A Comparison of CERES CO2 & Multilayer Cloud Properties with CALIPSO and CloudSat Data

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CERES Science Team Meeting
Pearl Young Theater
NASA Langley Research Center, Hampton, VA
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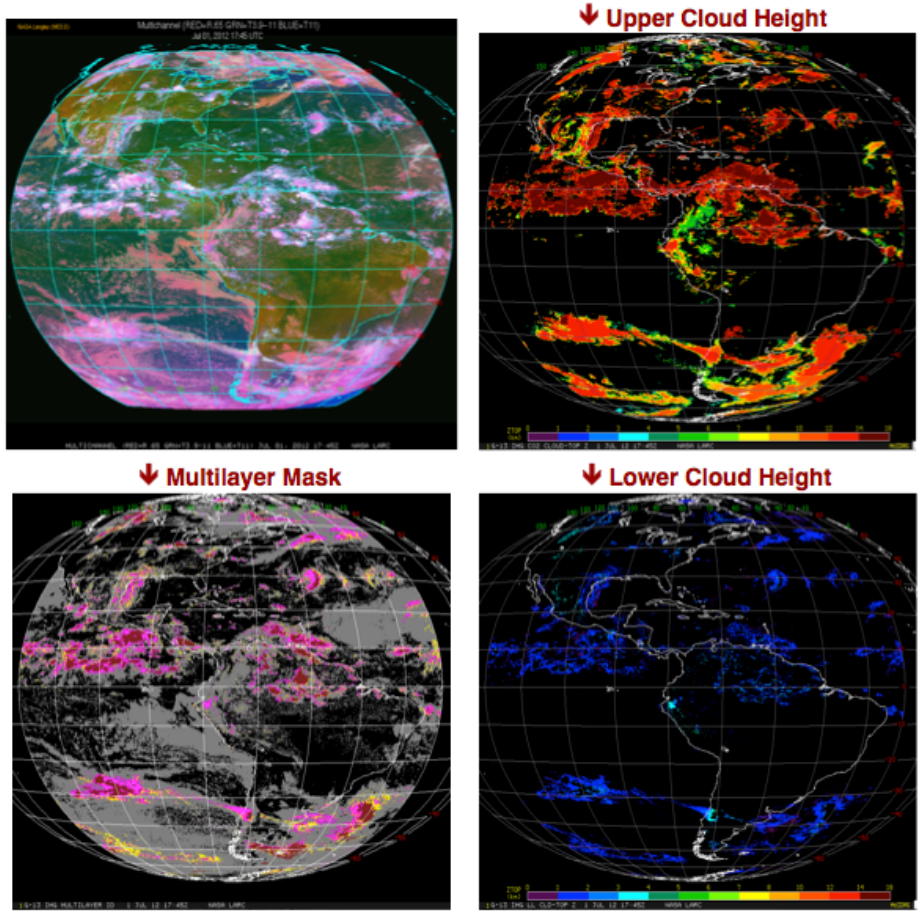
My Interest

- An evaluation of the CERES GEO (i.e., GOES-13 East, GOES-15 West and Meteosat-10) CO2 & multilayer cloud top properties.
- An evaluation of the CERES MODIS CO2 & multilayer cloud top properties.

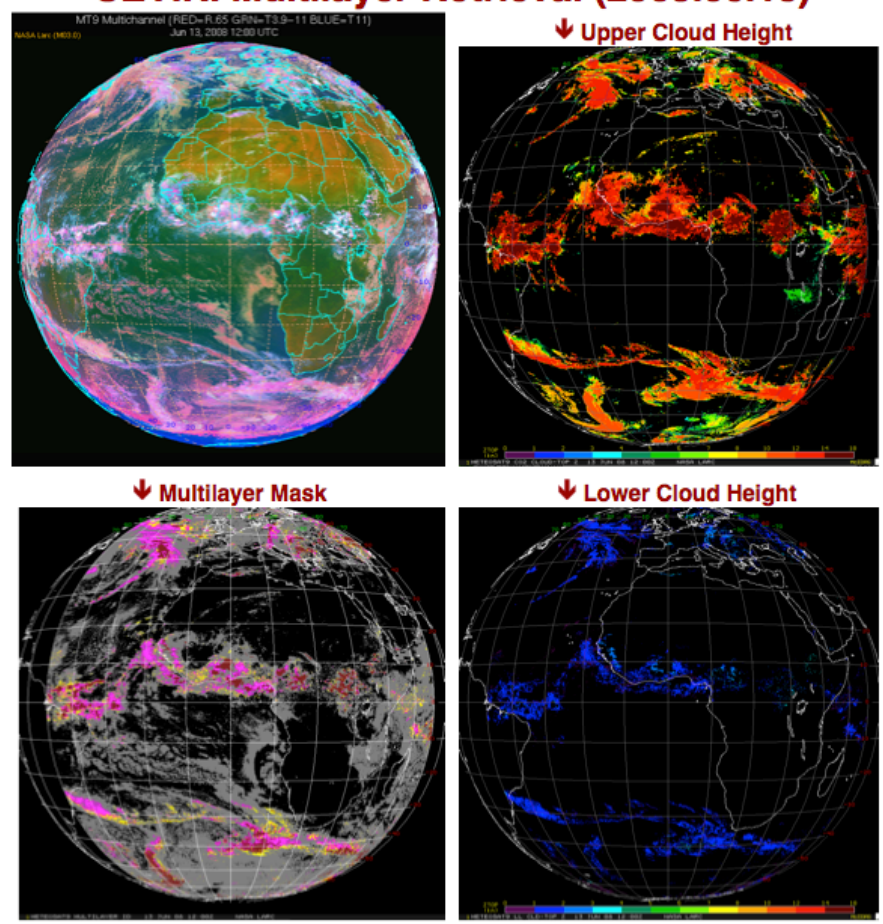
Example of Current GEO CO2 & Multilayer Cloud Retrieval

- Enhance the CO2 & Multilayer cloud retrieval through:
  Image visualization, data validation and, then, adjustment of LUTs (e.g. used the GFS reanalysis data).

