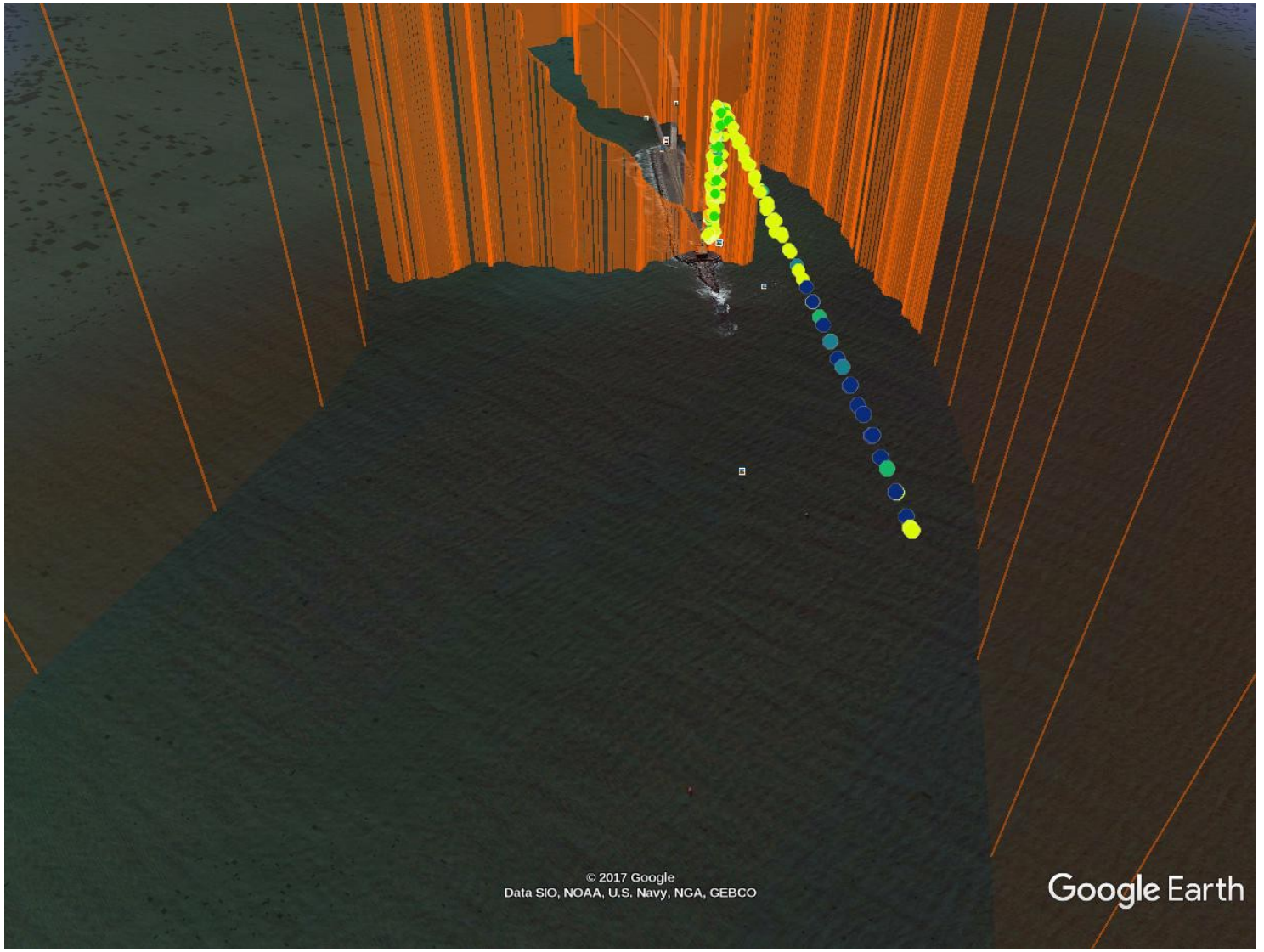
OWLETS Ship Titration Event

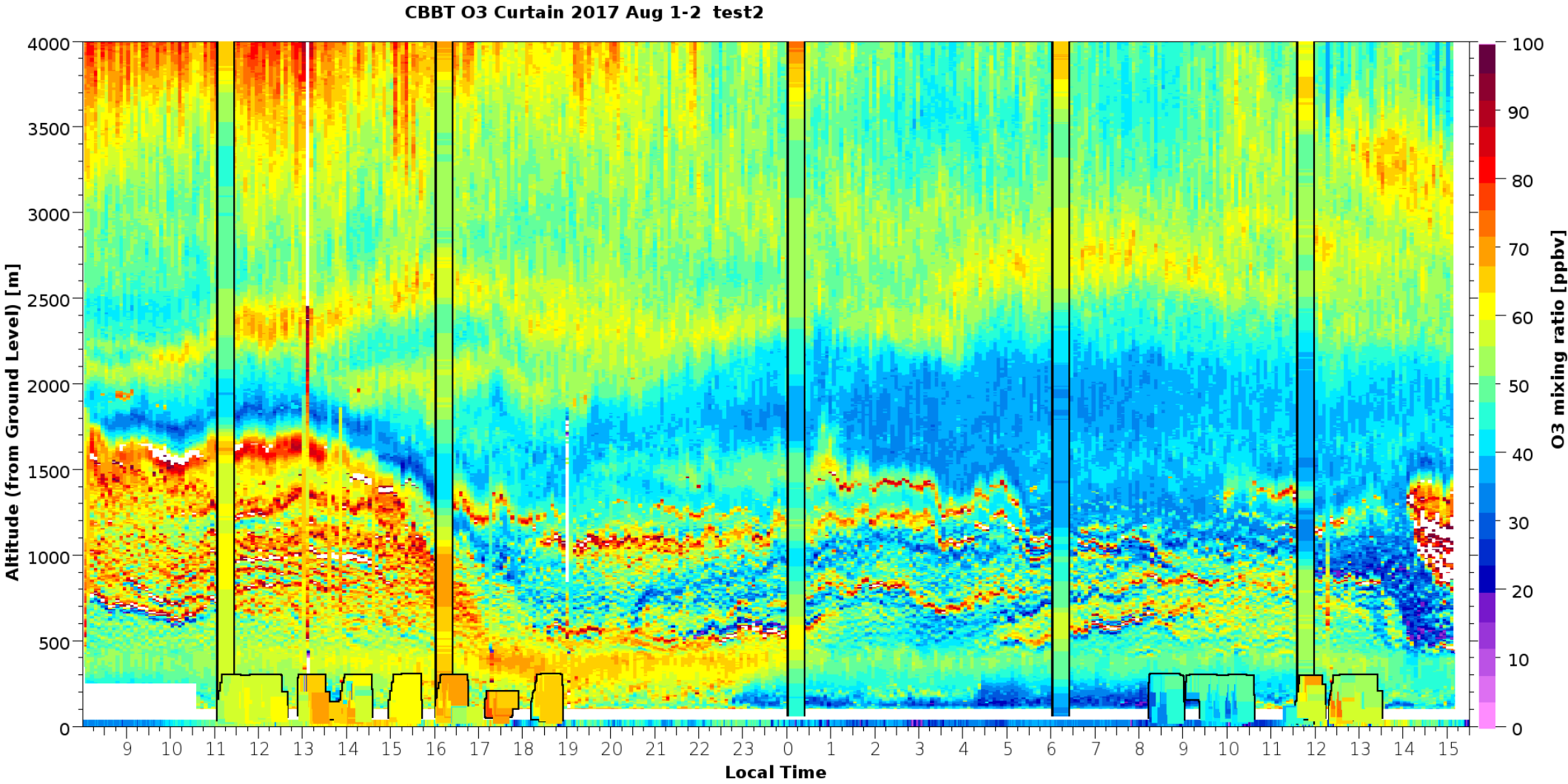
- Location: CBBT 3rd island
- Observation with UAV/POM sensor
- Observation with LMOL lidar (Very Near Field, newly developed, with minimum altitude ~100m)

