



Supplement of

**A full year of continuous net soil and ditch CO₂, CH₄, N₂O fluxes,
soil hydrology and meteorology for a drained fen in Denmark**

Annelie S. Nielsen et al.

Correspondence to: Jesper R. Christiansen (jrc@ign.ku.dk)

The copyright of individual parts of the supplement might differ from the article licence.

Supplementary Figure S1

The supplement figure shows a picture of the Vejrumbro site south of the SkyLine transect.



Figure S1: The Vejrumbro site looking south east towards Nørre Å. *Juncus effusus* plants are colonizing part of the area which is otherwise covered by grass.

Supplementary Figure S2



Figure S2: A) The SkyLine2D trolley and chamber at Vejrumbro site looking from south towards the north tower. Note the orange collars on the ground arranged in a straight line. B) Close-up of the chamber: wheels move the trolley back and forth on the ropes (1), magnet sensors (2) and rubber gasket on the bottom of the chamber (3). C) The GHG analyzer “hut” with the Picarro G2508 gas analyzer (4) and the main pump (5). D) The SkyLine2D system with the north and south towers and the GHG analyzer shelter. Towers were at both ends attached with ropes to water-filled 1000 L pallet tanks. One tank shown at the right of the picture.

Supplementary Figure S3

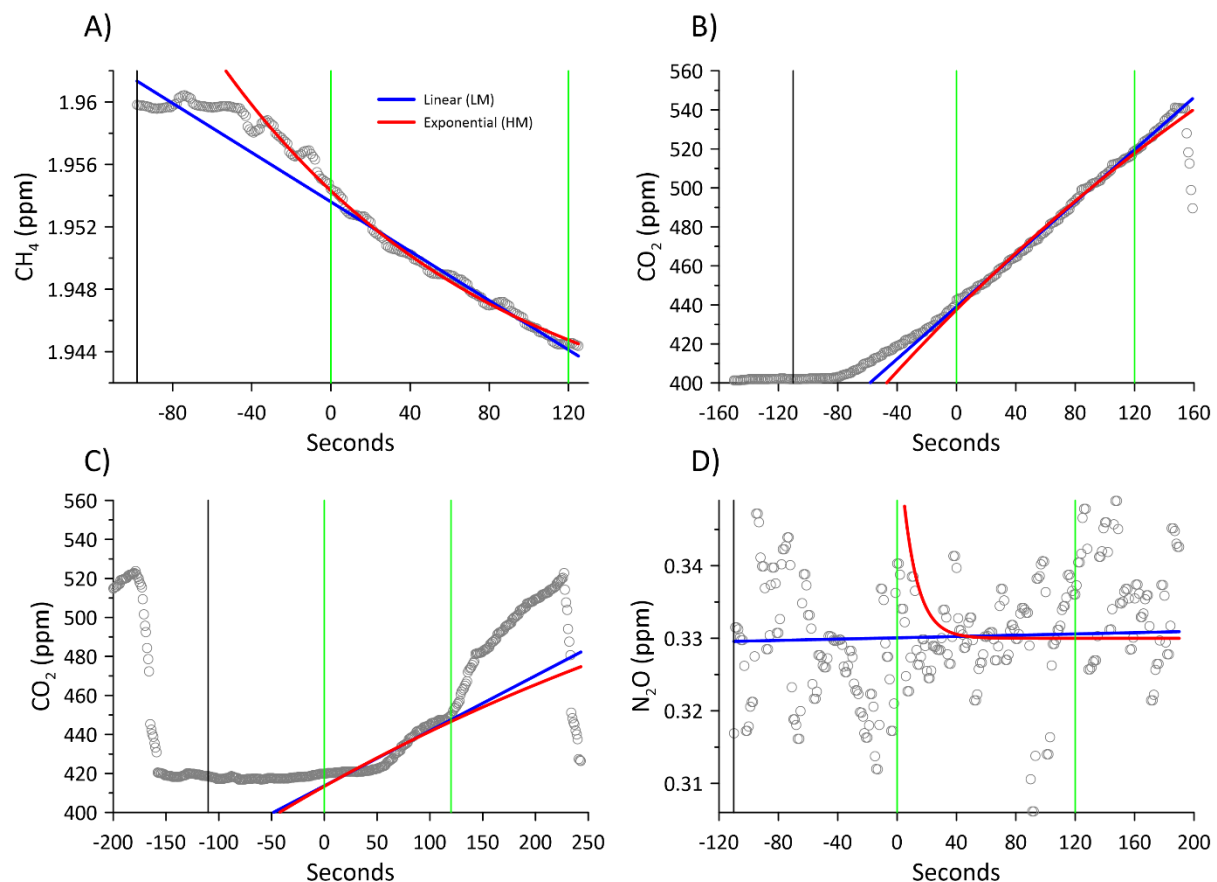


Figure S3: Example of flux detection and resulting flux calculation using linear (blue) (LM) and non-linear (red) (HM) regression models. Chamber closure is marked by the black vertical line and the 120 second flux calculation window marked by the green vertical lines. Examples of successful measurements of A) net CH_4 uptake measurement, B) CO_2 efflux, C) example of erroneous detection of chamber closed and D) example of measurement of non-detectable N_2O flux with HM overfitting.

Due to a combination of variability in flux magnitudes and the mechanics of the SkyLine2D it is possible to achieve a number of situations where fluxes will be discarded. Successful flux measurements and calculations are when the timing of chamber closed and GHG time series are synchronized (Fig. S2A and B). As seen from the numbers in the previous paragraph this was the case in more than 90% of all flux measurements. However, if there was a mismatch between the chamber closed detection and the time series of GHG concentrations the flux would be calculated on a wrong “window” of the actual enclosure (example in Fig. S2C). This window could either be too early or late and fluxes would accordingly be discarded. Lastly, at low fluxes, but otherwise successful deployment of the chamber, the HM model could overfit the GHG time series and result in unrealistic flux estimates (Fig. S2D). In this case flux calculations would also be discarded.