GOES-13 Multilayer Retrieval (2012.07.01)

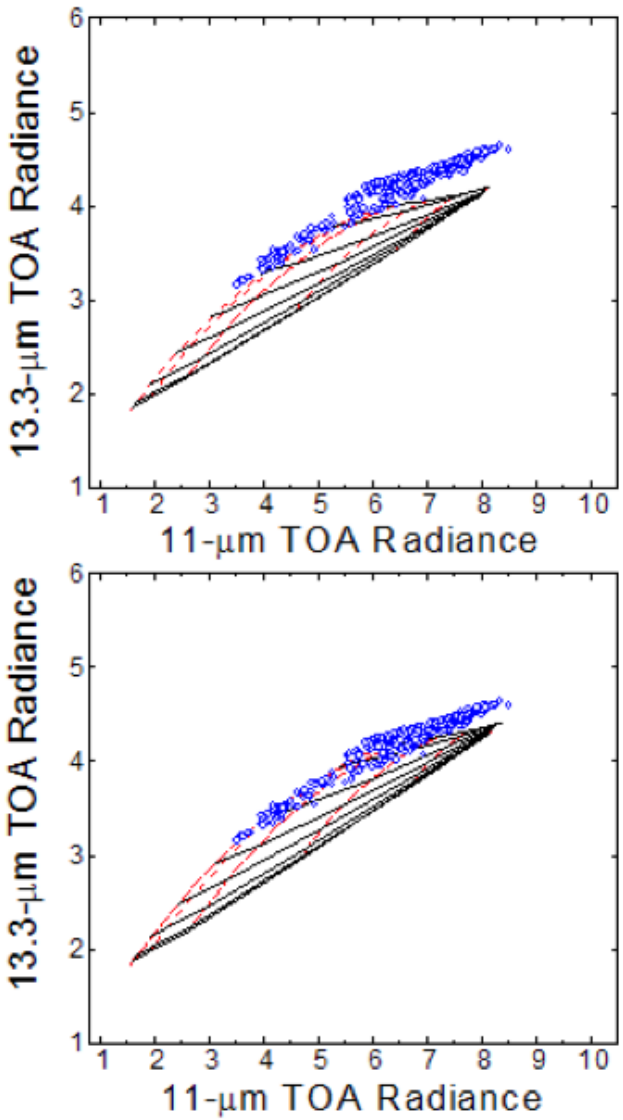


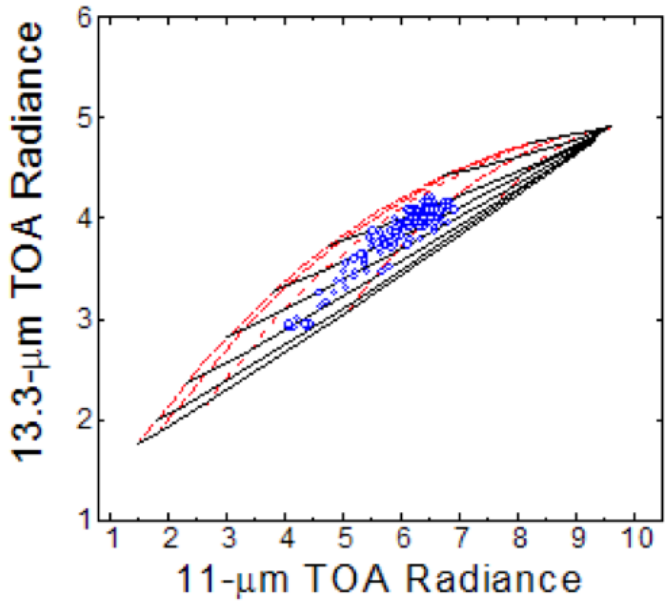
SEVIRI Multilayer Retrieval (2008.06.13)



Uncertainties in Modelling and Observations

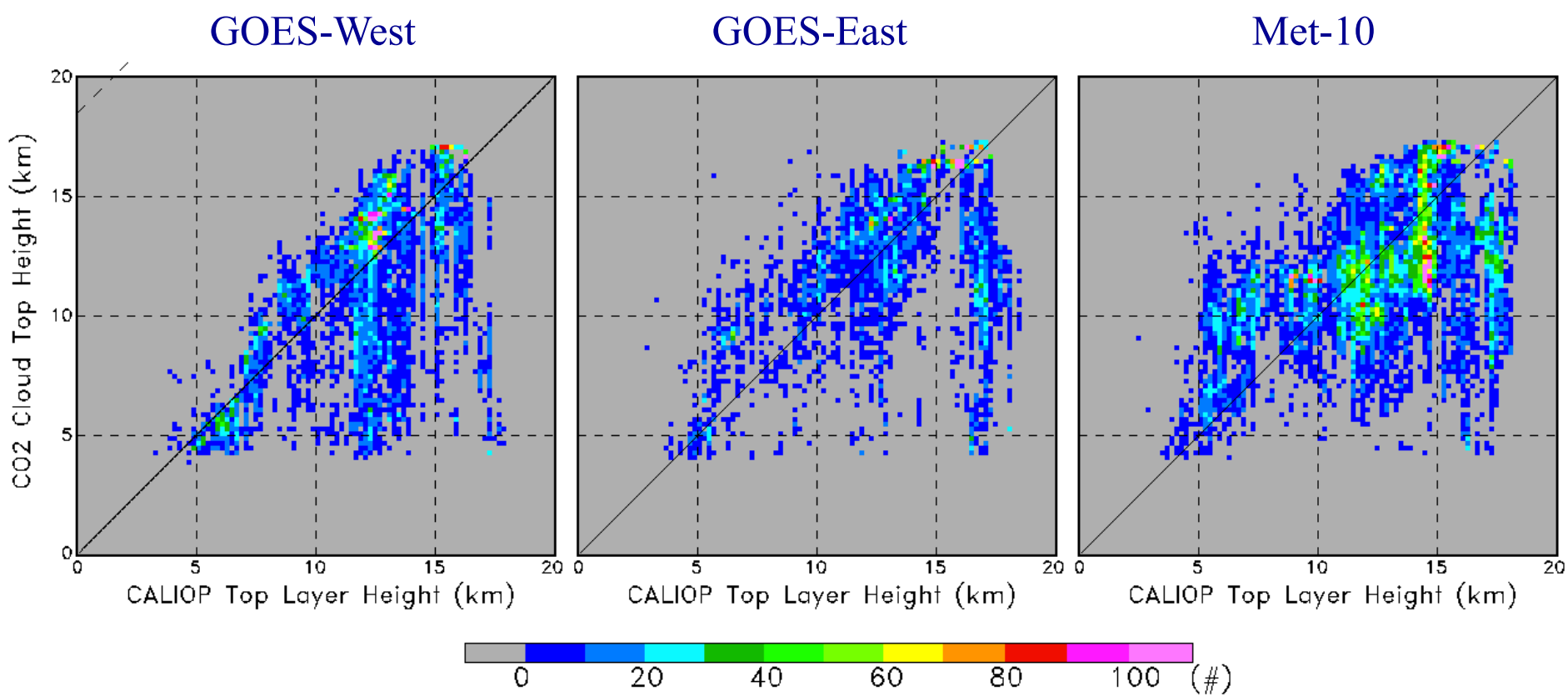
- Adjust LUTs to enhance the cloud retrieval for matched observations.





