A first look at Met Office hind-casts for MAGIC

Cyril Morcrette, Met Office, UK

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Why am I interested in stratocumulus and its breakup

- Low clouds (Sc and Cu) are important cloud type from point of view of cloud feedback.

- Important to get them right in climate models.

- At Met Office, our climate model is also a global NWP model.

- Sc → Cu also very important for forecasting surface temperatures.

- Important for road surface temperature at night in winter. Will it be icy, do we need to grit?

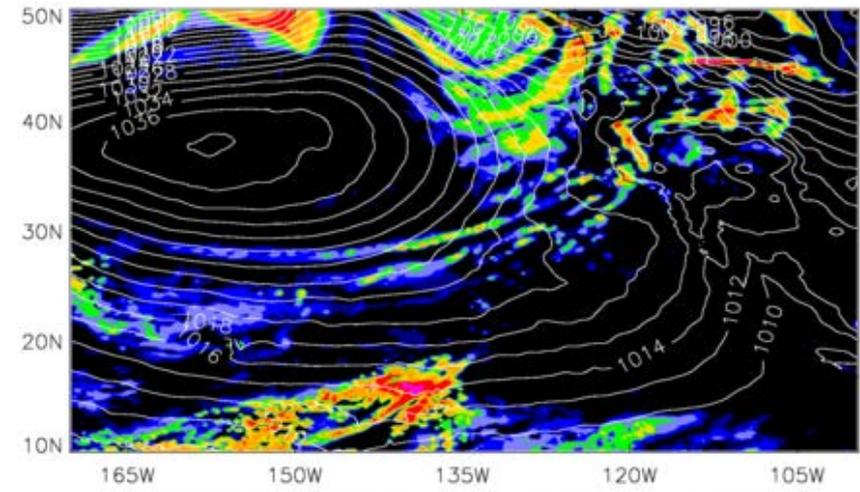- So the more we understand Sc→Cu the better.

Model set-up

- Using Met Office Global Atmosphere (GA) 6.0 configuration (dx~30km)

- Version used operationally since July 2014.

- Includes separate variables for prognostic cloud water and prognostic cloud cover (one is not diagnosed from the other).

- Take operational analyses produced during ~12 months of MAGIC.

- Re-run 365 2-day hind-casts.

- Output hourly data over north-east Pacific.

- For each day during MAGIC there is a "day 1" and a "day 2" forecast.

- Very happy to share this model data with those with access to observational data and to collaborate on comparison.

Example output:

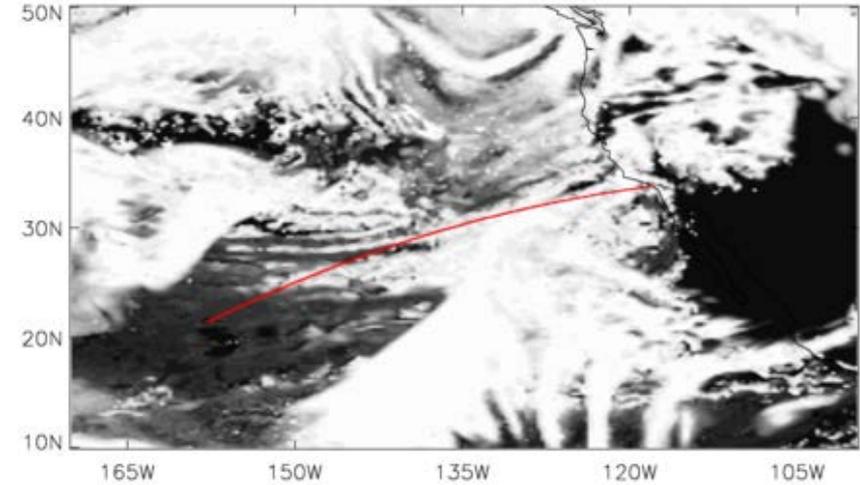Surface precipitation rate (mm/hr) and MSLP (hPa)

LWP (kg/m2)

