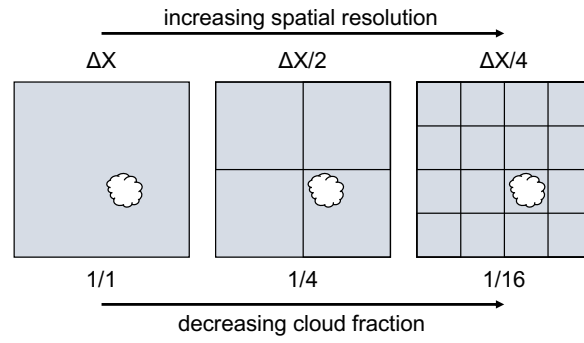
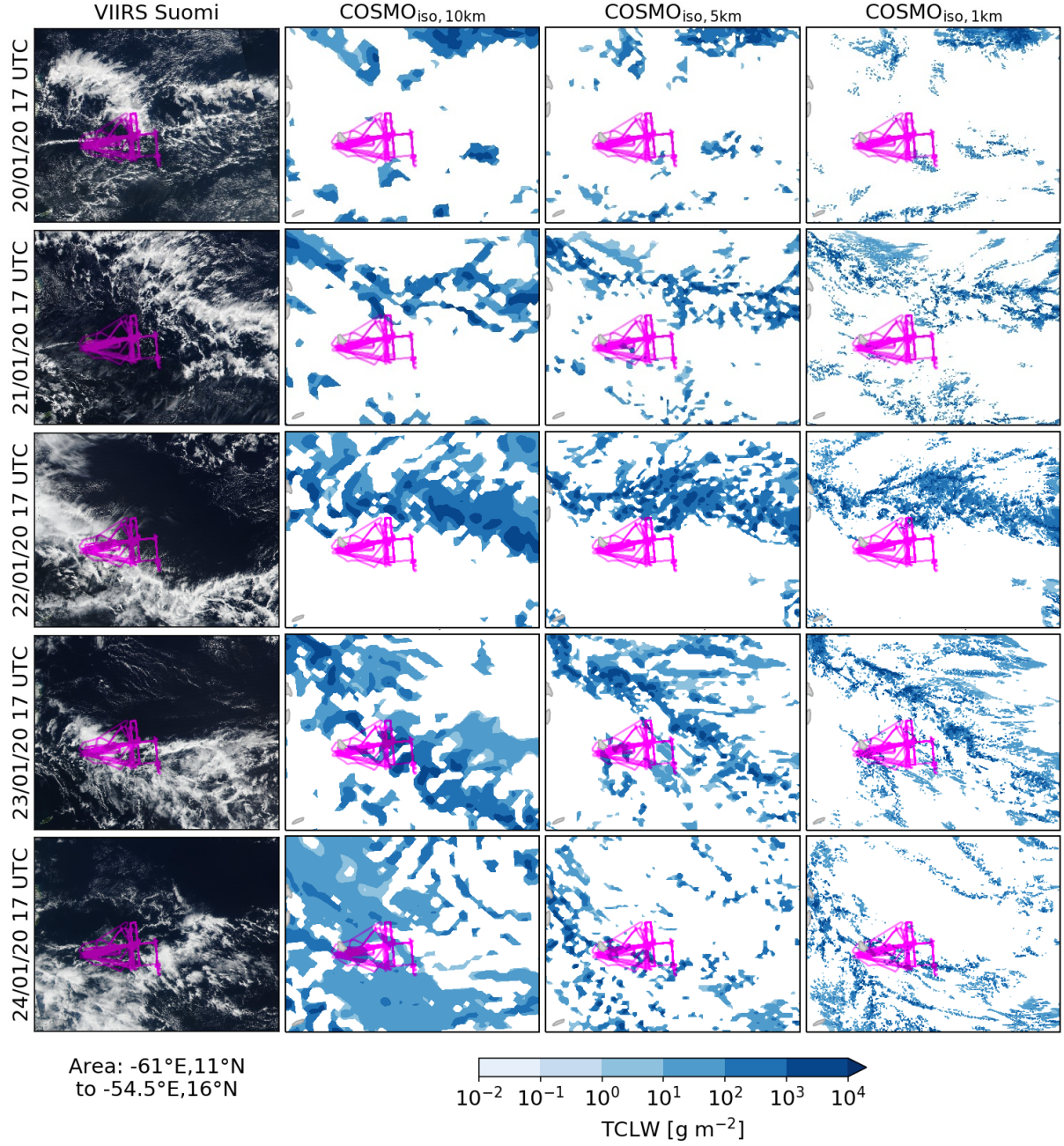


