



Supplement of

ML-TOMCAT: machine-learning-based satellite-corrected global stratospheric ozone profile data set from a chemical transport model

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TOMCAT and datasets timeseries, 15° lat

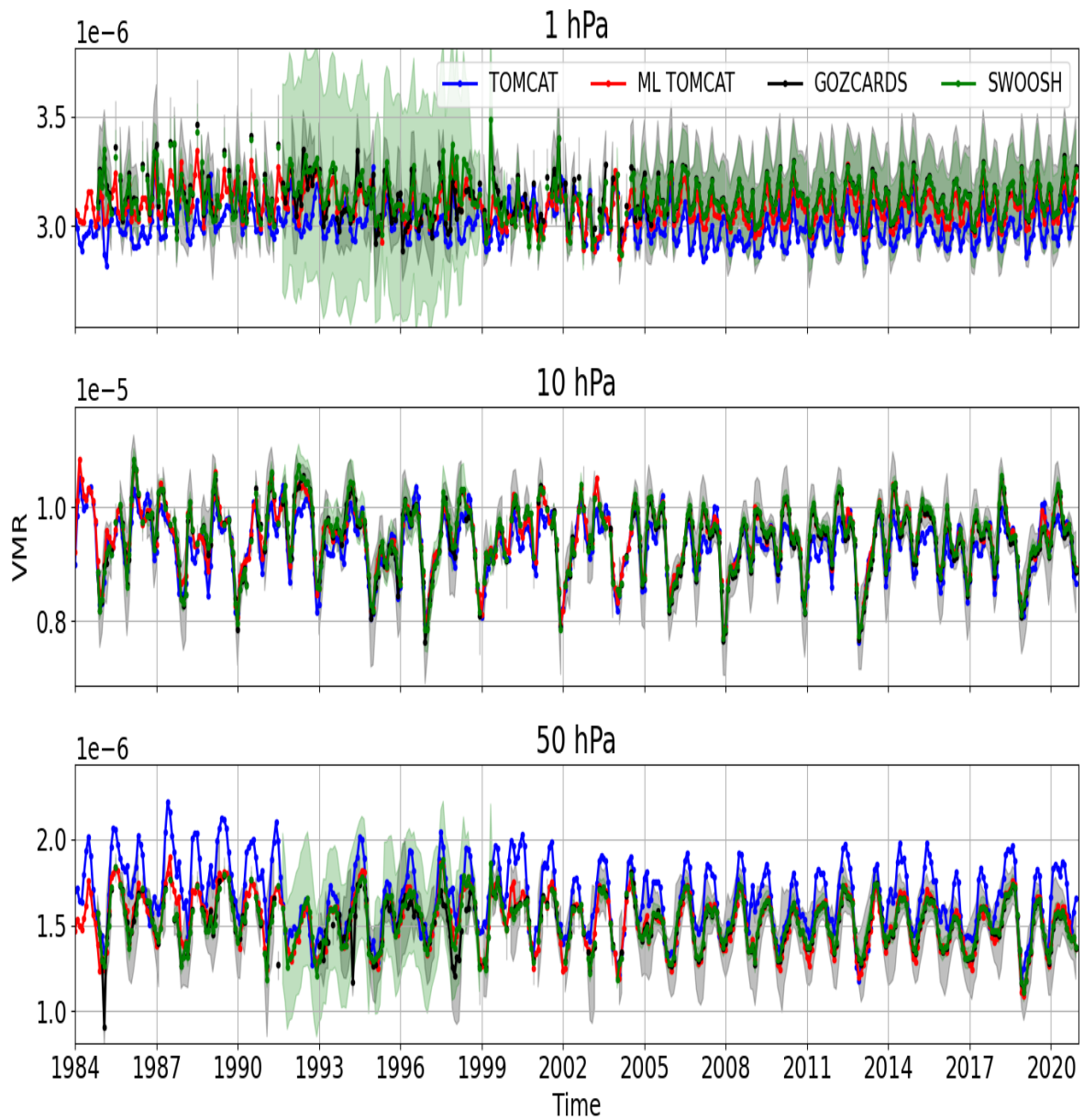


Figure S1. Comparison between TOMCAT, ML-TOMCAT, SWOOSH Davis et al. (2016) and GOZCARDS Froidevaux et al. (2019) monthly mean zonal mean ozone at 15°N

