Geophysical Research Abstracts
Vol. 16, EGU2014-11947, 2014
EGU General Assembly 2014


# Vertical distribution of volcanic $SO_2$ retrieved from IASI.

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Sulphur dioxide ($SO_2$) is an important atmospheric constituent that plays a rucial role in many atmospheric processes and its effect and lifetime are dependent on the $SO_2$ injection altitude.
In the troposphere $SO_2$ production leads to the acidification of rainfall while in the stratosphere it oxidises to form a stratospheric H2SO4 haze that can affect climate for several years.

We report applications of IASI high resolution infrared spectra to study volcanic emission of sulphur dioxide ($SO_2$).
IASI is a Fourier transform spectrometer that covers the spectral range 645 to 2760 cm-1 (3.62-15.5 um).
The IASI field of view consists of four circles of 12 km inside a square of 50 x 50 km, and nominally it can achieve global coverage in 12 hours. From 2013 there were 2 IASI instruments on board both METOP A and B giving up to 4 overpasses a day.

The $SO_2$ retrieval algorithm uses measurements from 1000 to 1200 cm-1 and from 1300 to 1410 cm-1 (the 7.3 and 8.7 um $SO_2$ bands) made by IASI on the MetOp satellite.
The $SO_2$ retrieval follows the method of Carboni et al. (2012) and retrieves $SO_2$ amount and altitude together with a pixel by pixel comprehensive error budget analysis. It permits the quantification of $SO_2$ amount and estimation of plume altitude, even for small eruptions in the lower troposphere (e.g. Etna lava fountains in 2011 and 2013).

We present the $SO_2$ amount described as a function of altitude, and the time evolution of $SO_2$ burden for recent volcanic eruptions. Quantification of the total amount of $SO_2$ over several days allows estimation of daily emission rates, and decay factors.