## Evaluation of the spatial distribution of clouds

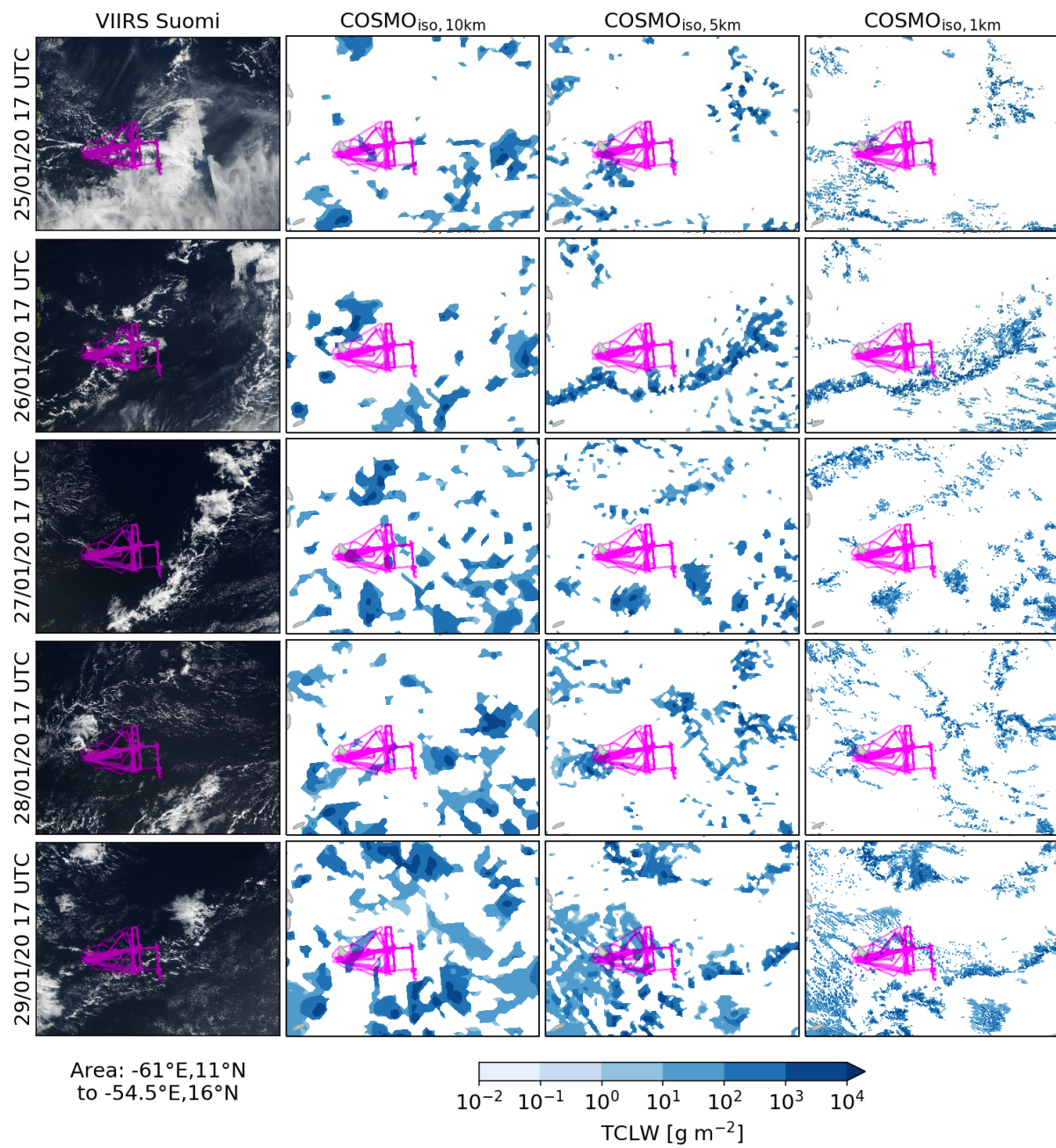
This supplement illustrates the model resolution's effect on variables such as cloud fraction and further provides the daily spatial distribution of clouds from 20 January to 13 February 2020 from satellite observations and the model simulation.



**Figure S1.1:** Schematic illustrating the strong dependence between cloud fraction and the spatial resolutions of the model. If the objects of interest (e.g., cloud, rain) are smaller than the grid resolution, the fraction of grid points with such an object decreases with increasing horizontal resolution.