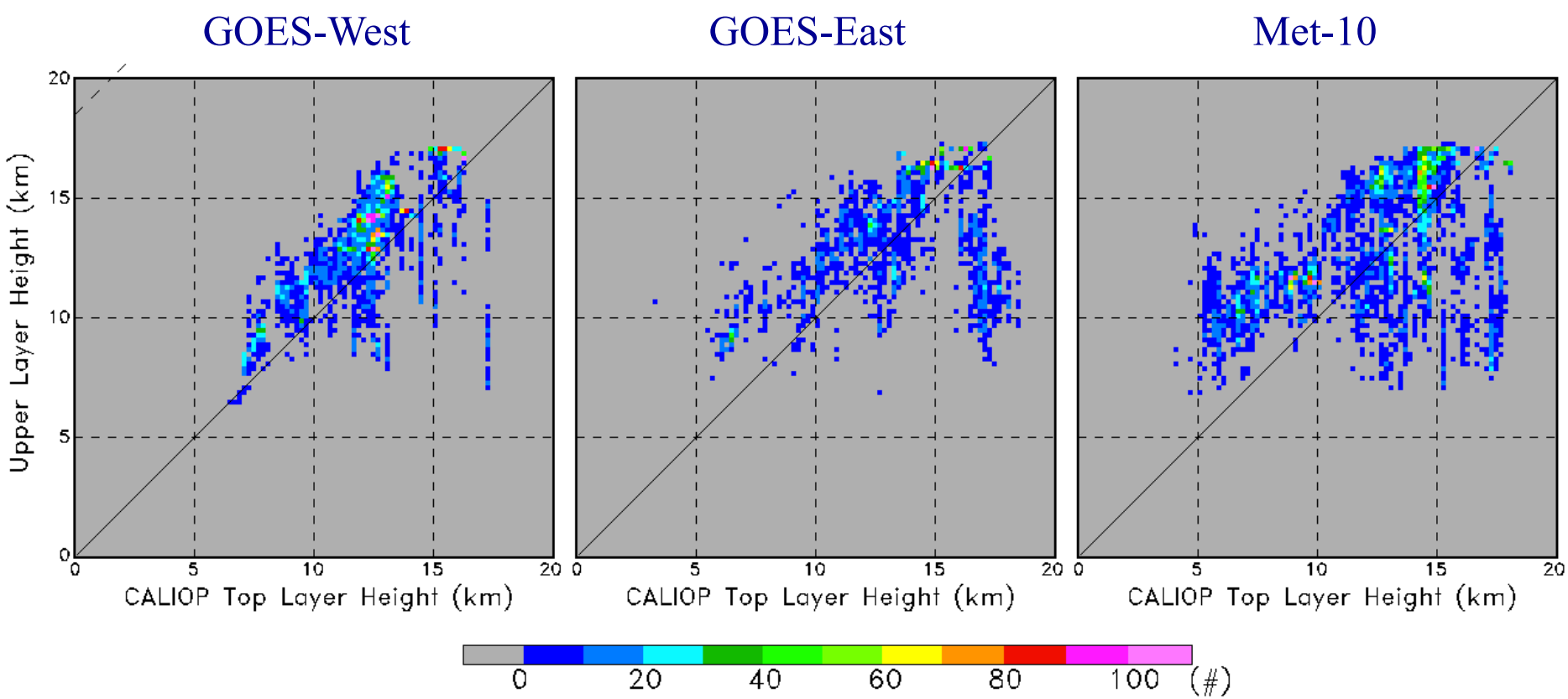
Comparison of the Current GEO CO2 Cloud Top Height

2013 January



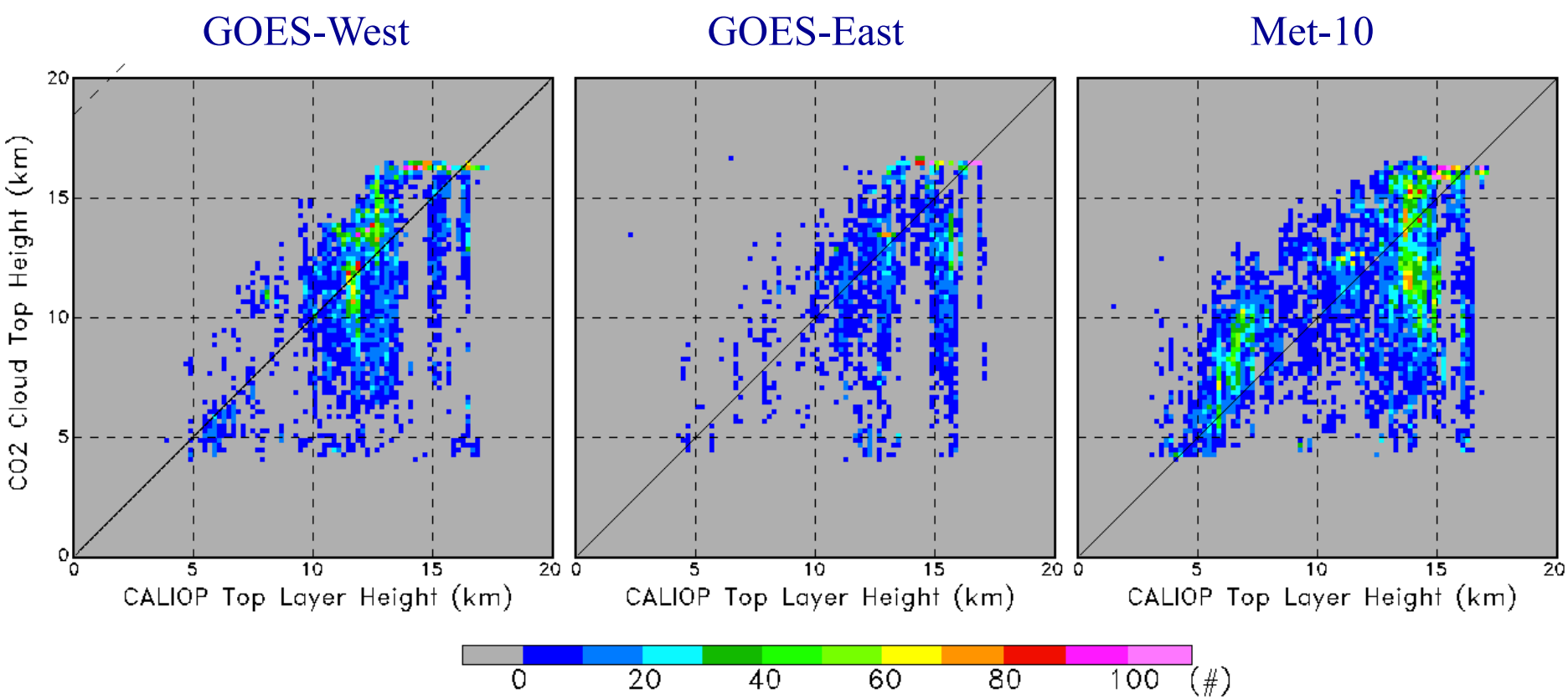
Comparison of the Current GEO Multilayer Top Height

