

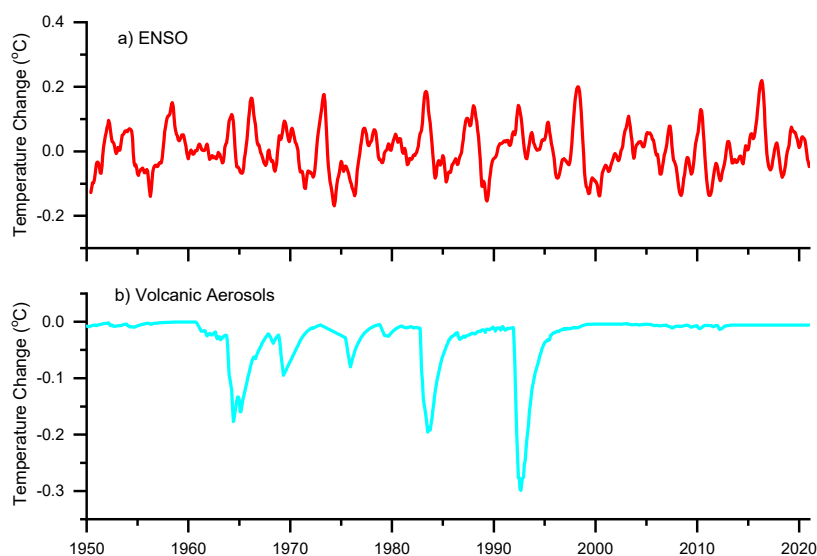
# Major Contribution of Halogenated Greenhouse Gases to Global Surface Temperature Change

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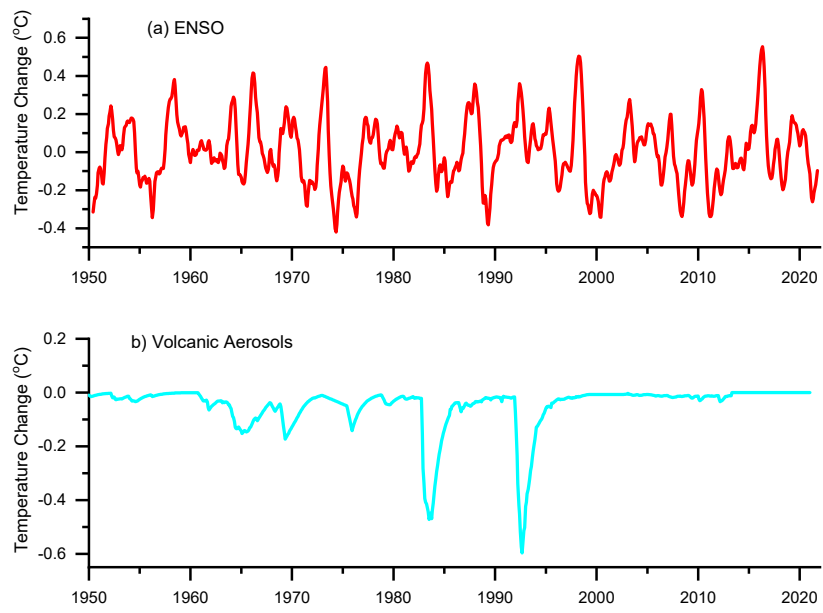
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This supplementary document includes the following additional data (Figures S1-S3):

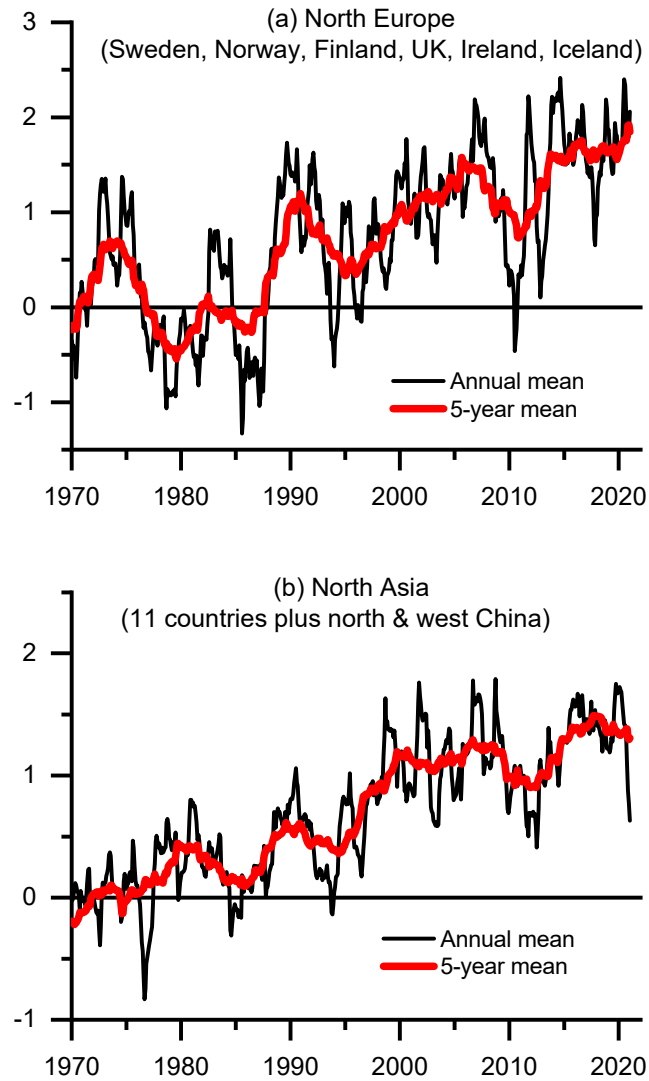
As stated in the text, to remove the ENSO and volcanic effects from the observed GMST data, we simply adopt the empirical model developed by Lean and Rind [21, 22], in which the natural contributions to the GMSTs were  $0.2^{\circ}\text{C}$  warming during major ENSO events in 1997–98, and about  $0.3^{\circ}\text{C}$  cooling in 1992 following the large Pinatubo volcanic eruption. For land surface air temperatures at NH extratropic (latitudes  $30^{\circ}\text{N}$ – $90^{\circ}\text{N}$ ), this same approach was used to remove the natural El Niño and volcanic effects. However, the natural contributions to the land surface air temperatures at NH extratropic were larger, which were  $0.5^{\circ}\text{C}$  warming during major ENSO events in 1997–98, and about  $0.6^{\circ}\text{C}$  cooling in 1992 following the large Pinatubo volcanic eruption. These are shown in Figures S1 and S2 below.



**Figure S1.** Contributions of natural ENSO and volcanic aerosols to observed GMSTs.



**Figure S2.** Contributions of natural ENSO and volcanic aerosols to observed land surface air temperatures at NH extratropic (30°N-90° N).



**Figure S3.** a-b: Time Series measured surface temperatures in North Europe (Sweden, Norway, Finland, UK, Ireland and Iceland) and North Asia including 11 countries (Afghanistan, Iran, Japan, Kazakhstan, N Korea, S Korea, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, and Uzbekistan) plus 12 north and west provinces (Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongolia, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjing, Xizang) of China.

## References

21. Lean, J.L.; Rind, D.H. How natural and anthropogenic influences alter global and regional surface temperatures: 1889 to 2006. *Geophys. Res. Lett.* 2008, 35, L18701.
22. Lean, J.L.; Rind, D.H. How will Earth's surface temperature change in future decades? *Geophys. Res. Lett.* 2009, 36, L15708.