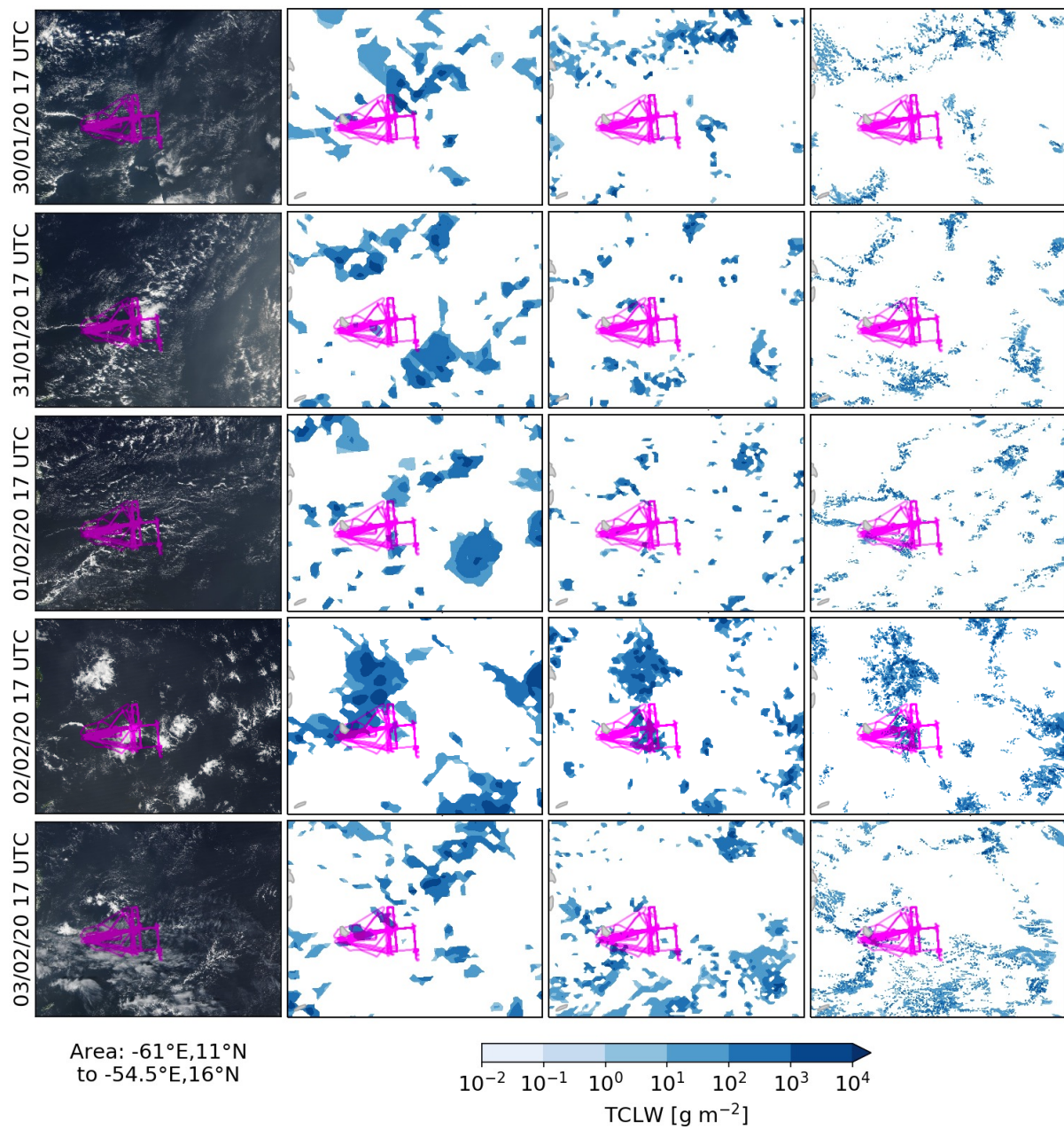


**Figure S1.2:** Spatial organisation of the clouds in the domain 54.5-61° W, 11-16° N from four datasets (columns) and on five dates (rows) together with the ATR track (pink). The first column shows the image from the VIIRS instrument onboard the polar-orbiting Suomi-NPP