



*Supplement of*

## **A global view of the stratospheric background, volcanic and wildfire aerosol in the CALIOP era (2006–2023)**

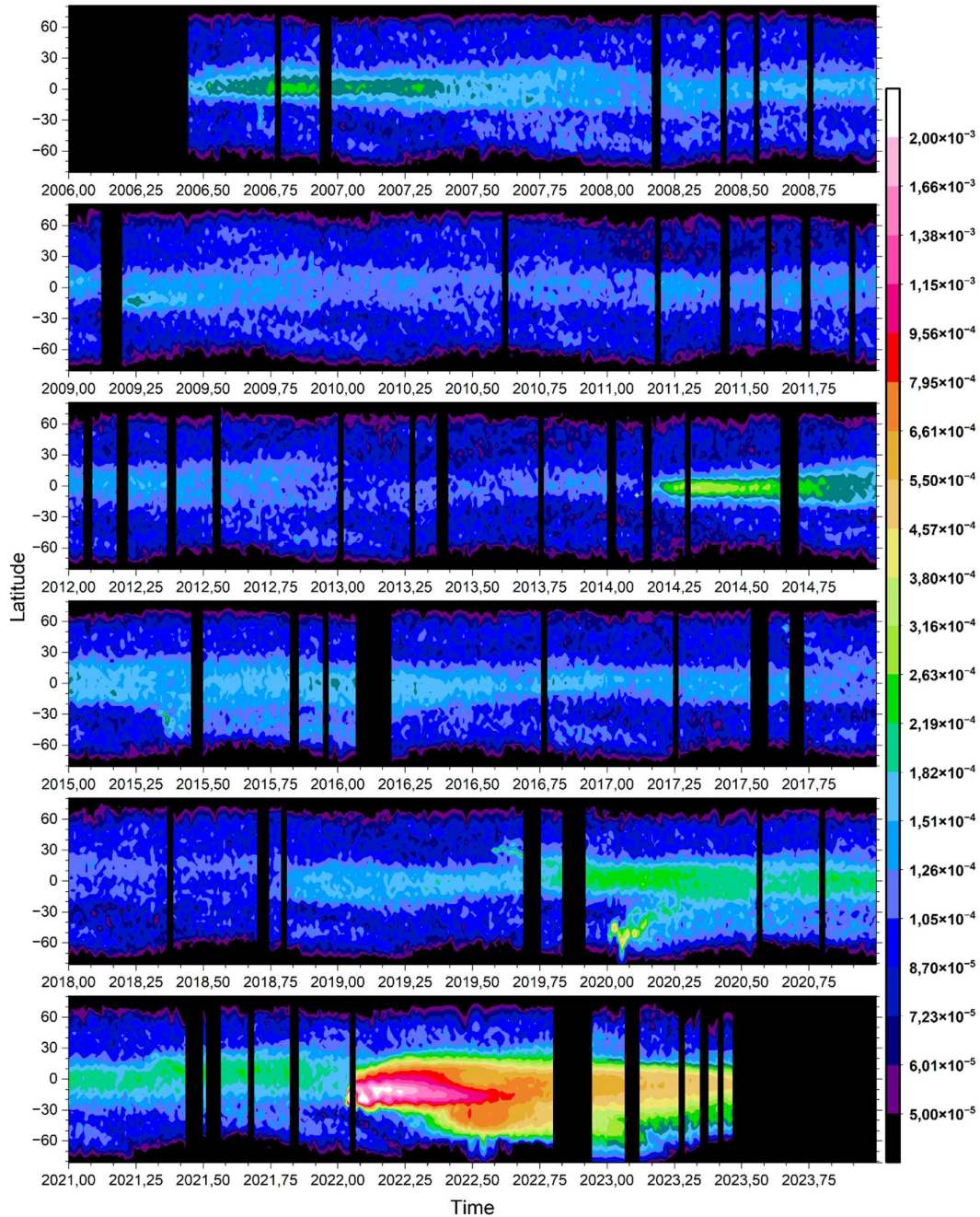
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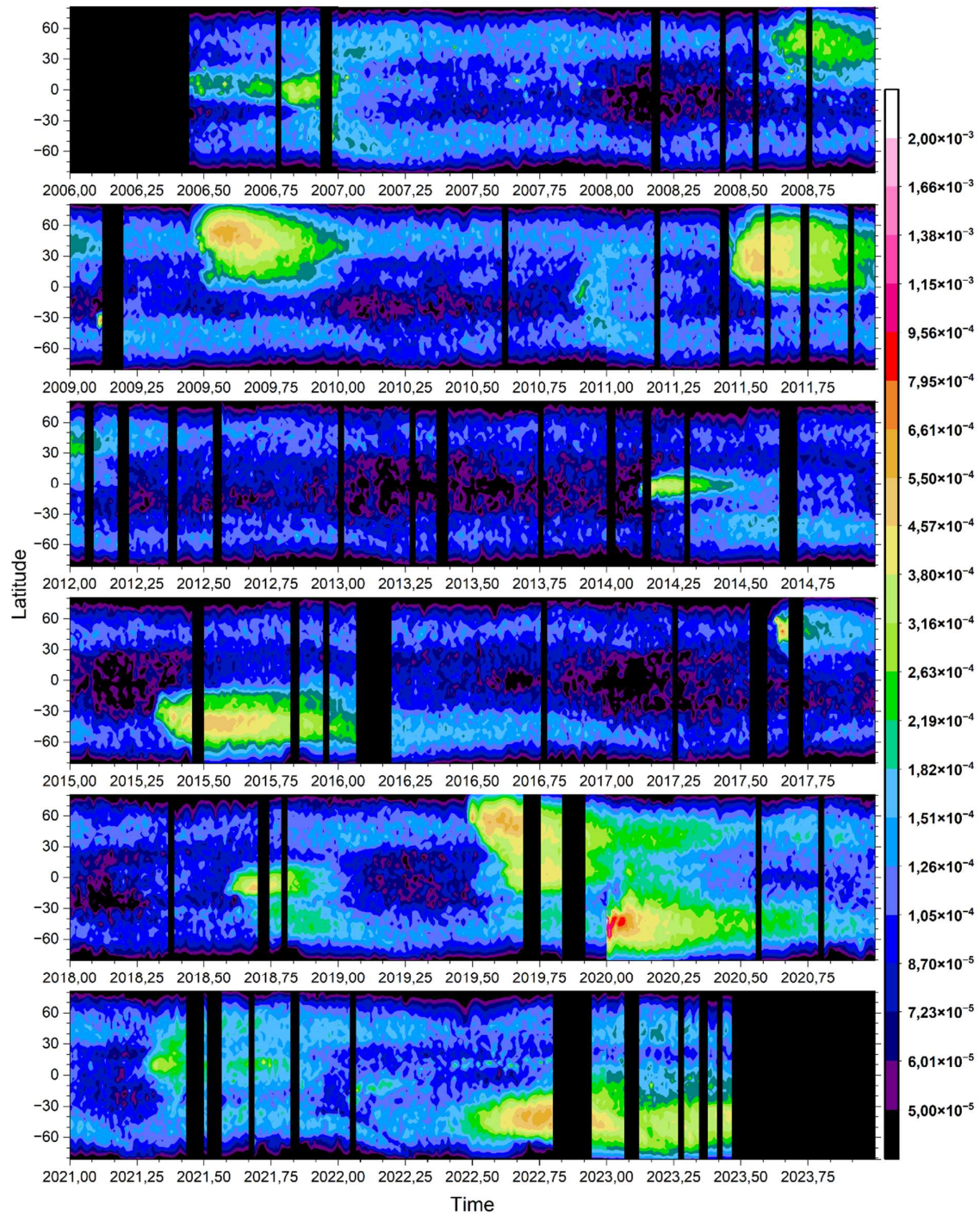
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1 **Supplementary material**

2 The supplementary material contains latitude-time distributions of three stratospheric  
3 altitude layers (Figures S1 – S3) and altitude-time distributions of three latitude ranges  
4 (Figures S4 – S6). Figure S7 shows latitudes where measurements are available and Figure S8  
5 shows AOD time series of nine stratospheric layers.