Total Cloud Amount

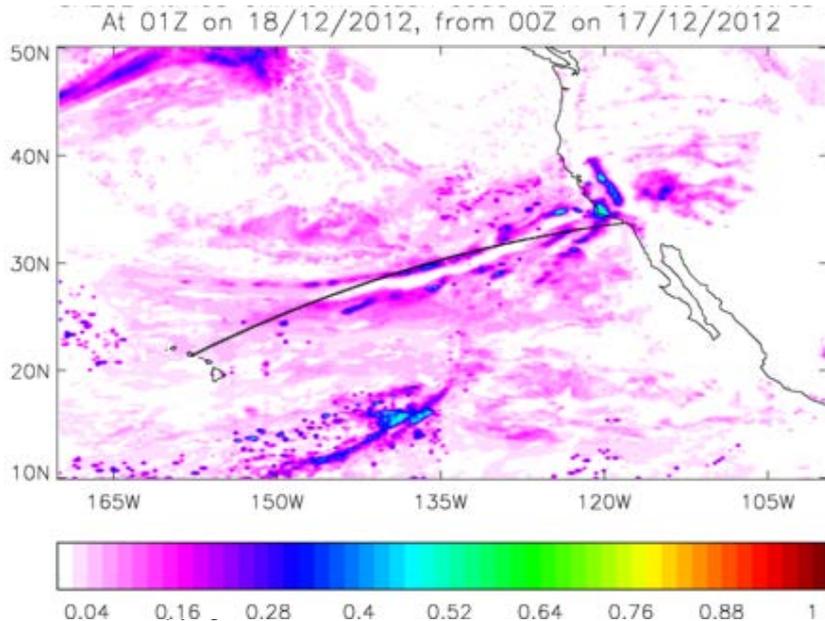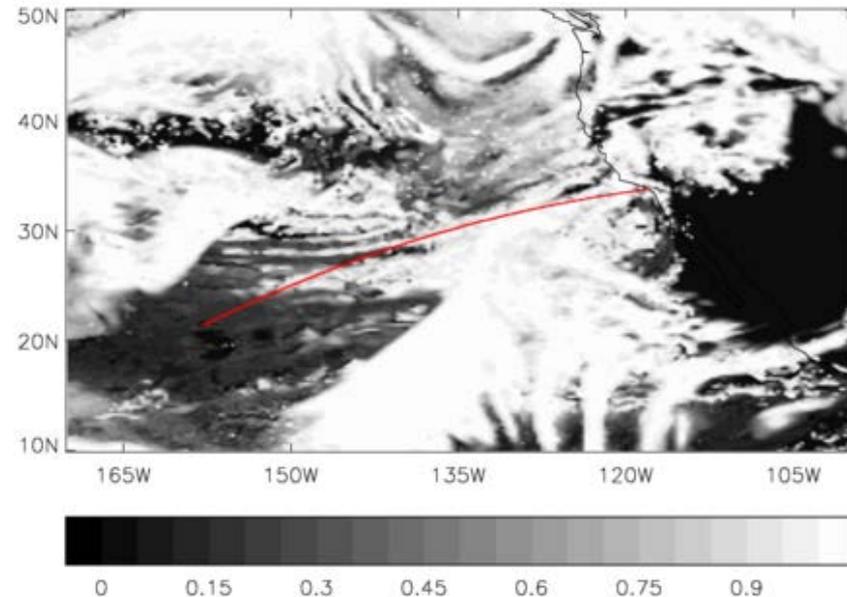At 01Z on 18/12/2012, from 00Z on 17/12/2012

Question:

Comparing average model cross-section to average observational cross-section:

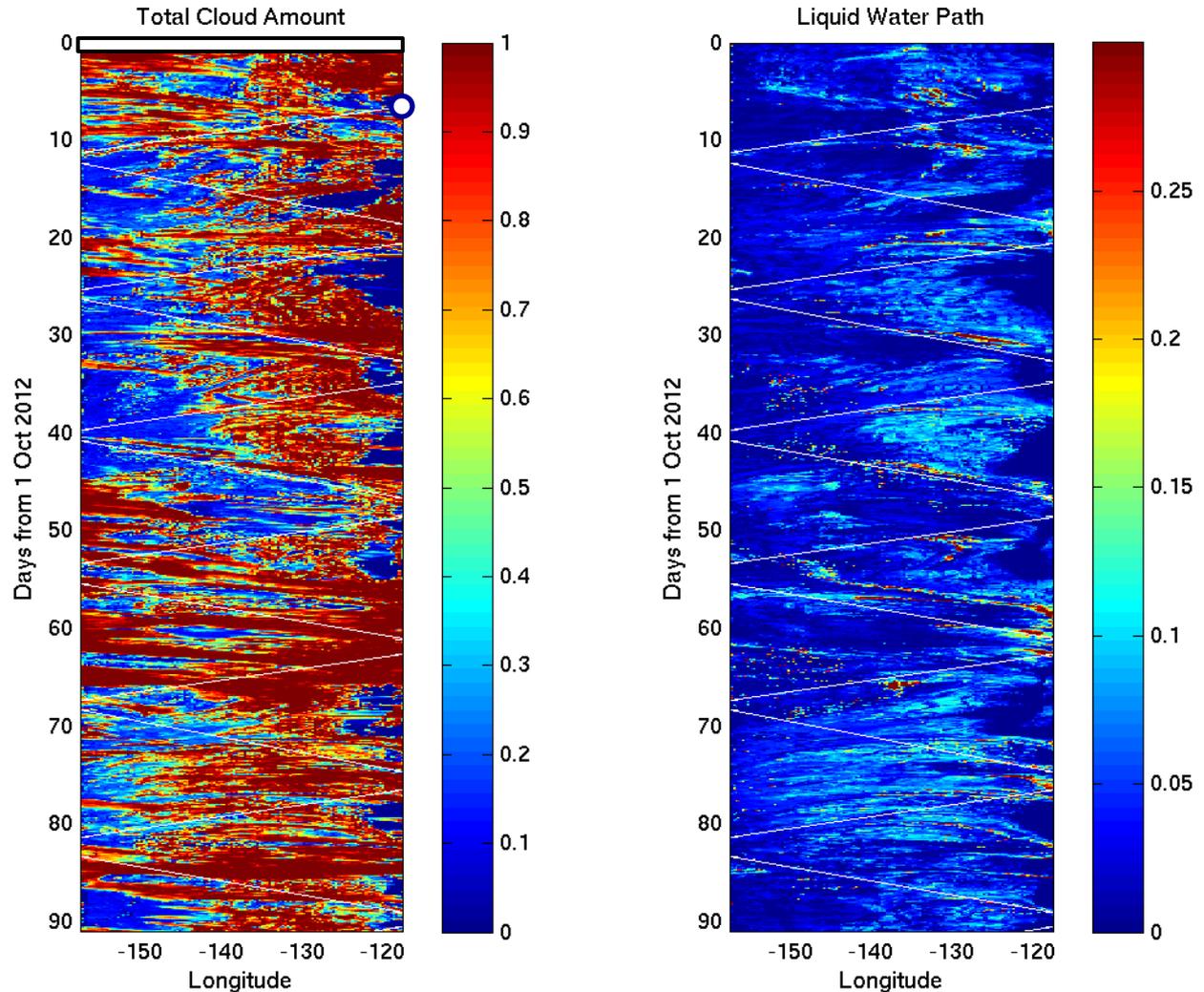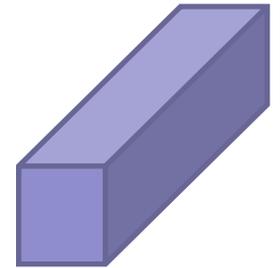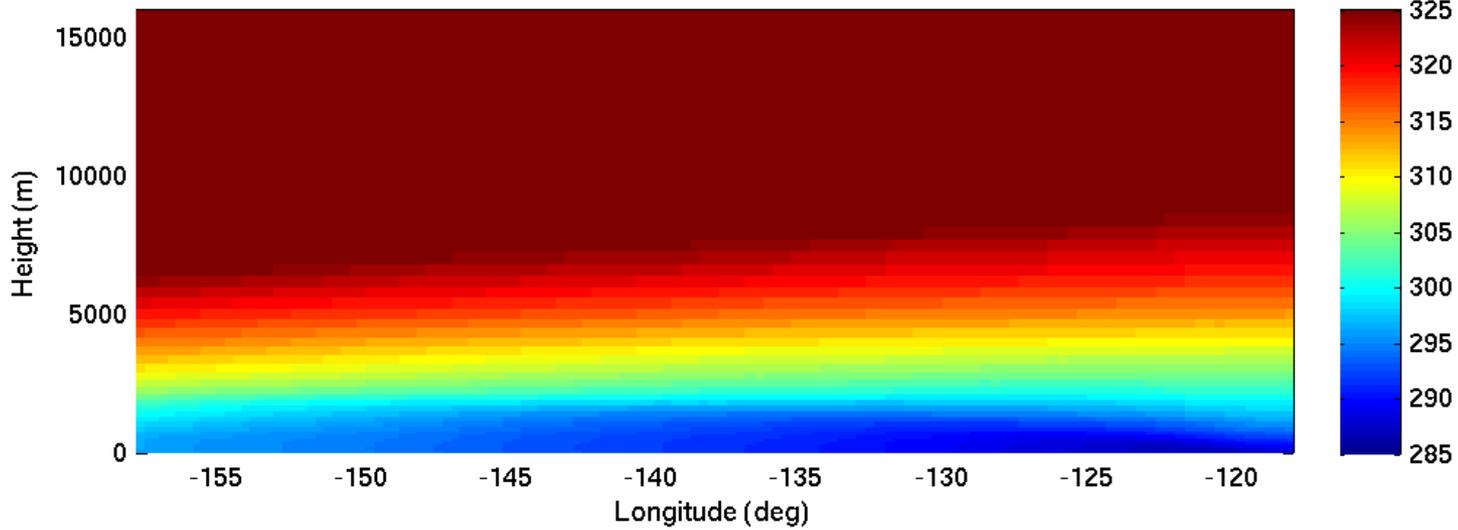Do I need to bother extracting model data at the time and location of the ship?

LWP (kg/m2)