TOMCAT and datasets timeseries, -15° lat

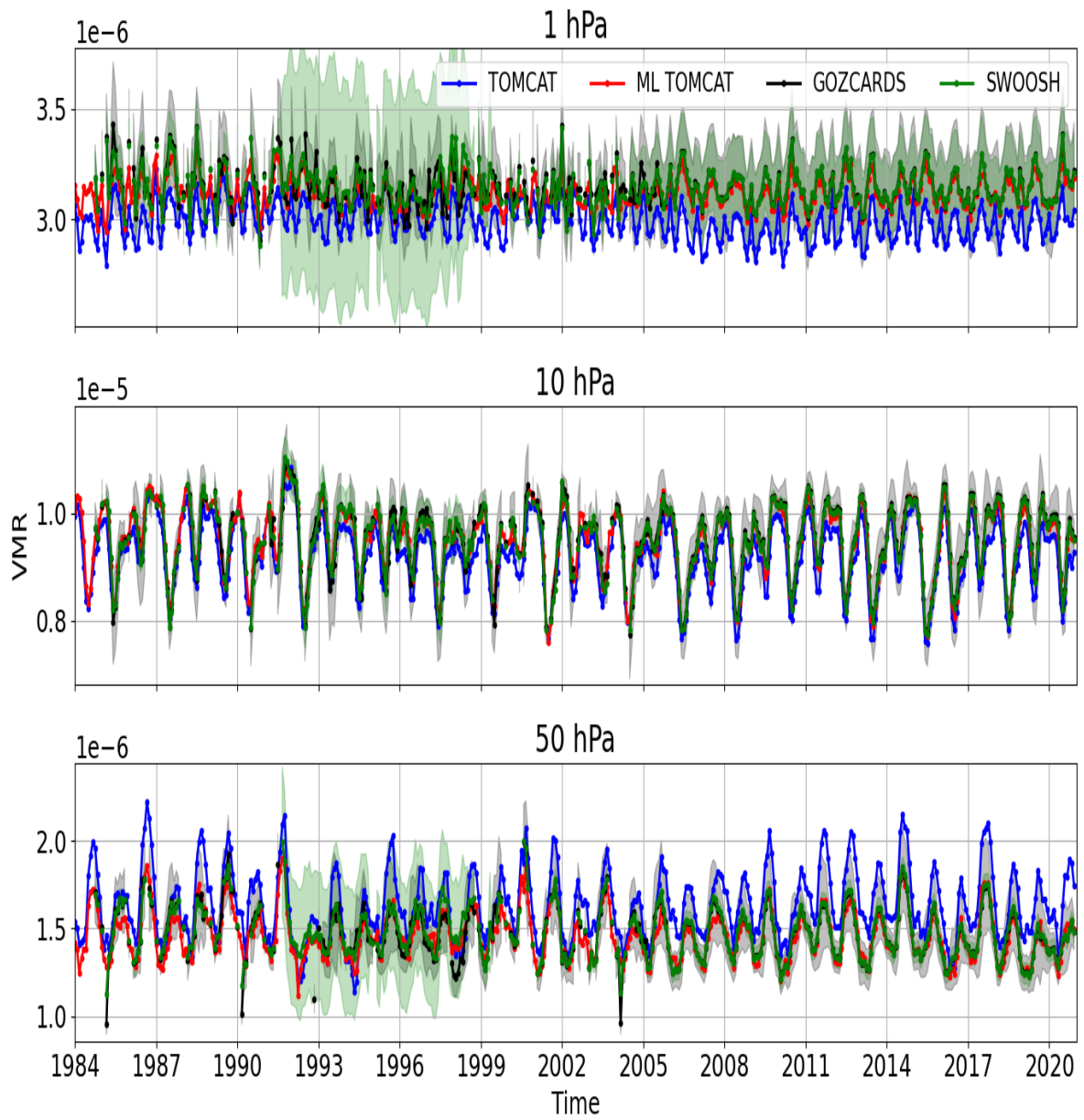


Figure S2. Same as S1 but for ozone at 15°S

TOMCAT and datasets timeseries, 30° lat

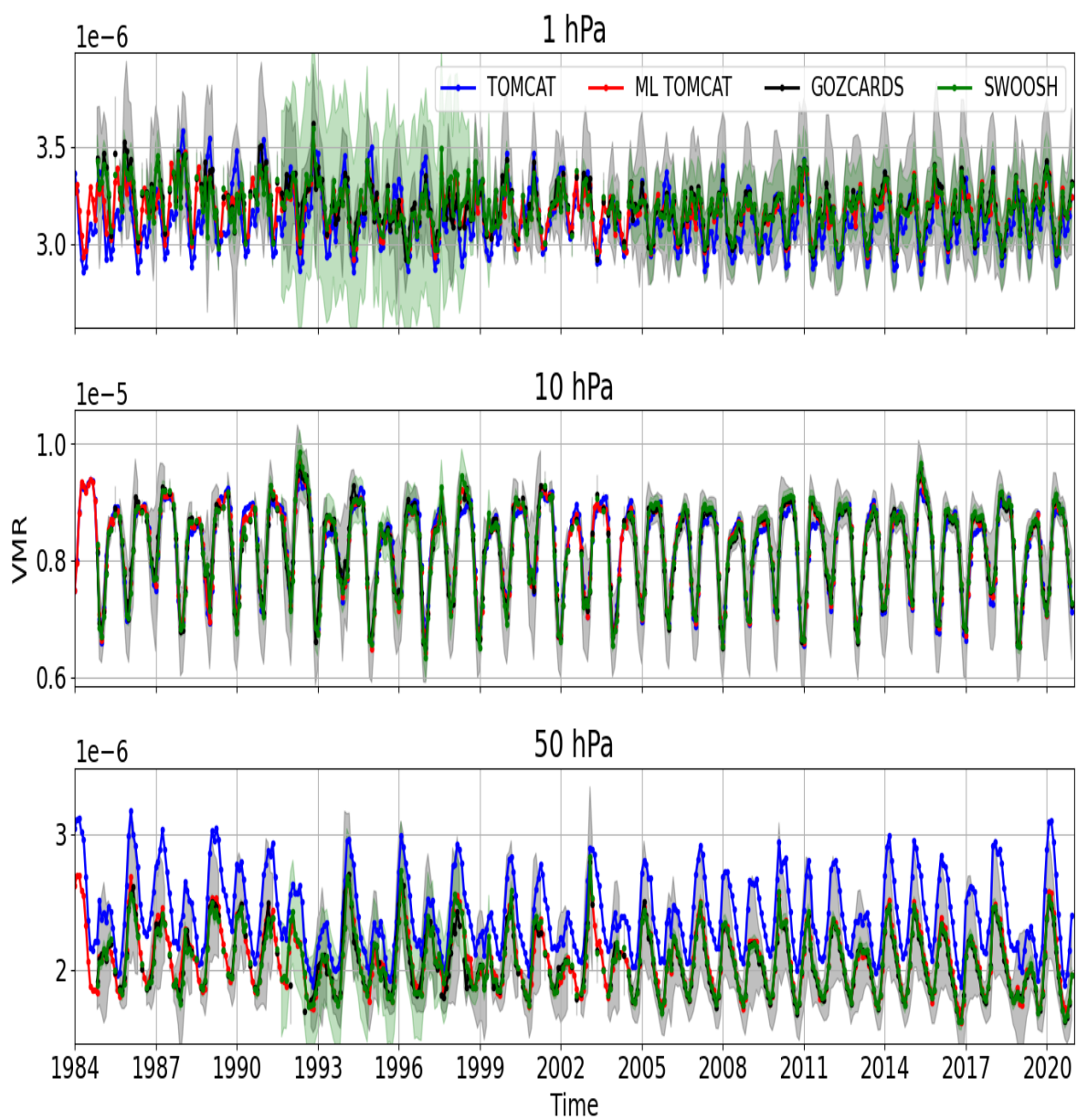


Figure S3. Same as S1 but for ozone at 30°N

TOMCAT and datasets timeseries, -30° lat

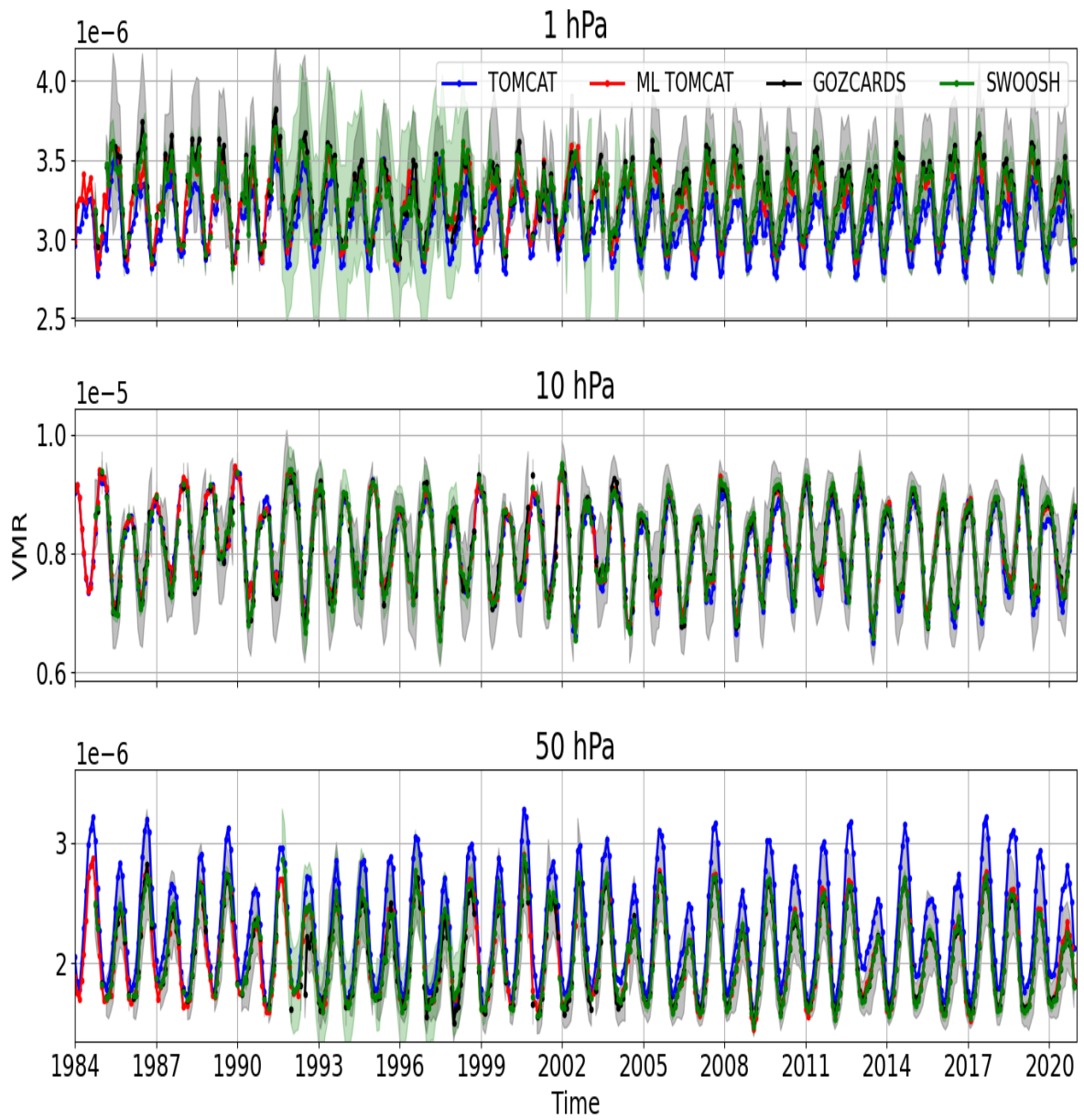


Figure S4. Same as S1 but for ozone at 30°S

TOMCAT and datasets timeseries, 45° lat

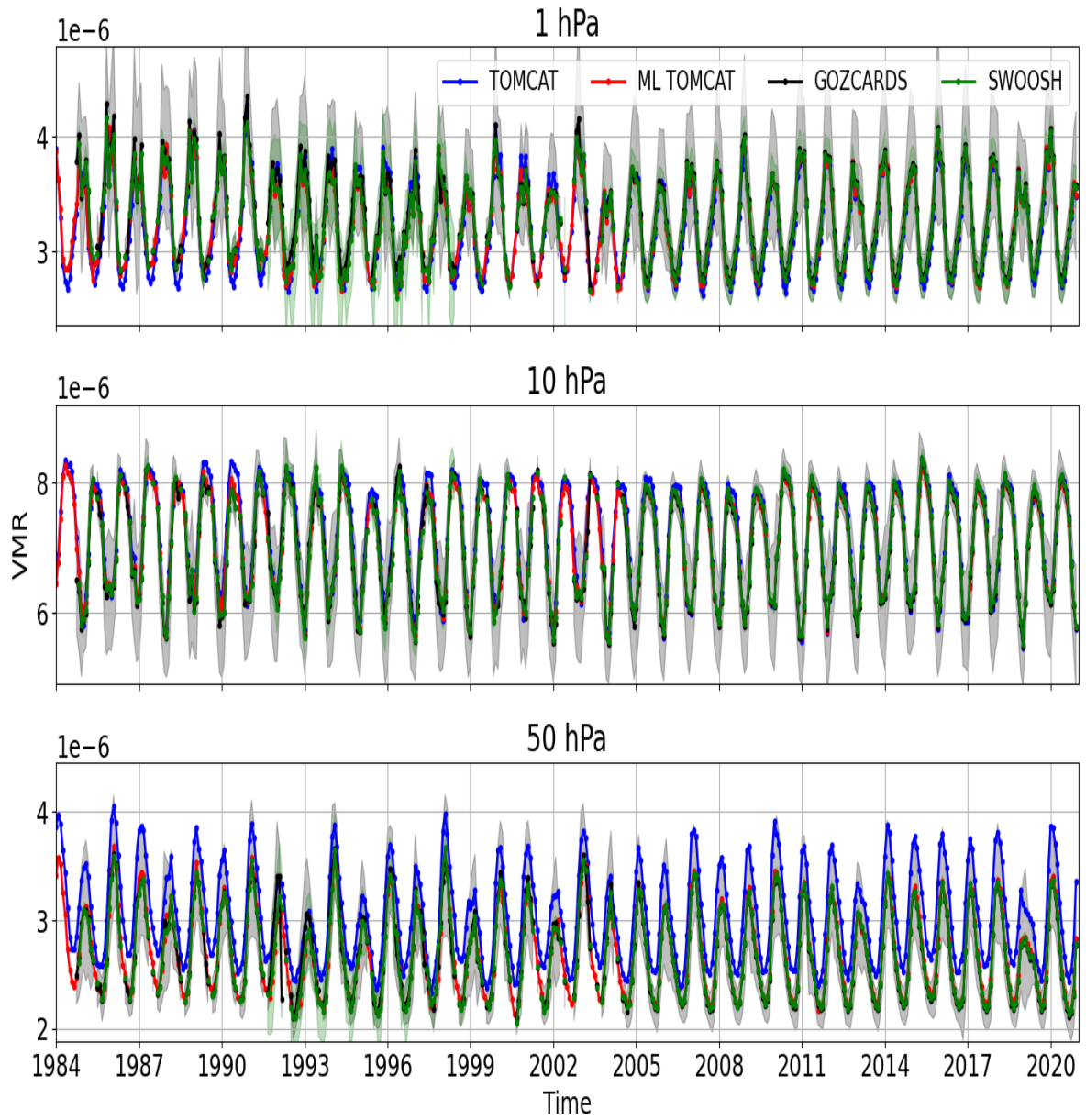


