Aqua-Planet Experiment Project (APE)

Sea Surface Temperatures

Eight analytic distributions of sea surface temperature (SST) are specified. Five are zonally symmetric and vary the latitudinal profile of SST in the tropics. Of these, four are symmetric about the equator while the fifth shifts the SST maximum to 5°*N*. The remaining three distributions add tropical SST anomalies to the control profile, with limited or global extent in longitude.

1. Control:
$$T_{S1}(\lambda,\phi) = \begin{cases} 27\left(1-\sin^2\left(\frac{3\phi}{2}\right)\right)^\circ C & ; \quad -\frac{\pi}{3} < \phi < \frac{\pi}{3} \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

2. Peaked:
$$T_{S2}(\lambda,\phi) = \begin{cases} 27\left(1-\frac{3|\phi|}{\pi}\right)^\circ C & ; \quad -\frac{\pi}{3} < \phi < \frac{\pi}{3} \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

3. Flat:
$$T_{S3}(\lambda,\phi) = \begin{cases} 27\left(1-\sin^4\left(\frac{3\phi}{2}\right)\right)^\circ C & ; \quad -\frac{\pi}{3} < \phi < \frac{\pi}{3} \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

4. Qobs:
$$T_{S4}(\lambda,\phi) = (T_{S1} + T_{S3})/2$$

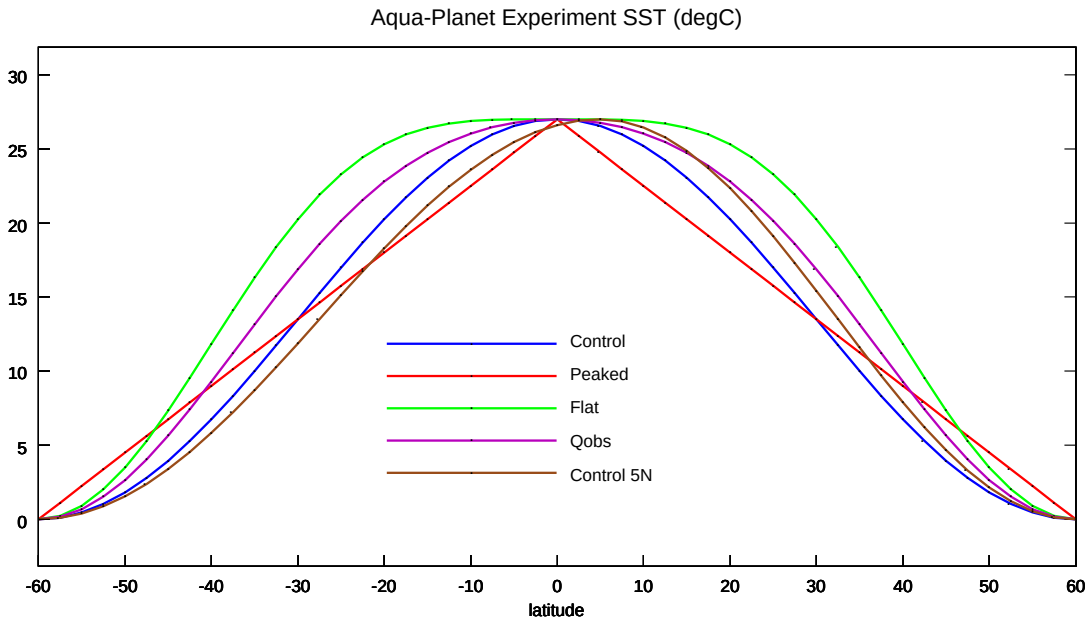
5. Control-5N:
$$T_{S5}(\lambda,\phi) = \begin{cases} 27\left(1-\sin^2\left(\frac{90}{55}\left[\phi-\frac{\pi}{36}\right]\right)\right)^\circ C & ; \quad \frac{\pi}{36} < \phi < \frac{\pi}{3} \\ 27\left(1-\sin^2\left(\frac{90}{65}\left[\phi-\frac{\pi}{36}\right]\right)\right)^\circ C & ; \quad -\frac{\pi}{3} < \phi < \frac{\pi}{36} \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

6. 1KEQ: $T'_{S6}(\lambda,\phi)$
7. 3KEQ: $T'_{S7}(\lambda,\phi)$
$$= \begin{cases} \chi\cos^2\left(\frac{\pi}{2}\left[\frac{\lambda-\lambda_0}{\lambda_d}\right]\right)\cos^2\left(\frac{\pi}{2}\left[\frac{\phi}{\phi_d}\right]\right)^\circ C & ; \quad \begin{cases} (\lambda_0-\lambda_d) < \lambda < (\lambda_0+\lambda_d) \\ -\phi_d < \phi < \phi_d \end{cases} \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