satellite (approx. equatorial crossing time 17:30 UTC). The remaining columns show the total column cloud liquid water (TCLW) from the three COSMO<sub>iso</sub> simulations at 17:00 UTC on 20 - 24 January 2020.



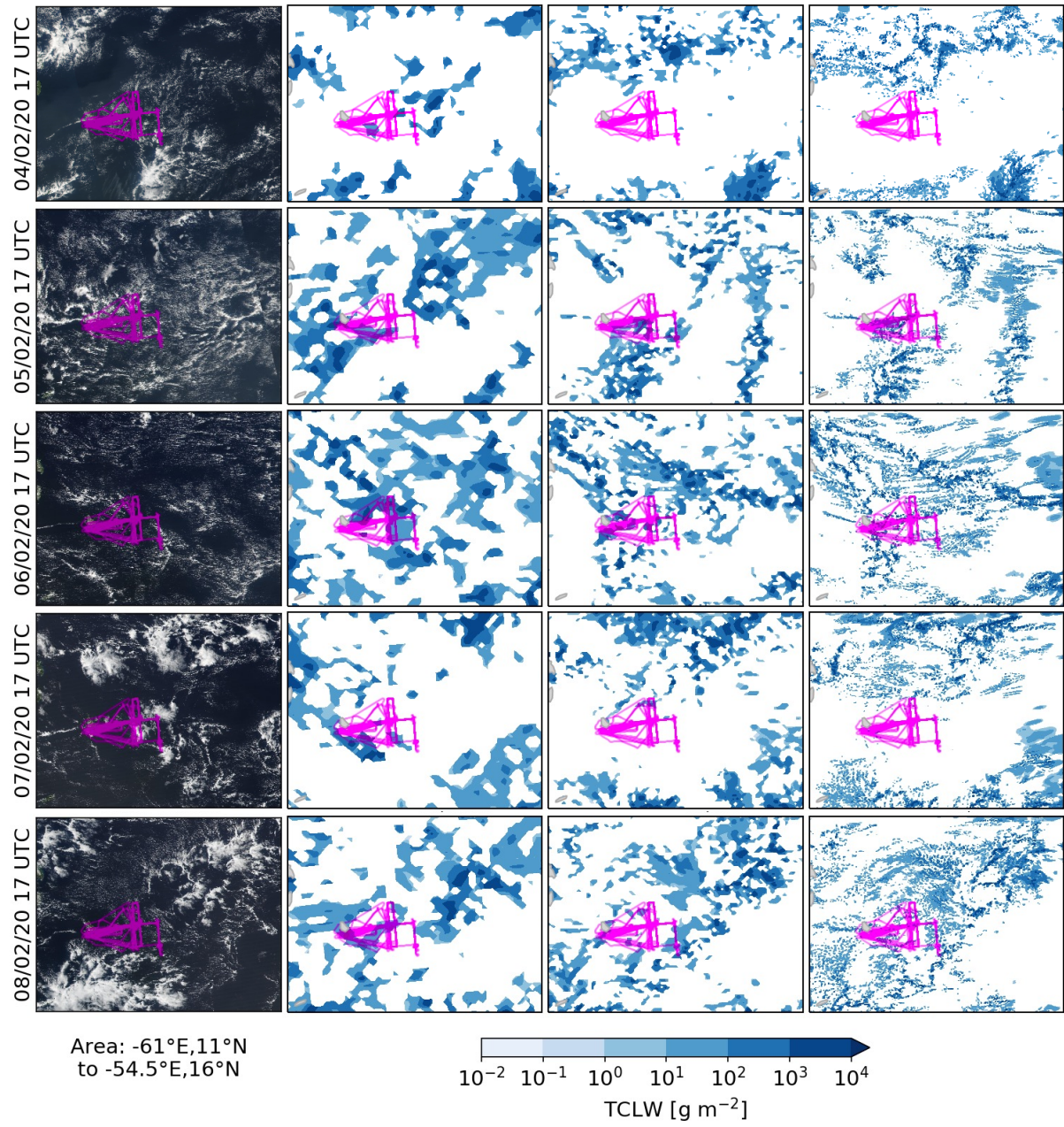
**Figure S1.3:** Similar as Fig. S1.2 but for 25 - 29 January 2020.