Google Earth/POM UAV

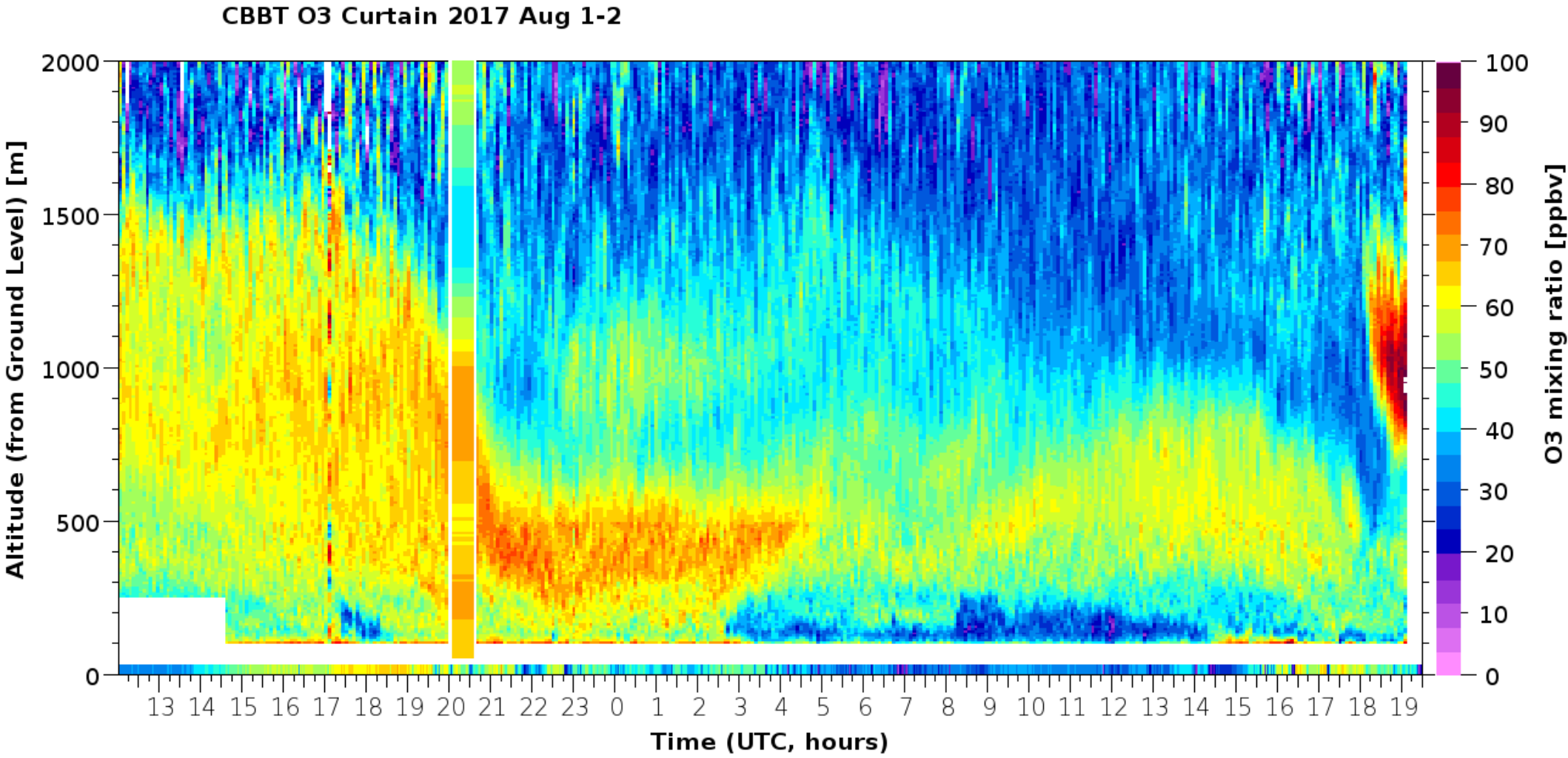
- Todo in future: add LMOL curtain



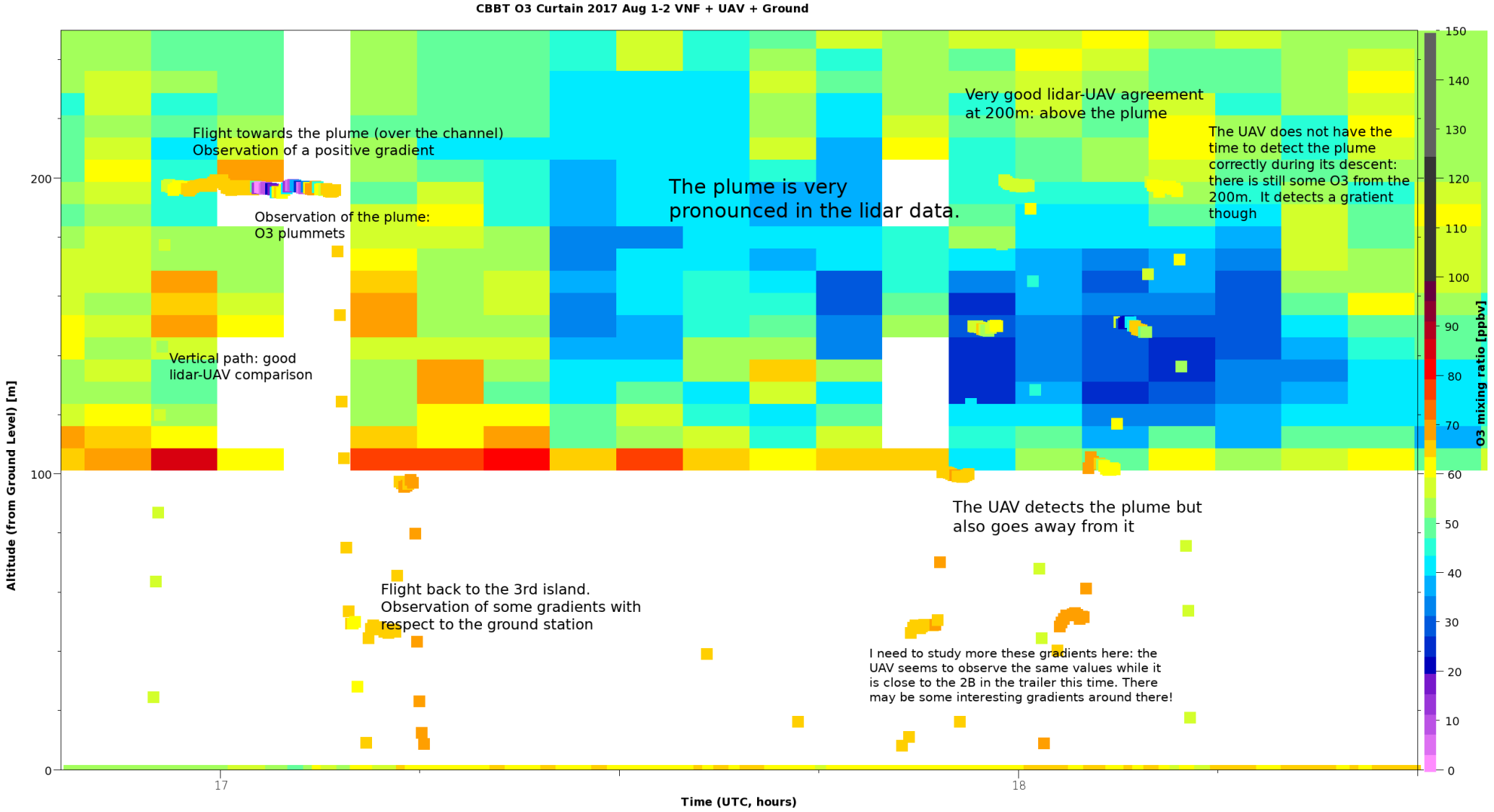
LMOL data

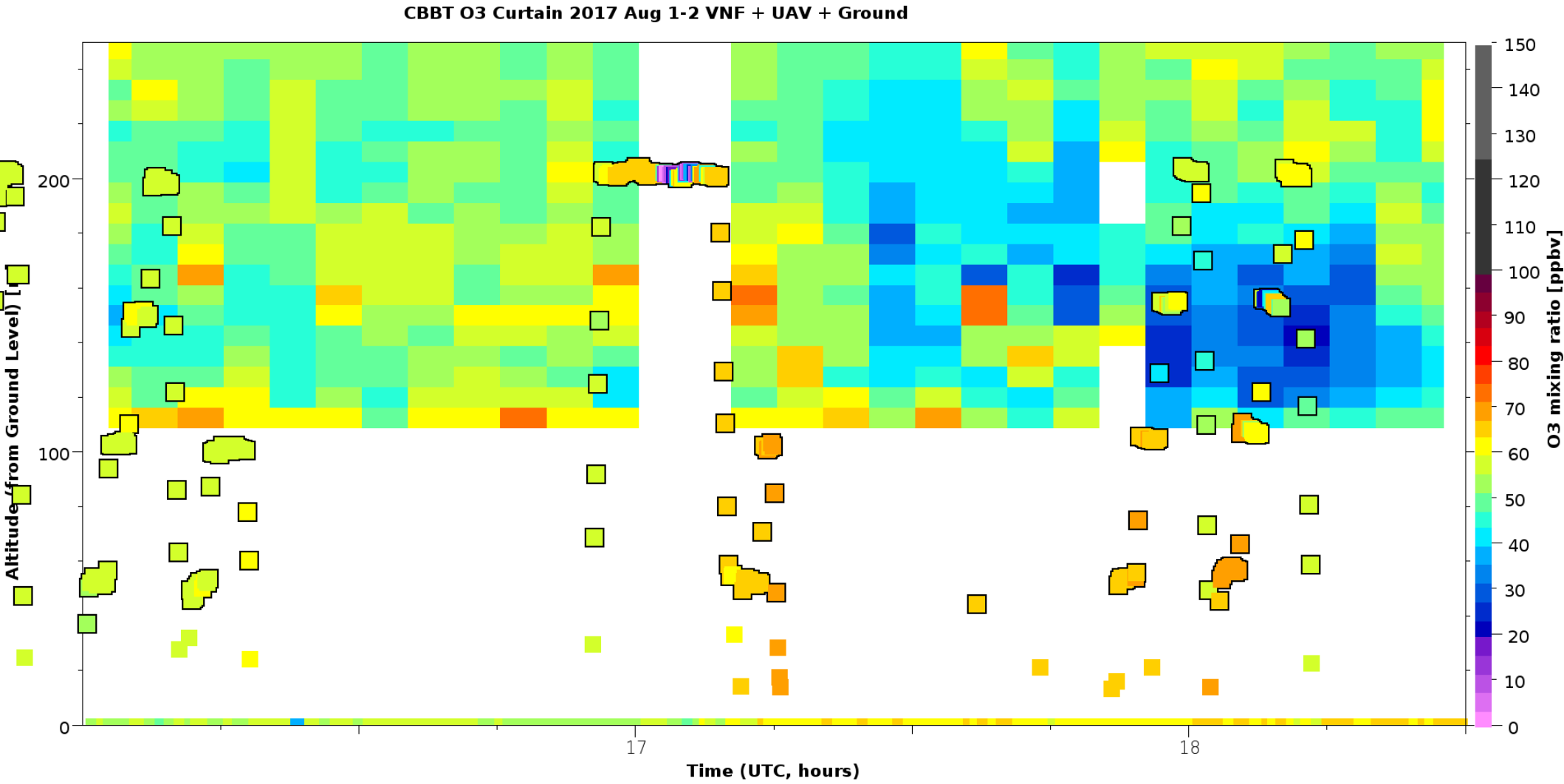

CBBT O3 Curtain 2017 Aug 1-2 test2
Altitude (from Ground Level) [m]
4000
3500
3000
2500
2000
1500
1000
500
0
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Local Time
O3 mixing ratio [ppbv]
100
90
80
70
60
50
40
30
20
10
0

Very Near field only



LMOL/POM comparison




CBBT O3 Curtain 2017 Aug 1-2 VNF + UAV + Ground
Altitude (from Ground Level) [
0
100
200
17
18
Time (UTC, hours)
O3 mixing ratio [ppbv]
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

Video of ship coming

- The specific event has a very yellow plume, and is way stronger than the following ones.

Plume and chemistry

- Paper have been published on impact of maritime traffic on O3 and NOx, but on a global scale
- Other papers are more specific (Huszar et al 2010. www.atmos-chem-phys.net/10/6645/2010/) but require a characteristic time parameter
- Chosson et al. 2008 has some plume dispersion simulations for that characteristic time