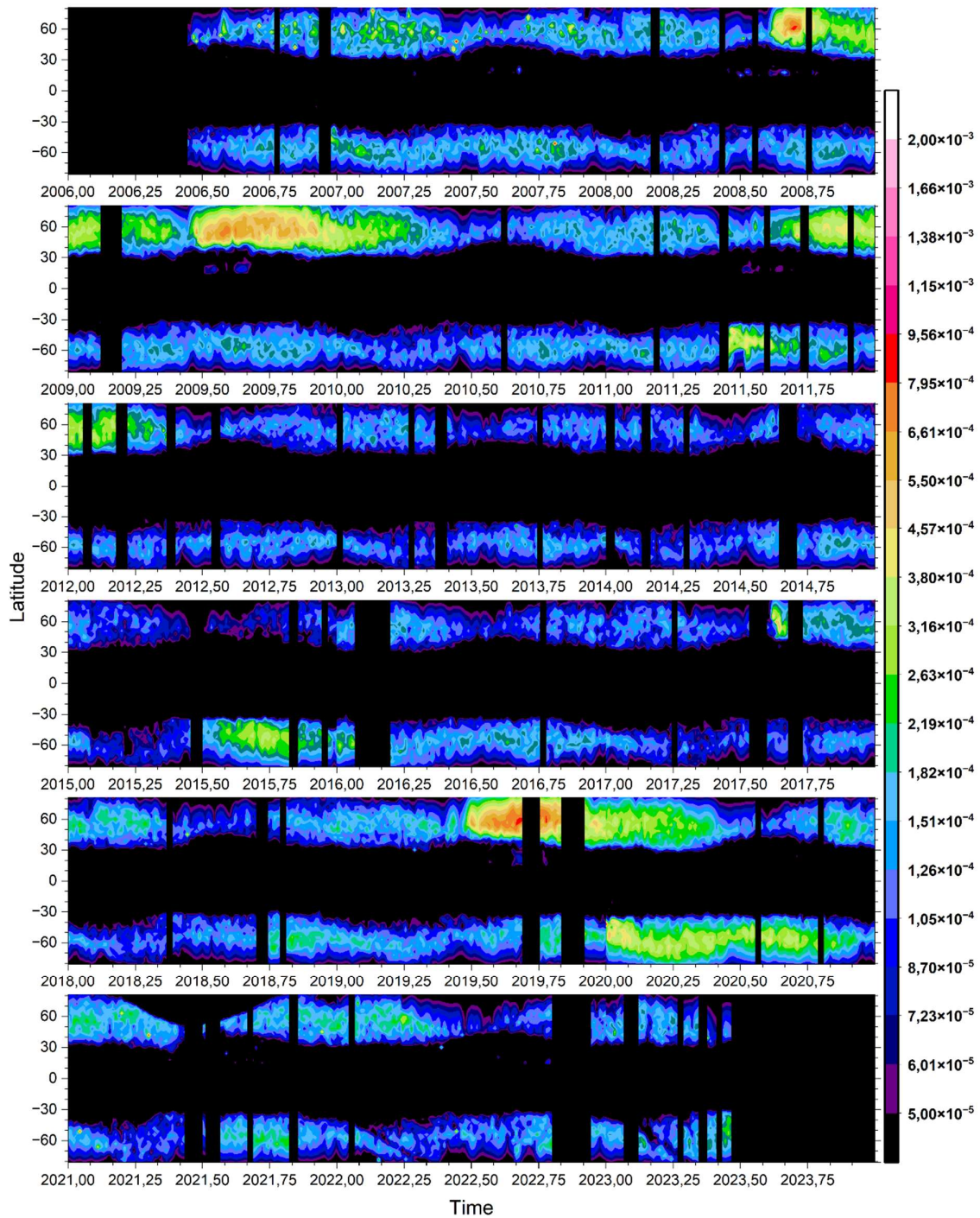
6  
7 Figure S1. Aerosol scattering integrated from the 470 K isentropes to 35 km altitude (the  
8 deep Brewer-Dobson branch) averaged over 4 days and 3 degrees in latitude. Color  
9 scale: Global AOD contribution per degree of latitude, i.e. the sum over latitude is the  
10 global AOD of the layer.



11

12 Figure S2. Aerosol scattering integrated between the 380 and 470 K isentropes (the  
 13 shallow Brewer-Dobson branch) averaged over 4 days and 3 degrees in latitude. Color  
 14 scale: Global AOD contribution per degree of latitude, i.e. the sum over latitude is the  
 15 global AOD of the layer.

