

# Evaluation of cloud properties in RCA4 CORDEX Africa ensemble

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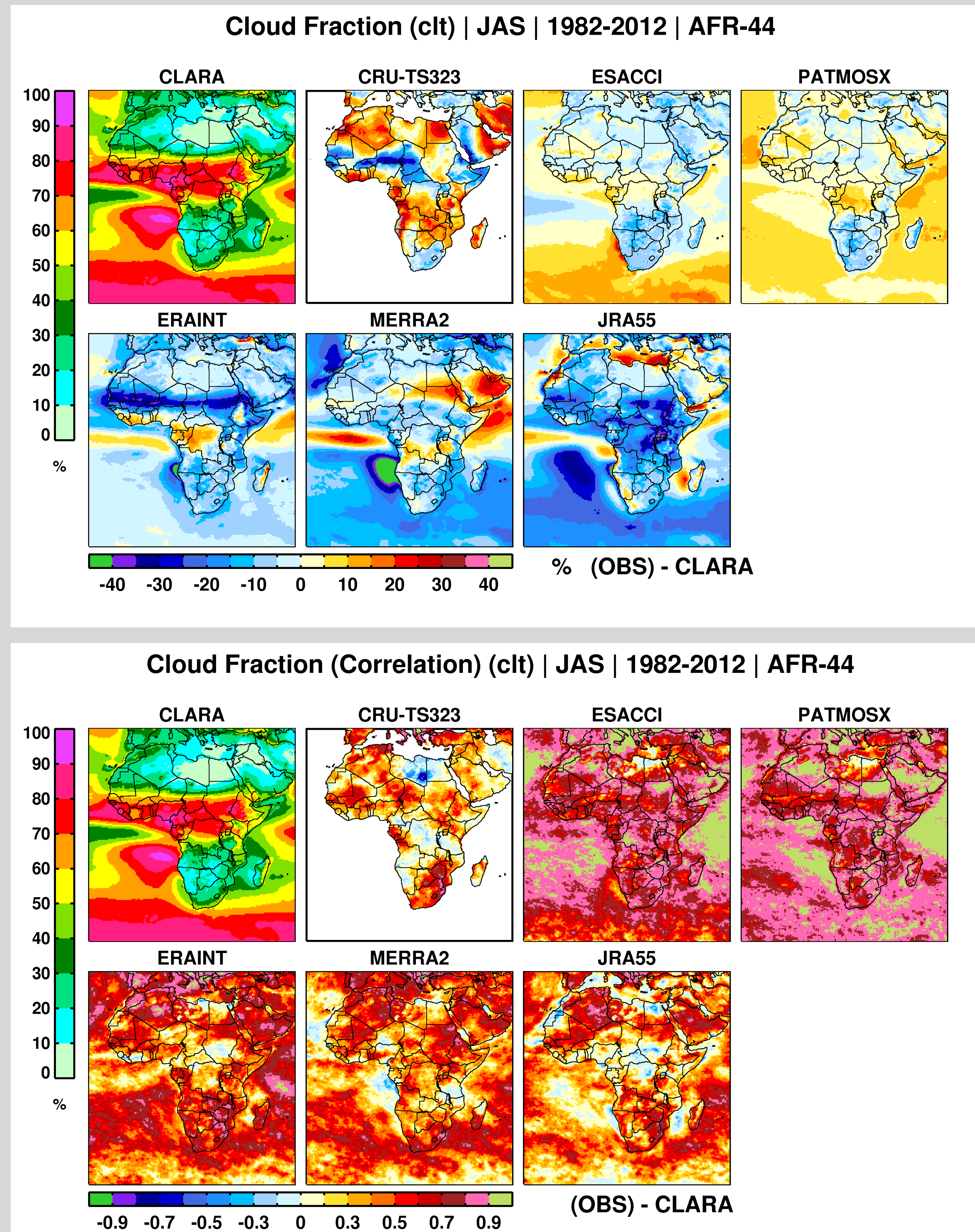


Fig 1: Observational uncertainties as represented by satellite (upper row) and re-analysis data (lower row) with upper figure representing total cloud fraction as compared to CLARA and lower representing correlation with CLARA dataset.

Fig3 Total cloud fraction in seasonal mean (JAS) as represented by RCMs driven with ERAINT simulations as compared with CLARA dataset.