2013 January



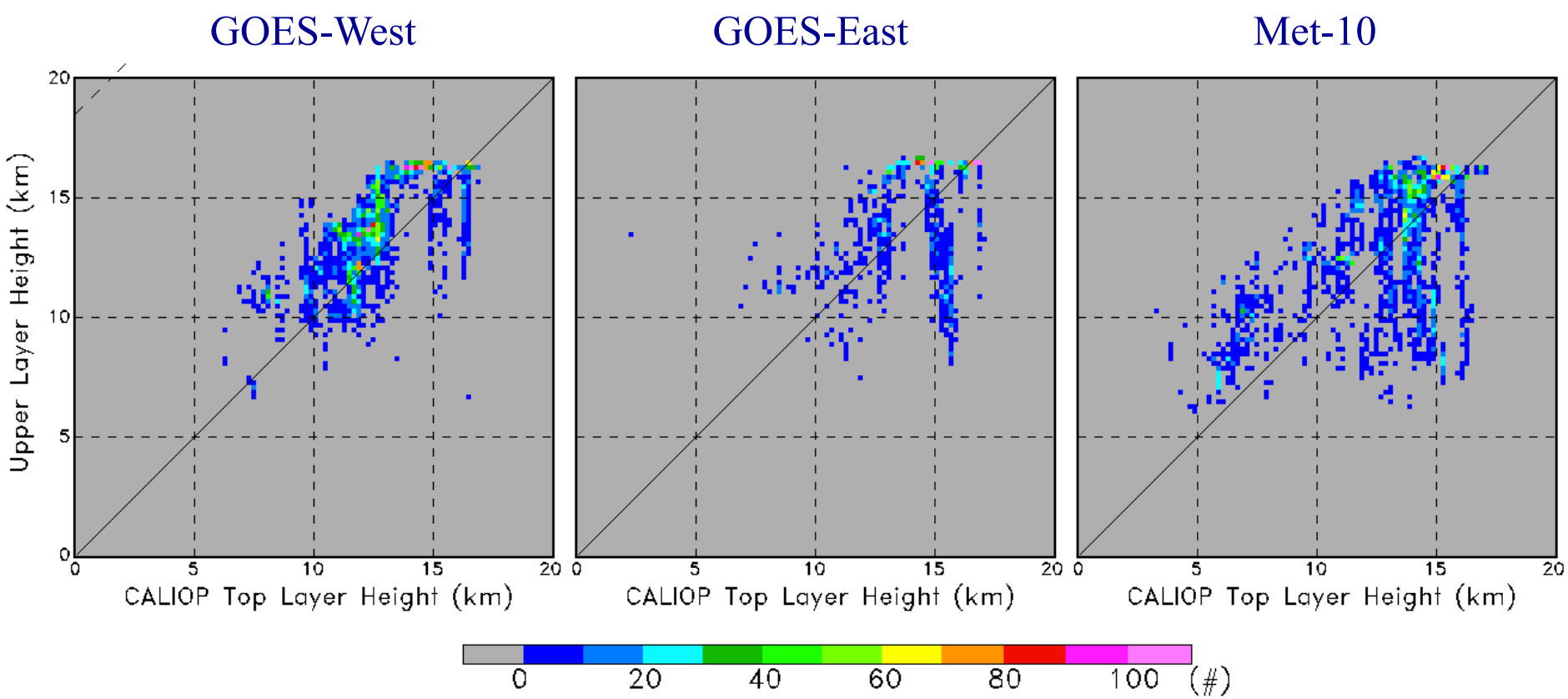
Comparison of the Current GEO CO2 Cloud Top Height