At 01Z on 18/12/2012, from 00Z on 17/12/2012

Total Cloud Amount

Look at first 3 months of data: Oct-Nov-Dec 2012
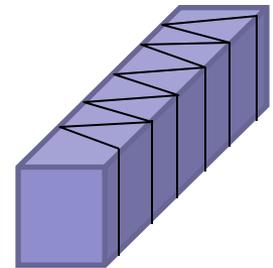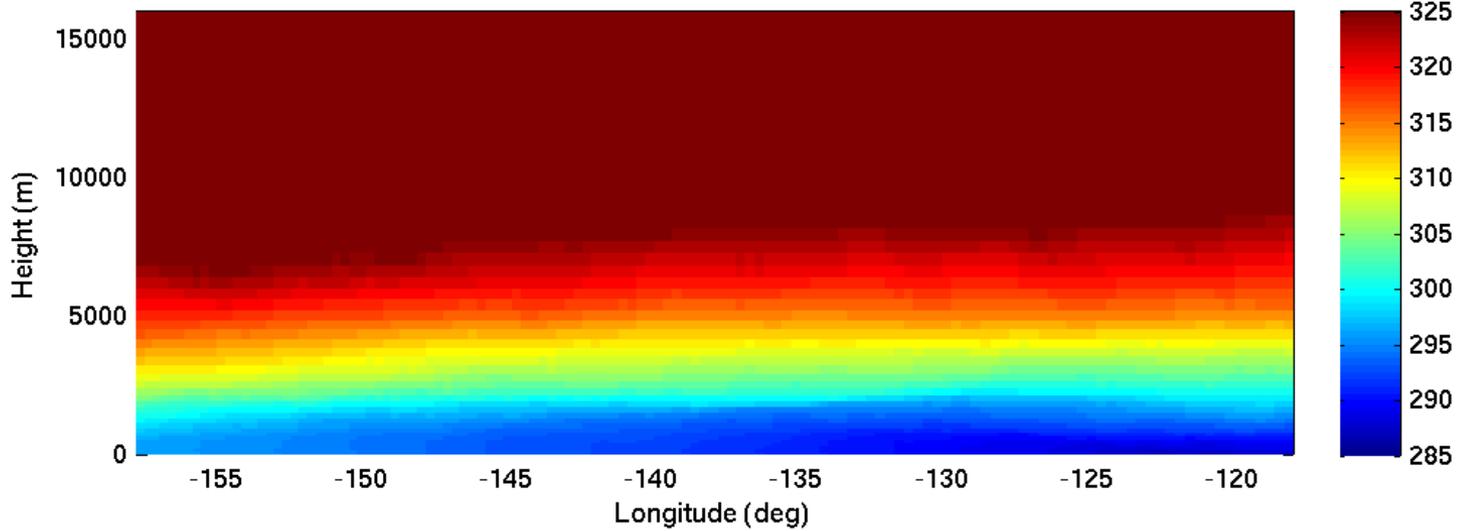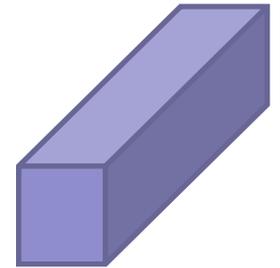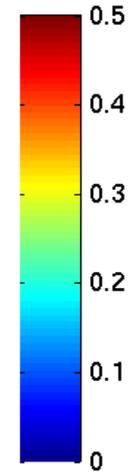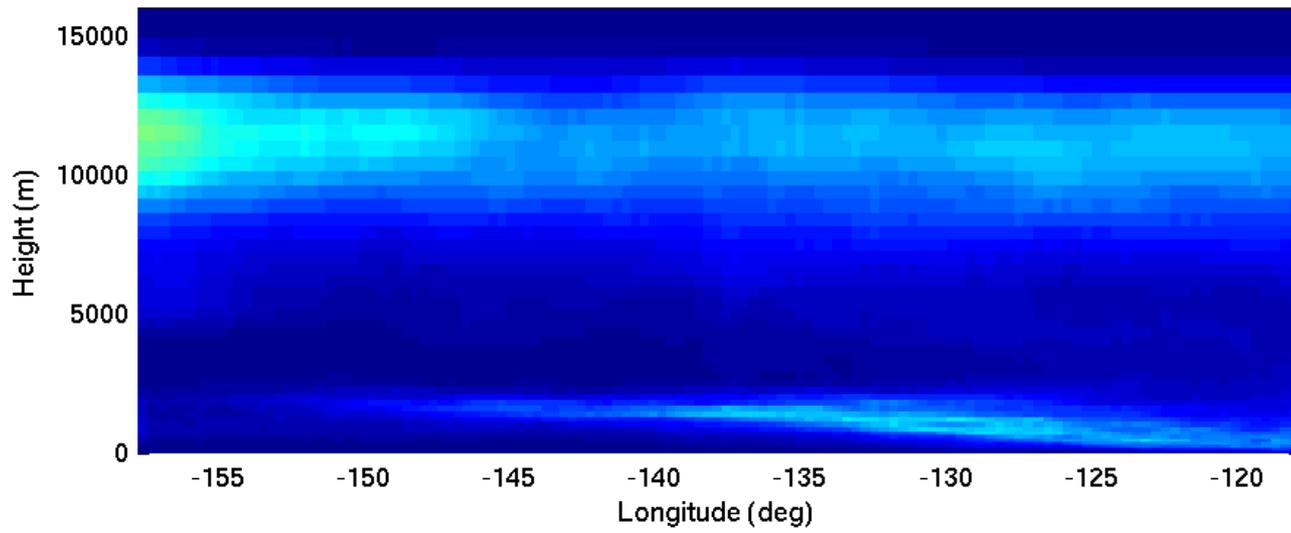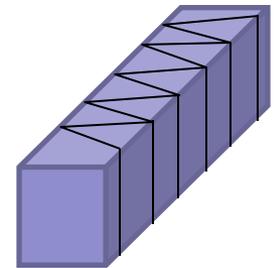

Hovmöller from Hawaii to Los Angeles
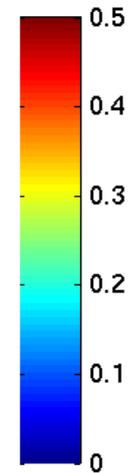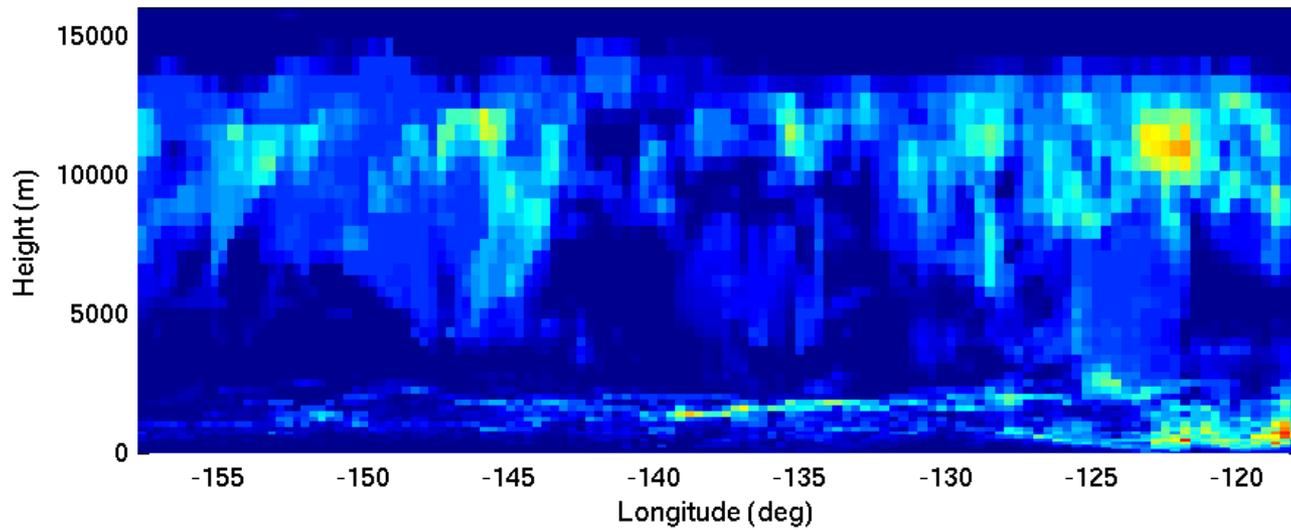
Time

