Shibata, K., and H. Naoe, 2025: Structure, trend and variability of the semiannual oscillation in the equatorial middle atmosphere in JRA-3Q and in satellite observations. *J. Meteor. Soc. Japan*, **103**, http://doi.org/10.2151/jmsj. 2025-017.

Plain Language Summary: The high-top (~80 km) Japanese Reanalysis (JRA-3Q) is investigated focusing on the semiannual oscillation (SAO) in the tropical middle atmosphere, together with the other high-top reanalyses, ERA5 and MERRA-2, and the MLS and SABER satellite data. In this paper, the SAO is literally defined and extracted as the component which covers the spectrum, approximately centered at 6 months, from 3 to 8 months.

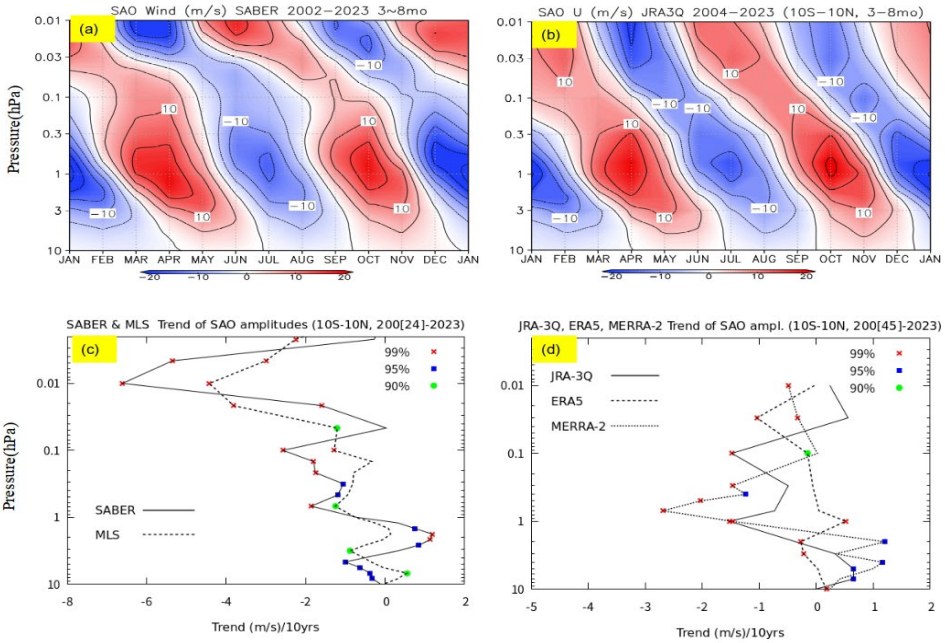

Figure 1. Monthly-height cross sections of SAO zonal wind for (a) SABER and (b) JRA-3Q. Contour interval is 5 m s^{-1}. (c) and (d) are the vertical profiles of the linear trends of the SAO zonal wind amplitudes of the satellite data (SABER and MLS) and the reanalyses (JRA-3Q, ERA5, MERRA-2). Unit of the trend is m s^{-1} $(decade)^{-1}$. Red crosses, blue squares, and green circles represent statistical significance higher than the 99%, 95%, and 90% levels, respectively.

- JRA-3Q reproduces well the seasonal cycle of the SAO, i.e., the calendar-locked downward propagation of the SAO from 0.01 hPa to 10 hPa with clear separation between the mesospheric SAO (MSAO) and the stratospheric SAO (SSAO), despite the MSAO being substantially underestimated compared to the satellite observations.
- The two satellite data exhibit that the MSAO amplitude has significant and negative trend, about −5 and −7 m s^{-1} $decade^{-1}$ at 0.01 hPa in MLS and SABER, respectively, over the recent two decades.
- None of the reanalyses show any hint of the MSAO significant and negative trend at 0.01 hPa.