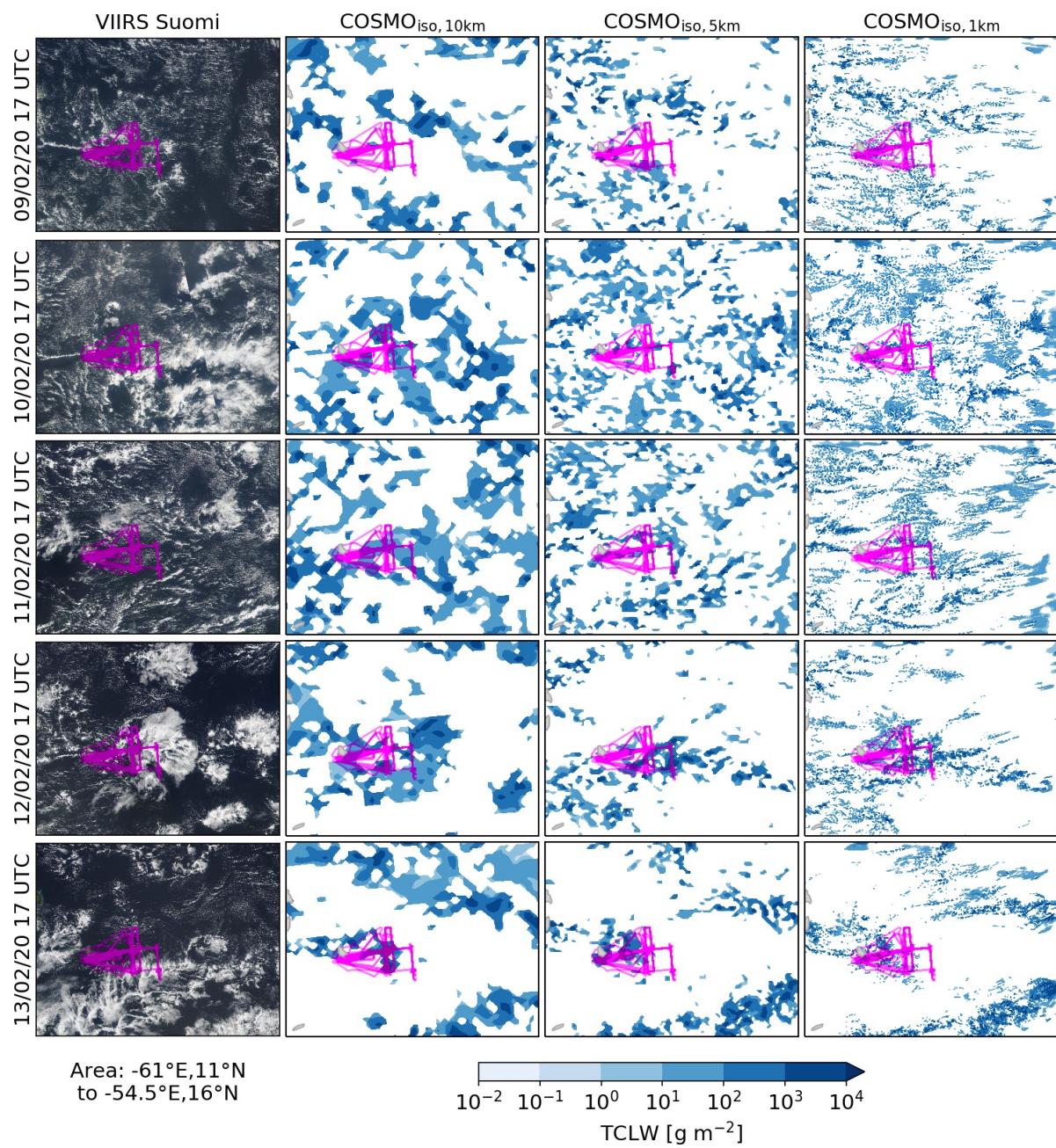


**Figure S1.4:** Similar as Fig.S1.2 but for 30 January - 3 February 2020.



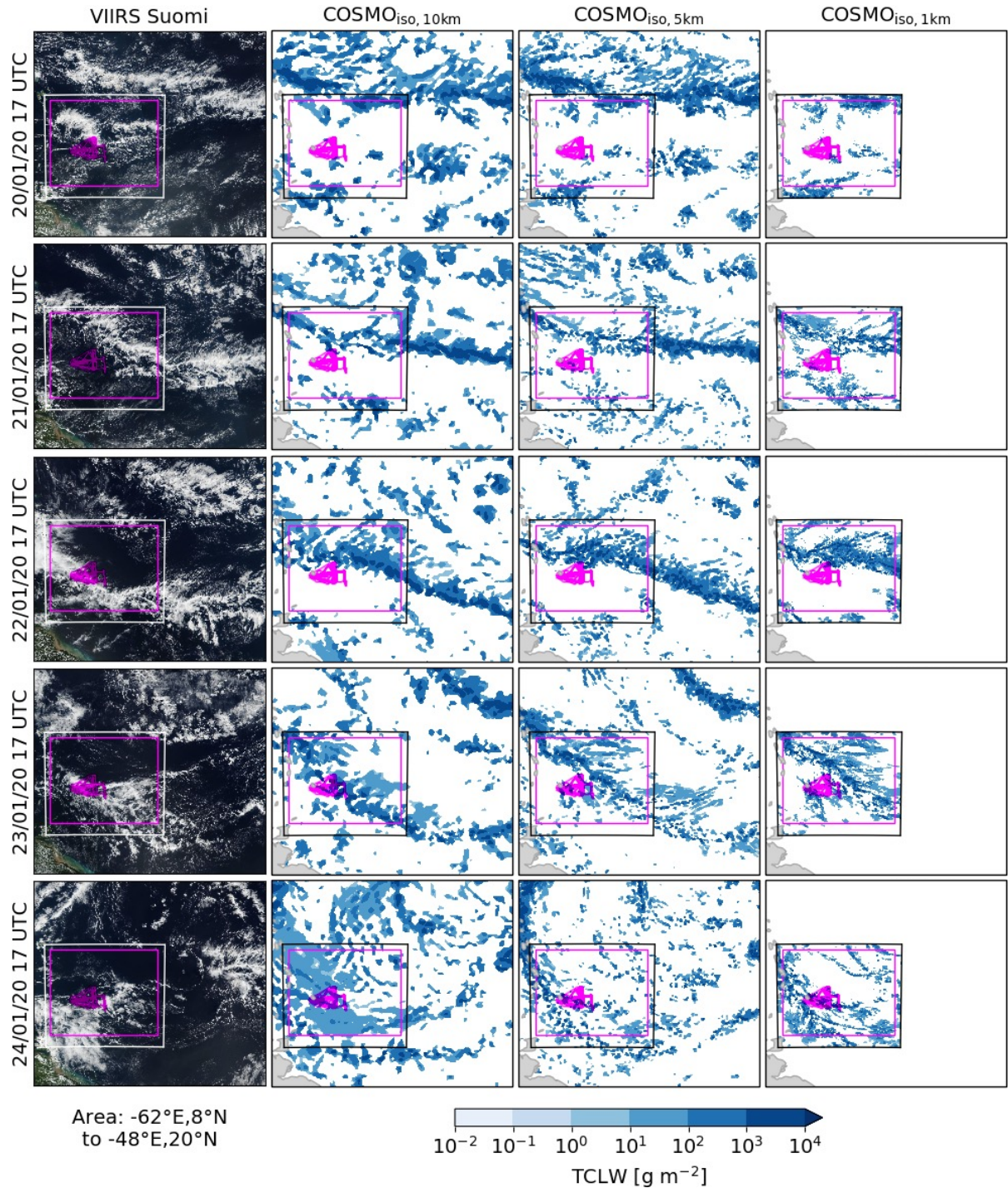


