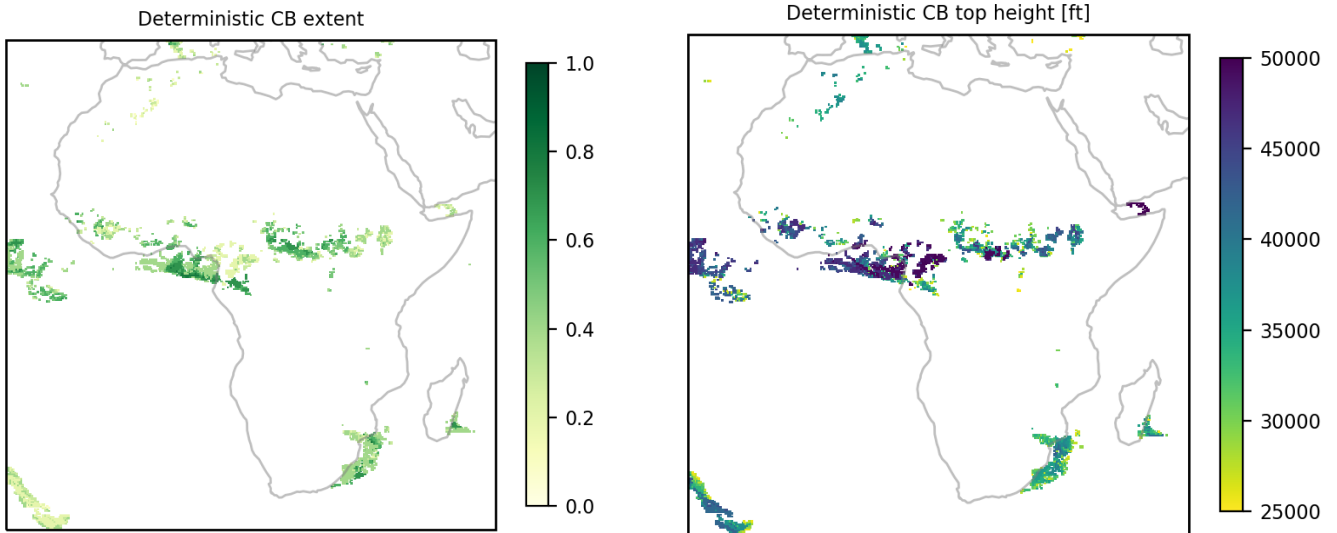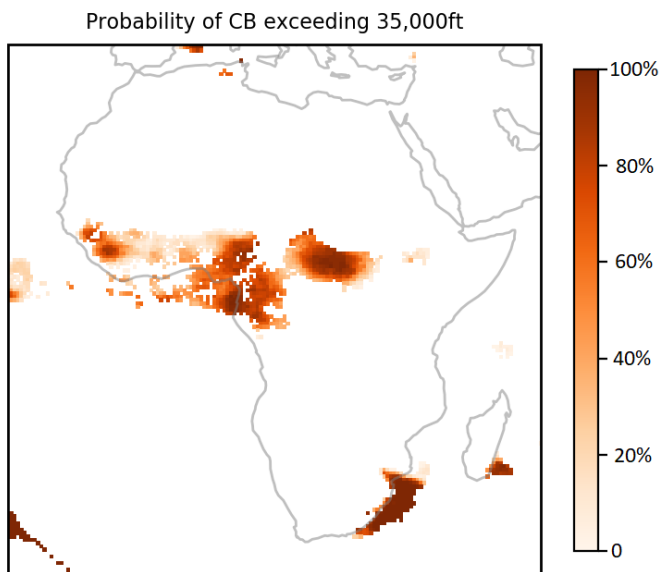# Probabilistic Cumulonimbus Data

At present WAFS data sets include three deterministic cumulonimbus (CB) cloud fields: CB extent, CB base and CB top. These fields are created by blending (harmonising) the output from WAFC London and WAFC Washington.

The plots above shows an example of existing WAFS CB extent and top data (which in this plot ranges from 25,000ft to above 50,000ft). It can be used to see where cumulonimbus clouds are forecast to be and how high into the atmosphere they extend.

By creating an ensemble of forecast models, it becomes possible to see the spread of forecast values and identify the probability of a threshold being exceeded.

The plot below shows the probability of the CB top heights being above a particular threshold value, in this case 35,000ft, for the same forecast time as the deterministic plots. This type of information could allow informed decisions to be made in line with the users risk appetite.

Questions

The WAFCs would like to find out the following information to help inform what a useful probabilistic data set would look like:

1) Would knowing the probability that the CB tops are above a certain threshold useful operationally? If so, please explain why, and what change to operating practices it might have?

2) What threshold(s) would be useful for operational use?

3) With multiple thresholds would the decision making be different?

4) If we provided probabilistic forecasts for multiple thresholds we would be interested to know whether you would make different decisions compared to if only a single probabilistic CB field was used.

   For example: if there is a 90% probability that the CB tops would be above 30000ft, but only a 10% probability that the CB top is above 35,000ft.

5) What forecast period would be useful? (maximum possible is 5 days)

6) Would probabilistic CB base information be useful? If so, how would you use it?

7) Would probabilistic CB extent information be useful? If so, how would you use it?

8) Would a field that shows the probability (which could be perhaps viewed as a confidence level) of there being no CB clouds be useful? If so, how would you use it operationally?

9) If there are any other ideas of what probabilistic CB information might help with operational decision making, please let us know.