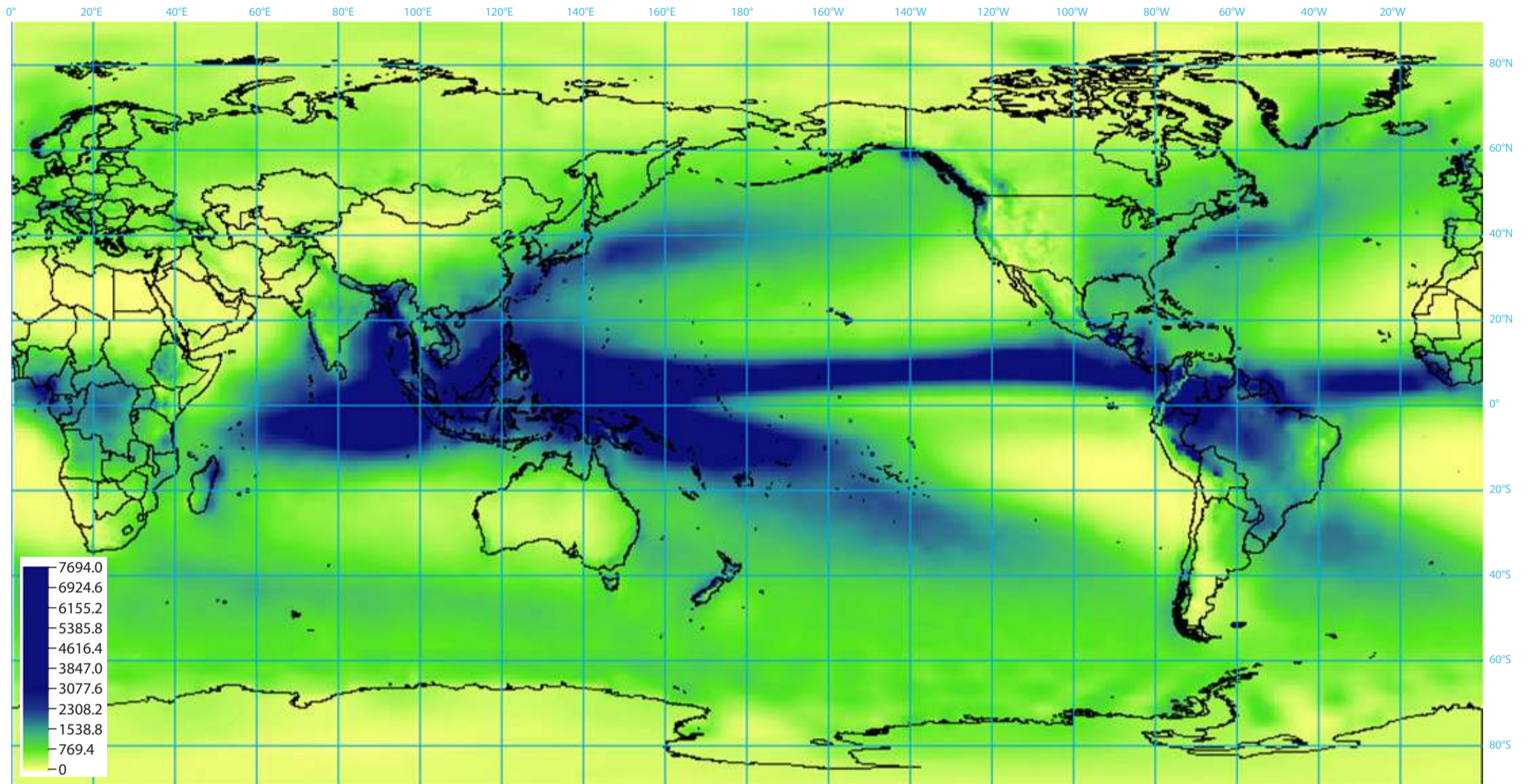
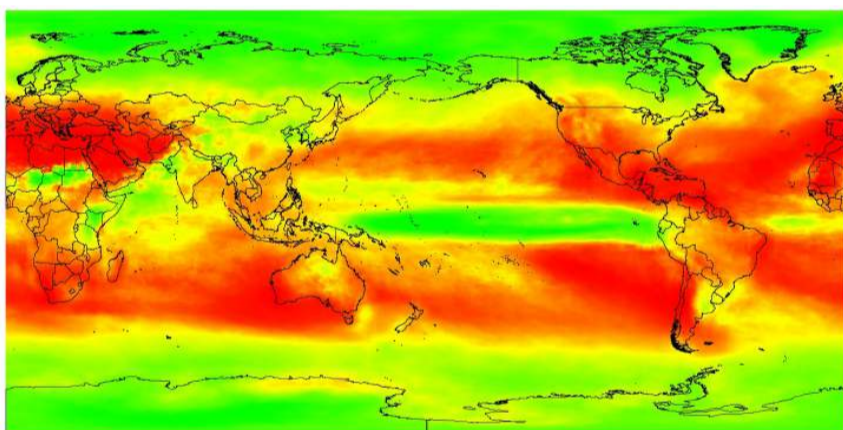