Supplementary Figure S4

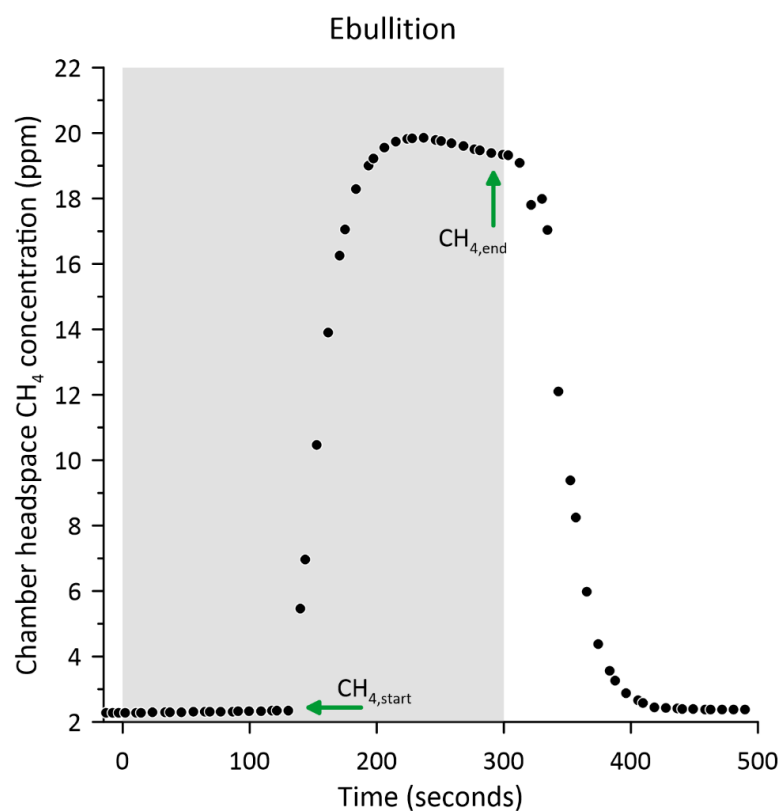
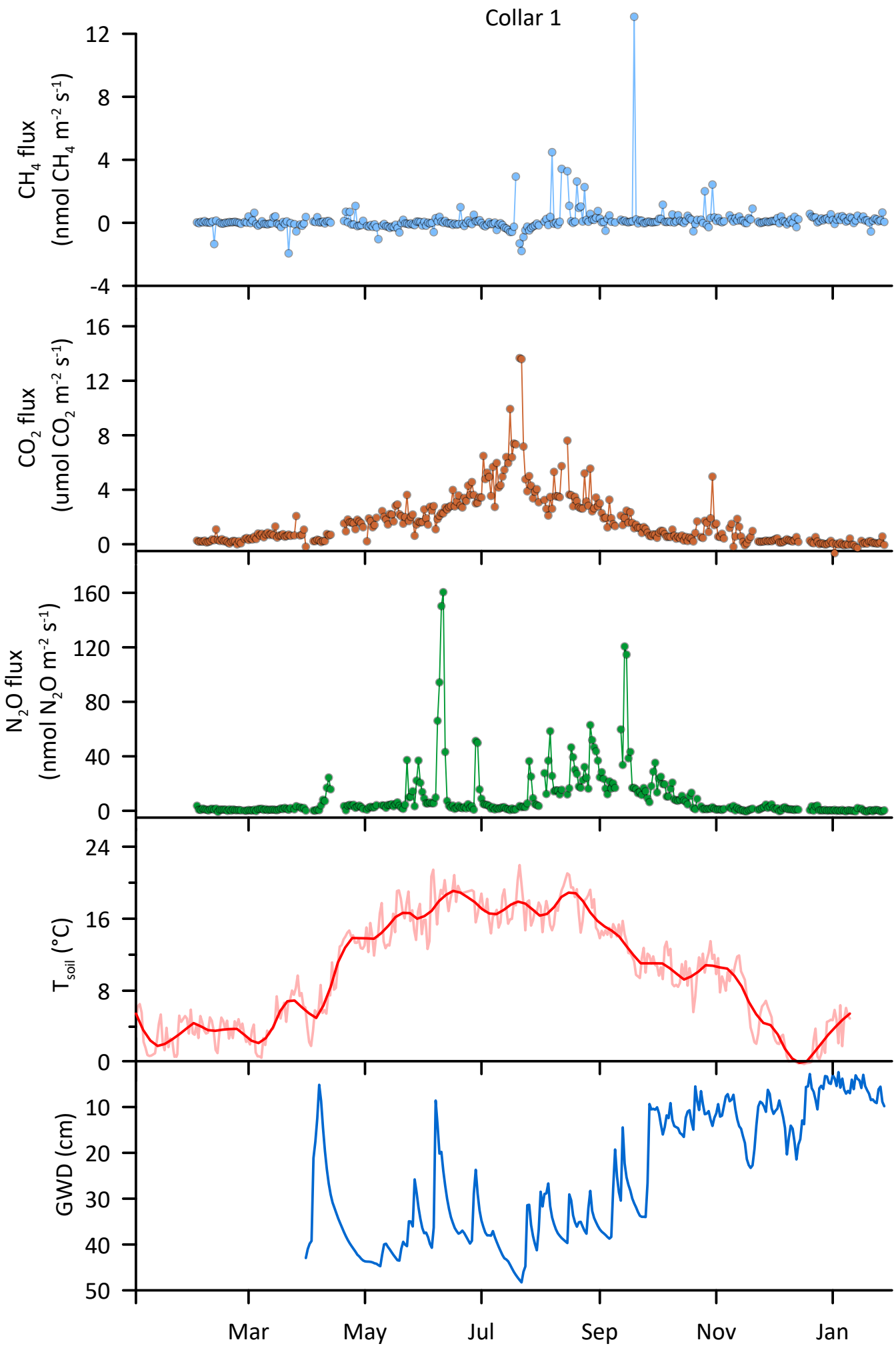


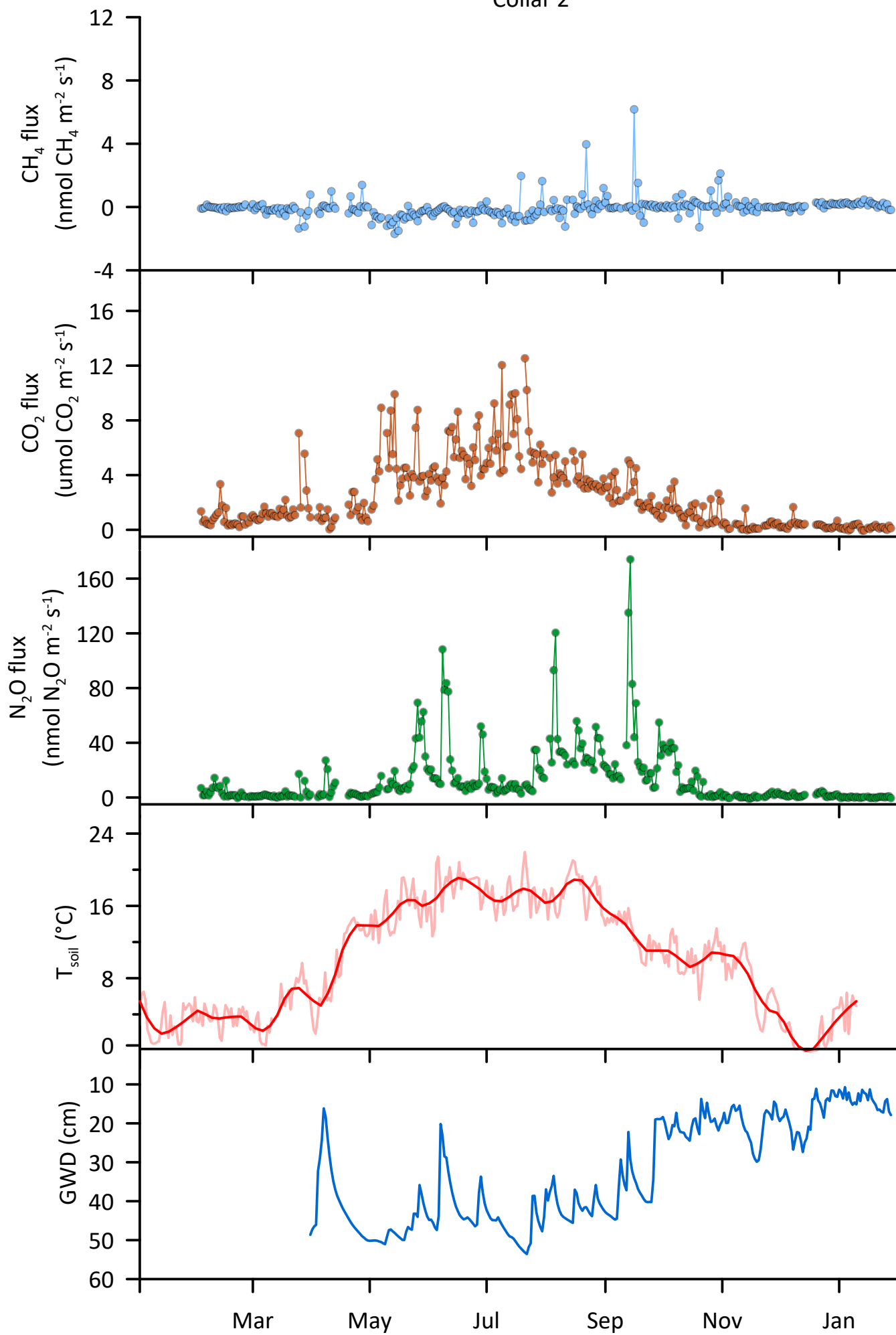
Figure S4: Example of ebullition measurement in the chamber. Initially, CH₄ concentrations increase steadily indicating diffusive fluxes. At time = 130 seconds CH₄ concentrations increase rapidly to 20 ppm indicating a ebullition event. The chamber opens at 300 seconds after which CH₄ concentrations drop back to background levels.

