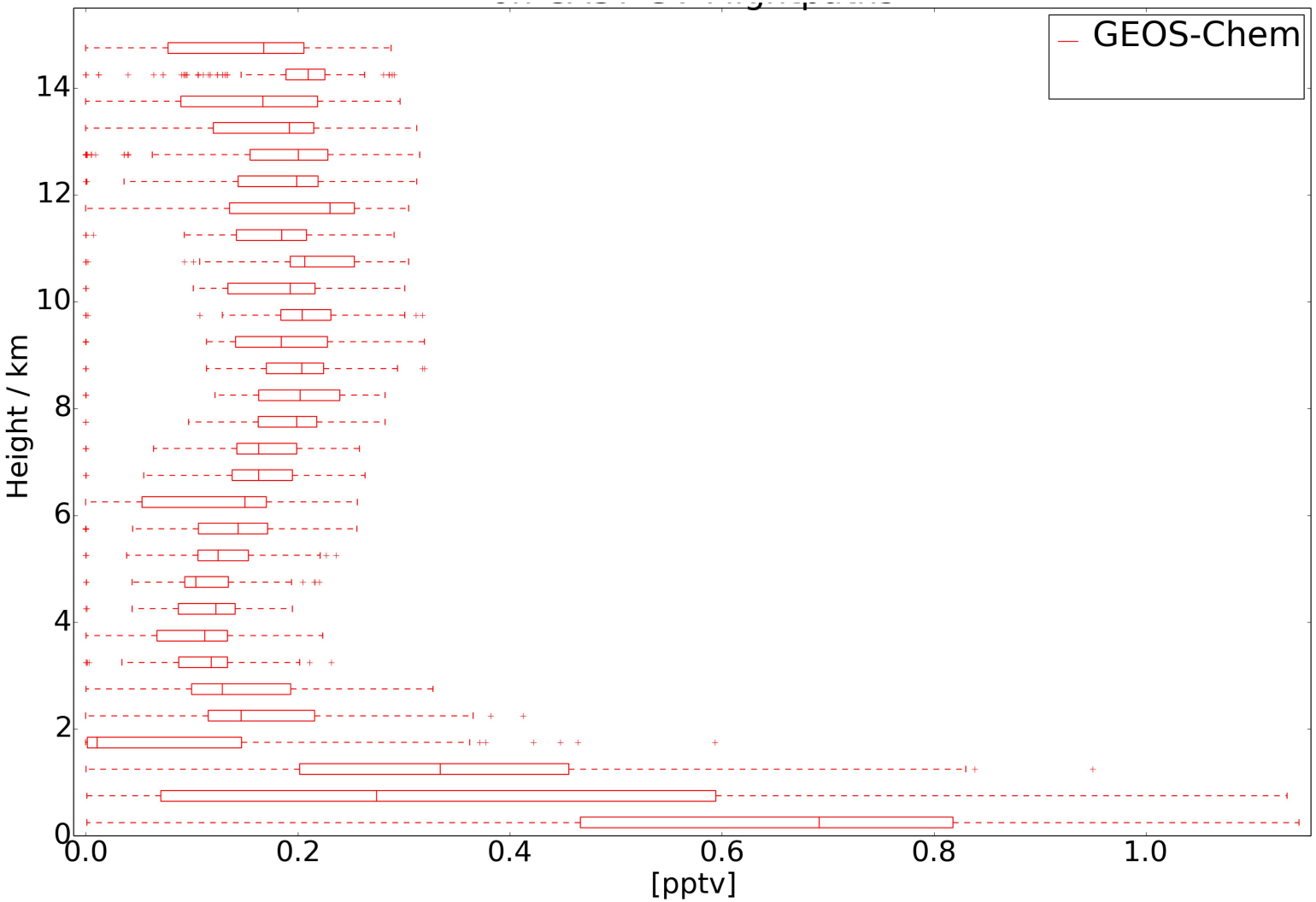
CONTRAST / CAST



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Conclusions

- Building a reactive iodine simulations
- Very poorly constrained by observations
- Often poorly defined kinetics
- Rather suprisinly IO concentrations calculated are consistent with observations
- Iodine alone ~2-7% change in O_3 column
- Iodine has almost no impact on OH
- Halogens ~10% change in O_3 column