



Water vapor emission in the region 8-12.5 microns and its importance as a feedback of the climate change

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The Third and Fourth IPCC Reports (2001 and 2007) consider the feedback process of the three phases of water in a remarkable way for the climate change due to the increase of atmospheric carbon dioxide. In the Thermodynamic Climate Model (TCM) we have improved the water vapor emissivity in the semitransparent region 8-12.5 microns, using the spectral calculator E-Trans and HITRAN data base. To determine in the best way this emissivity is very important, since it is virtually the only region of the long-wave spectrum not saturated, and therefore the water vapor increasing by the warming is an important positive feedback by the greenhouse effect of this gas.

In the TCM a parametric formula is introduced to calculate the water vapor absorptivity in the semitransparent region as a function of the precipitable water and the wave number. This formula reproduces quite well the calculated emissivity by E-Trans integrated between 8 and 12.5 microns. Additionally a parametric formula is provided to calculate the precipitable water in the atmospheric column as a function of annual surface air temperature anomaly. This formula is used with different parameters for the case when the vertical profile of relative humidity is kept fixed in the climate change and for the one in which this profile is variable. The case of fixed relative humidity produces a runaway warming by 2020 and the case of non-fixed relative humidity produces a warming by 2100 which is within the range of IPCC climate models.