Supplementary Figure S5

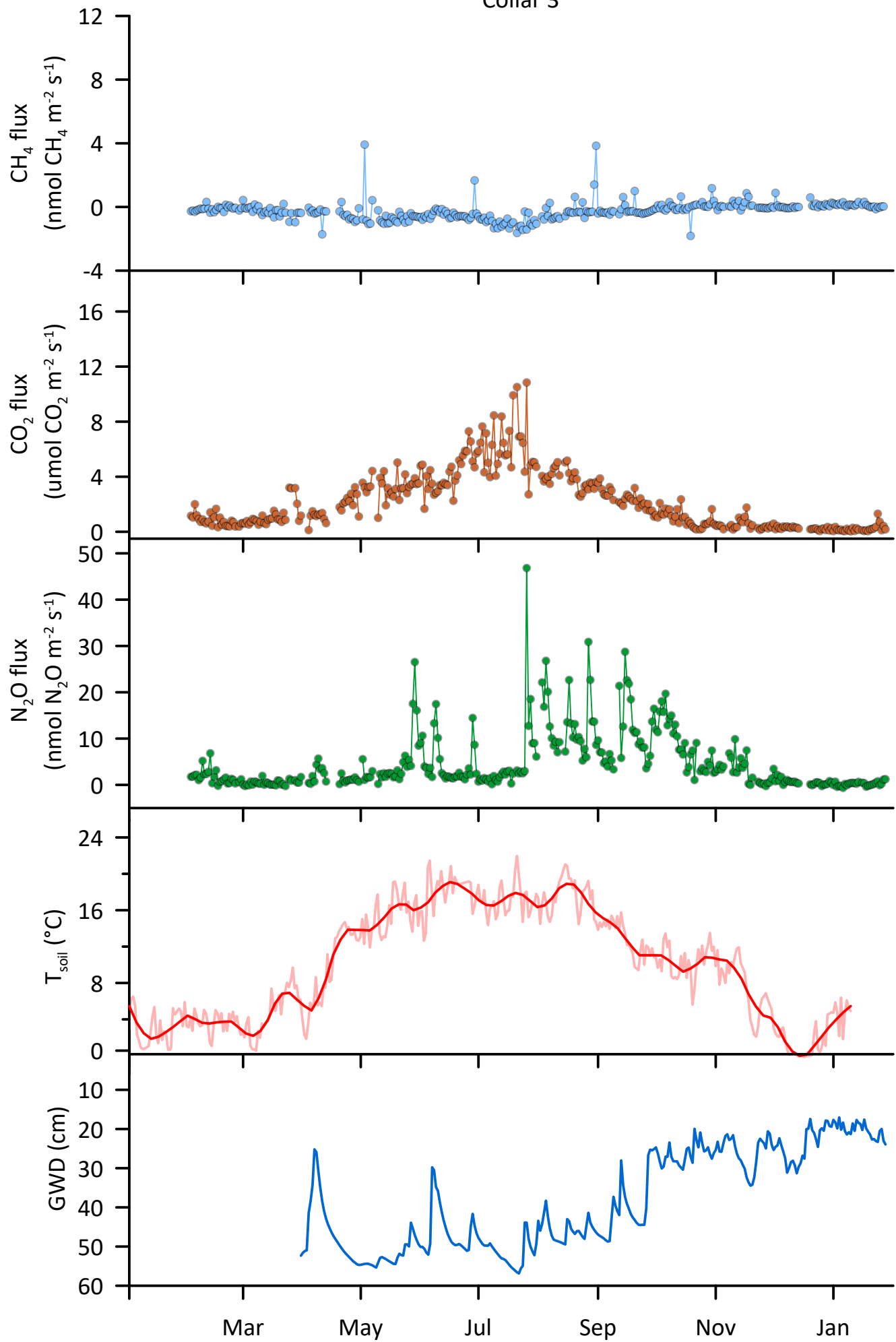
The supplement figure shows time series of net soil carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) fluxes from the field site at Vejrumbro for collars 1 to 27, excluding the ditch (collar 10). Soil temperature (ST), groundwater table depth (WTD) are shown as well.