Theta: Mean over CA-HI cross-sections
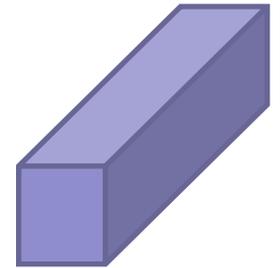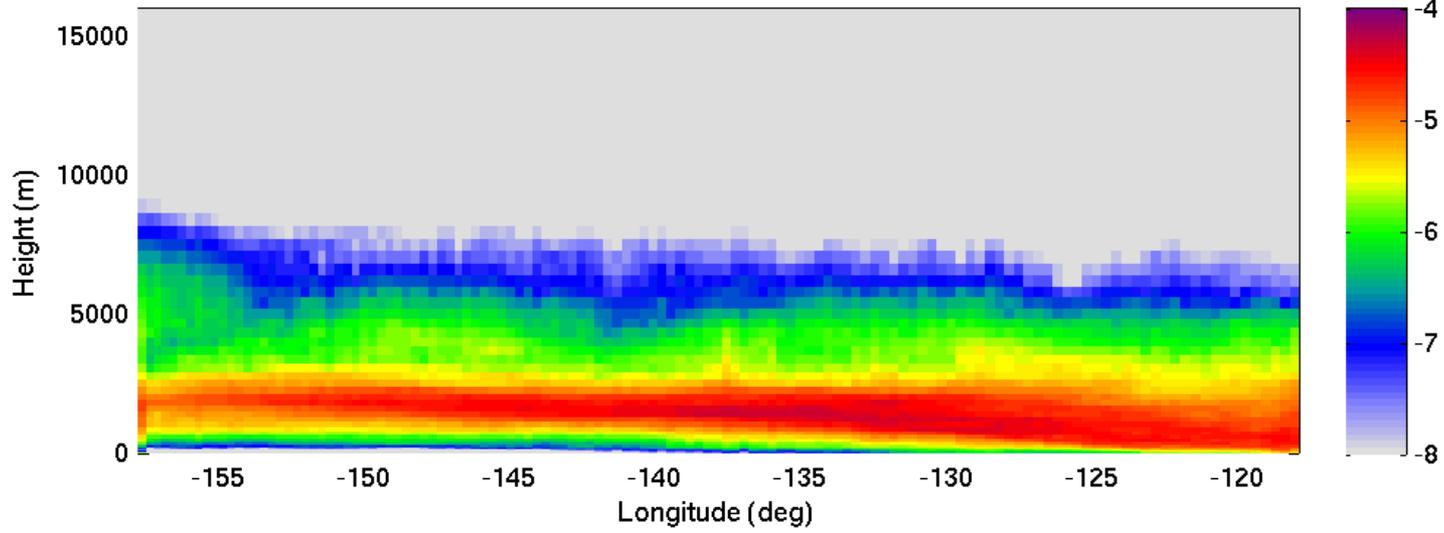
Theta: Mean over ship transects
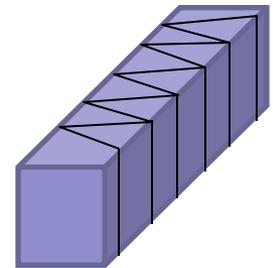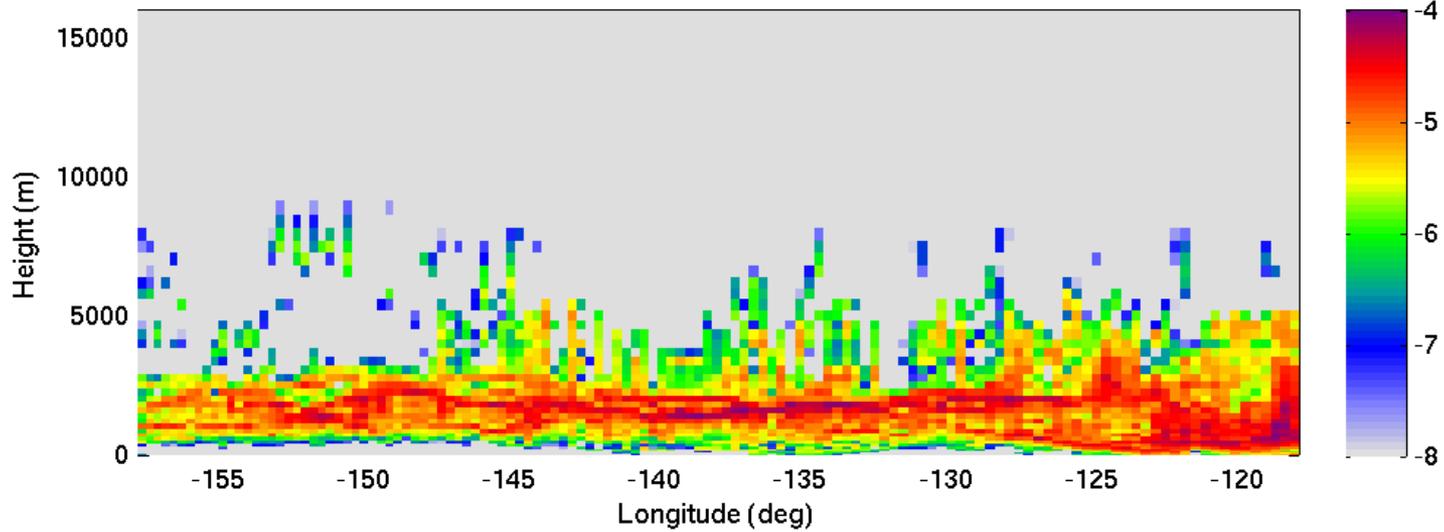
Bulk Cloud Fraction: Mean over CA-HI cross-sections
