enough to block surface emission from reaching the satellite under most conditions, but weak enough that the imager can usually "probe" well into the troposphere without being blocked by the small amounts of water vapor found in the stratosphere and upper troposphere.

Unlike the case for CO_2 and O_2, water vapor is far from well mixed and varies wildly in concentration, both horizontally and vertically. Therefore, the emission weighting function $W^{\uparrow}$ at 6.7 μm is highly variable, peaking at low altitudes (or even the surface) in a very dry atmosphere and in the upper troposphere in a humid tropical atmosphere or when high altitude clouds are present.

As usual, the observed brightness temperature T_B is a function of the temperature of the atmosphere in the vicinity of the weighting function peak, but variations in brightness temperature are a much stronger function of height of the weighting function peak than of the temperature at any specific altitude.

Consequently *dry*, cloud-free air masses typically produce relatively *warm* brightness temperatures, because the observed emission originates at the warm lower levels of the atmosphere. *Humid* air masses, on the other hand, produce *cold* brightness temperatures, because emission then originates principally in the cold upper troposphere. In fact, globally speaking, there is often a roughly inverse correlation between brightness temperature at 6.7 μm and air mass temperature, because warm tropical air masses are capable of supporting higher water vapor content, and may also be associated with colder tropopause temperatures, on average, than cold extratropical air masses.

An example of a 6.7 μm image is shown in Fig. 8.6. In this instance, the most dramatic features are the very dark (warm) bands snaking across the subtropical Pacific. These bands are presumably associated with regions of strong subsidence (sinking motion) in connection with the subtropical high pressure belt. The effect of subsidence is to bring extremely dry air from the upper troposphere down to relatively low levels, allowing the imager to "see" warm emission from the lowest kilometer or two. Elsewhere, deep humidity and some high-level clouds connected with a weakening extratropical cyclone produce bands of relatively cold brightness temperatures. Overall, one has an impression of a three-dimensional

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