2013 July



Comparison of the Current GEO Multilayer Top Height

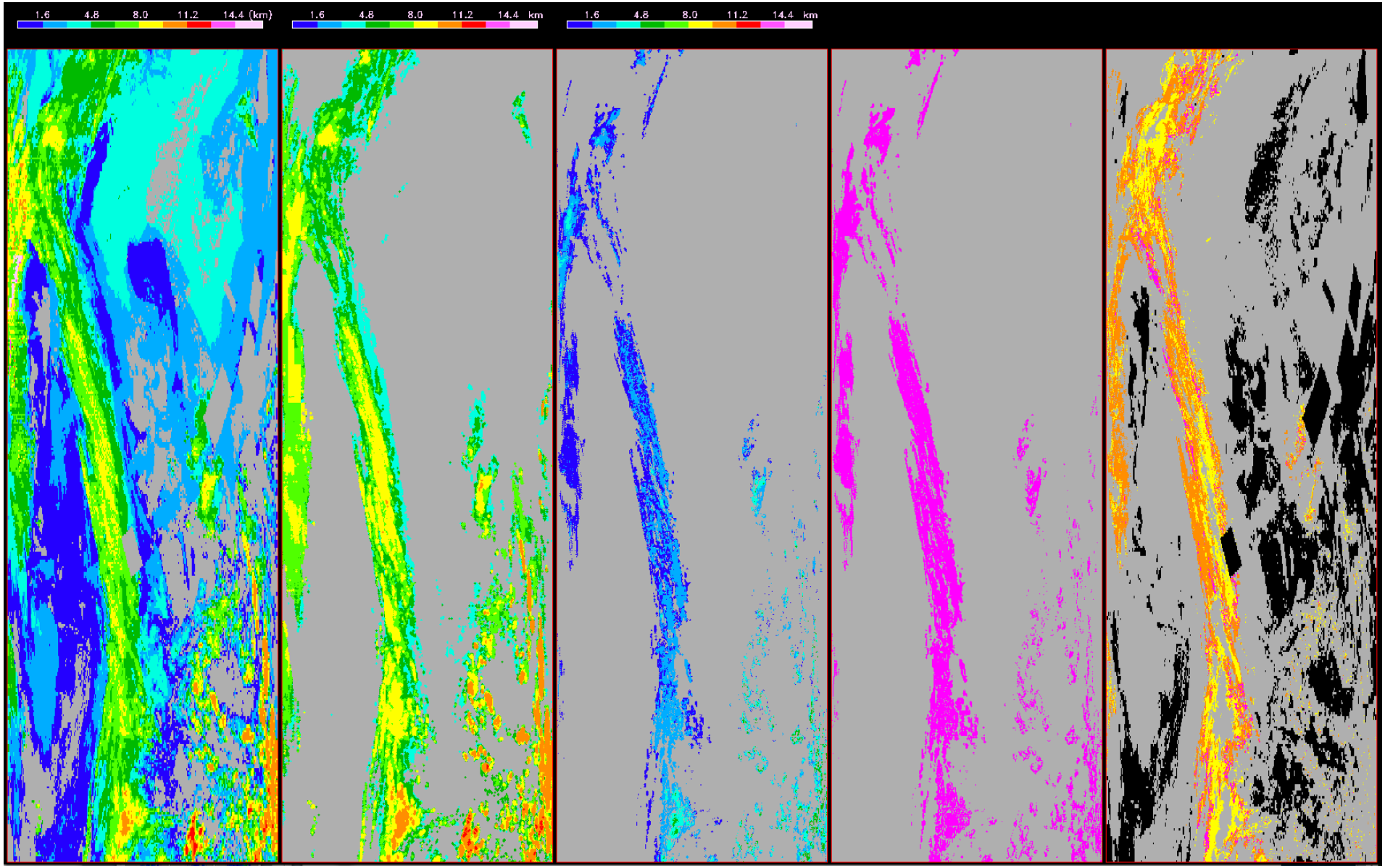
2013 July



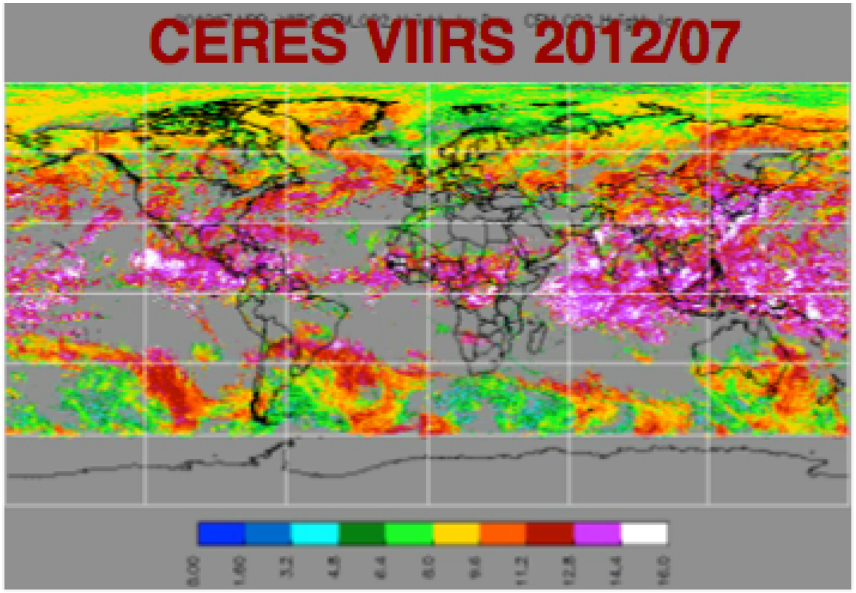
Current GEO Evaluation

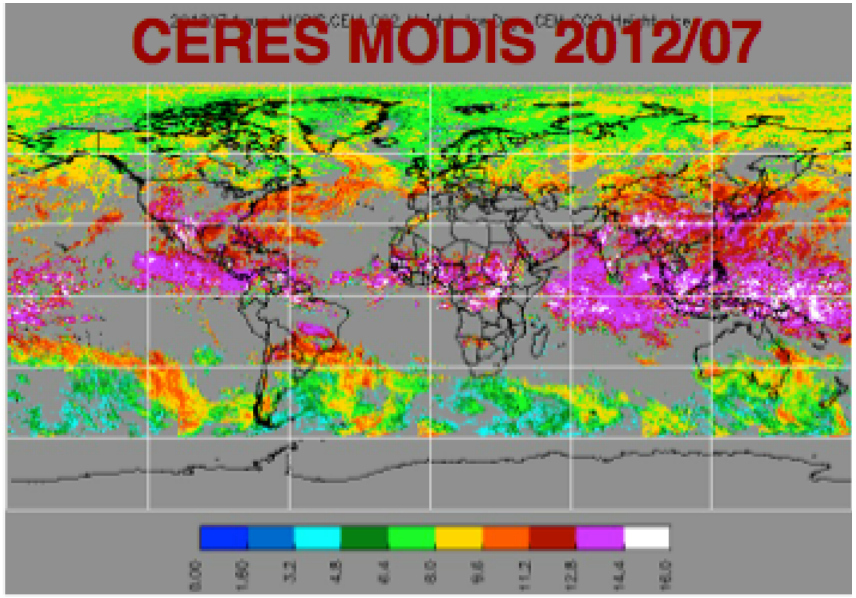
- The current version of GEO CO2 cloud top height appears to be overestimated.
- Need to adjust back the GEO CO2 LUT modeling for normal application.

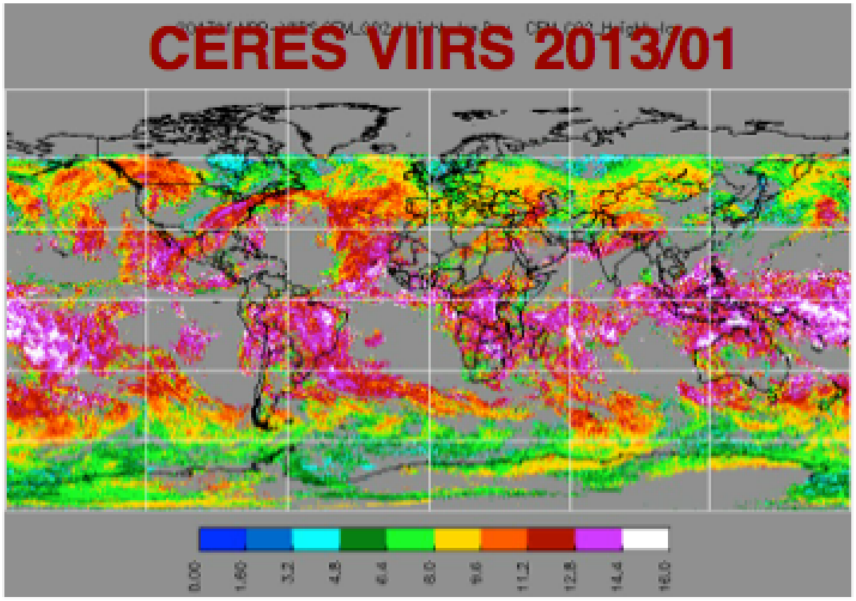
Typical of a CERES MODIS Granule Evaluation