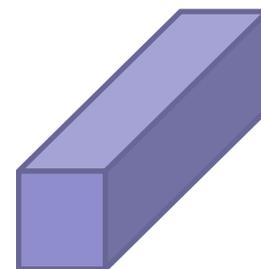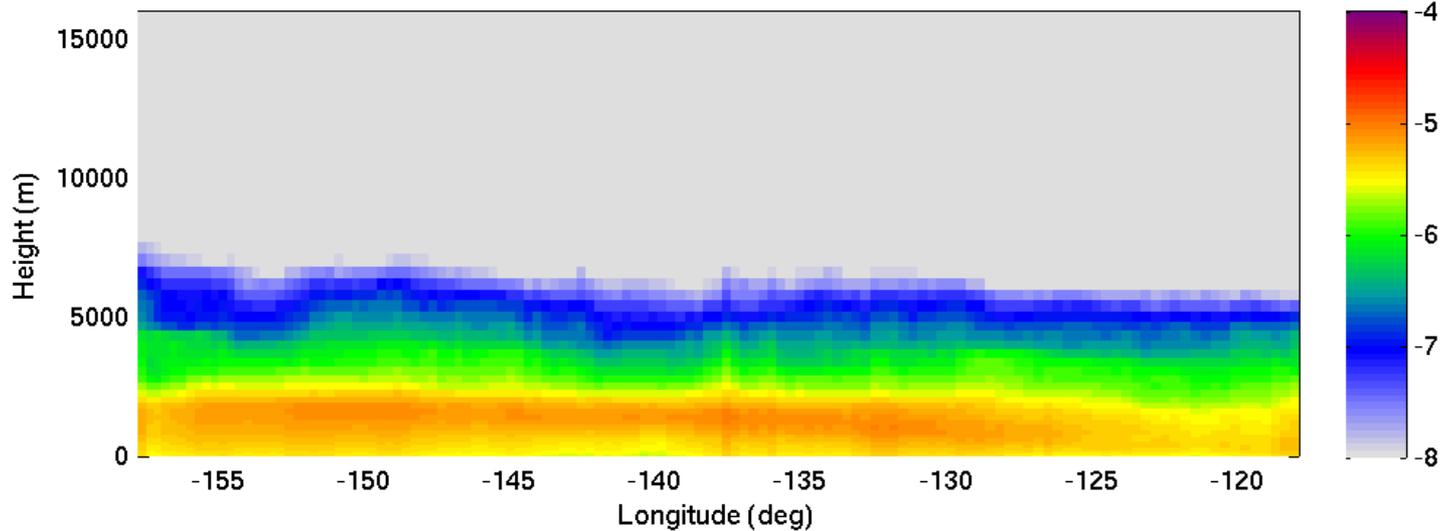
Bulk Cloud Fraction: Mean over ship transects
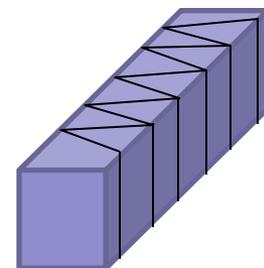
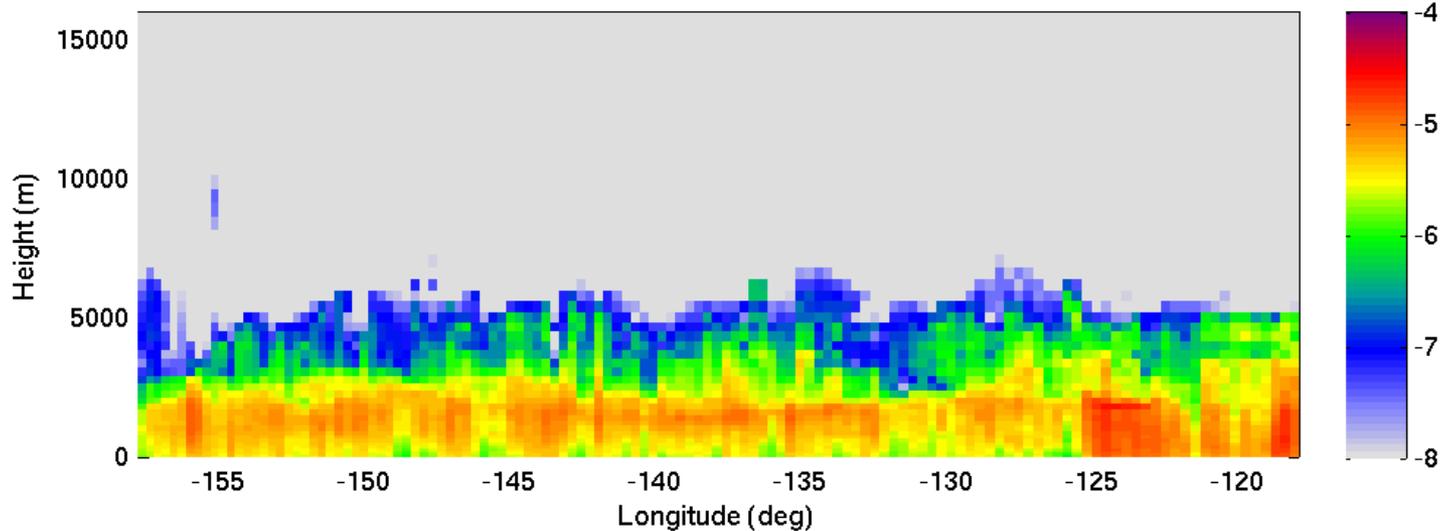log10(qcl): Mean over CA-HI cross-sections