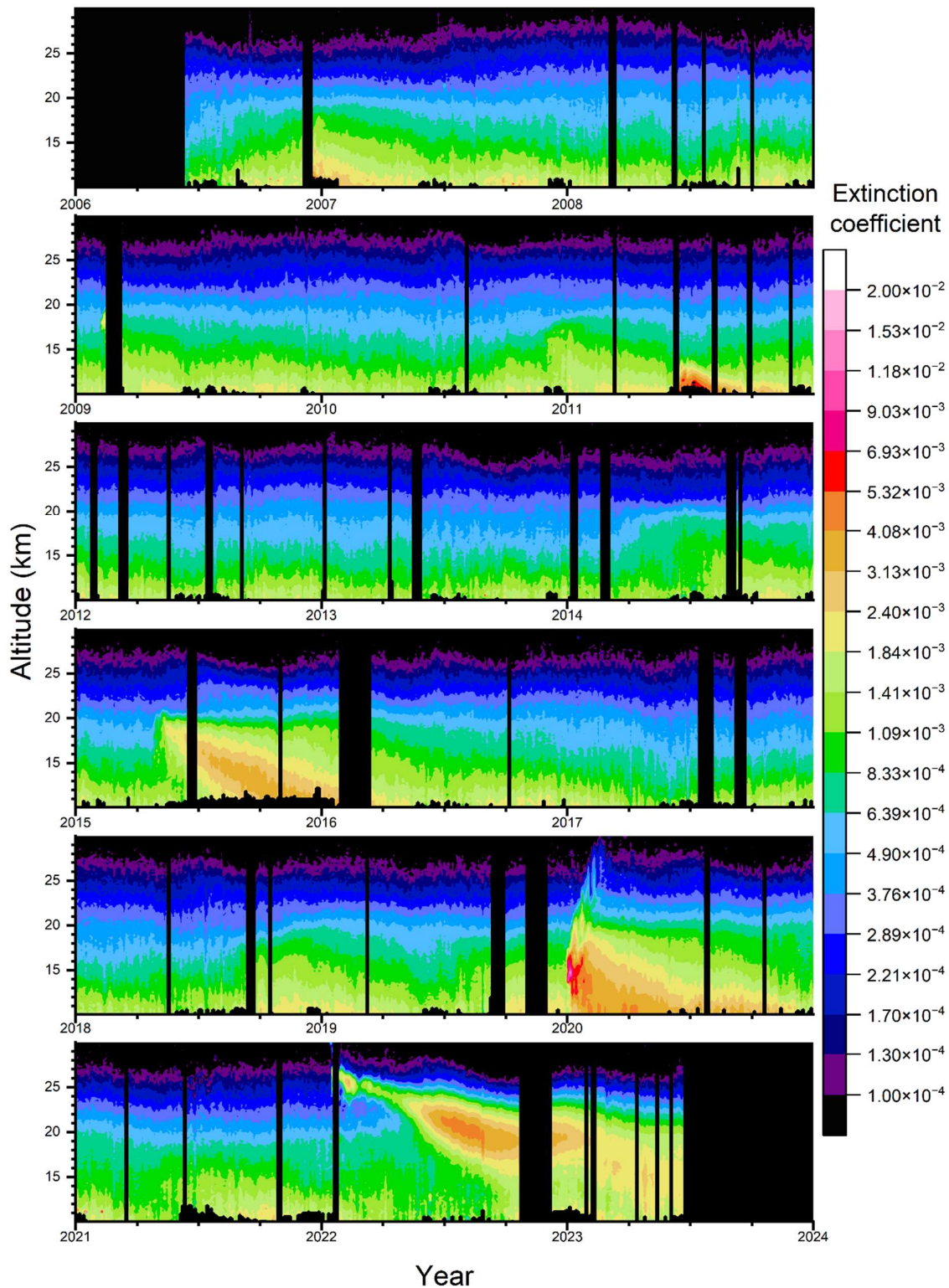
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18 Figure S3. Aerosol scattering integrated from the tropopause to the 380 K isentropes (the  
 19 lowermost stratosphere) averaged over 4 days and 3 degrees in latitude. Color scale:  