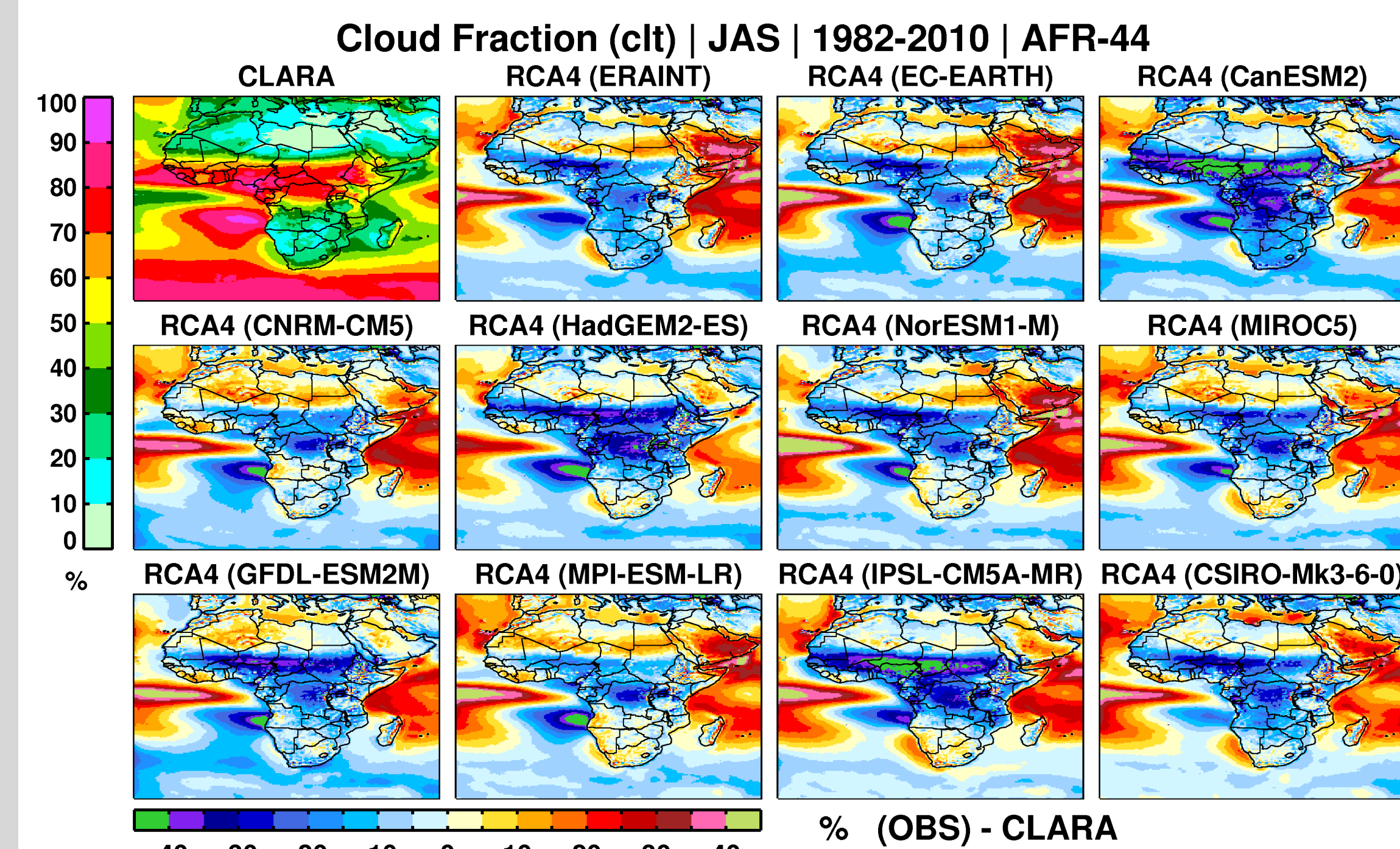