log10(qcl): Mean over ship transects

log10(qrain): Mean over CA-HI cross-sections
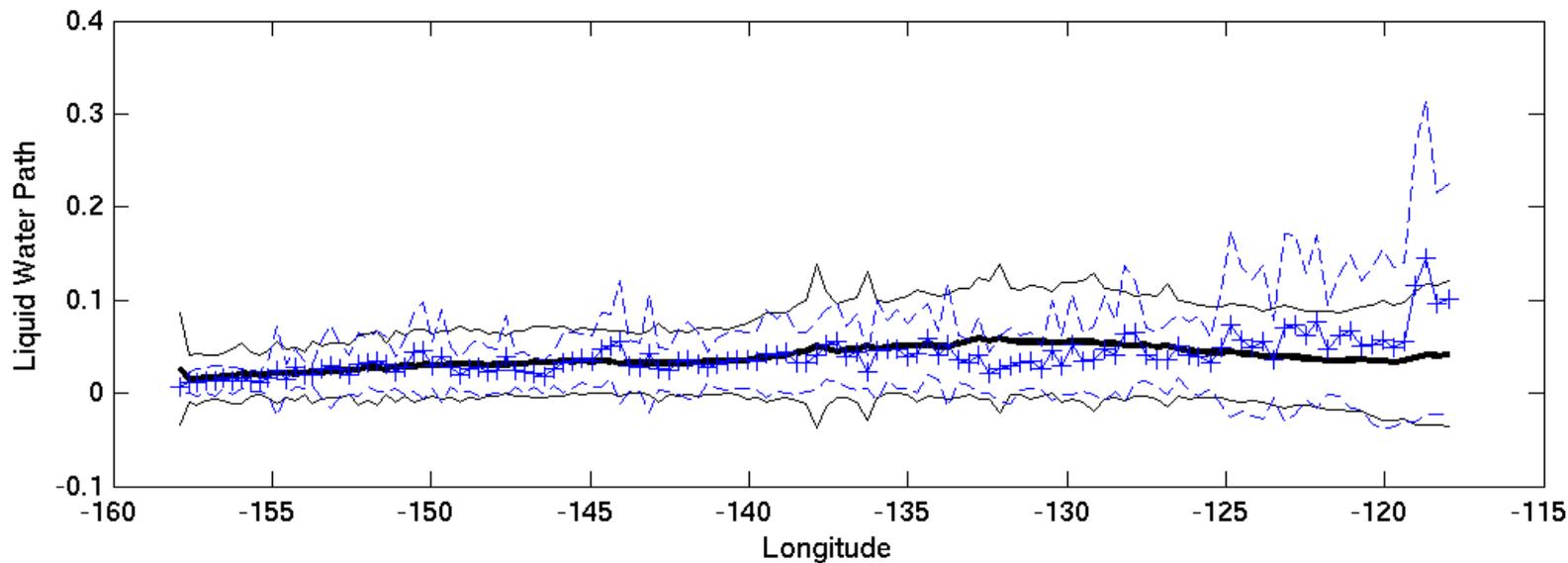
log10(qrain): Mean over ship transects