Figure S5. Same as S1 but for ozone at 45°N

TOMCAT and datasets timeseries, -45° lat

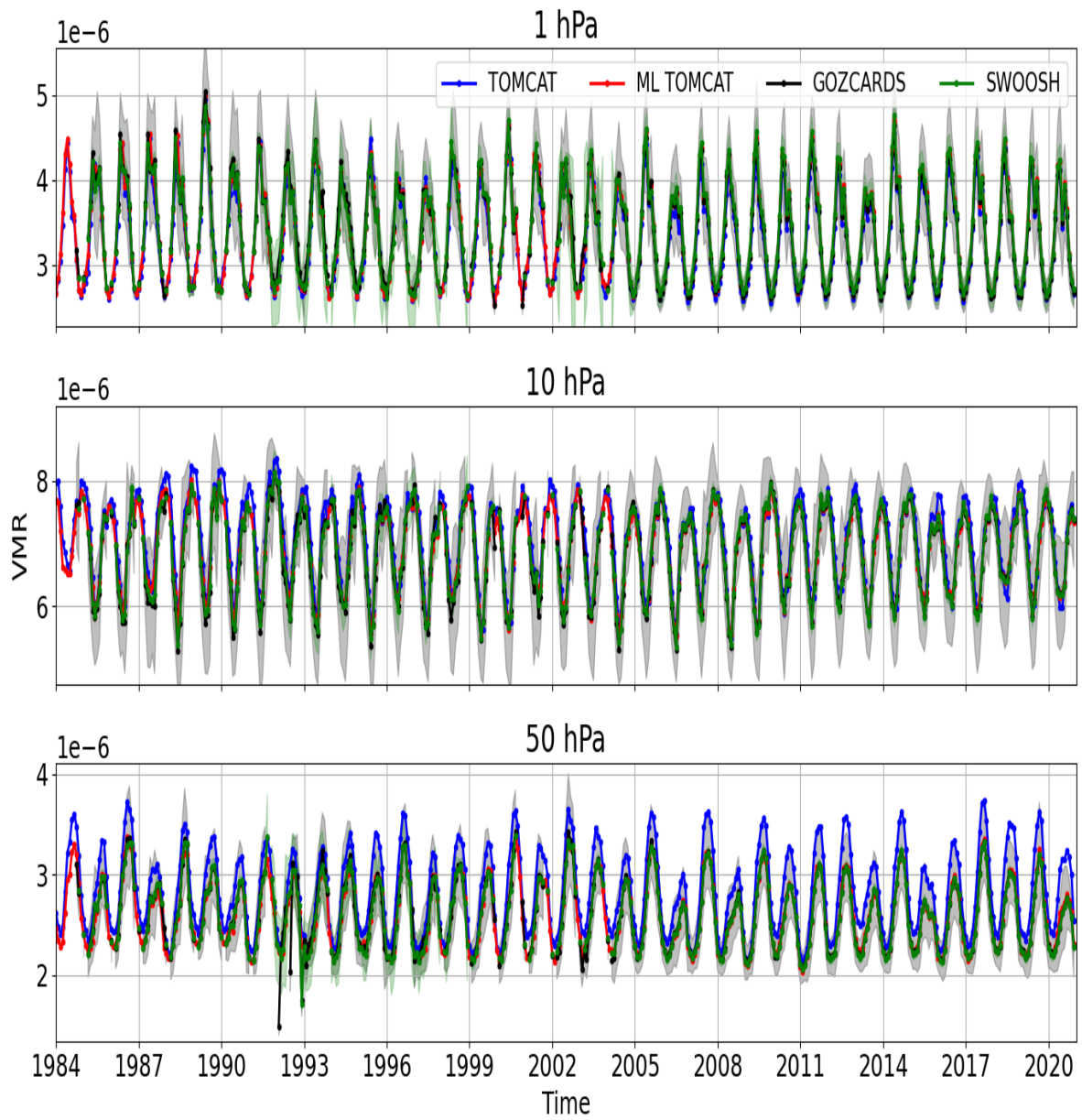


Figure S6. Same as S1 but for ozone at 45°S

TOMCAT and datasets timeseries, 60° lat

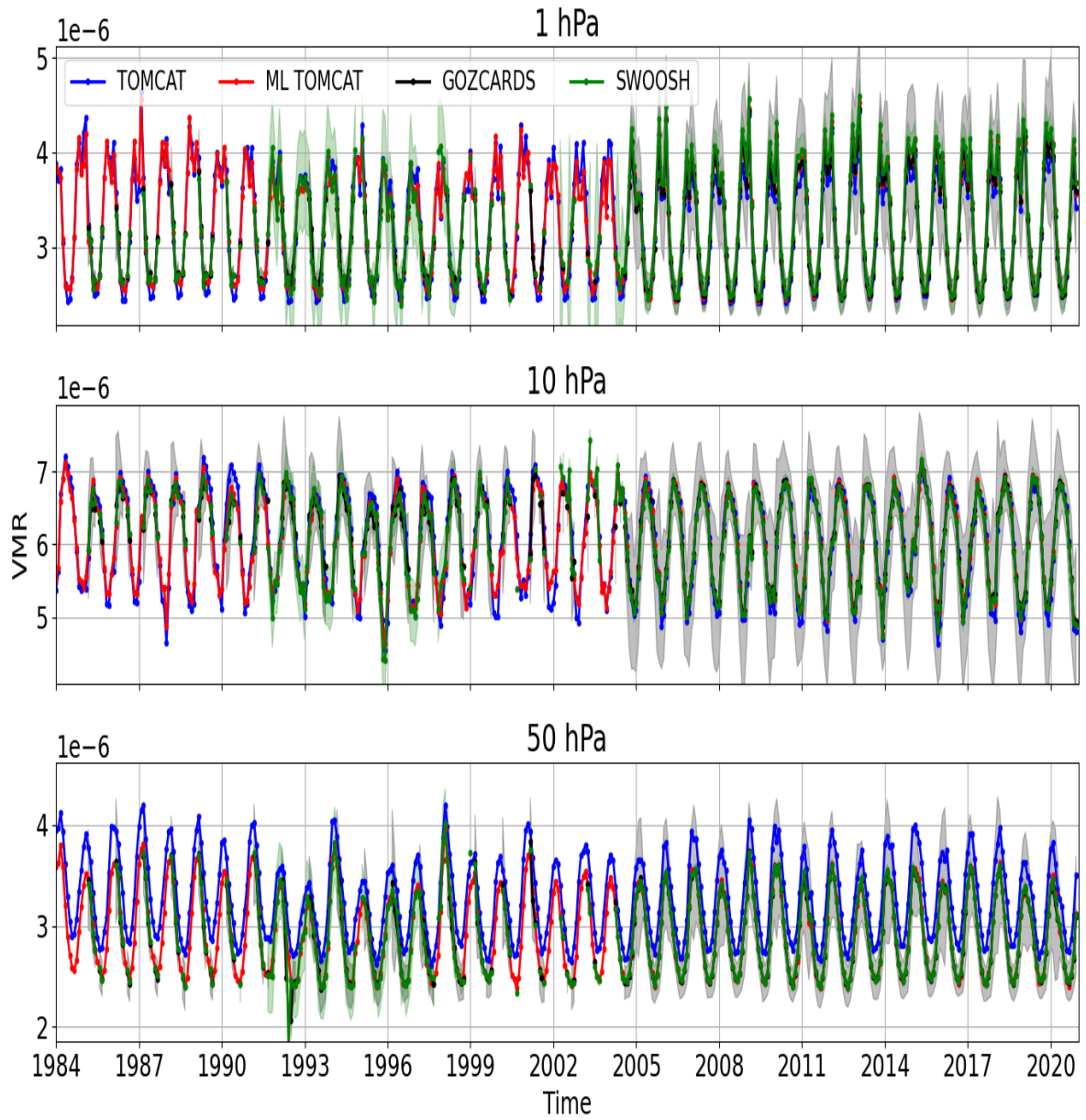


Figure S7. Same as S1 but for ozone at 60°N

TOMCAT and datasets timeseries, -60° lat

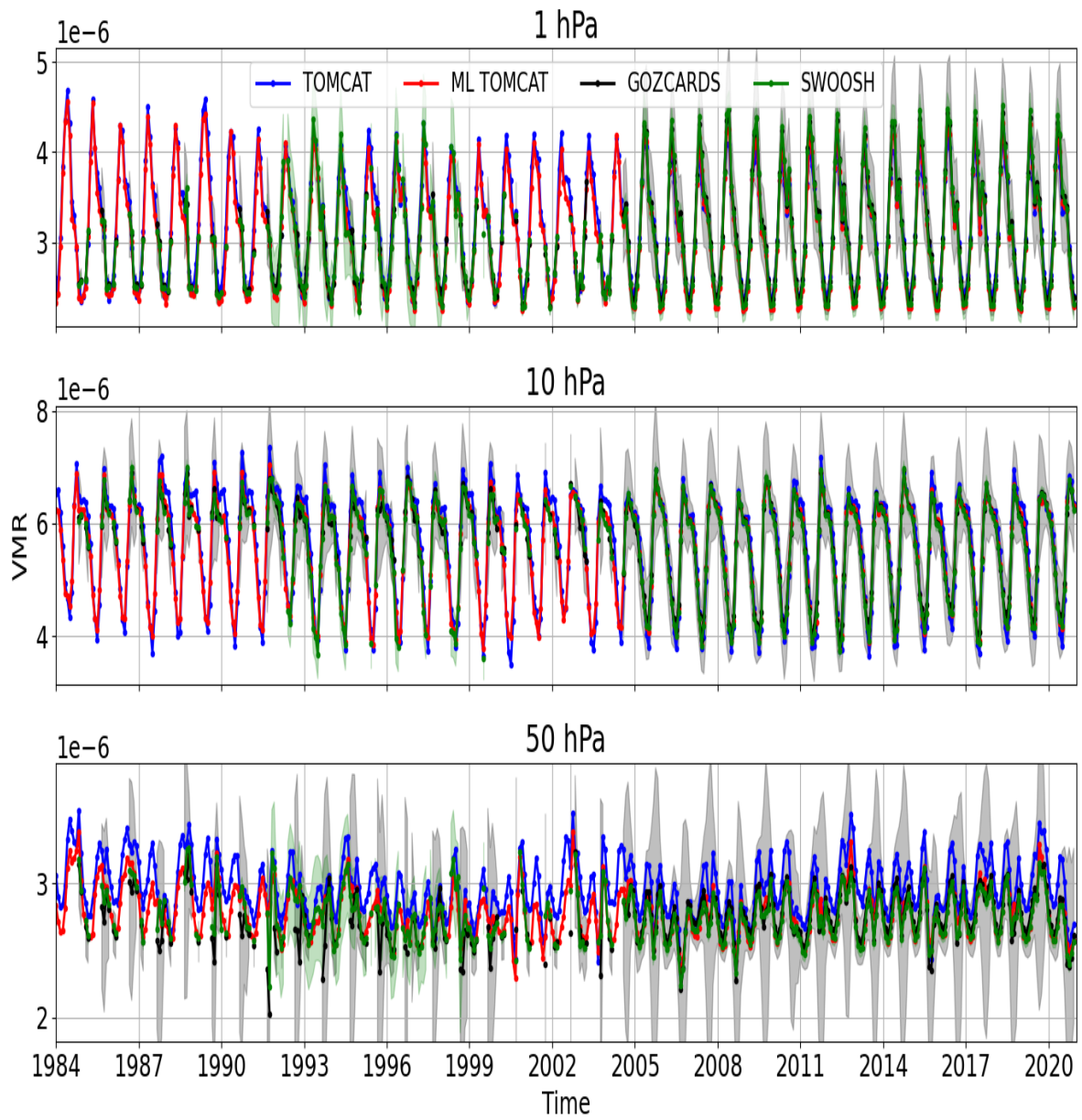


Figure S8. Same as S1 but for ozone at 60°S

TOMCAT and datasets timeseries, 75° lat

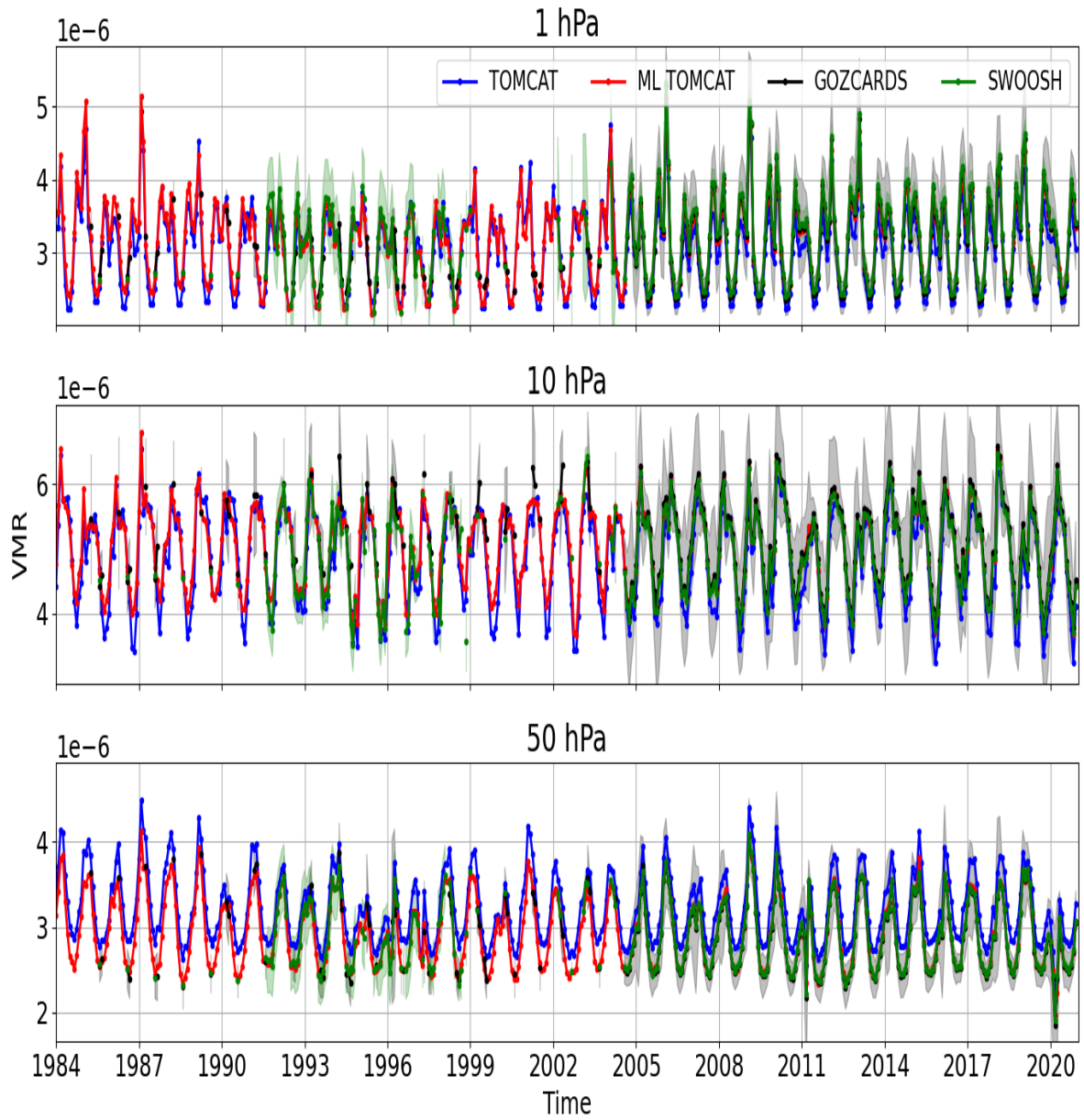