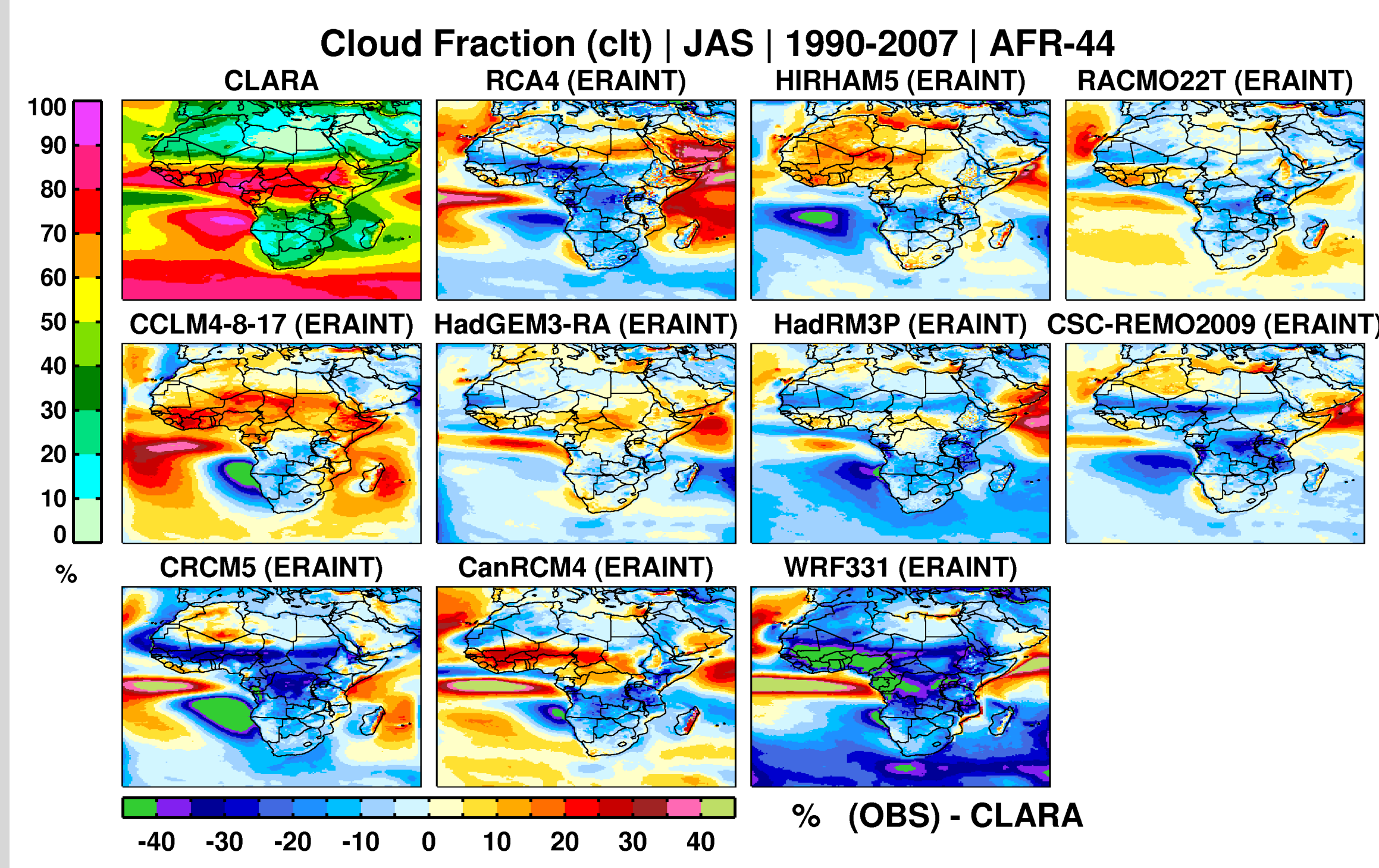