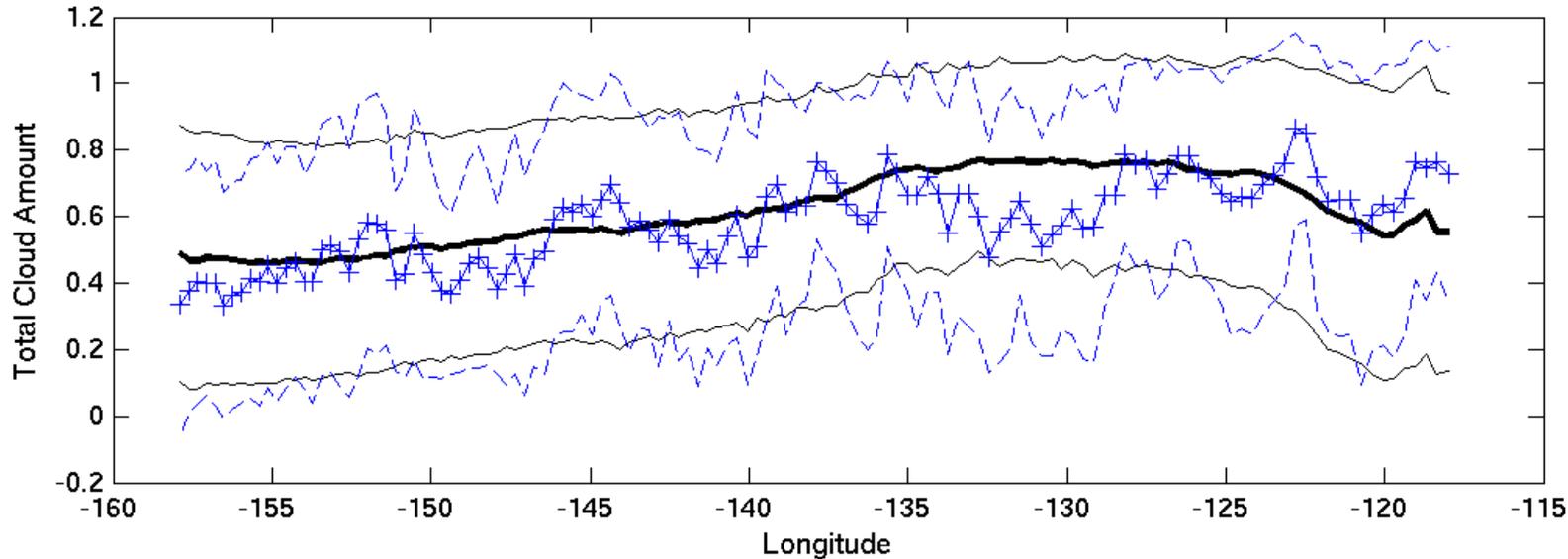Blue: average following the ship

Black: average using all points along the cross-section.

+/- 1 standard deviation
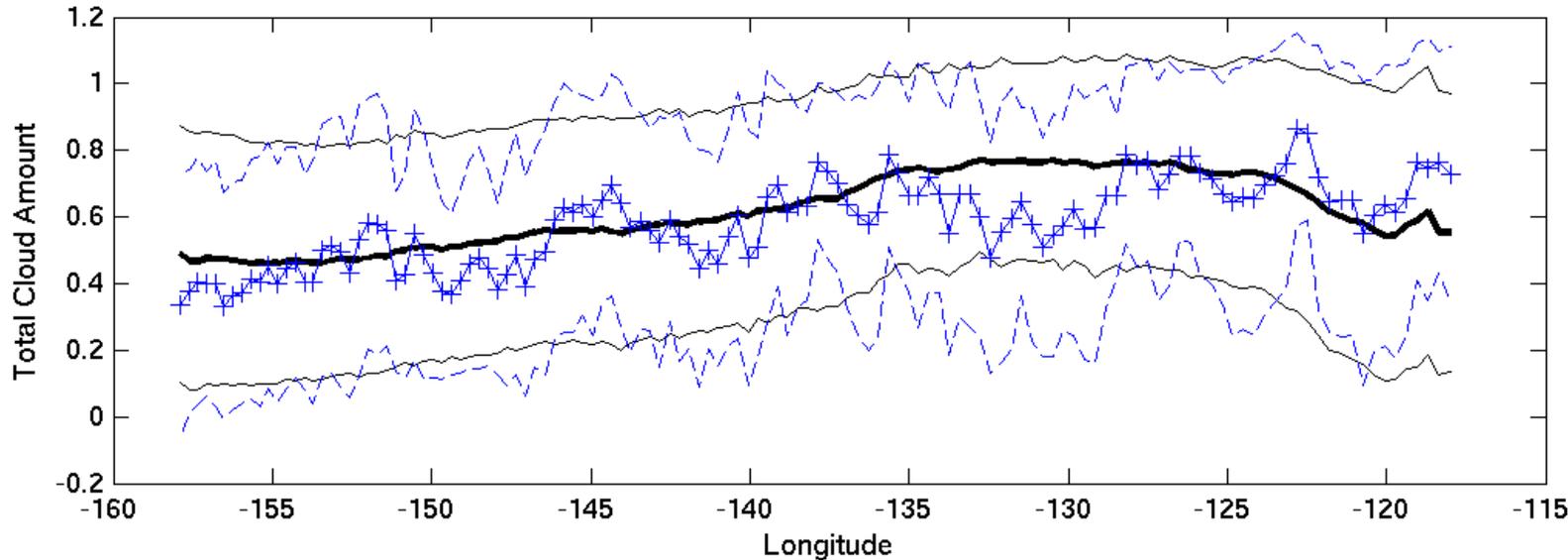

Blue: average following the ship

Black: average using all points along the cross-section.

Assume that model is perfect (!)

Use ship-average to estimate what the observations may show to be the average transect.

Model-mean (without accounting for ship) is well within range of "truth".

But fluctuations about model average can be outside of range from "obs". This is a sampling issue.

Summary

•One year's worth of Met Office forecast data available

Future Work

•Extend sampling test to look at whole year of data (rather than just 3 months).

•Very keen to collaborate on evaluation of our model data using observations.

•Runs some simulations using dx=4km for limited periods
(e.g. a couple of "crossings of particular interest")