Abstract
The Tropical Atlantic (TA) region still exhibits large errors in simulating the mean climate with general circulation models. One aspect of eliminating these biases is to increase the horizontal model resolution, which we did in a series of global atmosphere only ECHAM5 simulations. The same present day forcing, amongst others observed daily SST from NOAA, is used to simulate the climate from 1982 to 2009 with 6 different horizontal resolutions: T031 (~3.75°), T042 (~2.5°), T063 (~1.87°), T110 (~1.12°), T159 (~0.76°), T213 (~0.56°). As a statistical measure of the average model performance error, the Mean Absolute Error (MAE) is calculated, which is an amorphous measure of the average error magnitude.

Conclusions
✓ An increasing horizontal grid resolution does reduce the magnitude of common biases in the Tropical Atlantic, but their spatial patterns remain.
✓ Relatively small changes for resolutions higher than T106.

10m winds
The 10m wind speed biases (compared to ERA-Interim reanalysis) are similar in all 6 horizontal resolutions. Main biases (Fig. 1) are too weak southerly (strong easterly) winds in the Eastern (Western) TA, especially during JAS.
The MAE does improve over all seasons in the Eastern TA (ETA, 20°S–5°N, 10°W–15°E), where it is smallest in JAS and largest in OND, Fig. 2. Reduction of MAE is almost equally distributed between the U- and V-components, except for AMJ, where the V-component reduces less (~20% instead of ~60%). Biases in the Western TA (WTA, 10°S–10°N, 60°W–10°E) improve less during autumn and winter, reduce stronger in spring, but roughly double in JAS. The latter can be attributed to an increase in the MAE of the U-wind by +40%, whereas MAE of V-wind reduces by -20%.

Precipitation
Total precipitation (Fig. 3), compared to the Global Precipitation Project (GPCP), shows a southward shift of the main precipitation band in JFM and AMJ. Further, there is too less (much) rain in the eastern (western) TA during boreal summer, OND displays a wetter ETA and WTA, but drier central TA.
Representation of total precipitation benefits from a higher horizontal resolution (Fig. 4). MAE along the equator (~10°S–15°N, 70°W–20°E) reduces equally across the seasons by about -20% and is strongest during boreal spring and summer.

Cloud cover
Total cloud cover (Fig. 5), compared to ERA-Interim reanalysis, reveals too much cloud over Northern Africa, where subsequently less incoming solar radiation leads to colder 2m temperatures (~3°C). Cloud cover over Northern Brazil is simulated quite well during JFM and AMJ, but there are too much clouds (and rain) during JAS and OND.
Too less marine stratuscumulus are simulated in the Northern and Southern TA, especially during JAS and OND, which consequently leads to a warming near the surface. The MAE (Fig. 6) roughly doubles during all seasons in the Southern TA and during JAS in the Northern TA.

Notes: Due to a prolonged shutdown of a computing center used by the authors, cloud cover data for T121 were not available.