Fig4 Total cloud fraction in seasonal mean (JAS) as represented by RCA4 driven with various GCMs simulations as compared with CLARA dataset.

- ### Results
- CLARA, ESACCI and PATMOSX are based on the same satellites and are in good agreement with each other.
  - CRU shows less consistency compared to other datasets, underestimates inter-annual variability which could be due to lack of data points (consistency) especially in central Africa.
  - Satellite data are closer representation of the cloud fraction in the study region and thus CLARA was chosen to evaluate the RCMs.
  - Generally, WRF, CRCM5 and RCA4 underestimates the mean cloud fraction as compared to CLARA.

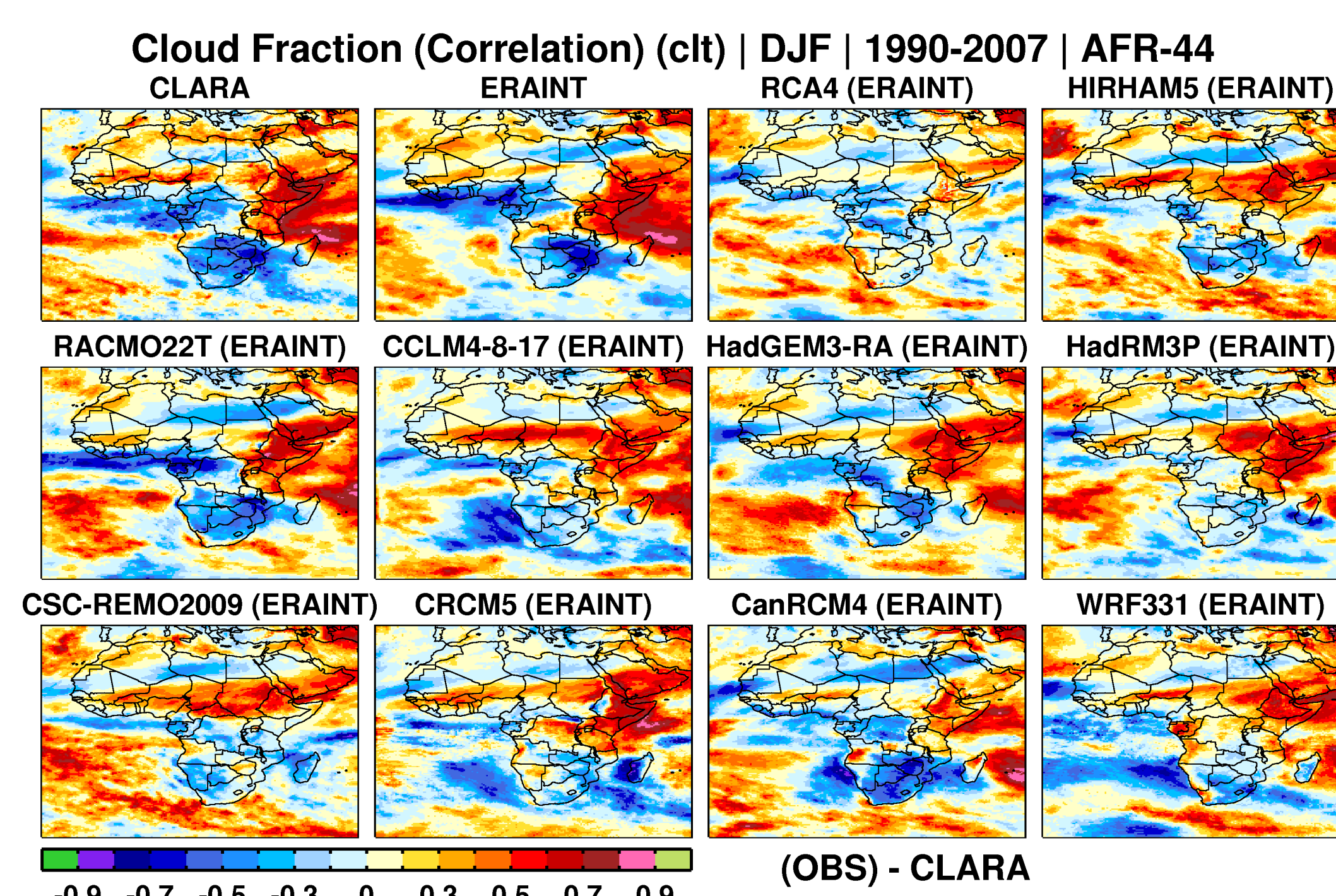


Fig 5: Correlation of RCM runs driven by ERAINT simulation with ENSO during DJF period