 20 Global AOD contribution per degree of latitude, i.e. the sum over latitude is the total  
 21 AOD of the layer.

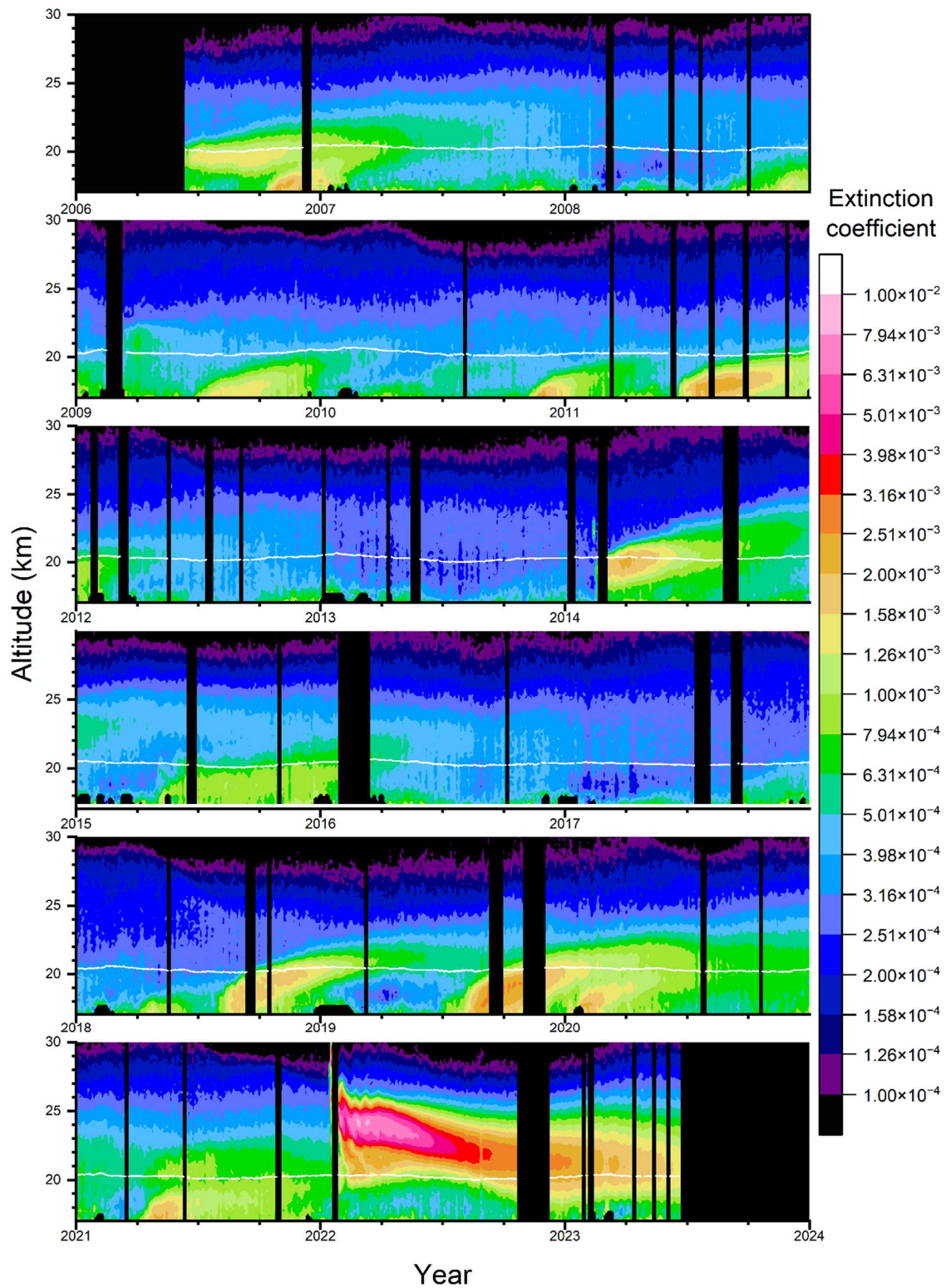
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24 Figure S4. Aerosol extinction coefficient ( $\text{km}^{-1}$ ) in the Southern hemisphere (latitudes -80  
 25 to  $-20^\circ$ ) from 10 to 30 km altitude. The data have not been latitude weighted.