Figure S9. Same as S1 but for ozone at 75°N

TOMCAT and datasets timeseries, -75° lat

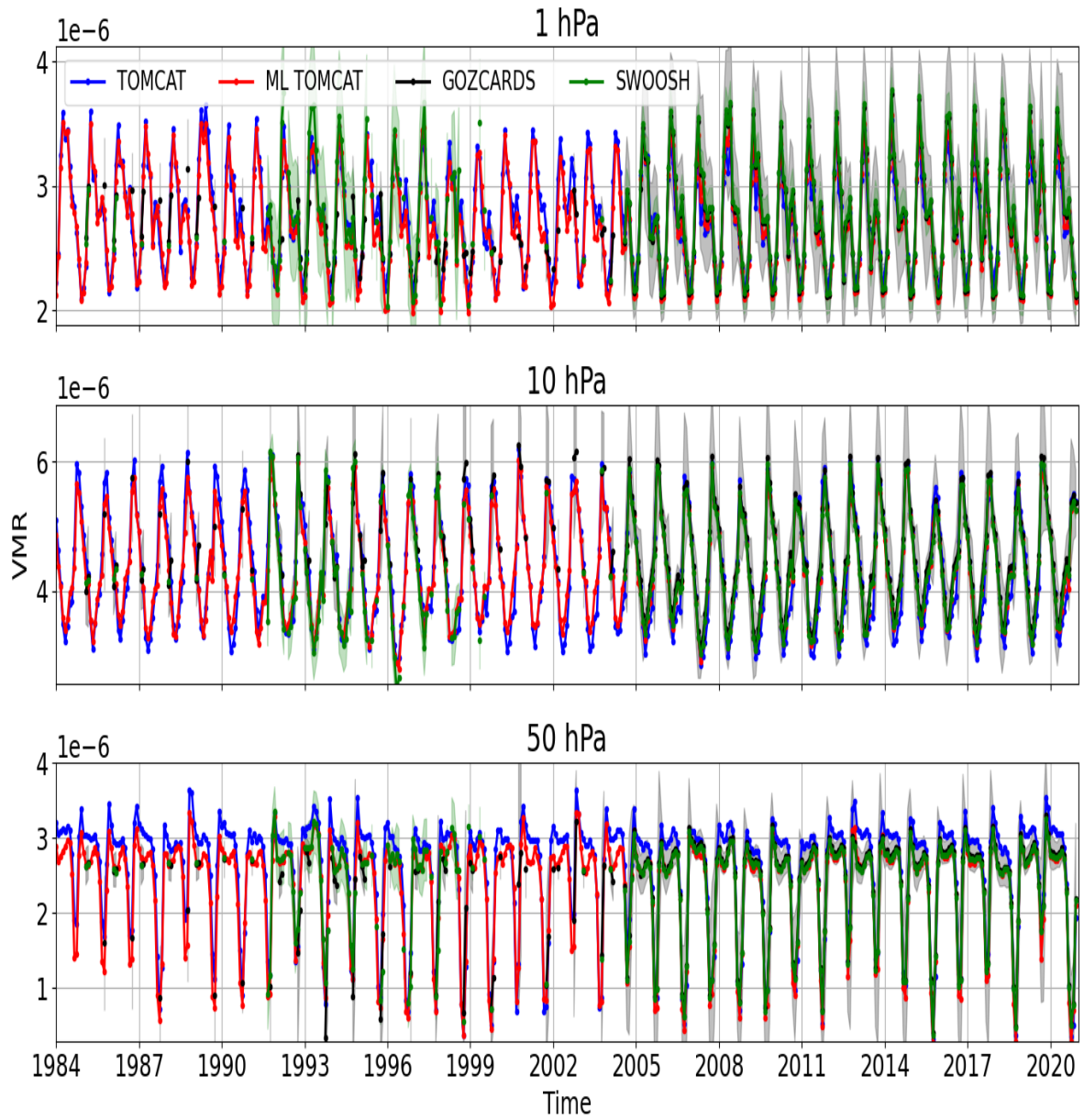


Figure S10. Same as S1 but for ozone at 75°S

TOMCAT and datasets timeseries, 15° lat

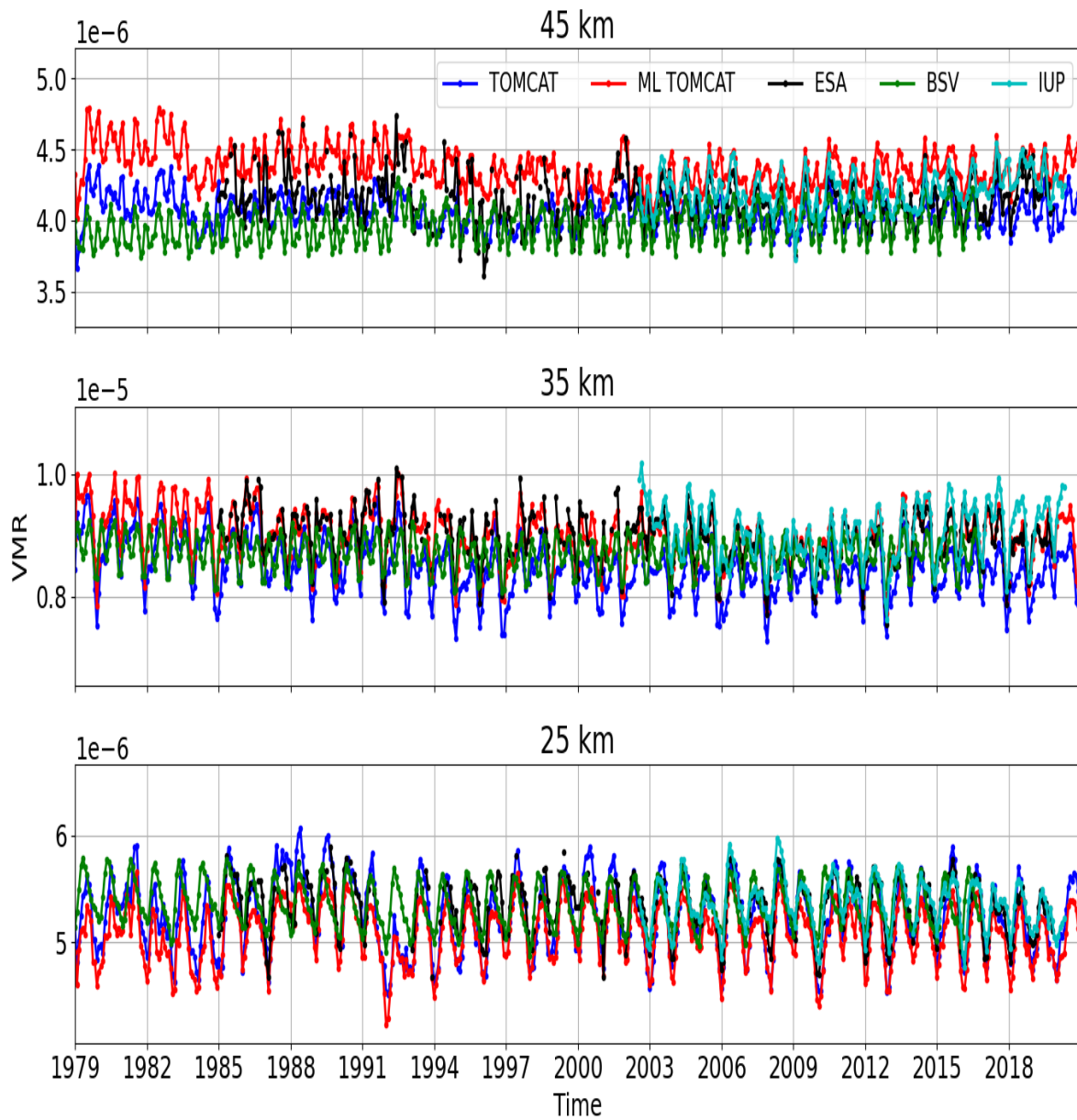


Figure S11. Comparison between TOMCAT, ML-TOMCAT, ESA-CCI, IUP (Arosio et al., 2018) and BSVert (Hassler et al., 2018) monthly mean zonal mean ozone at 15°N at (bottom) 25 km, (middle) 35 km and (top) 45 km.