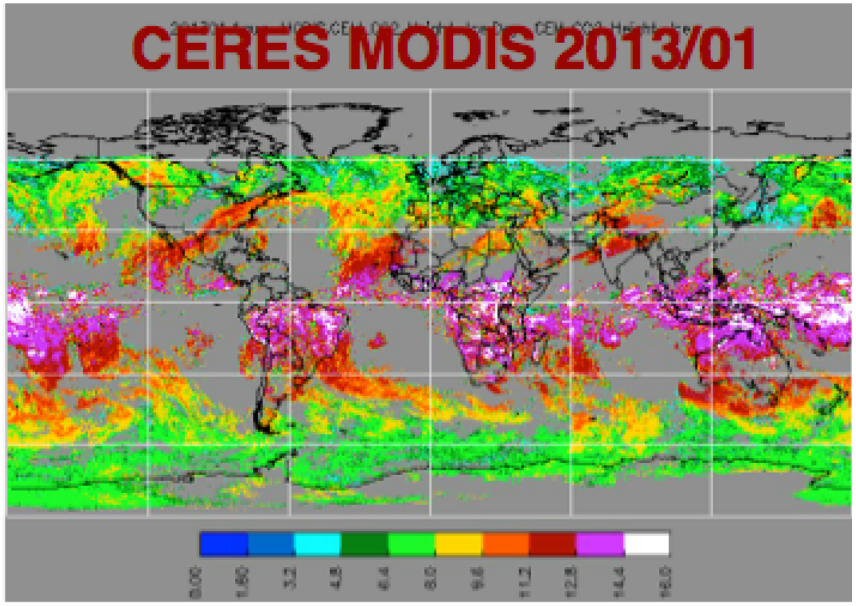


Monthly Mean CERES CO2 Cloud Top Height



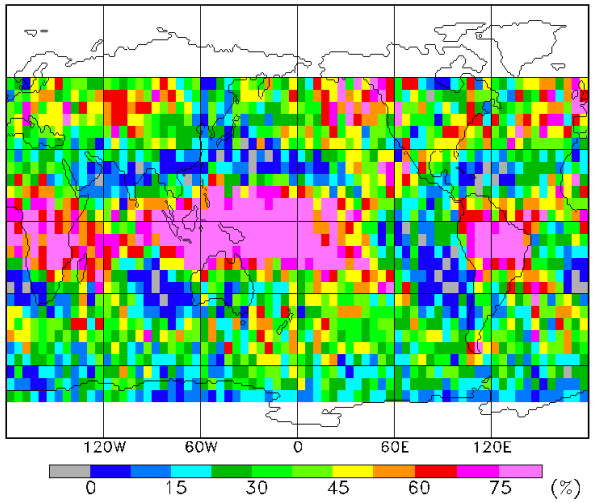




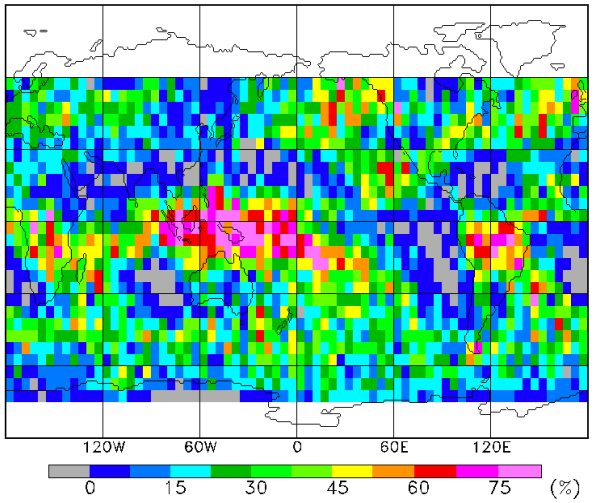


Comparison of CERES CO2 Cloud Retrieval (Jan 2013)