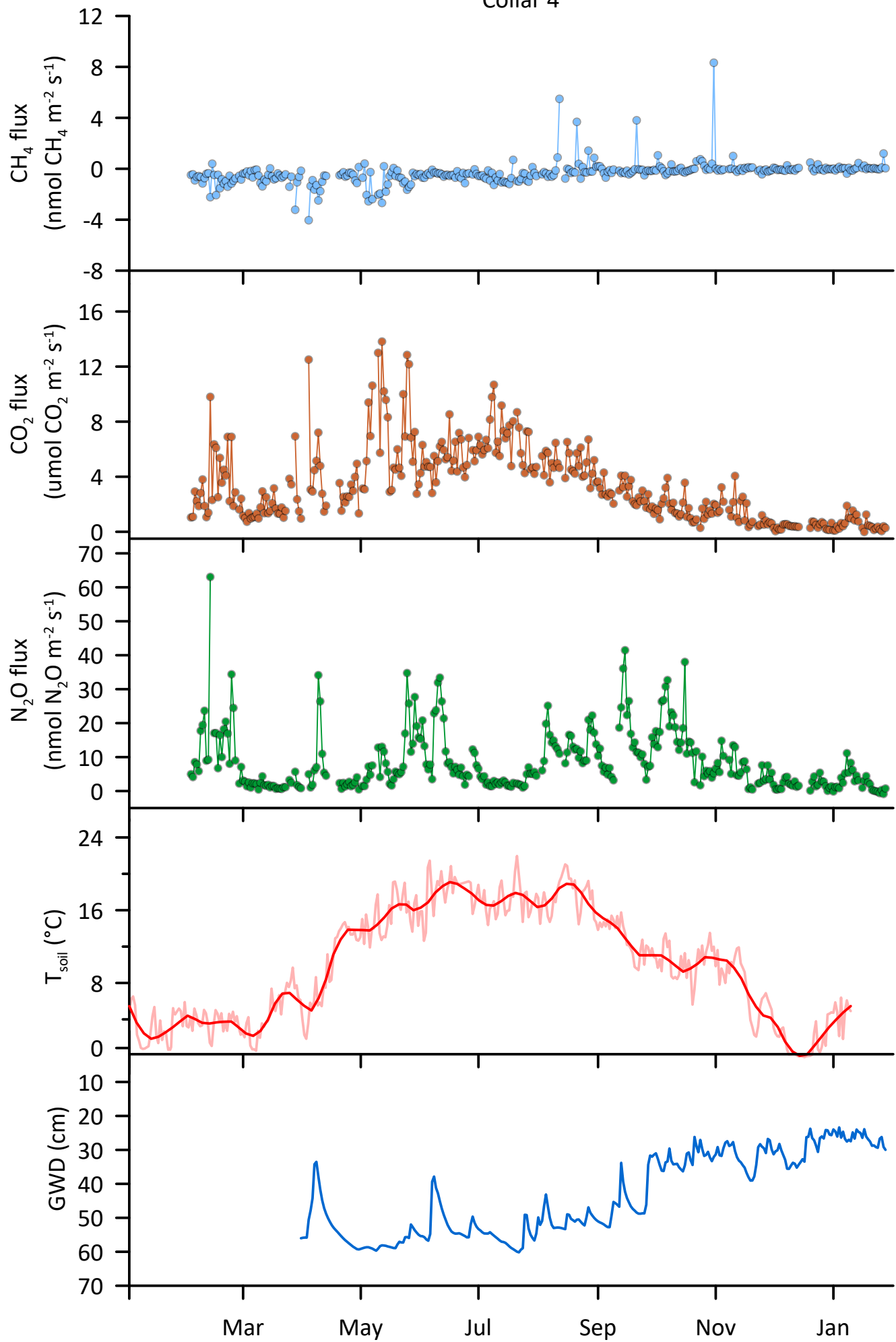
Collar 2



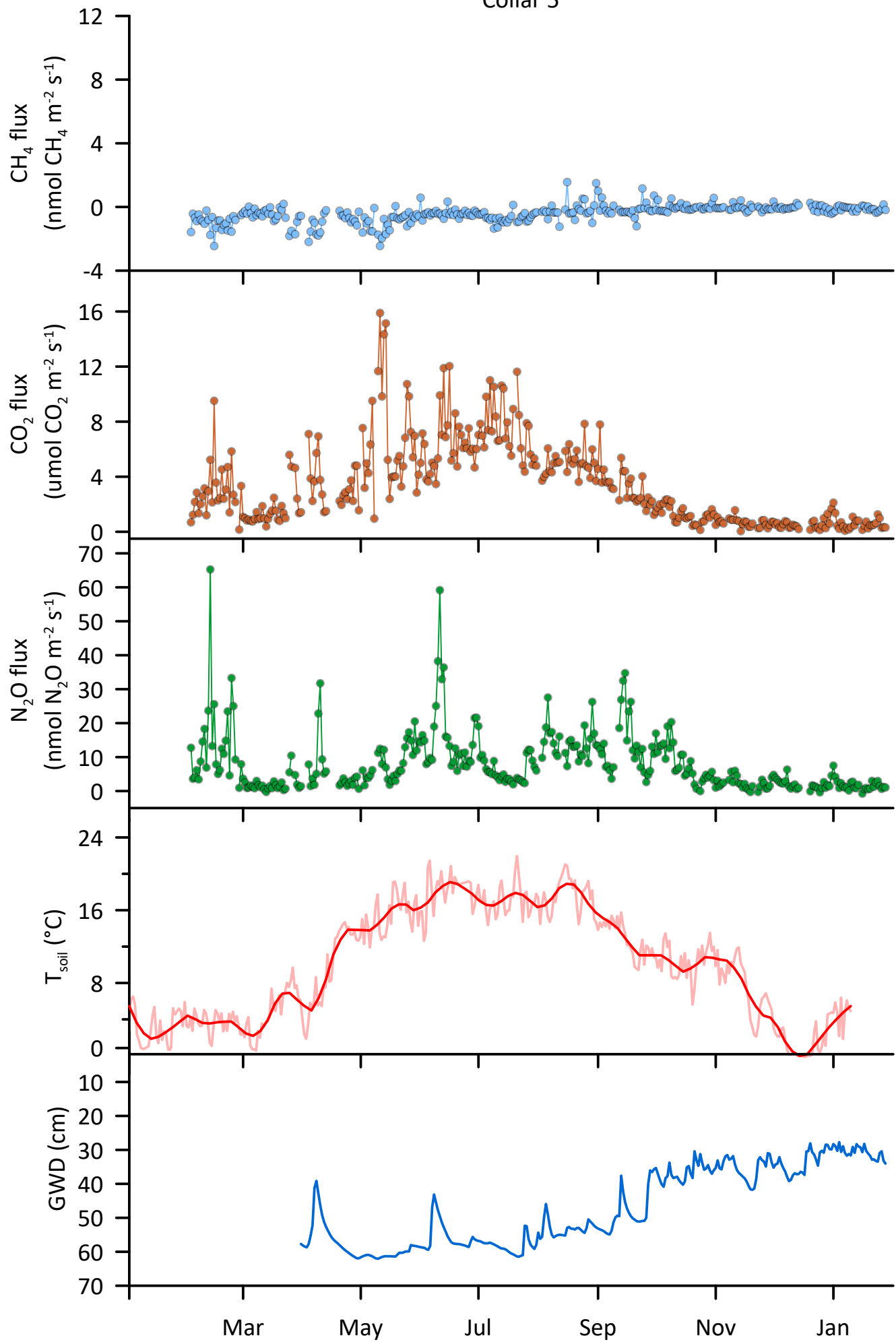
Collar 3



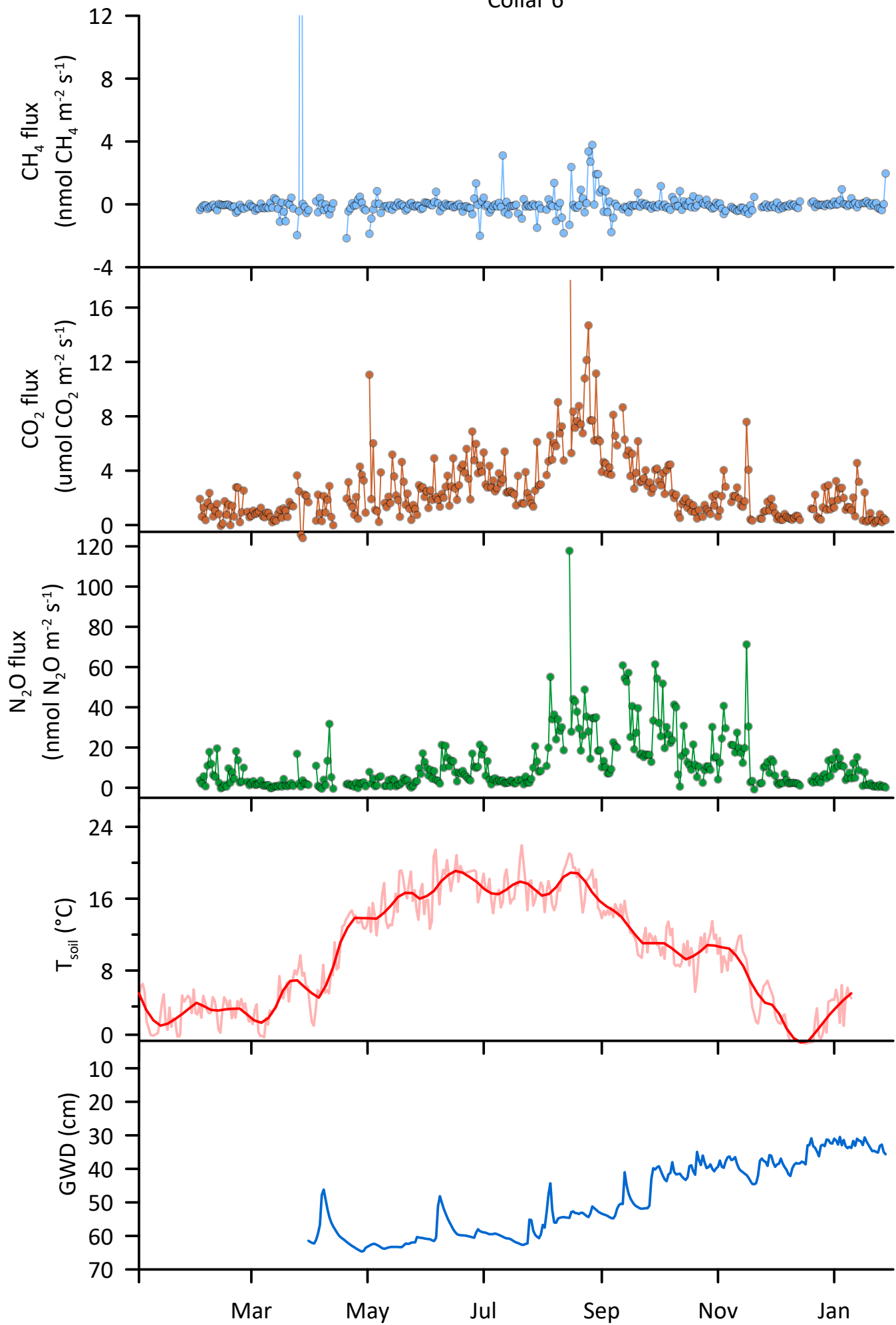