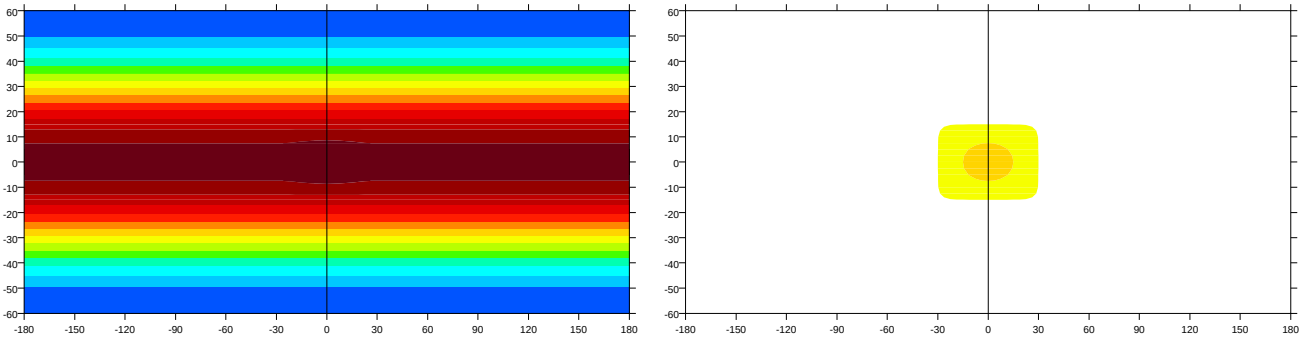
8. 3KW1:
$$T'_{S8}(\lambda,\phi) = \begin{cases} \chi\cos(\lambda-\lambda_0)\cos^2\left(\frac{\pi}{2}\left[\frac{\phi}{\phi_d}\right]\right)^\circ C & ; \quad -\phi_d < \phi < \phi_d \\ 0^\circ C & ; \quad \text{otherwise} \end{cases}$$

$\chi = 1^\circ C\ (T'_{S6})$; $\chi = 3^\circ C\ (T'_{S7}; T'_{S8})$: Maximum magnitude of SST anomaly
$\lambda_0 = 0^\circ E$; $\lambda_d = 30^\circ$; $\phi_d = 15^\circ$: 1KEQ, 3KEQ: longitude of maximum anomaly; half widths.
$\lambda_0 = 0^\circ E$; $\phi_d = 30^\circ$: 3KW1: longitude of maximum anomaly; half width.

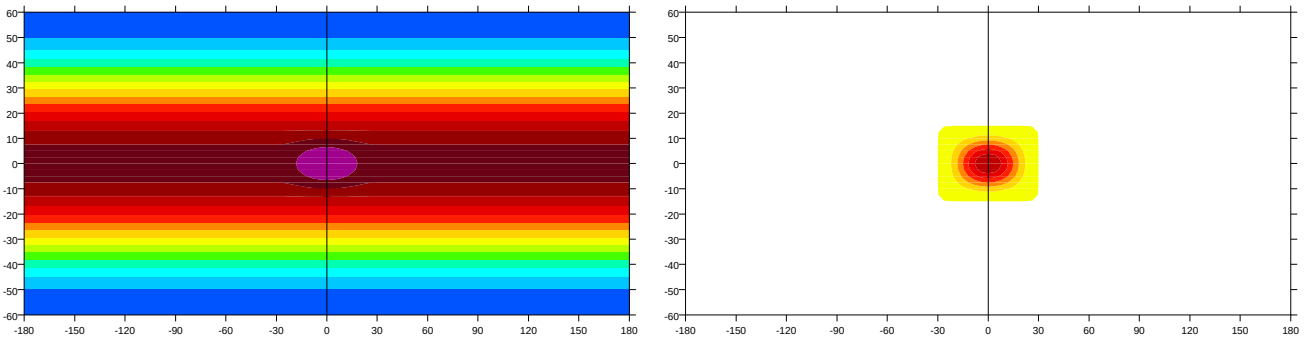
Neale, R. B. and Hoskins, B. J. (2000) A standard test for AGCMs including their physical parametrizations: I: The proposal. *Atmos. Sci. Letters*, **1**, 101-107.



1KEQ



3KEQ



3KW1