Comparison of CMIP3 and CMIP5 Models for Precipitation Around the World

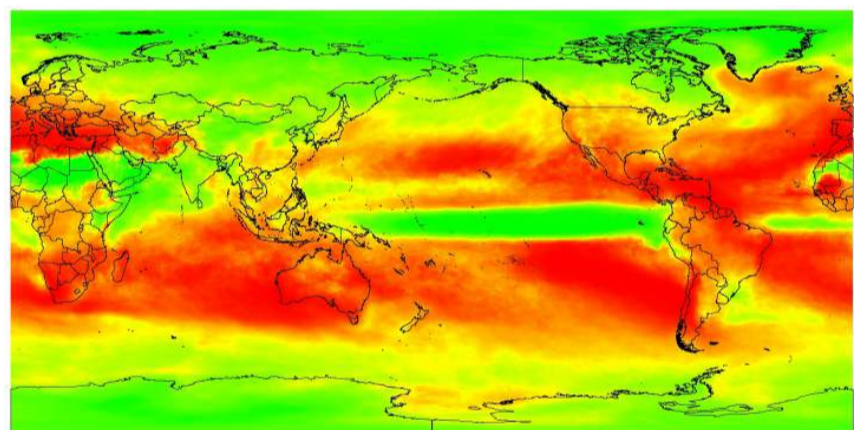
Dr. Peter Kouwenhoven — Dr. Yinpeng Li — Dr. Peter Urich



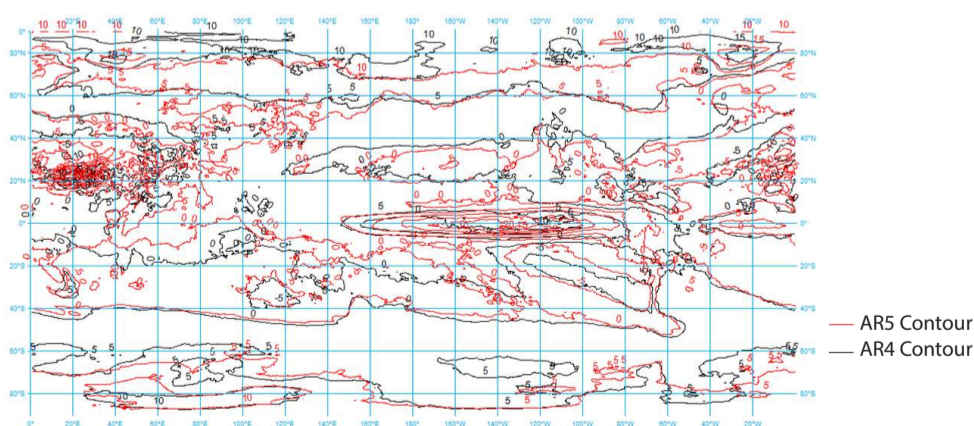
This image shows the world's annual baseline for precipitation derived by averaging data from 1961 to 1990. The legend scale is "stretched", better bringing out the low differences, showing that many parts of the world are fairly dry (<800 mm per year), with much more rain over the oceans and the equator.



