

OA413 : Climate Dynamics; Assignment No. 1

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(adapted from Kump et al 1999)

1. Venus and Mars orbit the sun at average distances of 0.72 and 1.52 AU respectively. What is the solar (SW) radiation flux at each planet ?
2. Venus has a planetary albedo of 0.80, whilst that of Mars is 0.22. What is the main reason for this difference ?
3. Estimate the effective radiative temperatures of both planets.
4. How do these temperatures compare with that of the Earth ? Is this result surprising, and if so, why ?
5. The mean surface temperatures of Venus and Mars are 730 K and 218 K respectively. Estimate the magnitude of the greenhouse effect on both planets, as both (a) a temperature difference, and (b) as a radiative flux (forcing)
6. How do these results compare with the greenhouse effect on Earth ? What are the main reasons for any differences that you find ?