

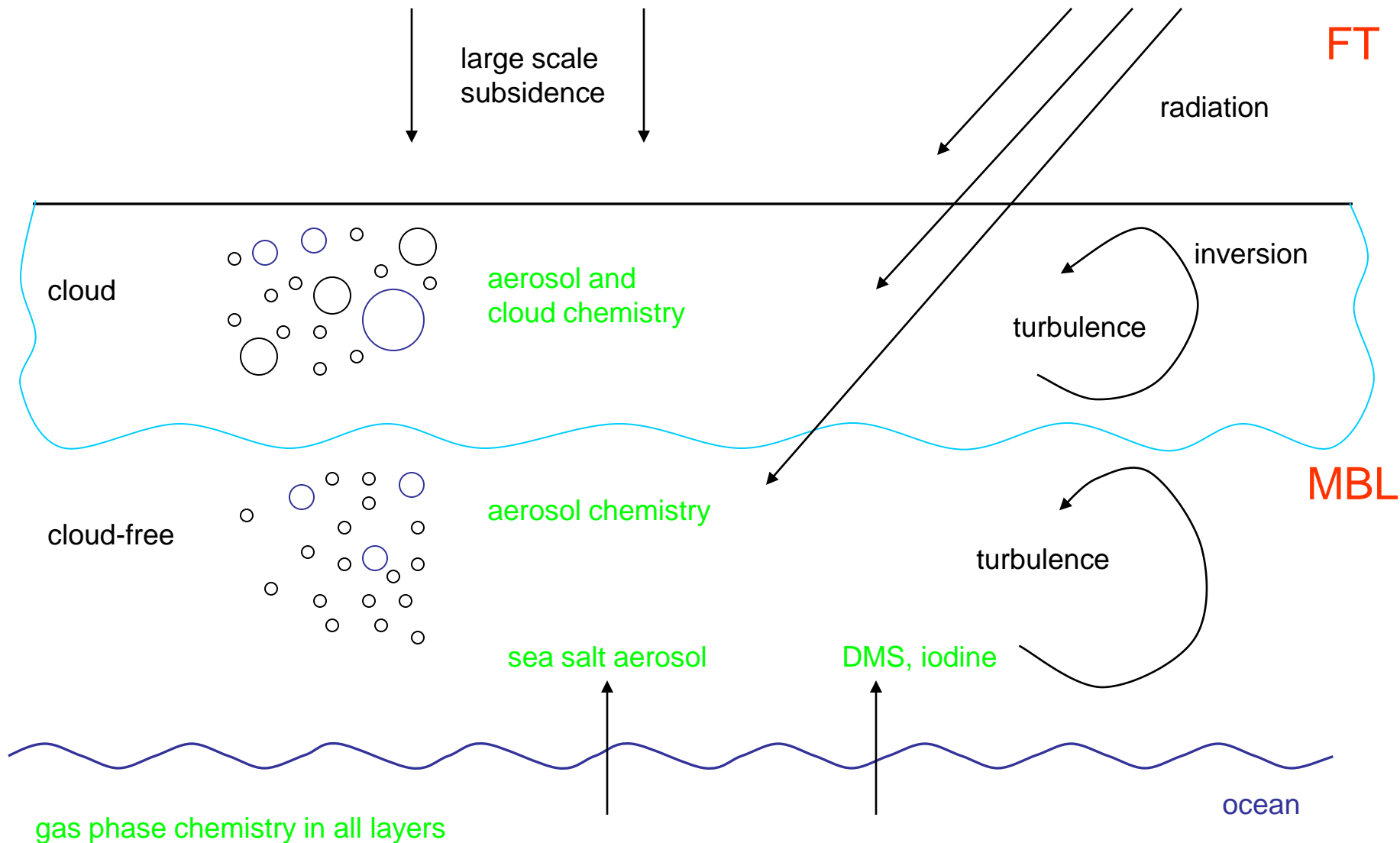
Modelling for TORERO

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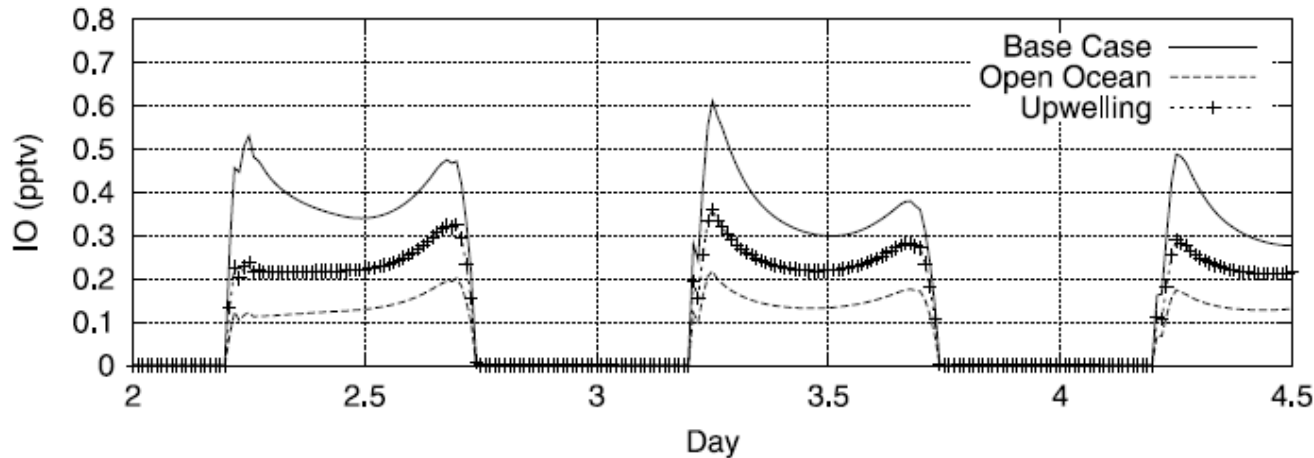
Modelling expertise at UEA

- Tropospheric chemistry, focus on halogen chemistry
 - marine boundary layer
 - polar boundary layer
 - salt lakes
 - ship plumes
 - volcanic plumes
- Some recent relevant papers
 - Jones et al. (2010)
 - Iodine chemistry around Cape Verde
 - Lawler et al. (2009, 2011)
 - Chlorine chemistry around Cape Verde
- Main model: MISTRA, 1D model