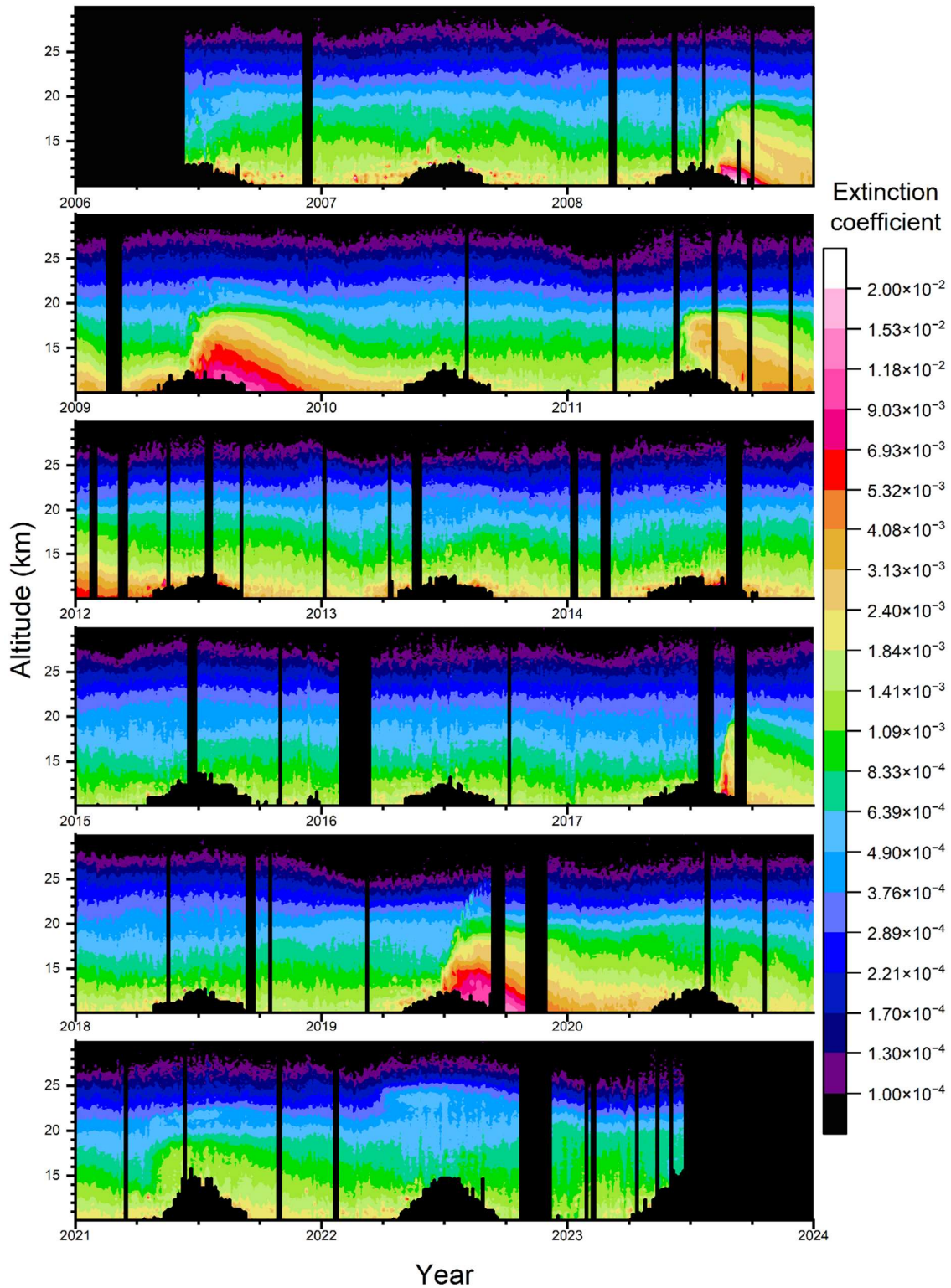
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28 Figure S5. Aerosol extinction coefficient ( $\text{km}^{-1}$ ) in the Tropics (latitudes  $-20$  to  $20^\circ$ ) from  
 29 17 to 30 km altitude. The data have not been latitude weighted. The white line shows the  
 30 470 K isentrope.