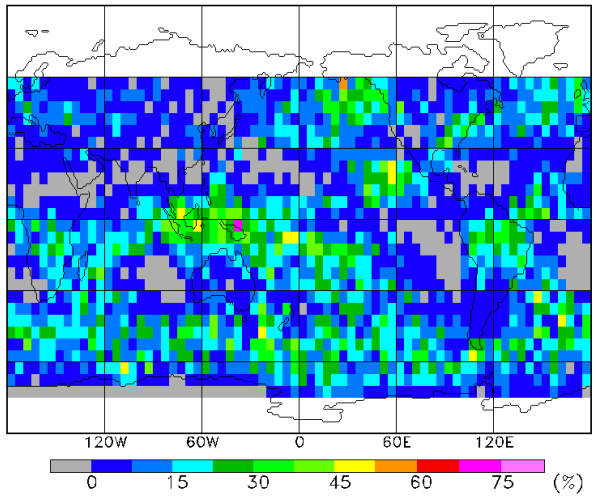
CALIOP High Cloud Tau>0.01



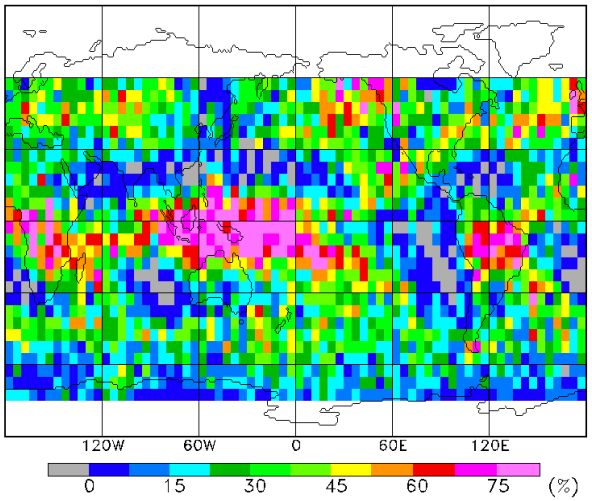
CERES CO2 Cloud Retrieval



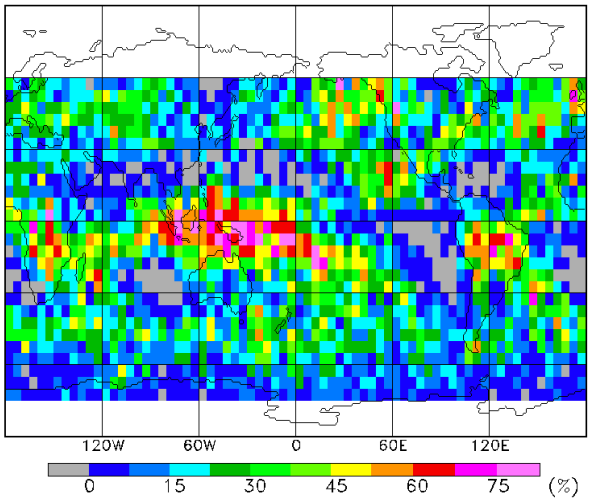
CERES CO2 Multilayer



CALIOP High Cloud Tau>0.1

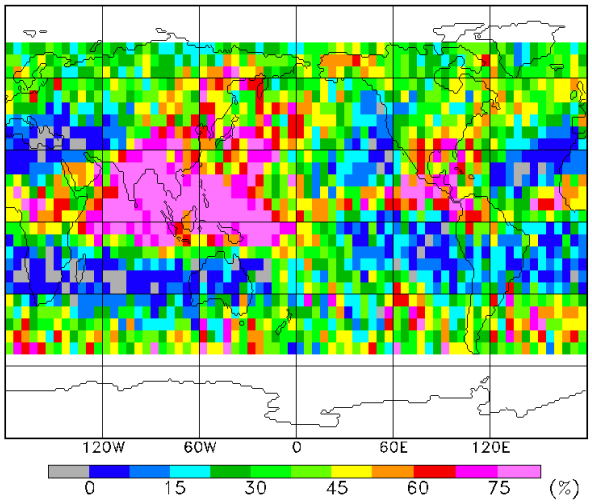


CALIOP High Cloud Tau>0.3

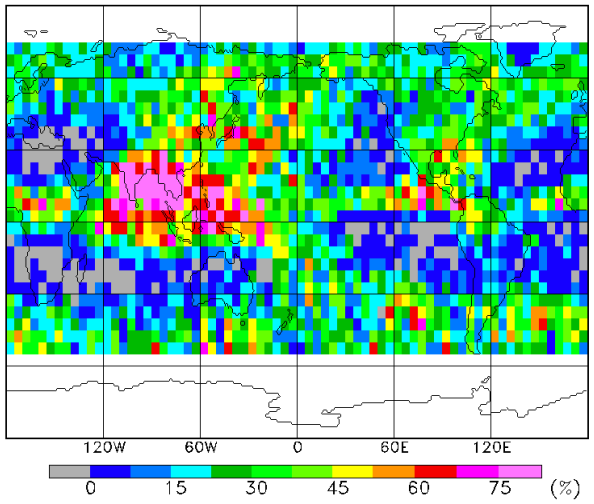


Comparison of CERES CO2 Cloud Retrieval (Jul 2013)

