Environmental Research Letters

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RECEIVED
26 September 2017

REVISED
4 October 2017

ACCEPTED FOR PUBLICATION
17 October 2017

PUBLISHED
2 November 2017

CORRIGENDUM

Corrigendum: A new archive of large volcanic events over the past millennium derived from reconstructed summer temperatures (2017 *Environ. Res. Lett.* 12 094005)

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In the original version of this paper, figure 2 reports the time-integrated radiative forcing units as Jm^{-2}. While this unit is dimensionally correct, to be numerically correct the units should be $Wm^{-2}yr$. For forcing estimates in the main text, extracted from the volcanic forcing record, the units similarly require correction. The error arose from an attempt to correct the units of the time-integrated forcing estimates from the original source (Sigl *et al* 2015), where values were presented in Wm^{-2} instead of $Wm^{-2}yr$. A version of figure 2 and the section 'The relationship between forcing magnitude and temperature response', both with the corrected units, are presented below. The radiative forcing values themselves were not affected, nor are the results, discussion or conclusions of this paper.

The relationship between forcing magnitude and temperature response

Volcanic cooling is sensitive to the altitude, latitude, and character of the volcanic eruption (Hansen *et al* 1997). The relationship between cooling patterns and forcing estimates is thus expecetd to be variable. The ice core sulfate records agree, for example, on an enormous peak in 1258, but the reconstructed cooling is less extreme (figure 2(*c*)). Measurement and calibration uncertainties associated with single events in ice core and tree-ring derived reconstructions further complicate such comparisons and impede the verification of the forcing magnitude based on the climatic impact. This is assessed by fitting linear regressions between the detected breaks and sulfate peaks from G08, C13 and S15 (figure 2(*b*)). G08 and C13 cohere relatively well with the break coefficients, but their regression models are based on large intercepts (22.1 and 10.4 $Wm^{-2}yr$) which were physically expected to be zero. The S15 volcanic forcing is not significantly correlated with the break coefficients, mainly due to the differences in 1258 and 1453. The more minor breaks are associated with very small forcing events in G08 and C13 (smallest forcing = $-0.5\ Wm^{-2}yr$ and $-0.1\ Wm^{-2}yr$, respectively) and more substantial events in S15 (smallest forcing = $-3.3\ Wm^{-2}yr$). The latter better explains a temperature response outside the range of internal variability and results in a linear regression with an intercept close to the origin for S15. The relatively weak forcing associated with the maximum cooling in 1453 points to another major inconsistency between forcing and temperature reconstructions in the 1450s. Although now off by 5 years, an integrated forcing of $-20\ Wm^{-2}yr$ (in 1458) would better explain the strong 1453 cooling observed in the tree-ring reconstruction and would be well in line with the linear regression model. The pronounced radiative forcing in 1258 has been discussed previously (Timmreck *et al* 2009) and is likely too large due to nonlinear aerosol microphysics in the volcanic plume of that eruption.

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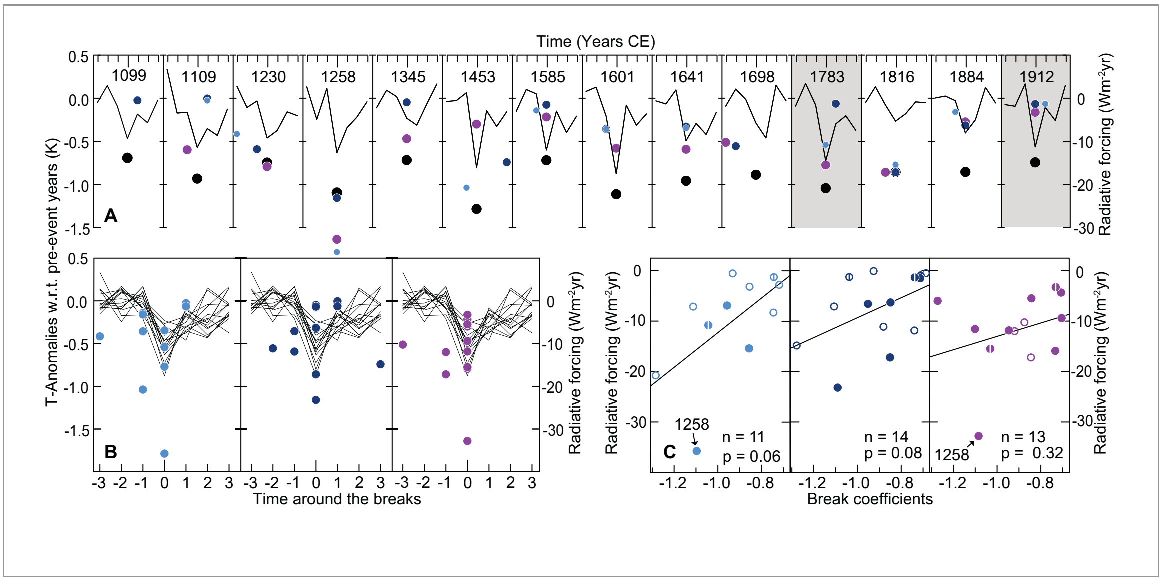
References

Sigl M *et al* 2015 Timing and climate forcing of volcanic eruptions for the past 2500 years *Nature* 523 543–9


Time (Years CE)
1099
1109
1230
1258
1345
1453
1585
1601
1641
1698
1783
1816
1884
1912
A
B
C
T-Anomalies w.r.t. pre-event years (K)
Radiative forcing (Wm⁻²yr)
Time around the breaks
Break coefficients
1258
n = 11
p = 0.06
n = 14
p = 0.08
1258
n = 13
p = 0.32