TOMCAT and datasets timeseries, -15° lat

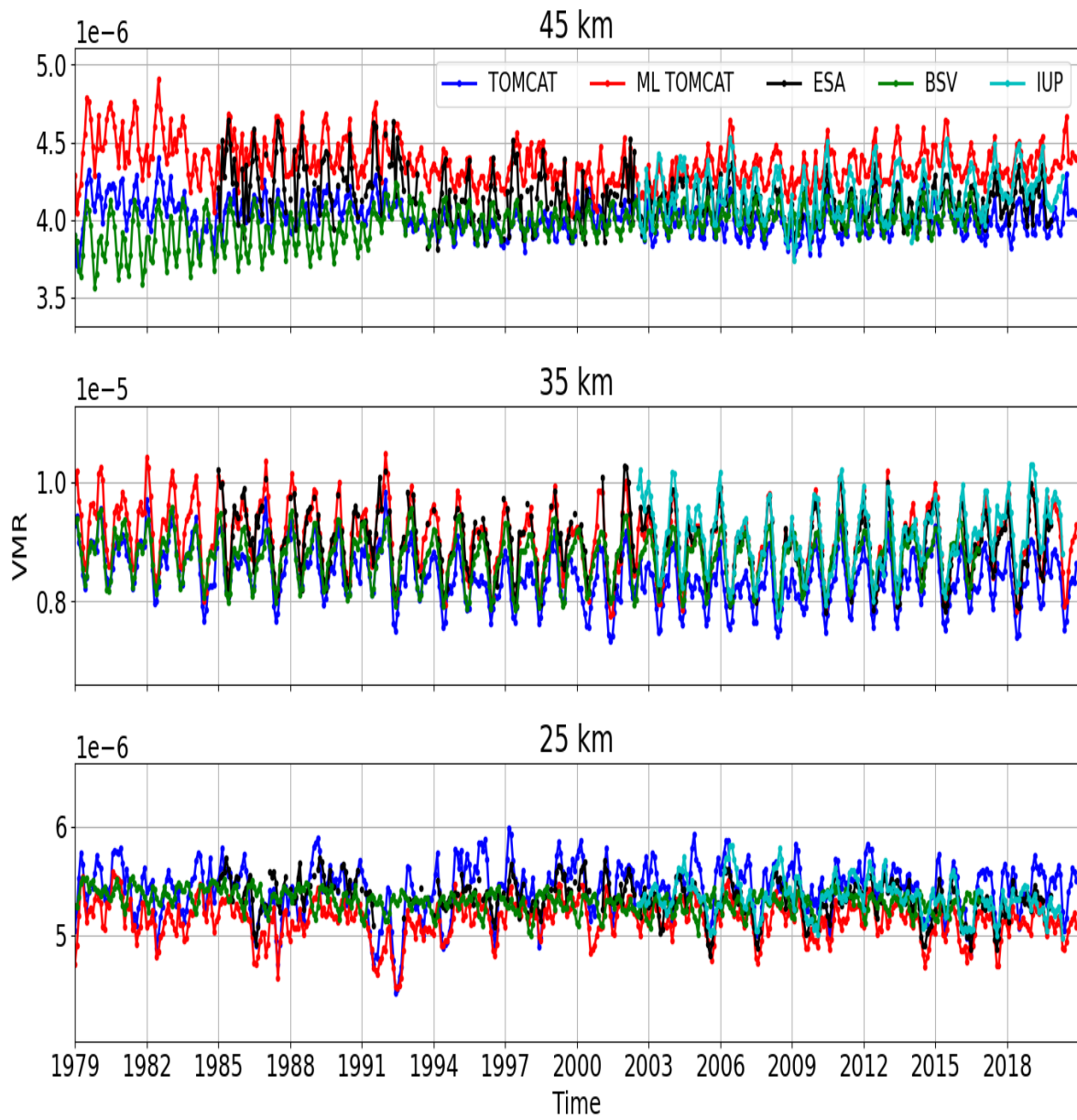


Figure S12. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, 30° lat

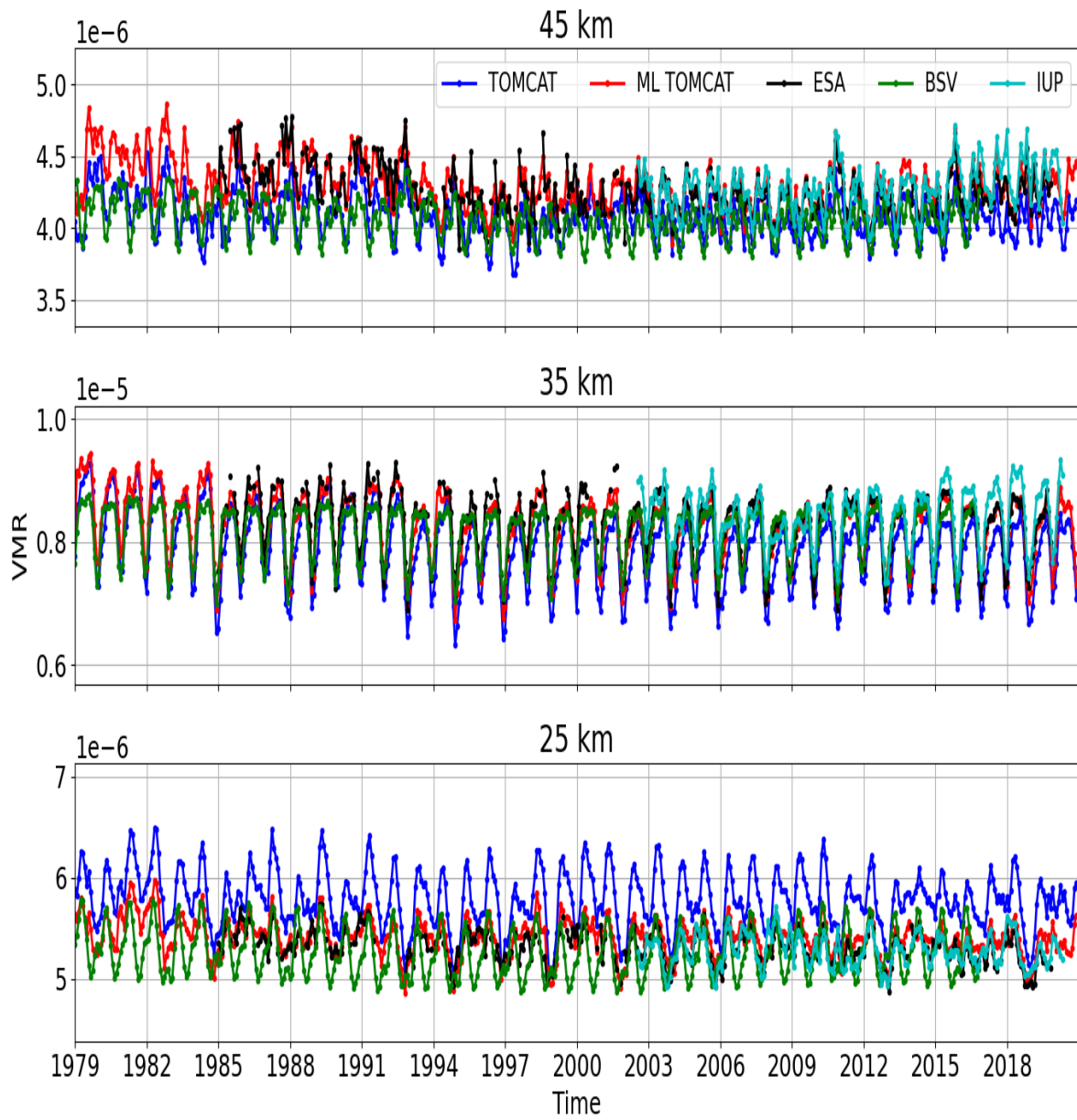


Figure S13. Same as S11 but for ozone at 30°N

TOMCAT and datasets timeseries, -30° lat

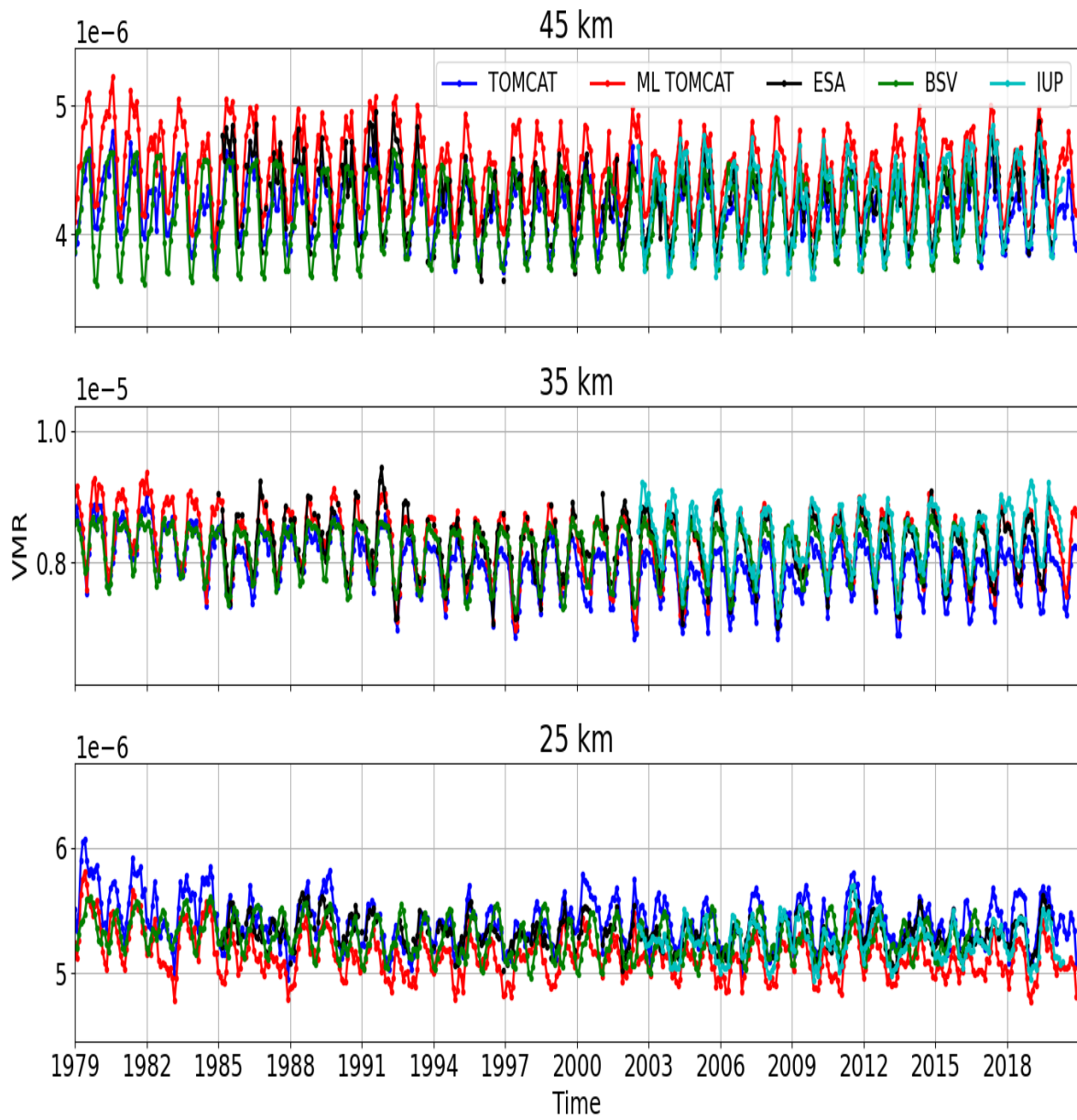


Figure S14. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, 45° lat

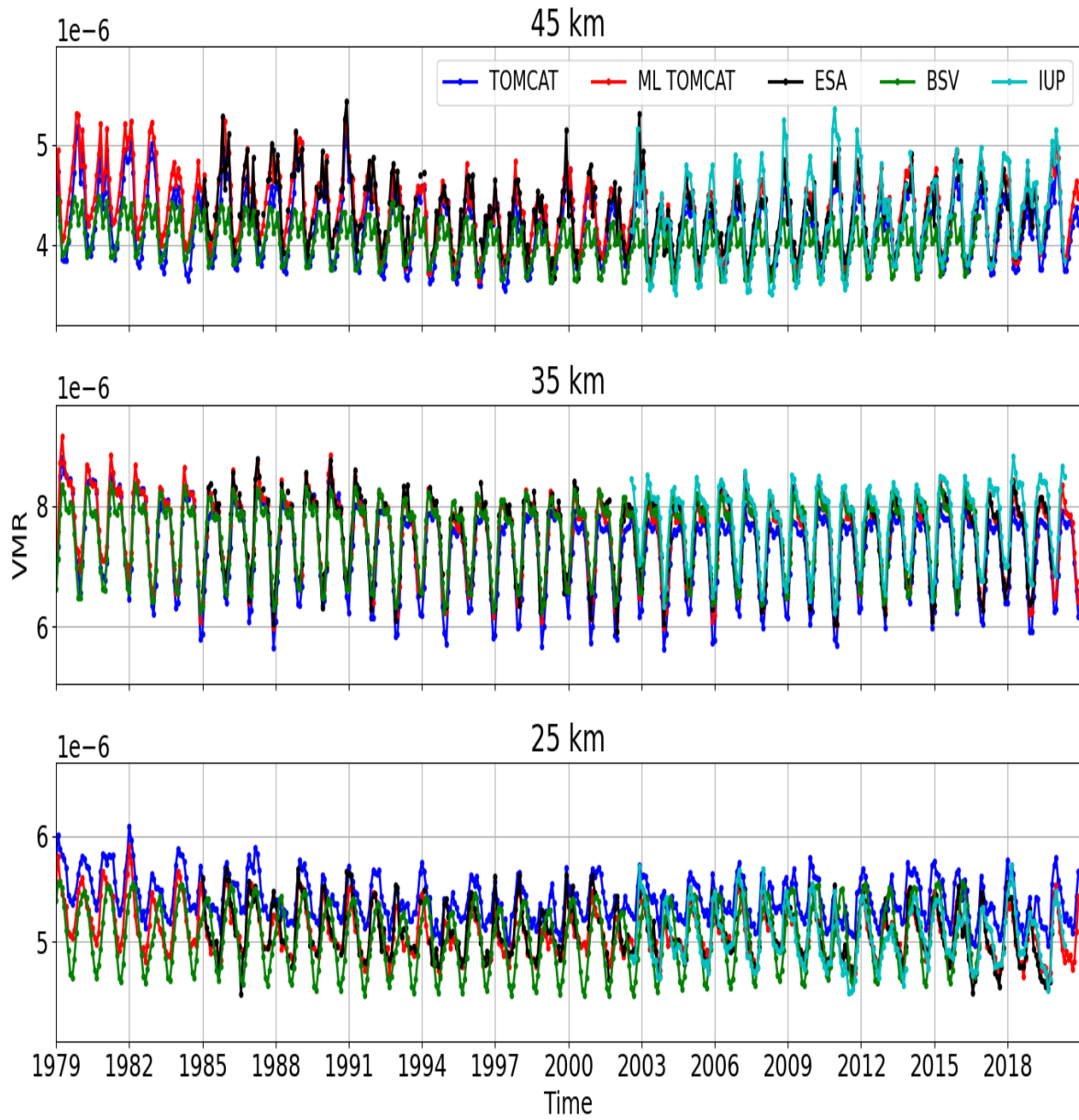


Figure S15. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, -45° lat

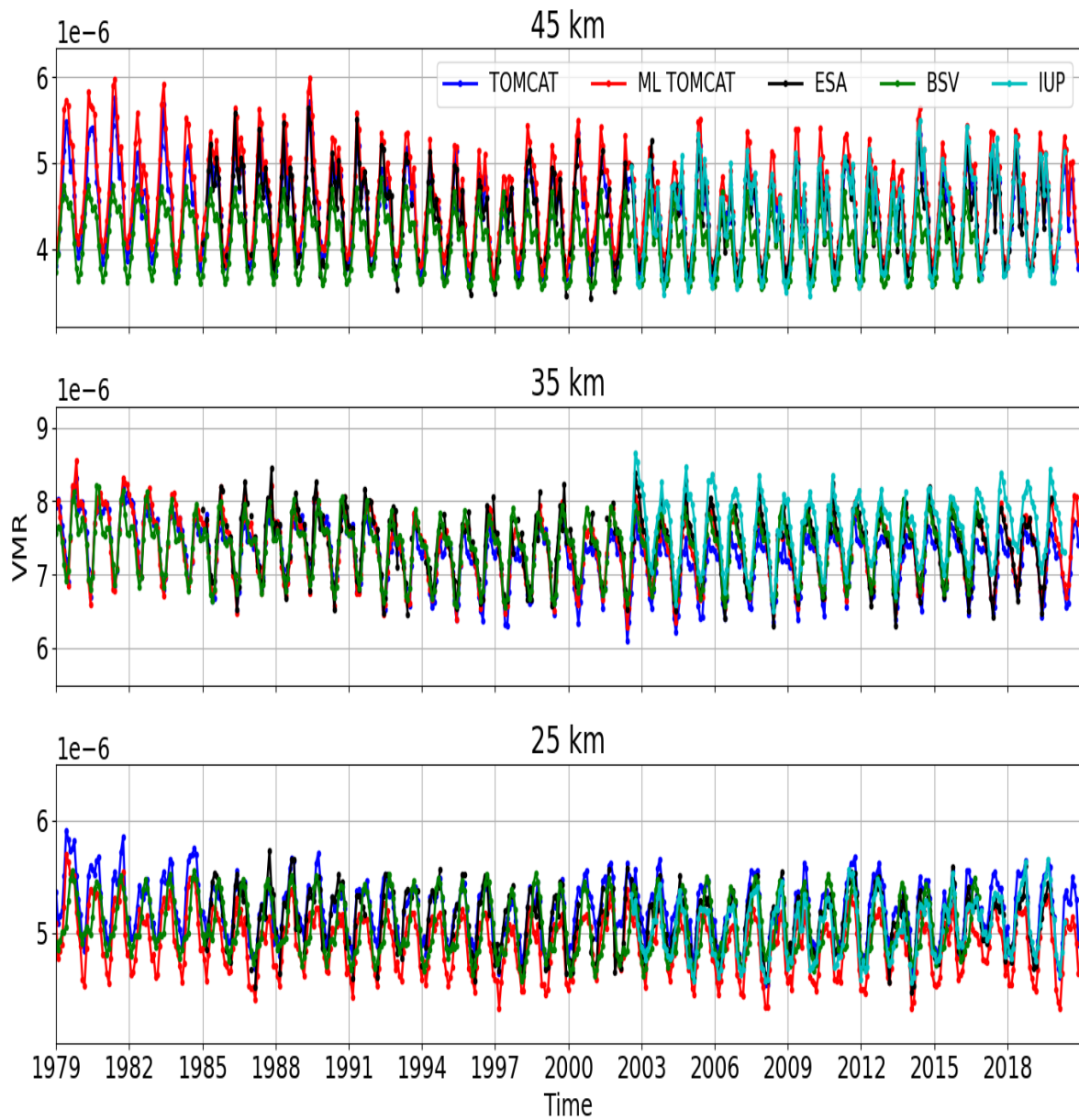


Figure S16. Same as S11 but for ozone at 45°S

TOMCAT and datasets timeseries, 60° lat

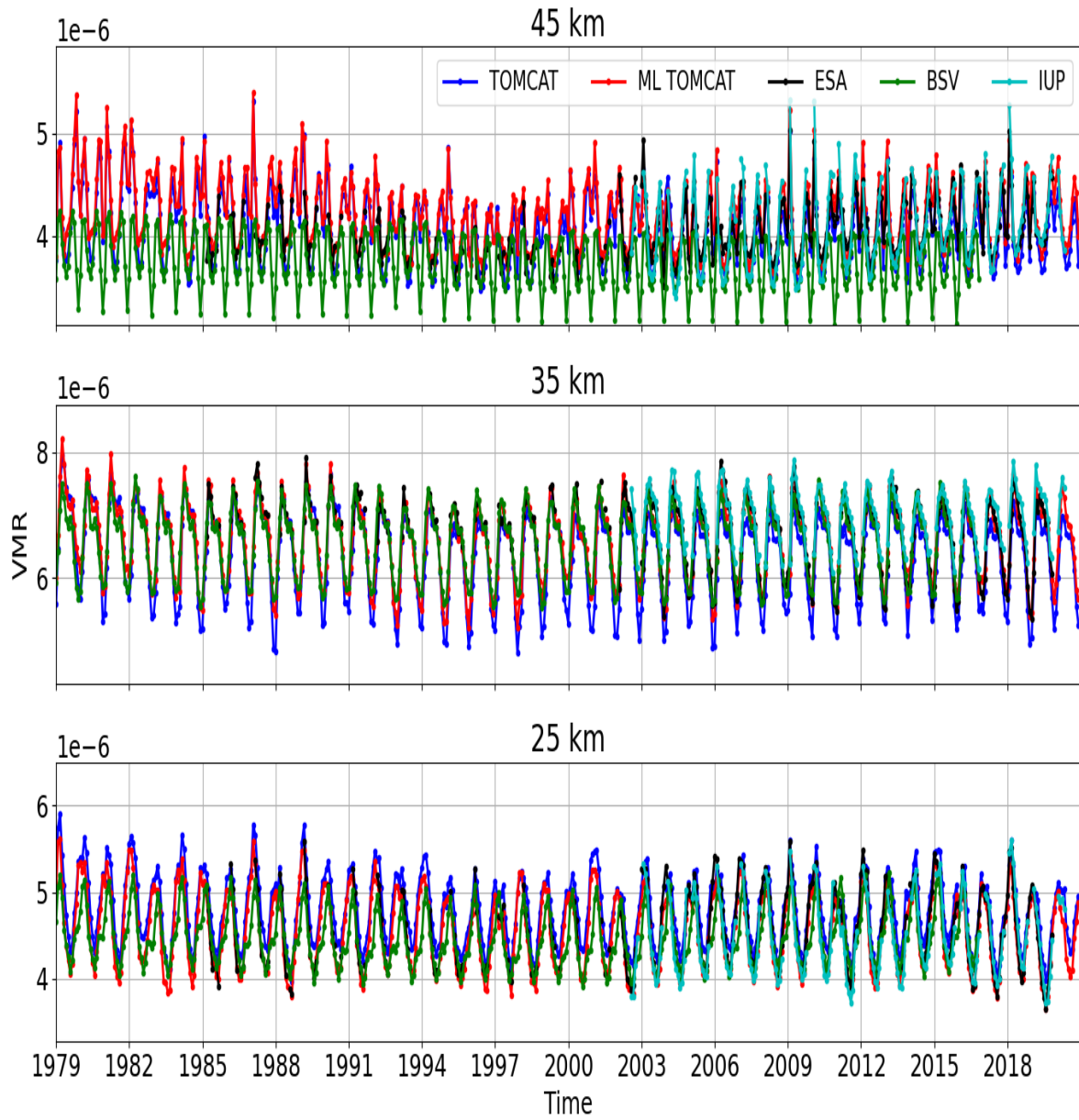


Figure S17. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, -60° lat