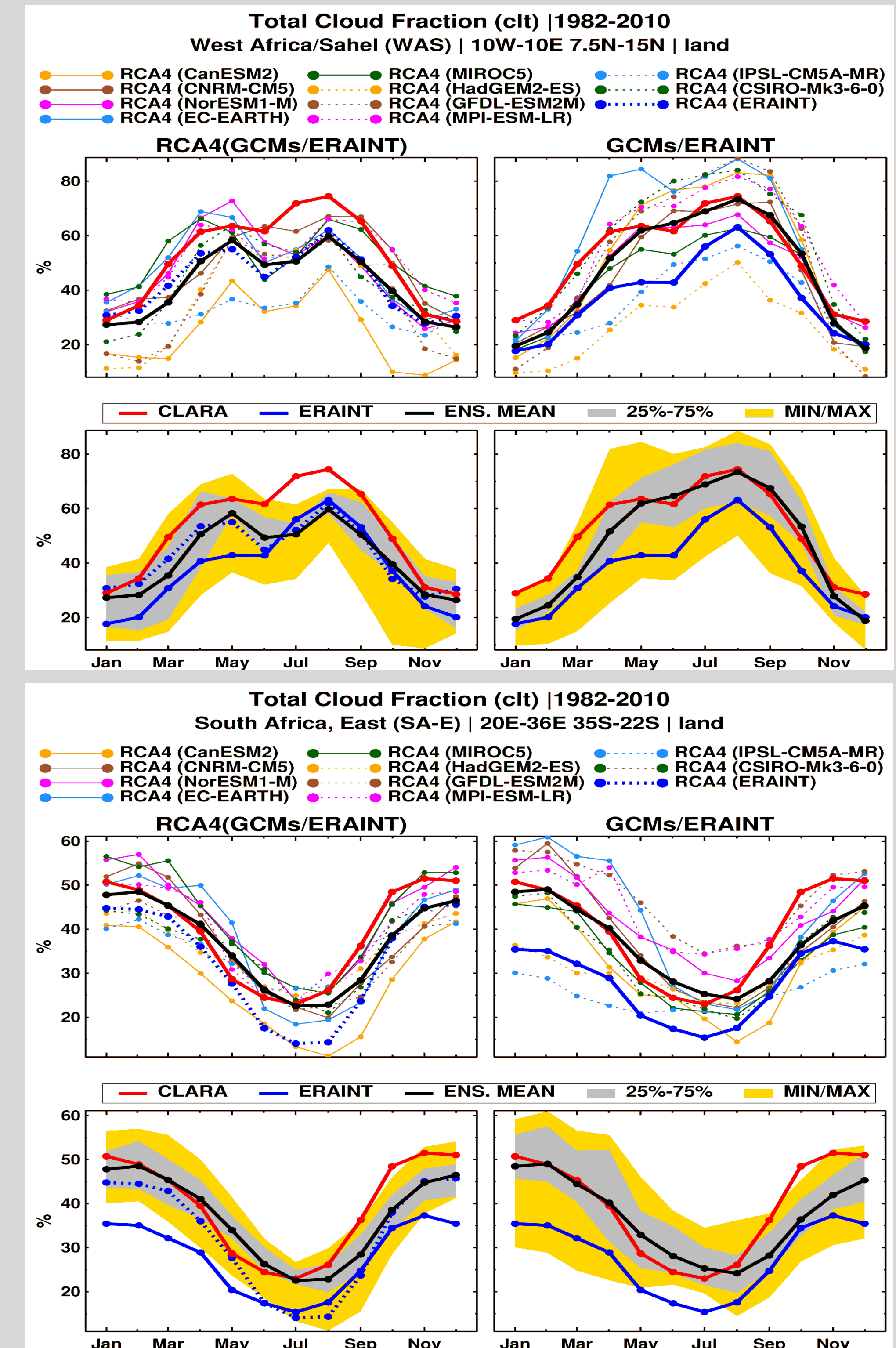


Fig 2: Annual cycle of total cloud fraction in Western Africa (upper) and Southern Africa-East (lower) in RCA driven by ERAINT runs of GCMs, GCMs with ERAINT and their associated uncertainties.

- ### Results
- There is stronger control from GCMs in southern Africa compared to West Africa
  - RCMs have strong varied cloud response to ERA-Interim, especially the stratocumulus regions off the southwestern parts and deep convective regions in Sahel and Arabian Sea areas.
  - RCA4 underestimates cloud fraction in both regions when CLARA used as reference
  - Correlation analysis also suggests that RCA4 and HIRHAM5 underestimates the relationship of ELNINO with cloud in Southern African region.
  - Various RCMs have different capabilities when compared to reproduce mean cloud fraction in the region and thus uncertainties involved.

Data Availability: RCM data is amde available within CORDEX framework and can be downloaded from ESGF, for details visit: [www.cordex.org](http://www.cordex.org)  
ESA-CCI: <http://www.esa-cloud-cci.org/>  
PATMOSX: <https://cimss.ssec.wisc.edu/patmosx/>  
CLARA: [https://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=CLARA\\_AVHRR\\_V001](https://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=CLARA_AVHRR_V001)

FRACTAL: The Future Resilience for African CiTies And Lands (FRACTAL) project funded through the Future Climate For Africa (FCFA) program. FRACTAL is a four-year project with the overarching aim to advance scientific knowledge about regional climate responses to human activities (such as burning fossil fuels, changing land cover, etc.) and work with decision makers to integrate this scientific knowledge into climate-sensitive decisions at city-regional scale. FRACTAL is designed to work across disciplines and foster collaboration between researchers, city government officials and other decision makers in southern Africa. <http://www.fractal.org.za/>

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