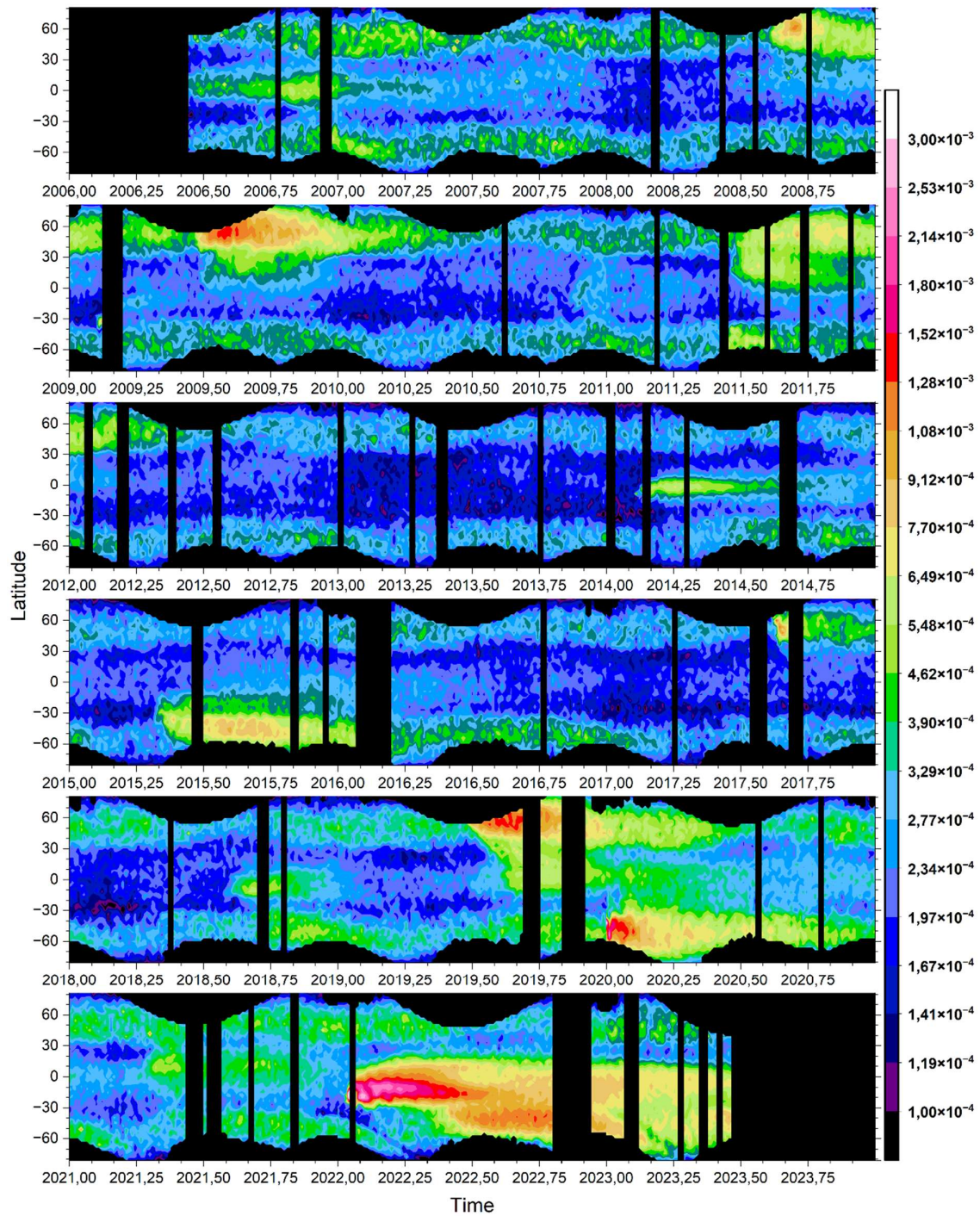
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33 Figure S6. Aerosol extinction coefficient ( $\text{km}^{-1}$ ) in the Northern hemisphere (latitudes 80  
 34 to  $20^\circ$ ) from 10 to 30 km altitude. The data have not been latitude weighted.