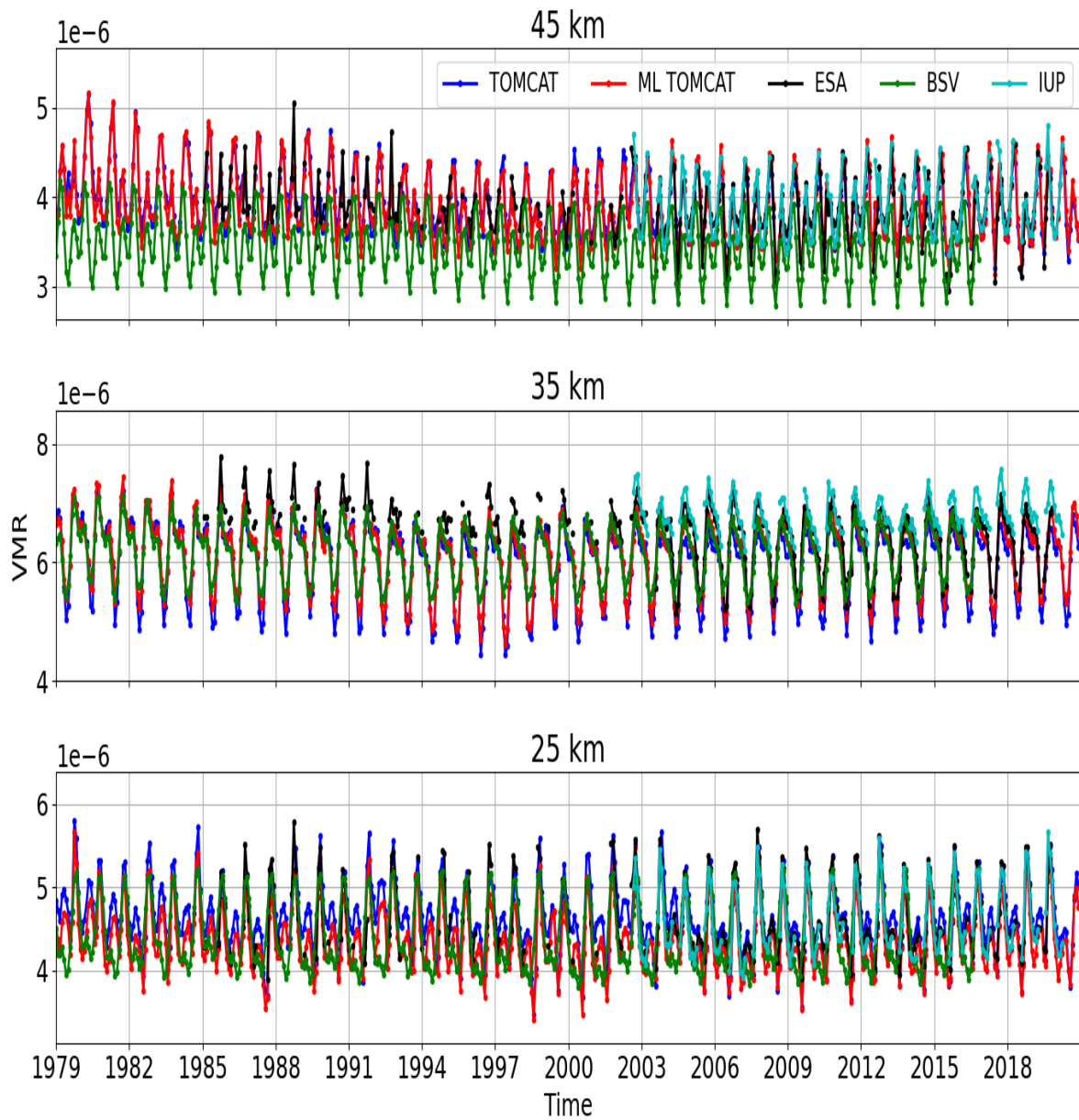


Figure S18. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, 75° lat

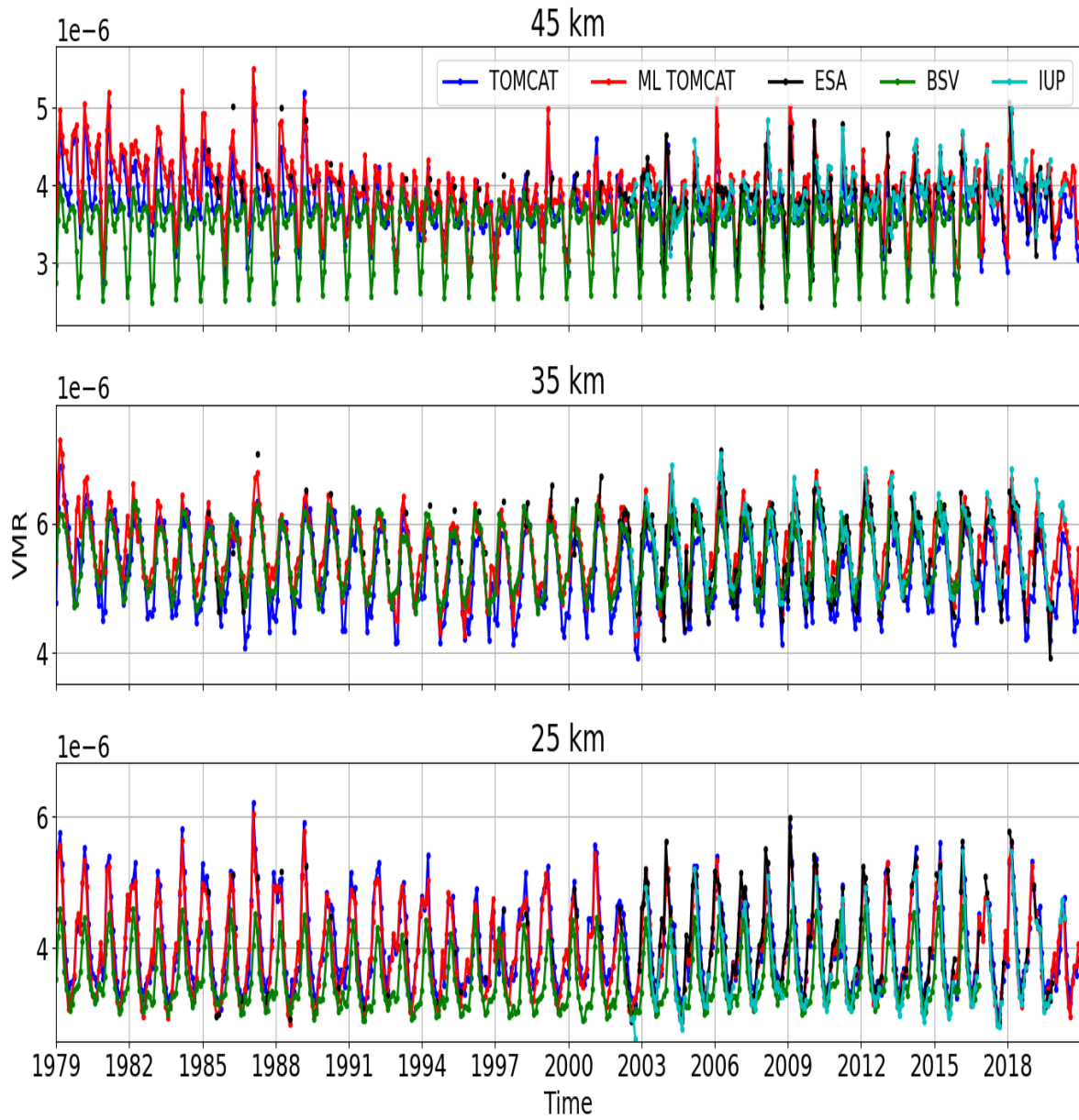


Figure S19. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, -75° lat

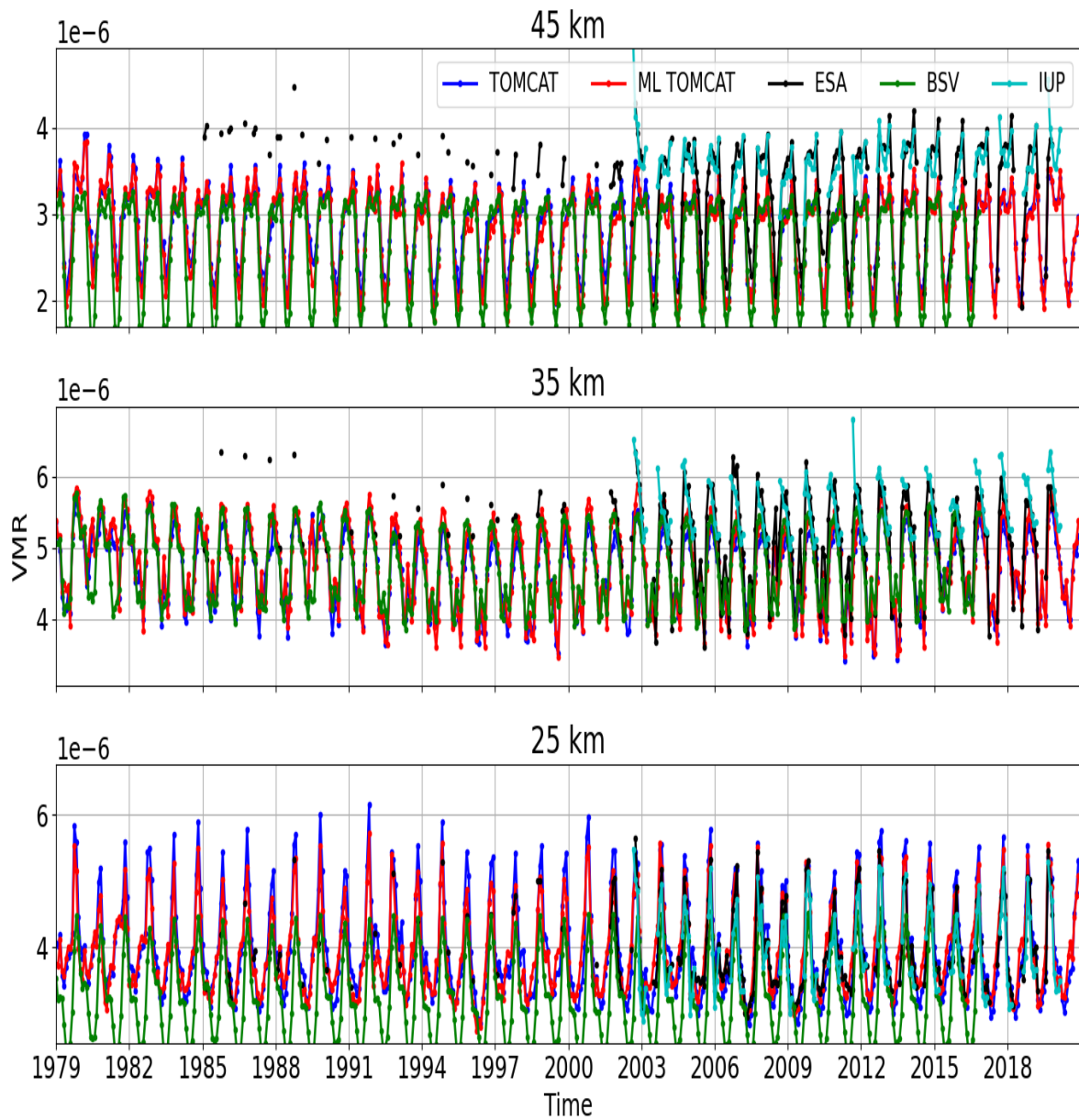


Figure S20. Same as S11 but for ozone at 15°S

TOMCAT and datasets timeseries, -75° lat

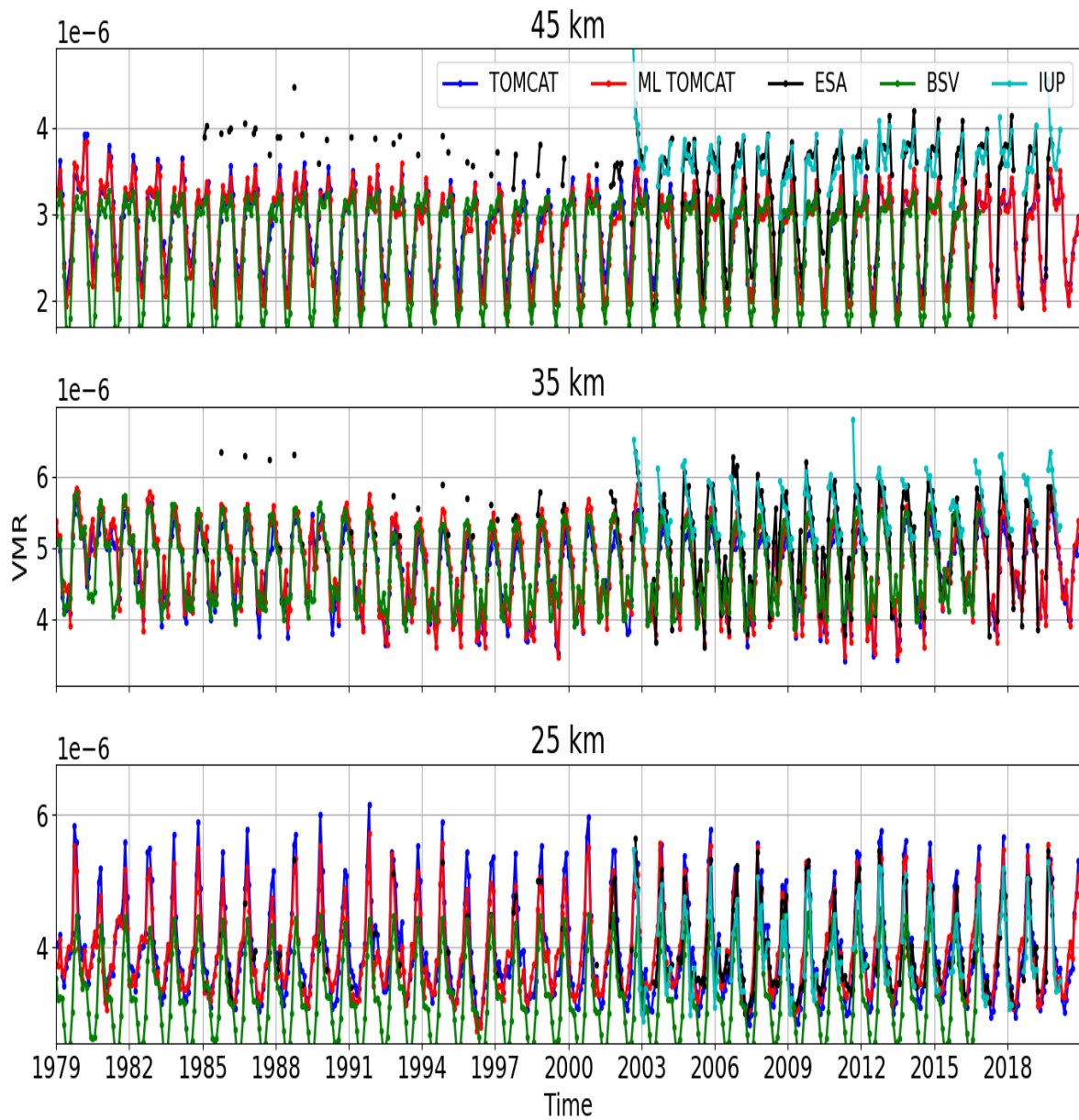


Figure S21. Same as S11 but for ozone at 15°S

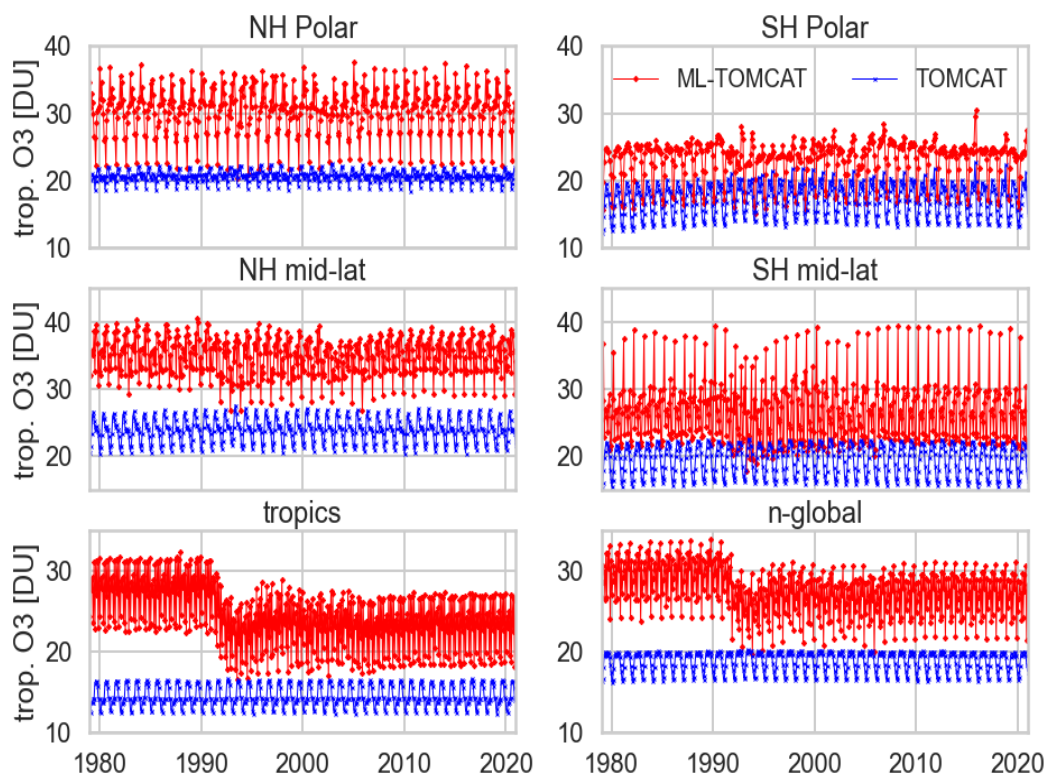


Figure S22. Tropospheric column comparison from ML-TOMCAT (red line) and TOMCAT (blue line) data set. Tropospheric columns are calculated by integrating number density profiles below 150 part per billion (ppb). Tropospheric column time series are