



Martin et al. (2004) finds that the ratio of formaldehyde columns to tropospheric NO_2 columns is an indicator of the relative sensitivity of surface ozone to emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs). The attached figure shows monthly mean tropospheric HCHO/NO_2 column ratio retrieved from GOME for North America, Europe, and East Asia. Ratios greater than 1 tend to be NO_x -limited. Ratios below 1 tend to be NO_x -saturated. White areas indicate remote regions (observed tropospheric NO_2 columns less than 2.5×10^{15} molecules cm^2) and regions below the HCHO detection limit of 4×10^{15} molecules cm^2 . The satellite-derived ratios indicate that surface ozone is more sensitive to emissions of NO_x than of VOCs throughout most continental regions of the Northern Hemisphere during summer. Exceptions include Los Angeles and industrial areas of Germany. A seasonal transition occurs in the fall when surface ozone becomes less sensitive to NO_x and more sensitive to VOCs.