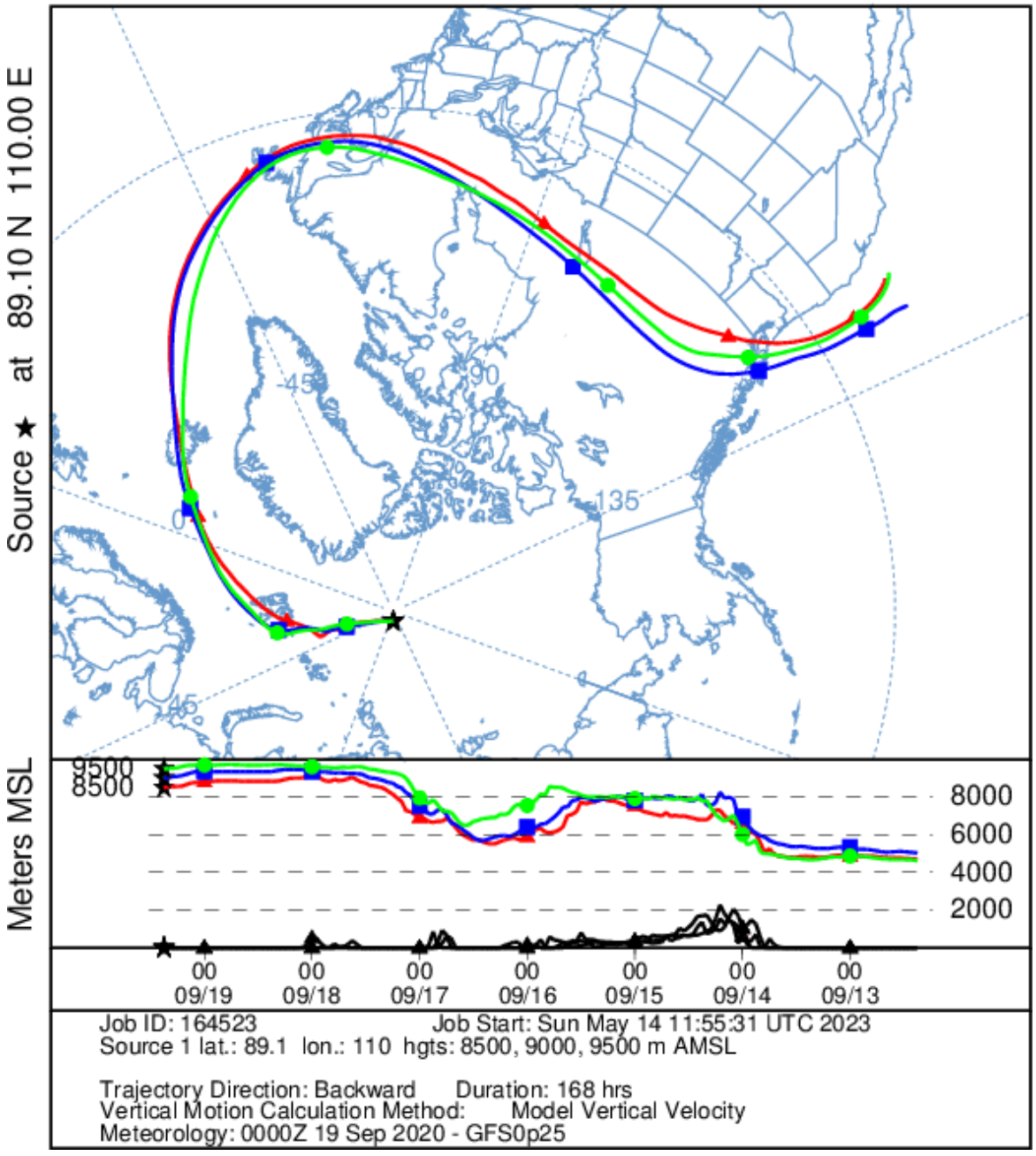
Regarding Fig.4, the optically dense upper tropospheric smoke layer and its attribution to a pyroCb in Canada or Alaska, the authors may benefit to learn that there were no pyroCbs detected in Canada at any time in 2020. There was a single pyroCb in Alaska in 2020, but in early June. There were pyroCbs in early September in California and Colorado, but they don't appear to be candidates for the Arctic smoke trajectories in Fig. 5. On 19 September, a smoke layer extremely similar to that in Fig. 4 was measured by the MOSAiC HSRL in northern Scandinavia (http://hsrl.ssec.wisc.edu/by_site/33/2020/09/19/am/#bscat_depol), and two days later by CALIOP at ~81N https://www-calipso.larc.nasa.gov/products/lidar/browse_images/show_v411_detail.php?s=production&v=V4-11&browse_date=2020-09-21&orbit_time=03-21-46&page=4&granule_name=CAL_LID_L1-Standard-V4-11.2020-09-21T03-21-46ZD.hdf. Back trajectories from these observations to 11-13 September suggest a connection with tropospheric wildfire smoke over the Pacific Ocean west of the USA. The Pacific plume episode is on display in this paper: https://acp.copernicus.org/articles/22/5399/2022/. If the back trajectories in Fig. 5 are run for a few more days, it is possible that some of them will curl in the direction of the Pacific smoke, which was not generated by pyroCbs. If these trajectories accurately connect the Polarstern smoke to its source, they are indicative of quasi-isentropic transport from the middle to upper troposphere.

NOAA HYSPLIT MODEL
Backward trajectories ending at 0900 UTC 19 Sep 20
GFSQ Meteorological Data



Job ID: 164523 Job Start: Sun May 14 11:55:31 UTC 2023
Source 1 lat.: 89.1 lon.: 110 hgts: 8500, 9000, 9500 m AMSL

Trajectory Direction: Backward Duration: 168 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 19 Sep 2020 - GFS0p25