shown for six latitude bins: Arctic (60°N - 90°N), Antarctic (60°S - 90°S), NH mid-latitude (35°N - 60°N), SH mid-latitude (35°S - 60°S), tropics (20°S - 20°N), and near global (60°S - 60°N).

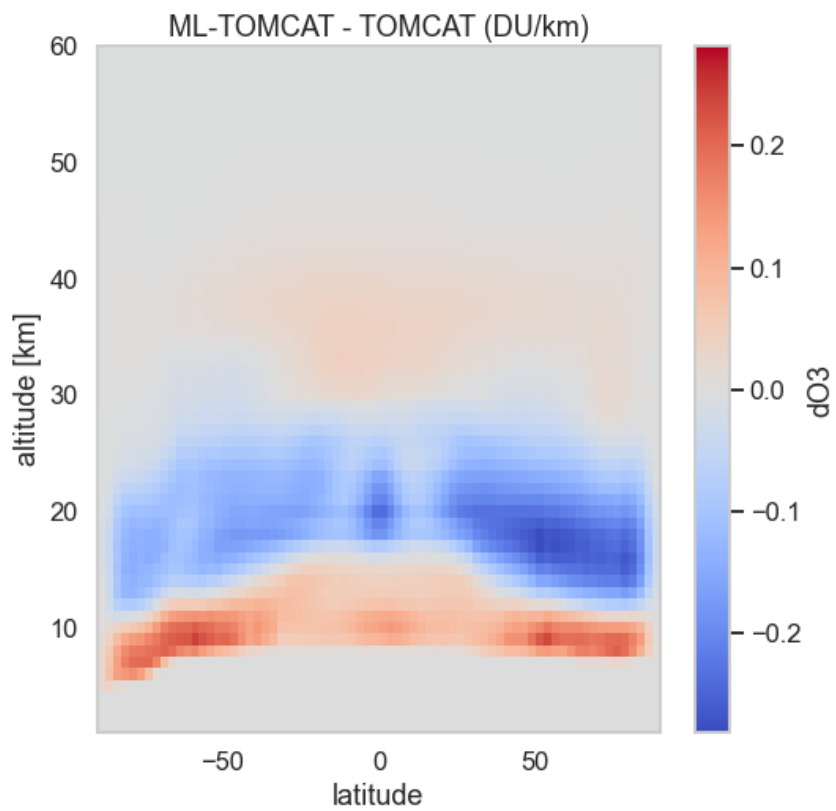


Figure S23. Latitude-altitude cross section of climatological (1979–2020) annual mean differences between ML-TOMCAT and TOMCAT.

References

- Arosio, C., Rozanov, A., Malinina, E., Eichmann, K.-U., von Clarmann, T., and Burrows, J. P.: Retrieval of ozone profiles from OMPS limb scattering observations, *Atmospheric Measurement Techniques*, 11, 2135–2149, <https://doi.org/10.5194/amt-11-2135-2018>, 2018.
- 5 Davis, S. M., Rosenlof, K. H., Hassler, B., Hurst, D. F., Read, W. G., Vömel, H., Selkirk, H., Fujiwara, M., and Damadeo, R.: The Stratospheric Water and Ozone Satellite Homogenized (SWOOSH) database: a long-term database for climate studies, *Earth System Science Data*, 8, 461–490, <https://doi.org/10.5194/essd-8-461-2016>, 2016.
- Froidevaux, L., Kinnison, D. E., Wang, R., Anderson, J., and Fuller, R. A.: Evaluation of CESM1 (WACCM) free-running and specified dynamics atmospheric composition simulations using global multispecies satellite data records, *Atmospheric Chemistry and Physics*, 19, 4783–4821, 2019.
- 10 Hassler, B., Kremser, S., Bodeker, G. E., Lewis, J., Nesbit, K., Davis, S. M., Chipperfield, M. P., Dhomse, S. S., and Dameris, M.: An updated version of a gap-free monthly mean zonal mean ozone database, *Earth System Science Data*, 10, 1473–1490, 2018.