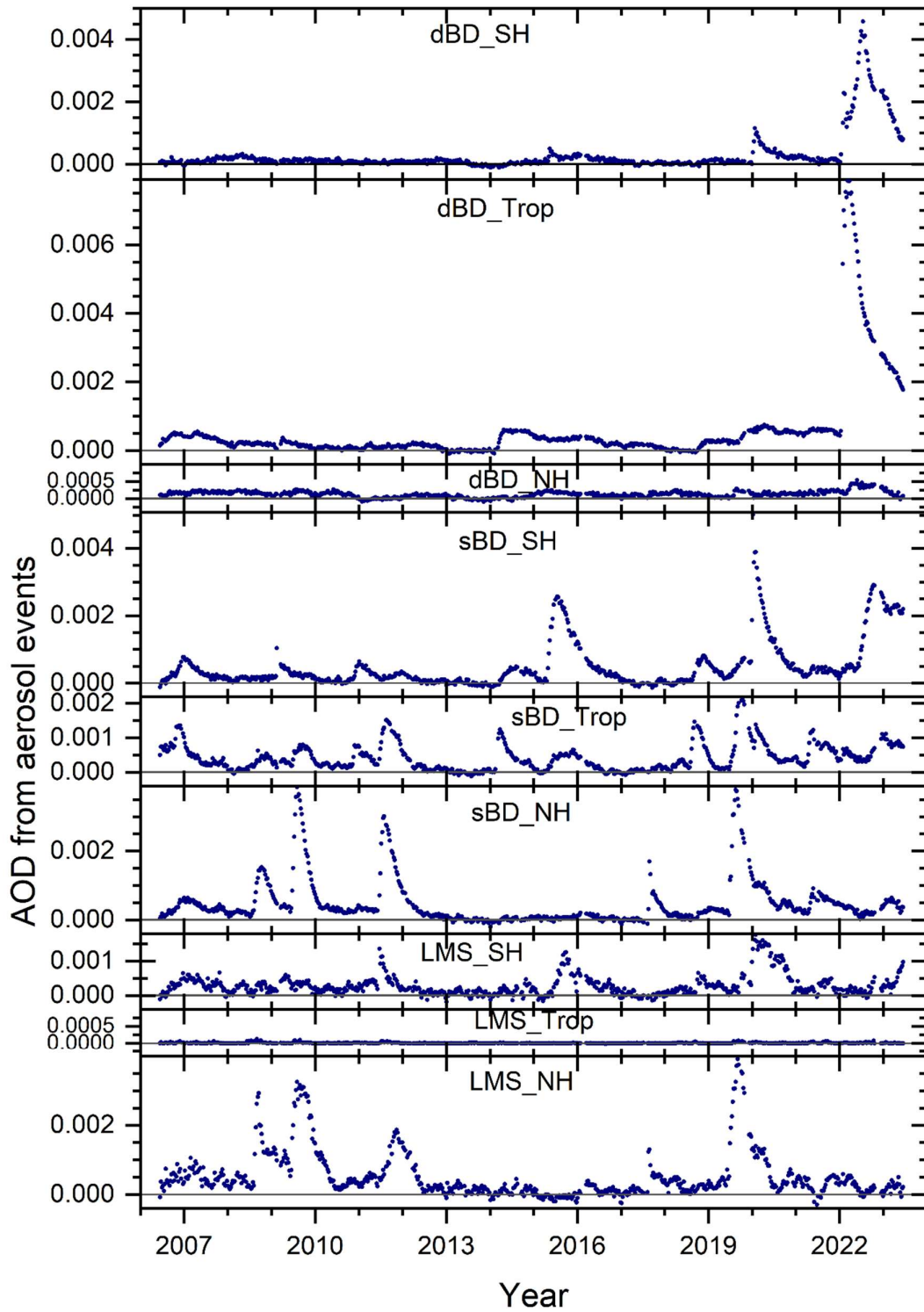
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37 Figure S7. Aerosol scattering integrated from the tropopause to 35 km altitude averaged  
 38 over 4 days and 3 degrees in latitude. Color scale: Global AOD contribution per degree  
 39 of latitude, i.e. the sum over latitude is the total AOD of the layer. The missing data at  
 40 high latitudes show where Figures 3 - 5, S1 – S6 were extrapolated.

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43 Fig. S8. Stratospheric AOD based on lidar ratio of 50 Sr after subtraction of background  
 44 scattering (Figure 7) in nine latitude and altitude regions. The sum of the nine AOD  
 45 curves displayed is the average AOD from the tropopause to 35 km altitude in the  
 46 latitude range -80 to 80°.

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