**Figure S1.5:** Similar as Fig. S1.2 but for 4 - 8 February 2020.



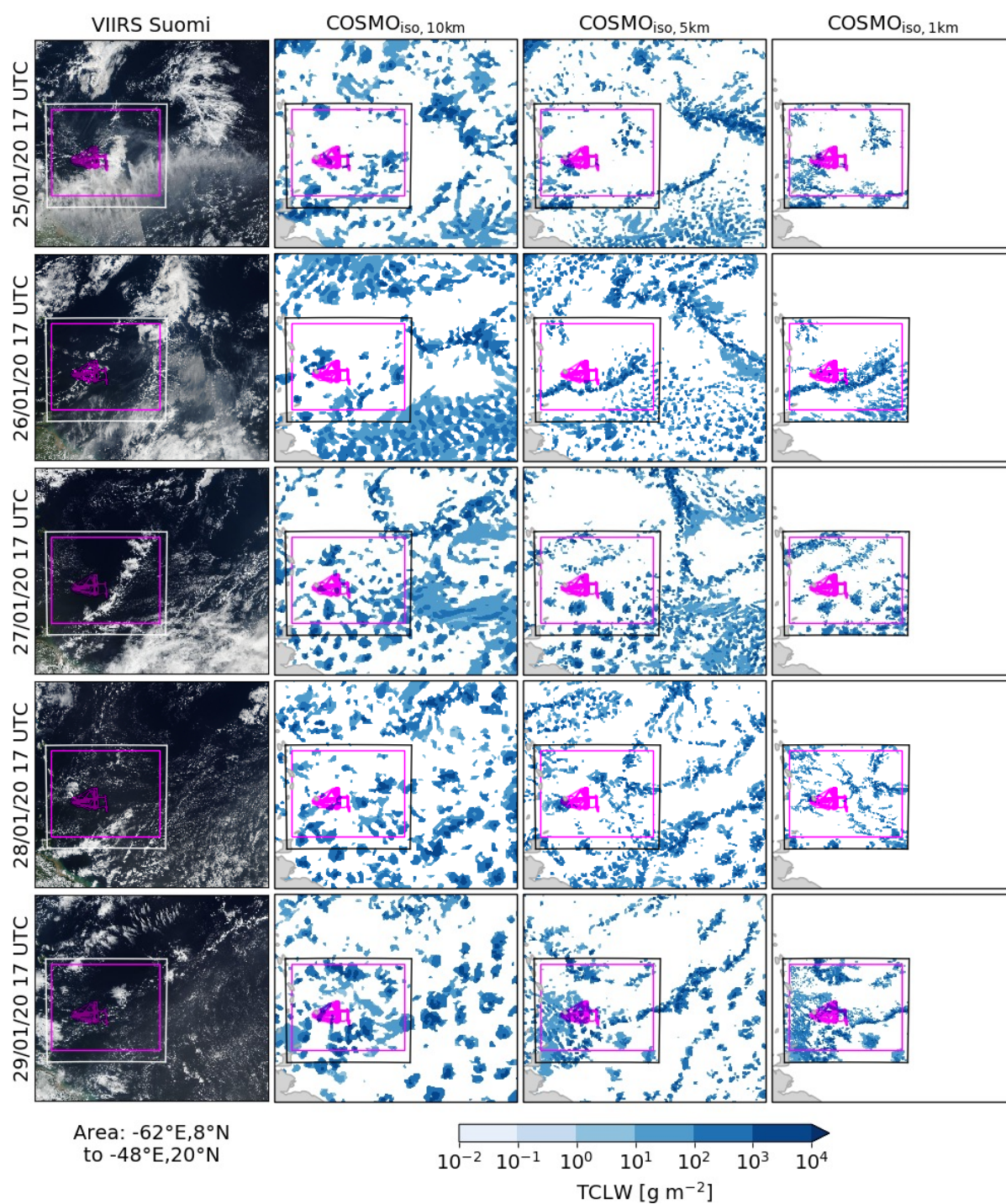
**Figure S1.6:** Similar as Fig.S1.2 but for 9 - 13 February 2020.





