

Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02555, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02555
EGU General Assembly 2008
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Ascent rates in the tropical lower stratosphere derived from vertical profiles of ozonesonde data

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The combined information on vertical gradients of ozone mixing ratios, supplied by the SHADOZ ozonesondes, and the rate of chemical ozone production, calculated by a chemical model, is used to estimate mean ascent rates of air in the tropical lower stratosphere. This provides estimates independent from conventional methods, that are based on the calculation of radiative heating rates or the analysis of vertical transport of chemically inert tracers (e.g., the water vapour "tape recorder"). Thus, it is possible to monitor tropical ascent rates without relying on the availability of satellite data. The results range between 0.2 and 0.4 mm/s over the altitude interval of 17...22 km, consistent with conventional methods. The sensitivity of the results is investigated with respect to assumptions about the mixing-in of midlatitude air and the chemistry scheme used (only ozone production from oxygen photolysis versus full chemical scheme).