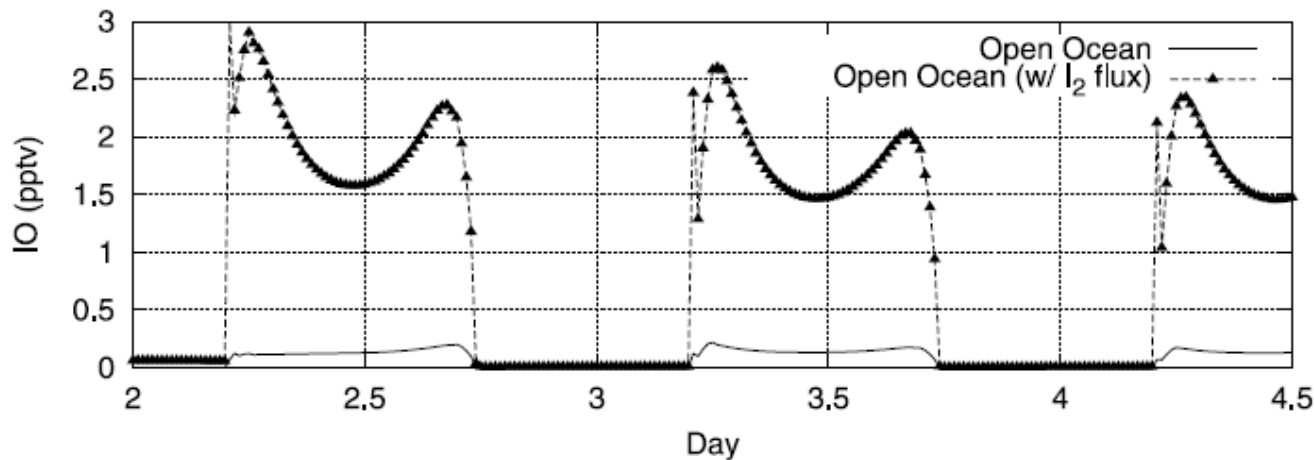
MISTRA: One-dimensional MBL model



Jones et al., 2010



only organic iodine gases as iodine precursors



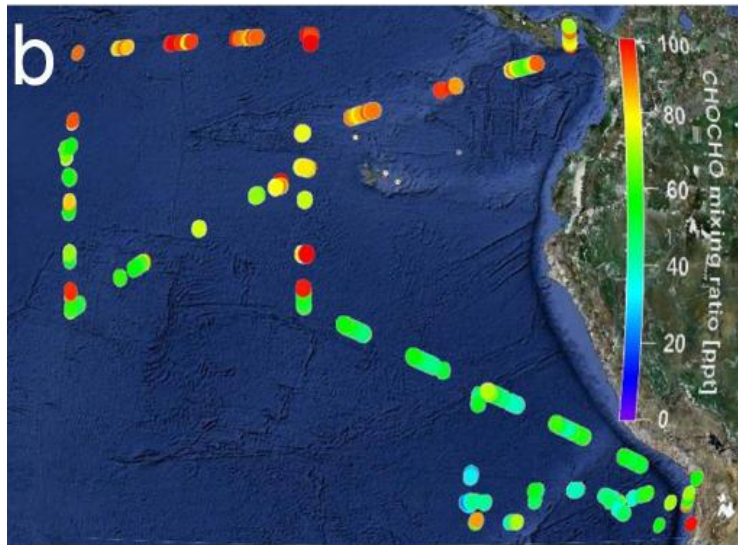
organic iodine ("open ocean") and additional flux of I₂

Measured IO at Cape Verde was 1.4 +/- 0.8 ppt, so organic precursors alone are not sufficient

Open question: What is source of inorganic iodine precursor?
Reaction on ocean surface microlayer?

Ongoing work

- Volkamer et al.:
 - Detection of IO on several cruises and a research flight in East Pacific
 - Detection of large amounts of CHOCHO (up to 140ppt) and HCHO (up to ~500 ppt) in East Pacific
 - Are sources of iodine and OVOCs correlated?



CHOCHO lifetime ~2h

Sinreich et al., 2010

- Relevance of OVOCs to bromine and chlorine chemistry

Intended work for TORERO

- MISTRA
 - Selected process studies using “typical” MBL conditions i.e. no attempt to reproduce individual days but rather focus on chemical processes
- WRF-Chem
 - Select focus periods of a few days in collaboration with TORERO scientists
 - WRF-Chem currently being set-up at UEA
 - Halogen chemistry being included on funded project
 - Meteorological boundary conditions currently from GFS, in future poss. from ECMWF
 - Nesting will depend on cruise/flight tracks but we expect to go down to 5km horizontal resolution, if need be poss. even higher resolution

Required data for model evaluation

- Standard meteorological parameters
 - T, u, rh, p (incl. vertical profiles)
 - clouds: type, vertical extent, LWC
- Aerosol and cloud droplet size distributions
- Chemistry
 - Major ion composition of aerosol (if possible size resolved)
 - O₃, CO, CH₄, NO_x, SO₂, DMS, aldehydes
 - OH, HO₂, H₂SO₄
 - BrO, IO, Cl (e.g. via hydrocarbon clock if feasible); CIMS for more halogen data would be superb
 - Photolysis rates, J(NO₂)
 - Tracers to identify air masses, such as radon, acetonitrile, etc

Funding for TORERO

- First attempt to secure funding for a UEA component of TORERO failed
- Revised proposal to a different agency is in preparation
- A small number of MISTRA runs can be done without funding