Collar 4



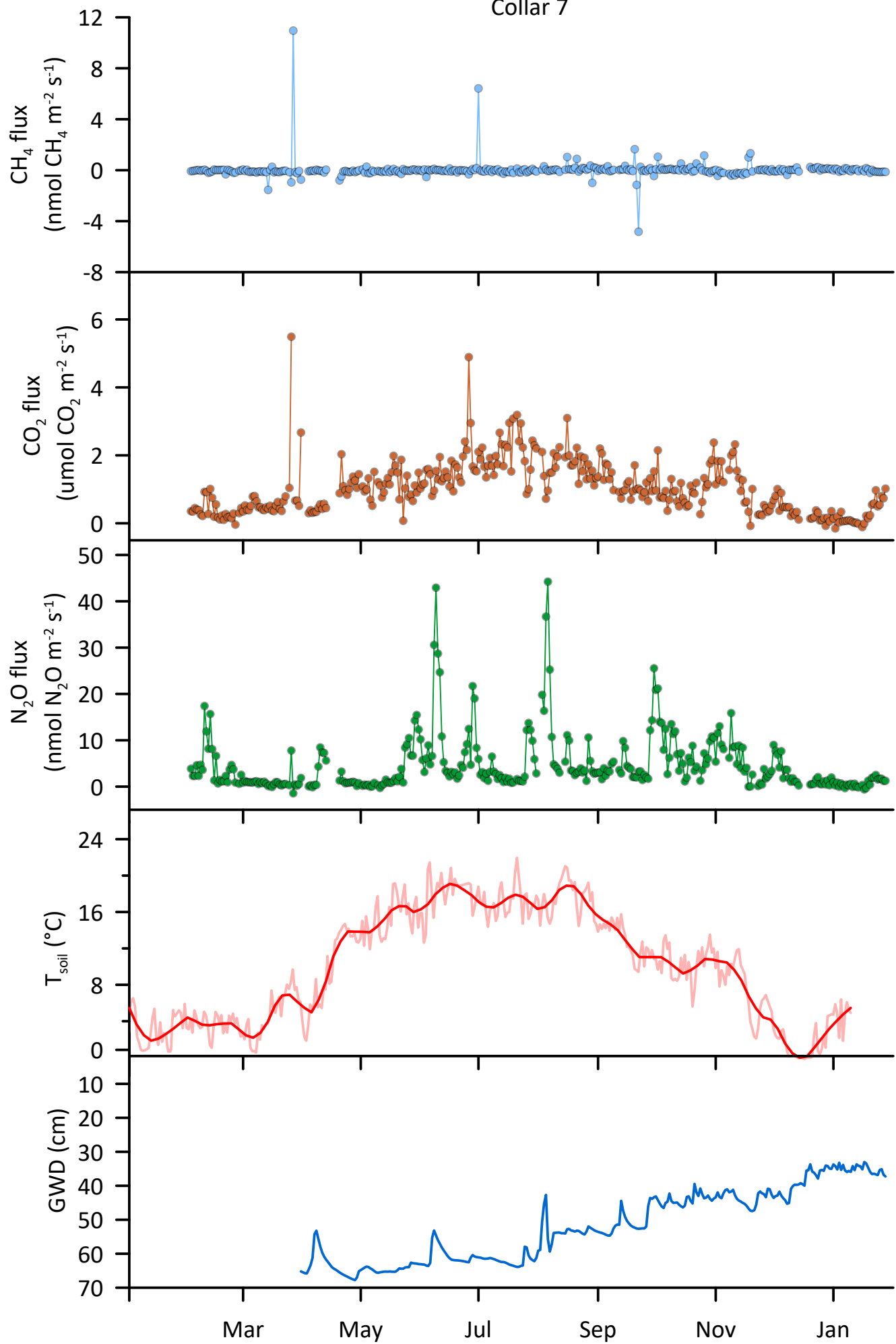
Collar 5



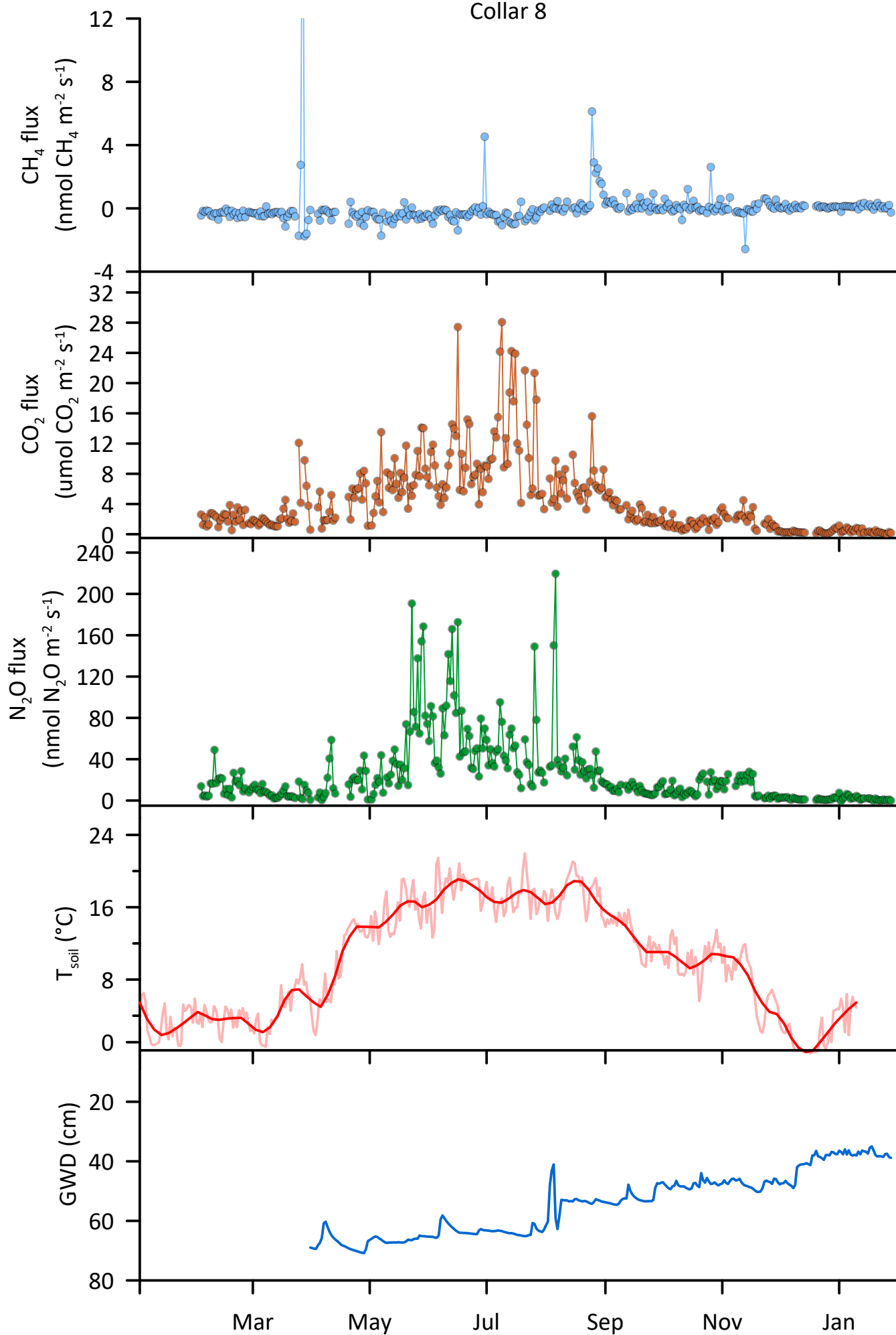