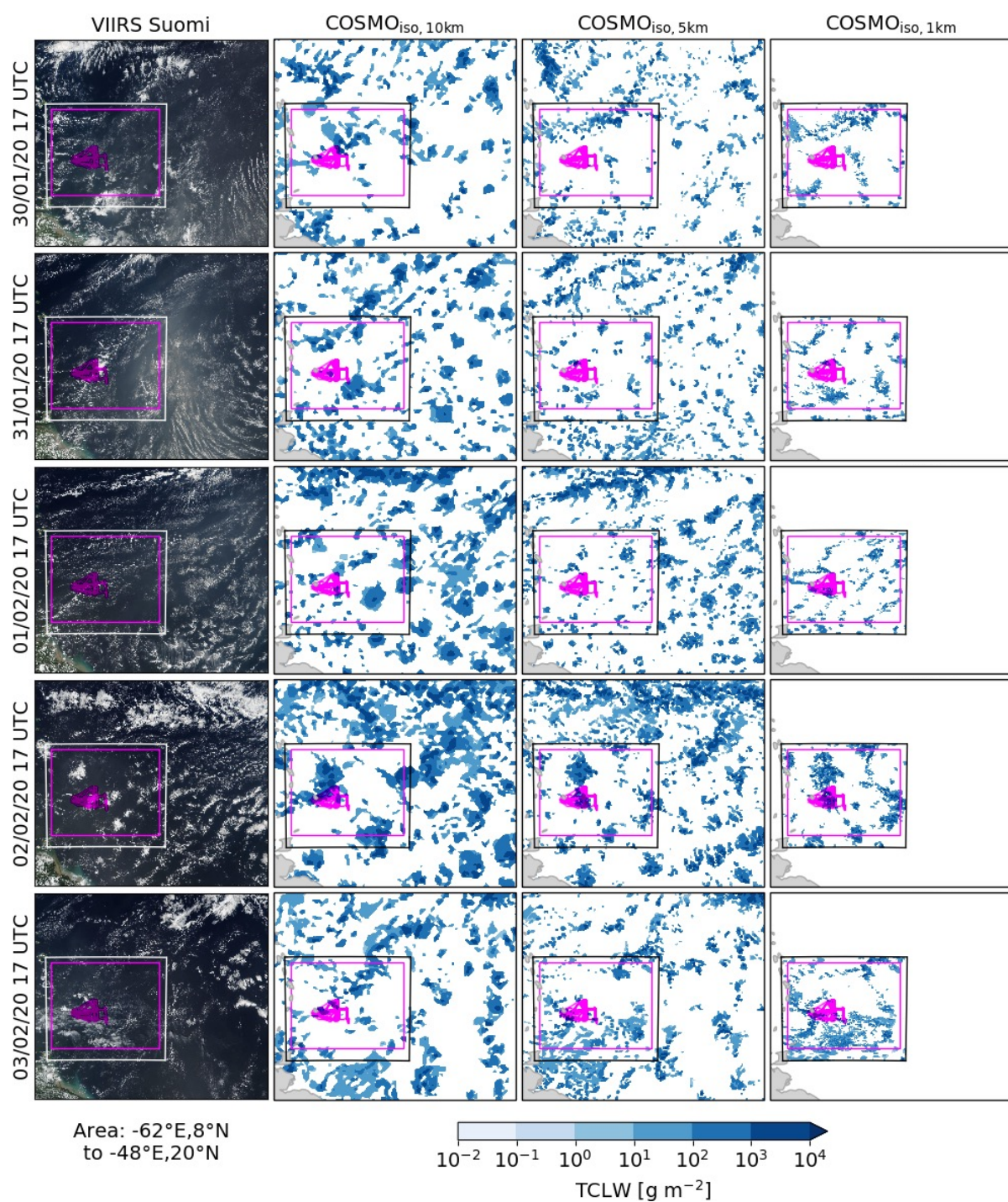
**Figure S1.7:** Similar as Fig. S1.2 but the domain 62-48° W, 8-20° N. The domain 54.5-61° W, 11-16° N is shown pink and the domain of COSMO<sub>iso,1km</sub> is shown in black.





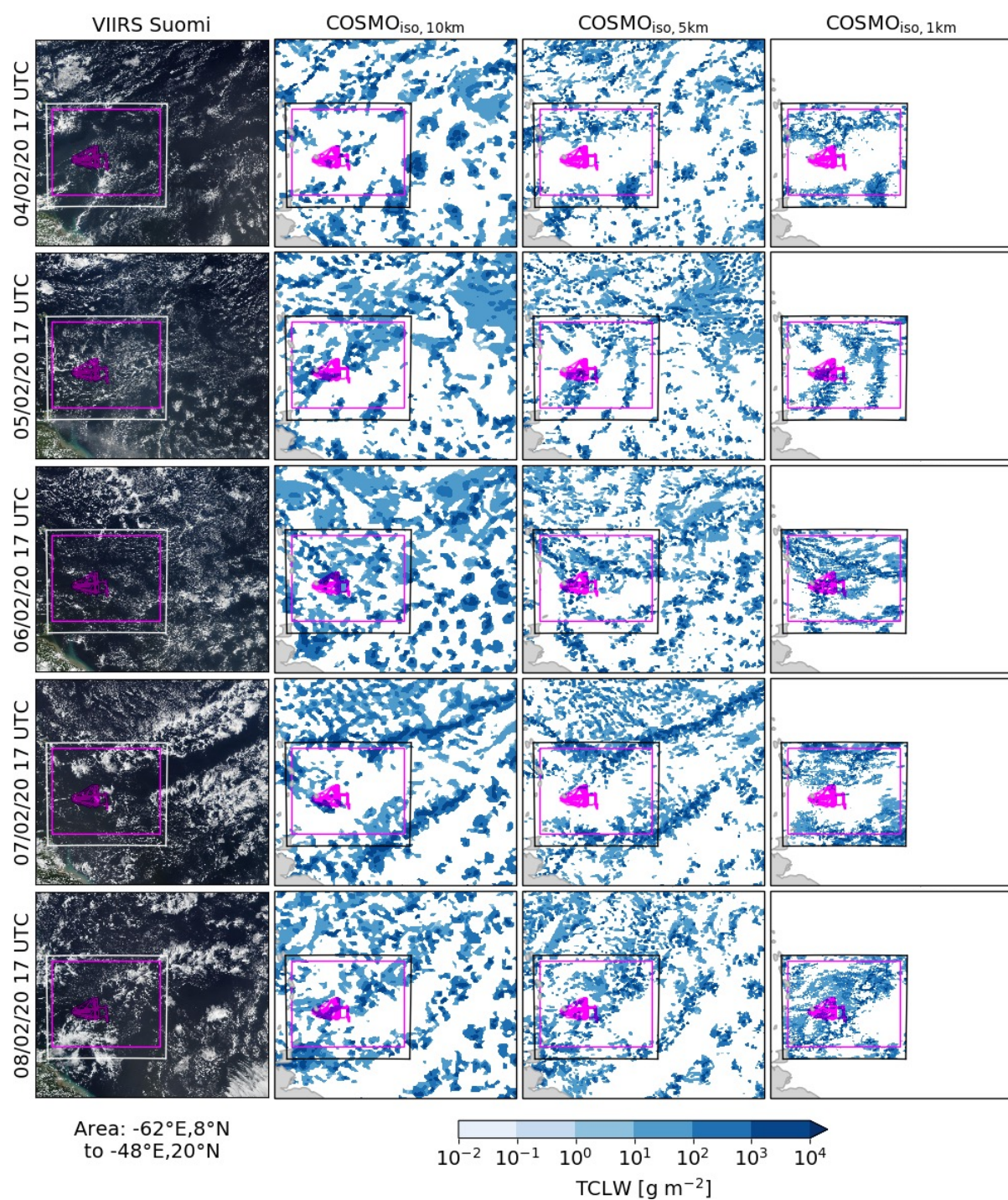
**Figure S1.8:** Similar as Fig. S1.7 but for 25 - 29 January 2020.