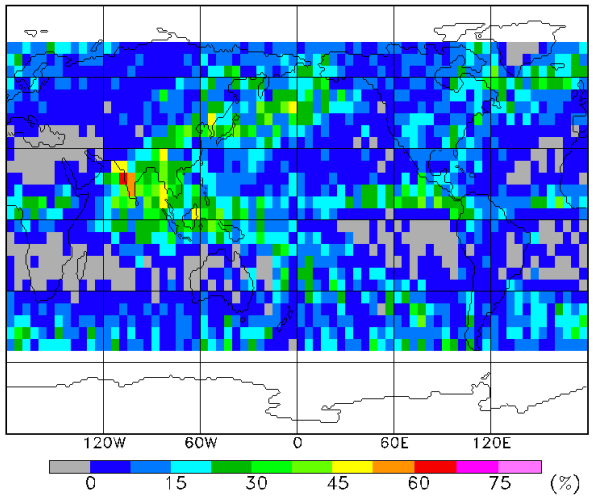
CALIOP High Cloud Tau>0.01



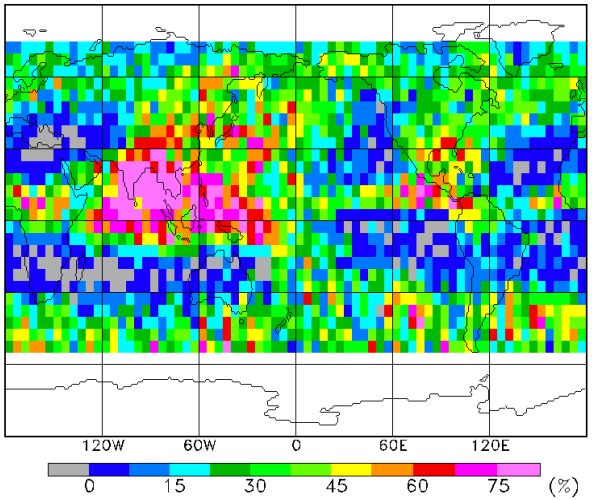
CERES CO2 Cloud Retrieval



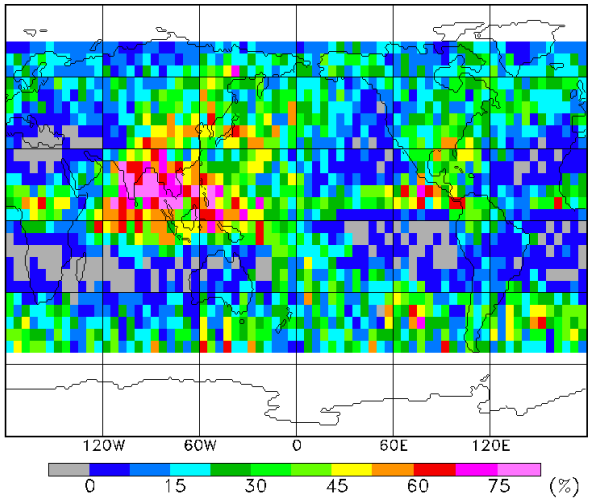
CERES CO2 Multilayer



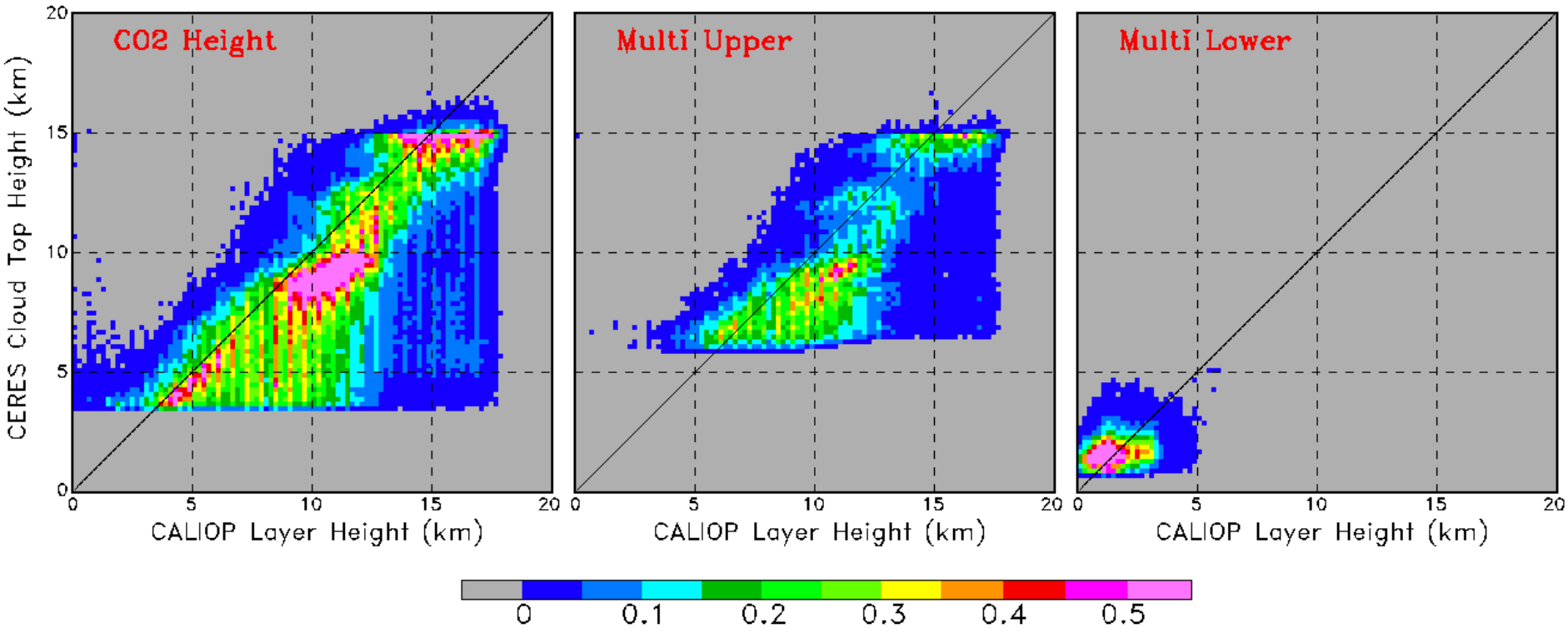
CALIOP High Cloud Tau>0.1



CALIOP High Cloud Tau>0.3

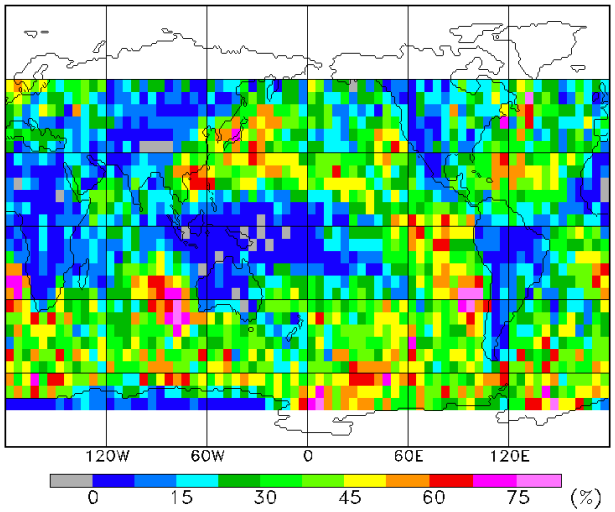


Comparison of CO2 & Multilayer Cloud Heights (April 2013)

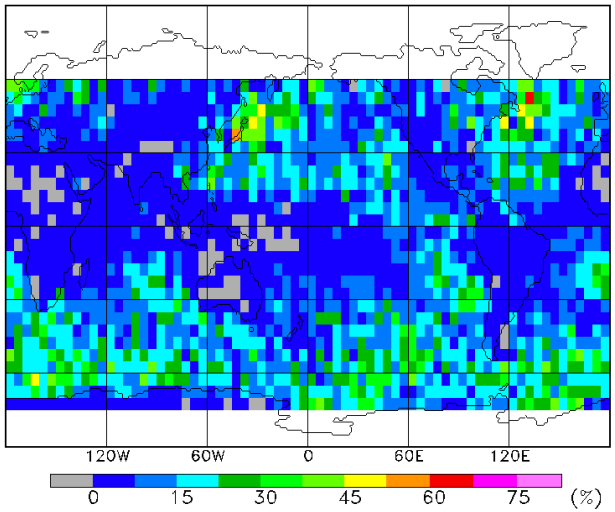


Comparison of Low Clouds

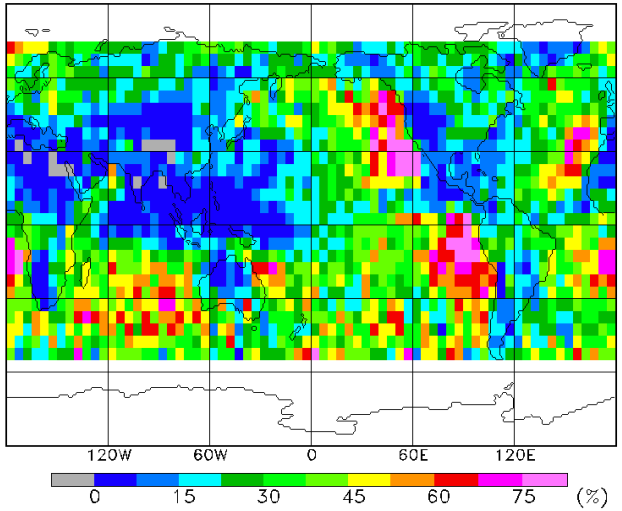
CALIOP Low Cloud (Jan 2013)



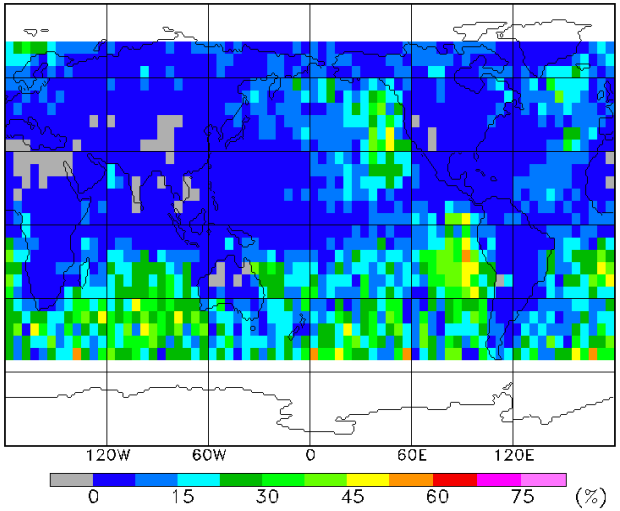
CloudSat Low Cloud



CALIOP Low Cloud (Jul 2013)



CloudSat Low Cloud



Current CERES CO2 & Multilayer

- The current version of CERES CO2 cloud top height appears underestimated.
- The current version of CERES multilayer cloud properties needs more validation.