Collar 6



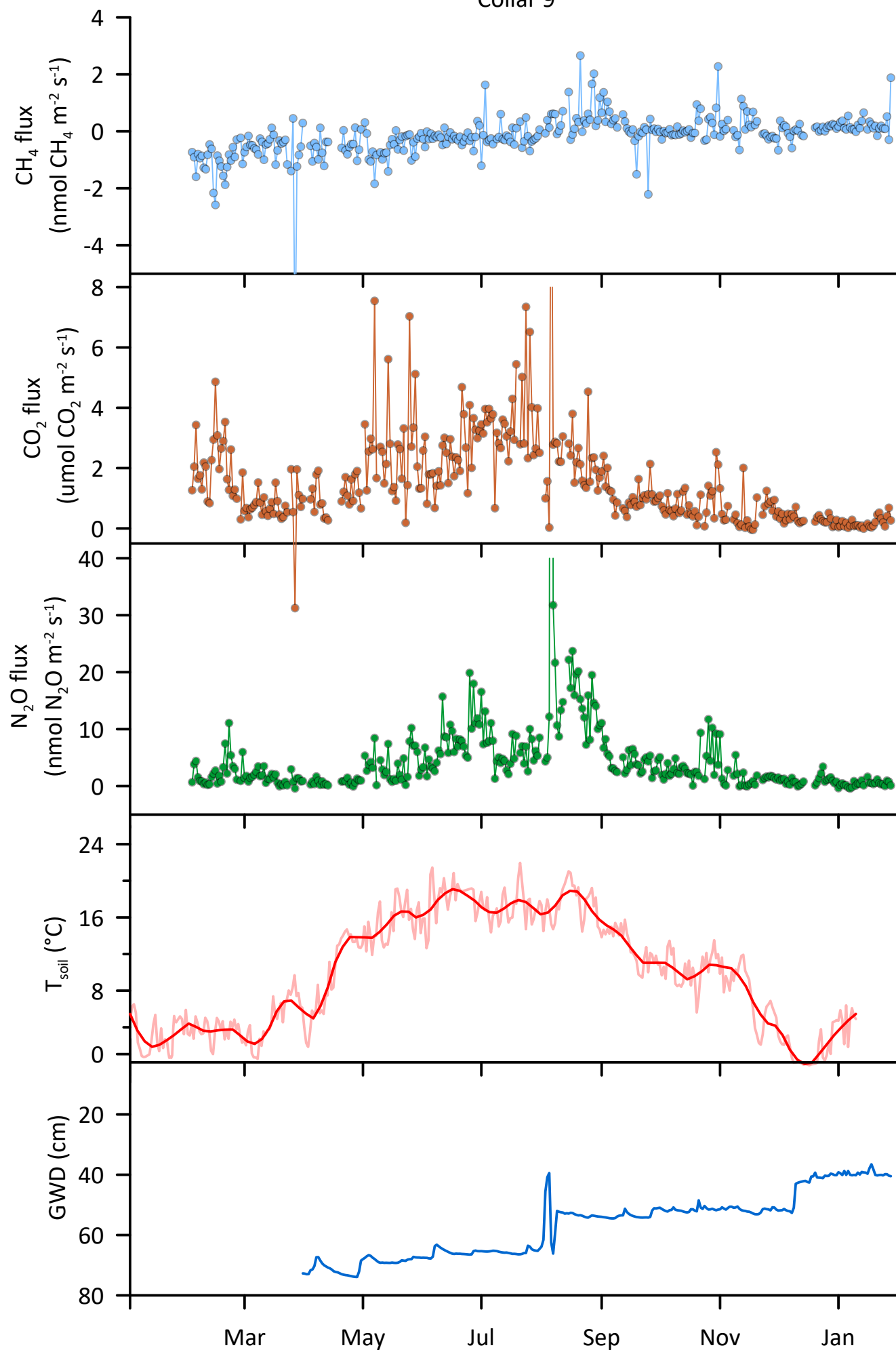
Collar 7



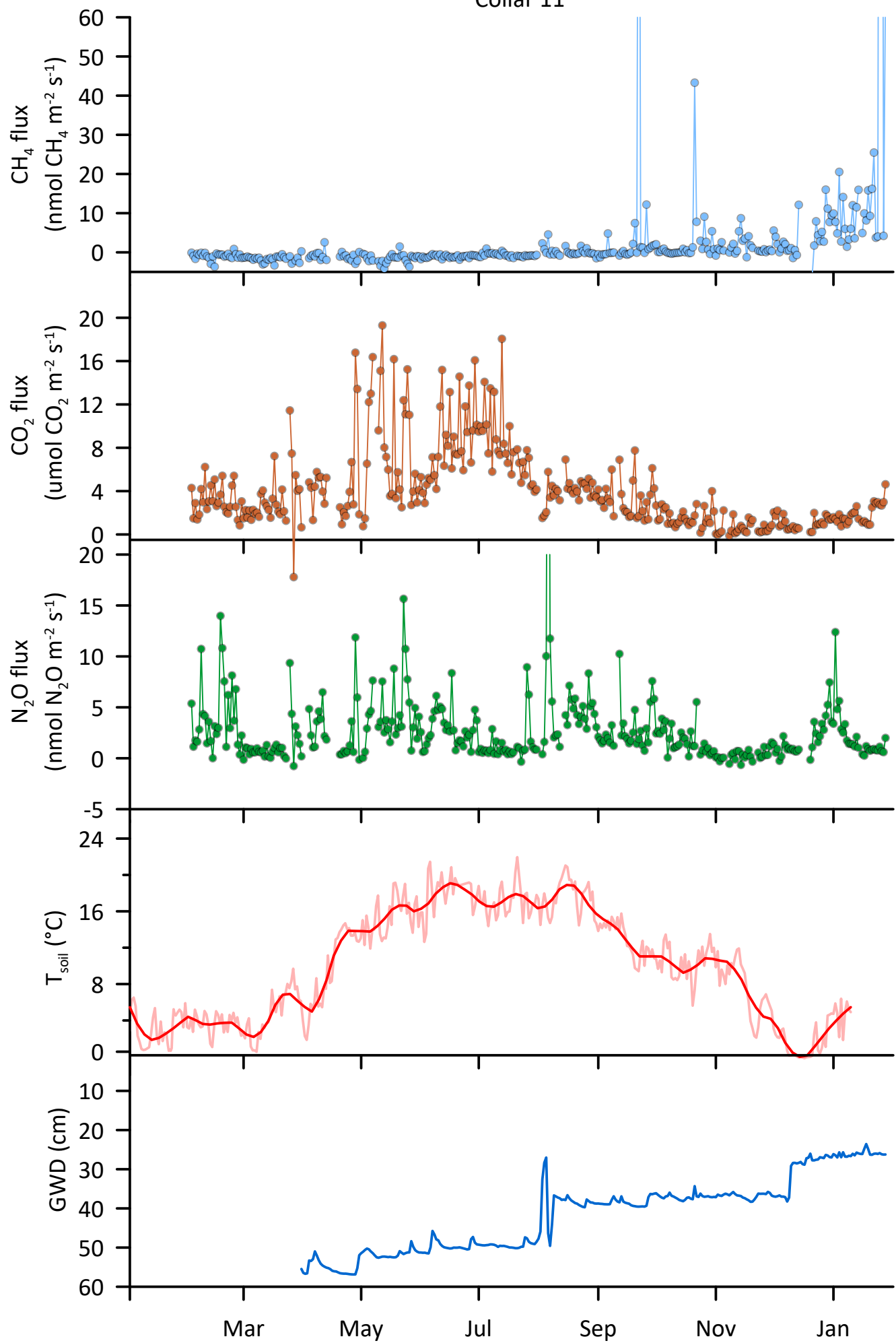
Collar 8