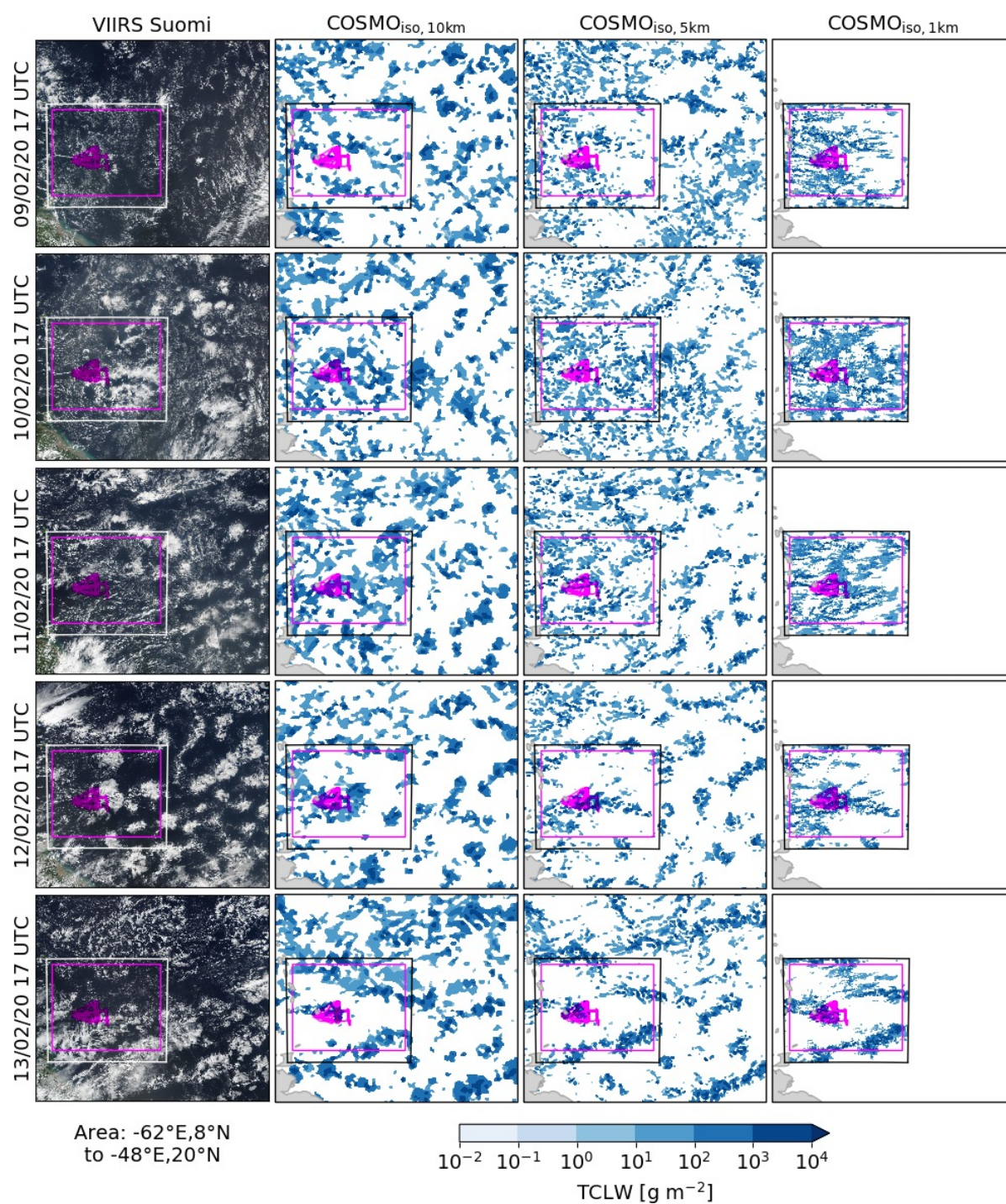
**Figure S1.9:** Similar as Fig. S1.7 but for 30 January - 3 February 2020.





**Figure S1.10:** Similar as Fig.S1.7 but for 4 - 8 February 2020.





**Figure S1.11:** Similar as Fig. S1.7 but for 9 - 13 February 2020.