**Calculations of sulfur degassing**

Calculations of sulfur degassing for the Torres Formation and Vale do Sol Formation are based on Thordarson & Self (1996) and Marks *et al* (2014).

The total amount of sulfur degassed can be estimated by:

*Ms =10-15* x *Vm* x *ρ* x *Δsulfur* x *e* x Φmelt

where *Ms* is the total mass of SO2 released in teragrams, *Vm* is the volume of magma erupted in each formation, estimated by Rossetti *et al* (2018), *ρ* is the magma density, taken here as 2,7 x 1012 kg/km3, *e* is the conversion factor necessary to convert pure element mass to assumed elemental compound mass (*i.e*: converting S to SO2) taken here as 2. *Δsulfur* is the difference between sulfur content in melt inclusions and sulfur content in lava groundmass glass and is related to the mass of sulfur released. We used the *Δsulfur* value of 817 ug/g reported in Marks *et al* (2014). Note that the *Δsulfur* value reported in Marks *et al* (2014) already takes into consideration degassing efficiency. Finally, the Φmelt is the melt volume fraction without crystal since these do not contributed to volatile release. For simplification we use a Φmelt of 1 (*i.e:* aphyric lavas). This is reasonable for Vale do Sol Formation which truly are aphyric, but this value is somewhat lower for the Torres Fm. which is often plagioclase or olivine phyric.

Using the lower volume estimate for the Torres Formation (4000 km3) and for the Vale do Sol Formation (15 000 km3) the total amount of sulfur released can be estimated:

*Ms (Torres Formation - total) =*17 647 Tg

*Ms (Vale* do sol formation - total) = 66 177 Tg

Lastly, we estimate the mass released at the vent and by lava flow degassing by assuming that 75% of the volatile mass is released at the vents and the remainder is released by lava flow (see Self *et al*, 2006). Therefore;

*Ms (Torres Formation - vent) =* 13 235 Tg

*Ms (Torres Formation – lava flow) =* 4 412 Tg

*Ms (Vale do Sol Formation- vent) =* 49 632 Tg

*Ms (Vale do Sol Formation- lava flow) =* 16 544 Tg

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