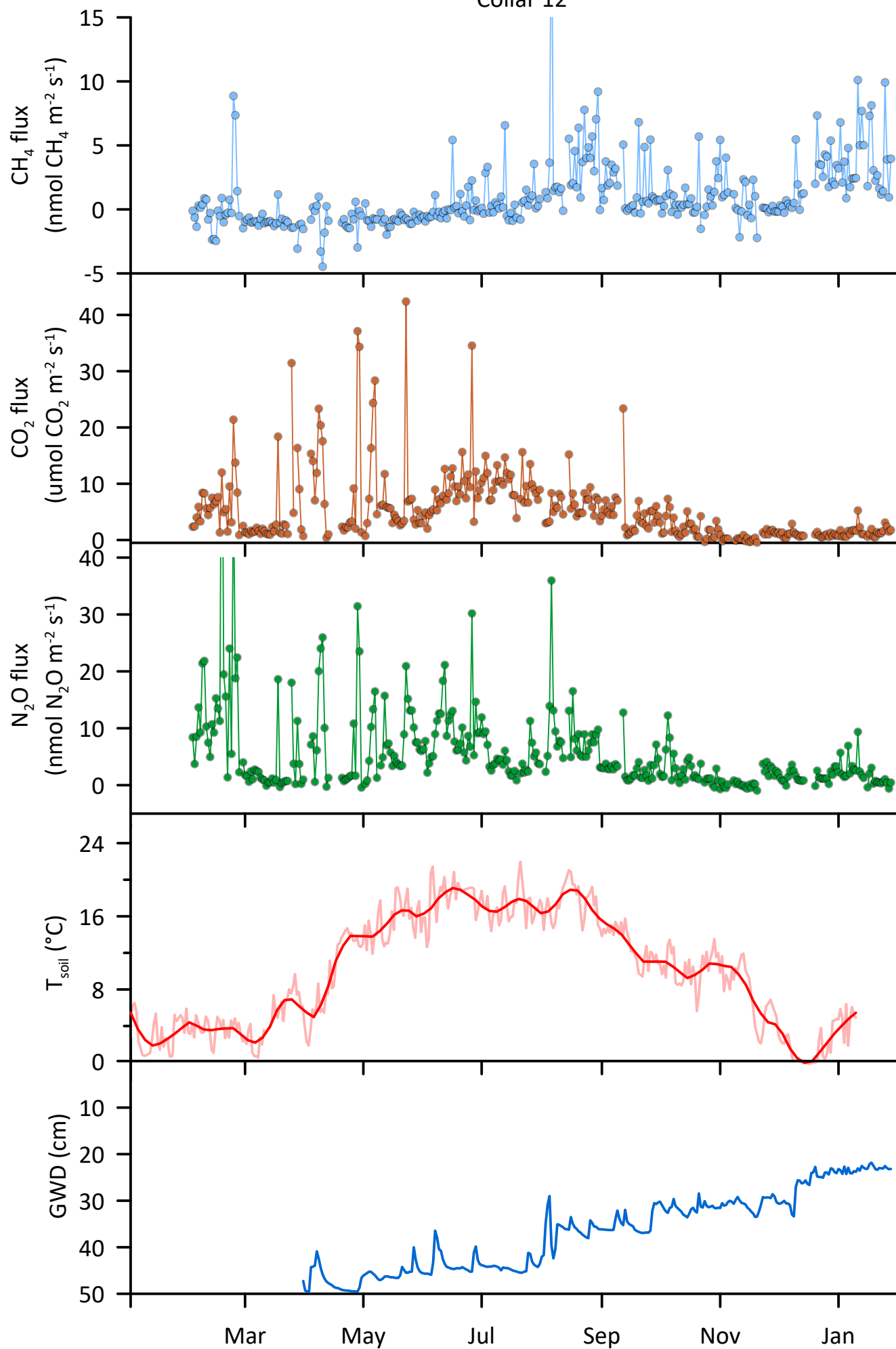
Collar 9



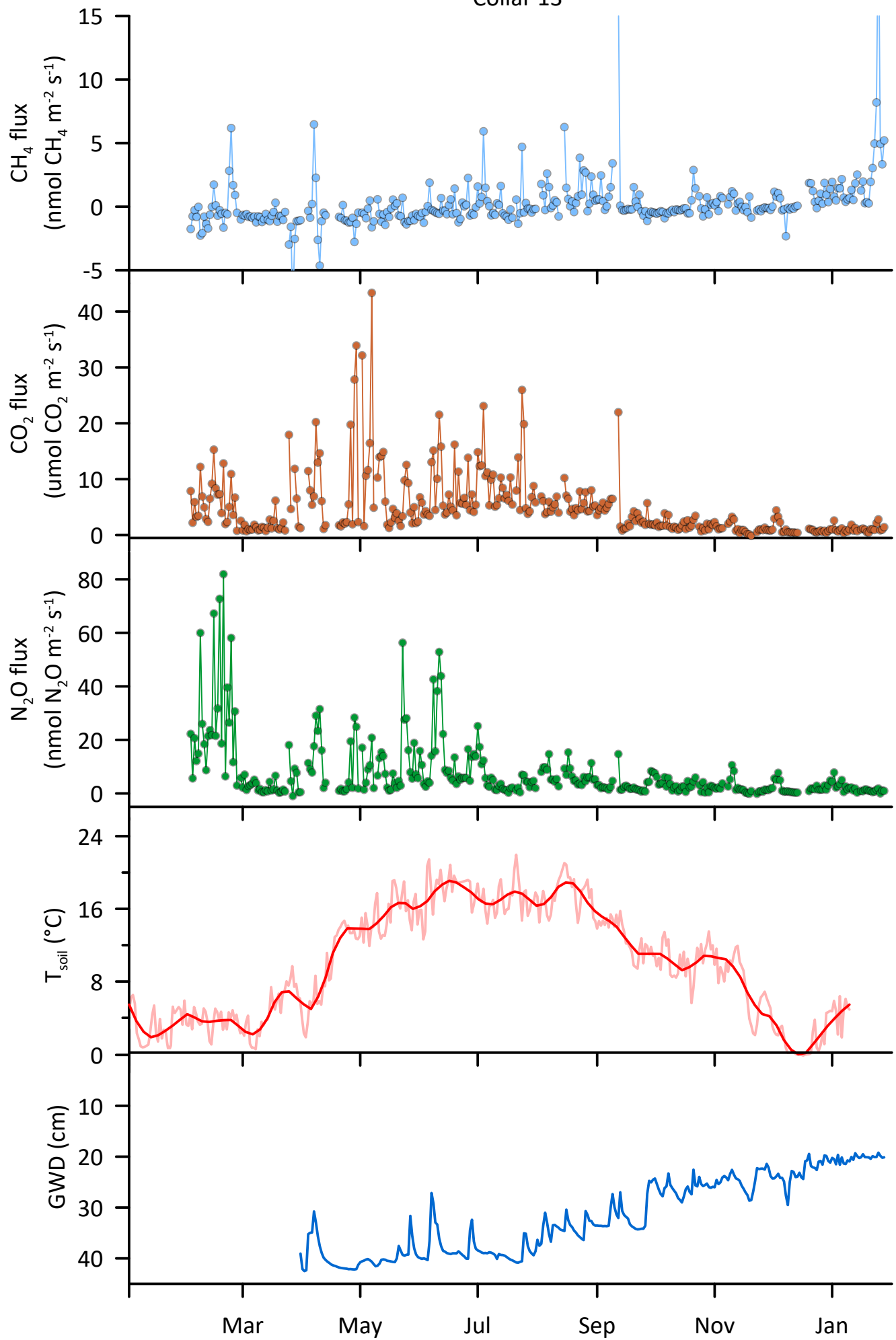
Collar 11



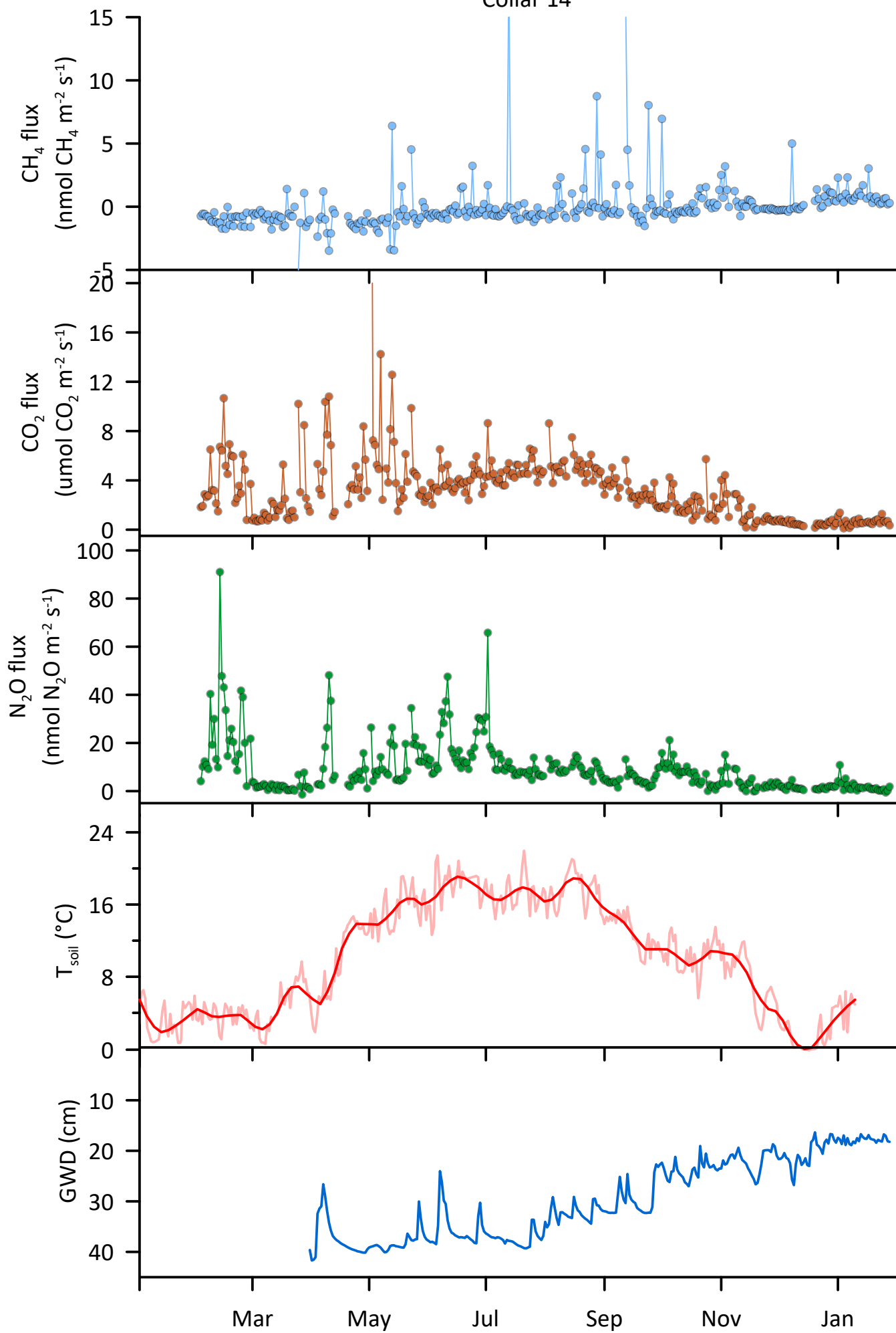
