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Volcanic emissions of SO_2 into the stratosphere: global height-resolved observations by MIPAS during 2002-2012

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The years since about 2000 are characterized by an increasing background stratospheric aerosol loading. Due to its negative radiative forcing this increase has been discussed as one explanation for the so-called global warming hiatus, a decrease in the rise of global temperatures since about 1998 (Solomon et al., Science, 333, 866–870, 2011). The rising aerosol levels are explained by injection of sulphur from small and medium-size volcanic eruptions into the stratosphere (Vernier et al., GRL, 38, 2011). To study this period with atmospheric models it is necessary to gain information about the mass of SO_2 reaching stratospheric altitudes globally. Here we present a global distribution of altitude profiles of SO_2 between 10 and 22 km as retrieved from MIPAS/Envisat infrared limb-emission observations between June 2002 and April 2012. This dataset is complementary to our earlier work (Höpfner et al., ACP, 13, 10405–10423, 2013) which consisted of the monthly and zonally averaged distributions of SO_2 above 15-20 km. The new data are derived from single - as opposed to averaged - MIPAS limb measurements. This global dataset which consists of over 1000 SO_2 profiles per day allows tracking of the plumes originating from more than 30 volcanic eruptions in the time period from June 2002 to April 2012 and quantification of their influence on the stratosphere.