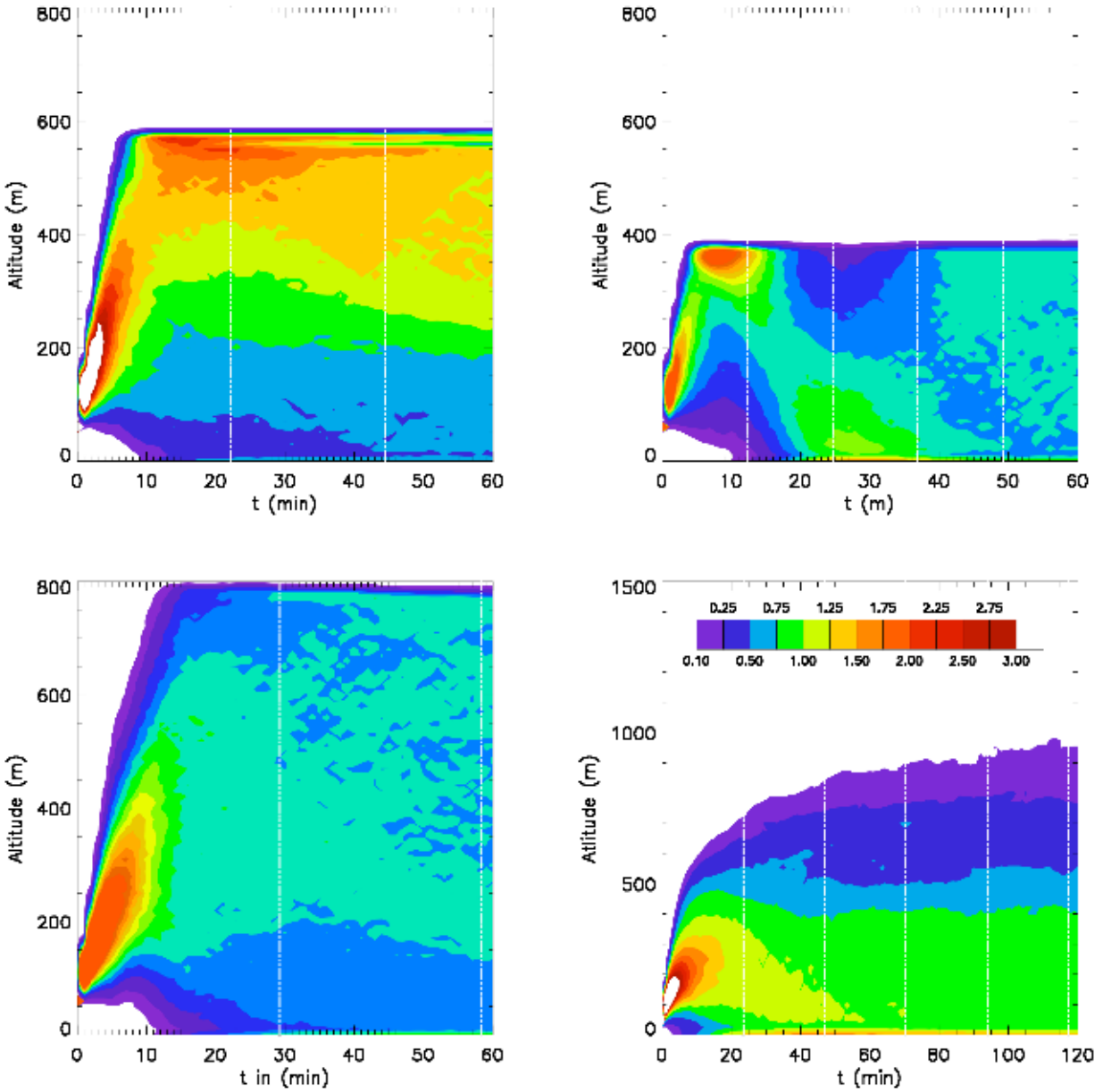


Fig. 5. Time evolution of normalized mean vertical concentration for FIRE1 (top left), FIRE2 (top right), FIRE3 (bottom left) and BOMEX (bottom right) with initial mean buoyancy flux $\overline{F}$=120 $m^4\ s^{-3}$. The vertical dashed-dotted lines represent the characteristic turnover time scale of each boundary layer.

My questions

- What is the relevant chemistry?
- Are sulfur oxides relevant?
- How can we retrieve the informations about the boats/traffic (I saw https://www.marinetraffic.com/)

Refs

- Chosson, F., Paoli, R., and Cuenot, B.: Ship plume dispersion rates in convective boundary layers for chemistry models, Atmos. Chem. Phys., 8, 4841-4853, https://doi.org/10.5194/acp-8-4841-2008, 2008.