Geophysical Research Abstracts,
Vol. 11, EGU2009-10574, 2009
EGU General Assembly 2009
© Author(s) 2009

An interpretation of the Free Tropospheric Humidity interannual variability observed from METEOSAT using a transport model

H. Brogniez (1), R. Roca (2), and L. Picon (2)

(1) LATMOS/IPSL/UVSQ/CNRS, Velizy, France (helene.brogniez@latmos.ipsl.fr), (2) LMD/IPSL/UPMC/CNRS, Jussieu, France

Satellite remote sensing of water vapor in the 6.3μm strong water vapor absorption band, offers a unique observational estimate of the free tropospheric relative humidity (FTH). A database of clear sky radiances from the METEOSAT First Generation series, spanning July 1983 – June 2005 with a 3 hourly time step and a spatial resolution of 0.625°, has been developed and is exploited to document the variability of the water vapor content of the free troposphere. A particular effort has been done on the dry subtropical highs that play a key role in the water vapor feedback through a significant impact on the longwave cooling to space.
The region of the Eastern Mediterranean reveals strong inter-annual features such as an extreme dryness during the summer (6%) and a higher relative variability (50%) than the convectively active regions of the African monsoon (20%) that underlines it's importance in the Earth's radiative balance. The link between such inter-annual variations and large-scale dynamic is performed with a lagrangian transport model. This technique, applied onto the whole set of summers, reveals a complex scheme of mixing between air masses of tropical (<25ºN) and/or extra-tropical (>25ºN) origins that explains for a large part the variability of FTH at the inter-annual scale. Hence, the tropical air ending its trajectory over the Eastern Mediterranean high has mainly a drying influence while extra-tropical parcels generally moisten the free troposphere.