CORRIGENDUM

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Corrigendum: Widespread movement of meltwater onto and across Antarctic ice shelves

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In our Letter reporting observations of Antarctic surface meltwater, we computed the volume of meltwater simulated by the regional climate model RACMO2 (ref. 1) across an approximately 250 km by 750 km region, encompassing the Amery Ice Shelf ($606,000 \leq x_{PS} \leq 855,400$ m; $1,511,000 \leq y_{PS} \leq 2,265,200$ m, where x_{PS} and y_{PS} are polar stereographic coordinates). We compared this simulated meltwater volume to the approximate volume contained in a single large pond on the ice shelf. This was the largest pond we observed during our continent-wide survey of satellite and aerial imagery. In 2015 this pond grew to around 3.5 km in width, 80 km in length and 60 km² in area. The estimated volume of meltwater in the pond was much greater than our estimate of the modelled melt volume over the entire ice shelf and so we concluded that the climate model underestimates the volume of meltwater produced on Amery Ice Shelf during the austral summer ending in 2015. However, we had misinterpreted the units of the output of the regional climate model, which caused us to underestimate modelled melt rates considerably. Specifically, we understood the units of the melt rate variable to be kilograms per square metre per day, when in fact they were kilograms per square metre per second. This error was pointed out by P. Kuipers Munneke at Utrecht University.

In Figure 1 of this Corrigendum, the original Fig. 3c has been replotted to correct this error. Figure 1 correctly compares the meltwater volume simulated by RACMO2 across the large region defined above to the volume of water in the pond. Following our original analysis, we assume mean water depths between 1 cm and 10 m. Figure 1 shows that the volume of water simulated by the model across the region is of the same order of magnitude as the volume of water in the pond. This does not support our original statement that RACMO2 “greatly underestimates melt rates over Amery Ice Shelf (Fig. 3c)”.

Figure 1 | This is the corrected version of the original Fig. 3c.

Similarly, our statement that the estimated volume of the pond was “around four orders of magnitude larger than the RACMO2-modelled melt production for the entire Amery Ice Shelf during the same period” is incorrect.

In fact, we do not have strong evidence that RACMO2 underestimates melt volumes on Amery Ice Shelf. We note, however, that Amery Ice Shelf supports a complex drainage system consisting of many independent catchments, feeding hundreds of ponds. We compared the modelled meltwater volume integrated over the whole region (188,000 km²) to the approximate volume of water in one pond (60 km²). An improved analysis of modelled and observed meltwater volumes would constrain lake depths using multi-spectral remote sensing² and would integrate modelled melt rates over individual catchments, rather than the whole region. Such improvements would better test the ability of regional climate models to simulate Antarctic surface melt rates accurately. The other conclusions of the original Letter remain unchanged. The original Letter has not been corrected.

1. Van Wessem, J. M. *et al.* Improved representation of East Antarctic surface mass balance in a regional atmospheric climate model. *J. Glaciol.* **60**, 761–770 (2014).
2. Pope, A. *et al.* Estimating supraglacial lake depth in West Greenland using Landsat 8 and comparison with other multispectral methods. *Cryosphere* **10**, 15–27 (2016).