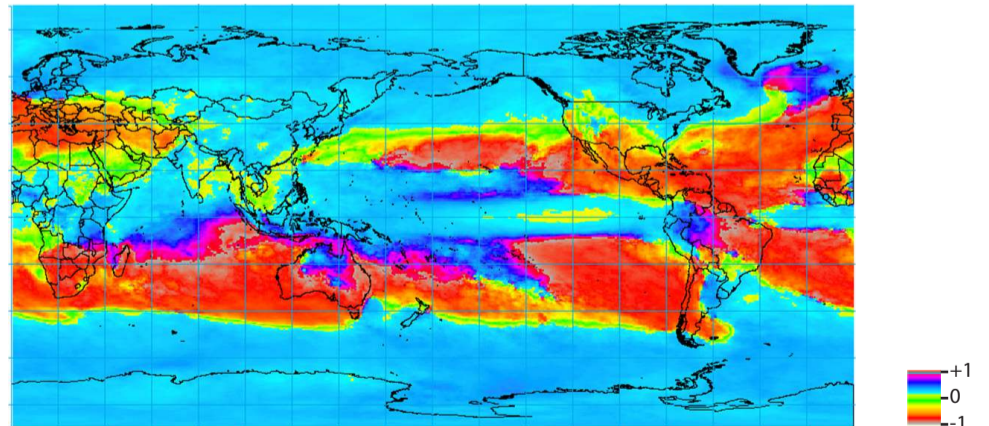
This image shows how precipitation changes as a result of global warming. The change is expressed as a percentage of the baseline values (in the previous image). The green areas are modelled to get wetter and the red areas dryer, while in the yellow areas the change is marginal. This is the result from the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment (AR4) CMIP3 data, using 21 models, from which the median value in each grid cell was used. The legend has been adjusted to be the same as the AR5 image (next image to the right)



This image has the same explanation as the AR4 image, but is now from IPCC's 5th Assessment (AR5) CMIP5 data represented by a 41-GCM ensemble. (AR5 has more model results than AR4). The AR4 and AR5 images use the same legend to make them comparable. Although differences can be seen, it is difficult to see how and where AR4 and AR5 differ. For existing climate adaptation plans, based on AR4 results, it is important to know if there are differences with AR5. The images below attempt to analyse these differences.



This image shows the contour-lines for both change patterns (with the continents removed to augment image quality). In some parts of the globe (i.e. the 60° North and the 40° South) the contours line up remarkably well, given that the two sets of models (AR4 and AR5) were produced five years apart, applying different process-parameters, resolutions and combinations of models. Although the patterns seem to compare favourably, it is still difficult to see where the AR4 and AR5 patterns significantly agree or disagree.



This image shows the "phase" plot between AR4 and AR5 results, the angle for a vector created by the AR5-value on a Y-axis, and the AR4-value on an X-axis, calculated for each grid-cell with the ATAN2 function of ArcGIS. The result has been divided by Pi to get a number between -1 and 1.

The interpretation of this image is as follows:

- bluish colour: both AR4 and AR5 project an increase in precipitation
- reddish colour: both AR4 and AR5 project a decrease in precipitation
- yellow-greenish: AR5 finds an increase, AR4 a decrease
- dark blue-purple: AR5 finds a decrease, AR4 an increase

The areas with more precipitation outweigh the areas with less precipitation. Which is to be expected: with a higher global temperature, the water-cycle intensifies.