Collar 12



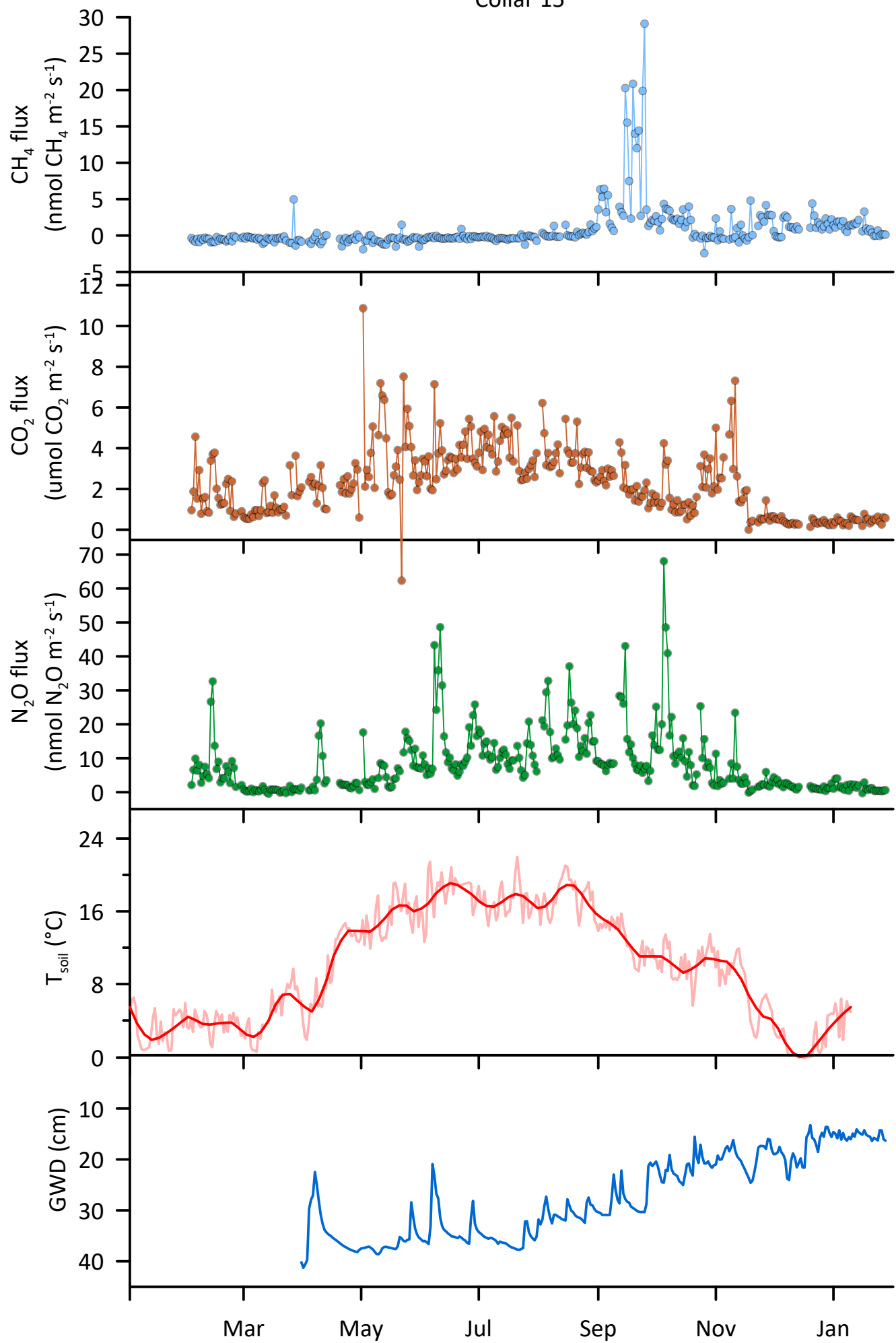
Collar 13



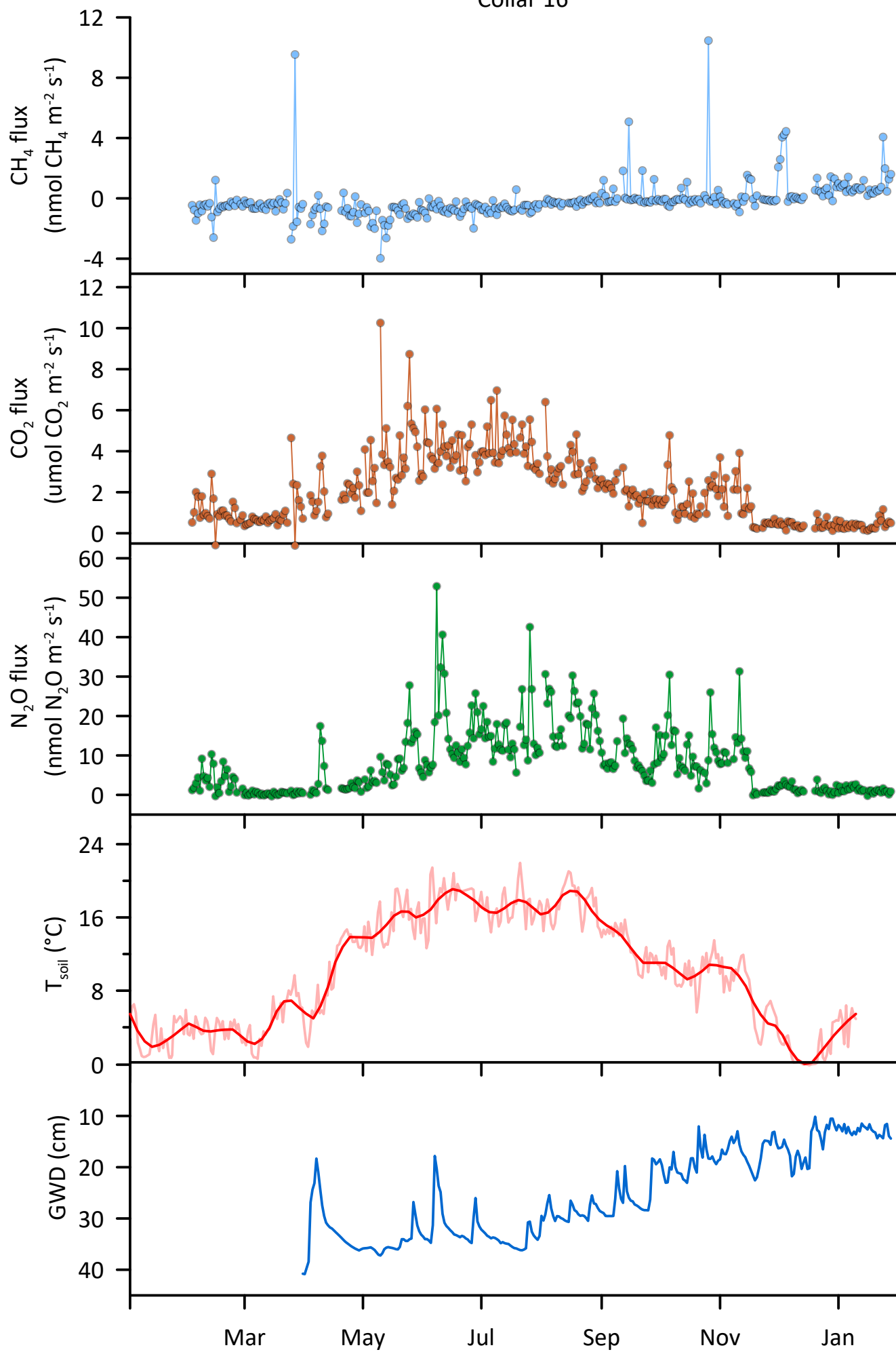
Collar 14



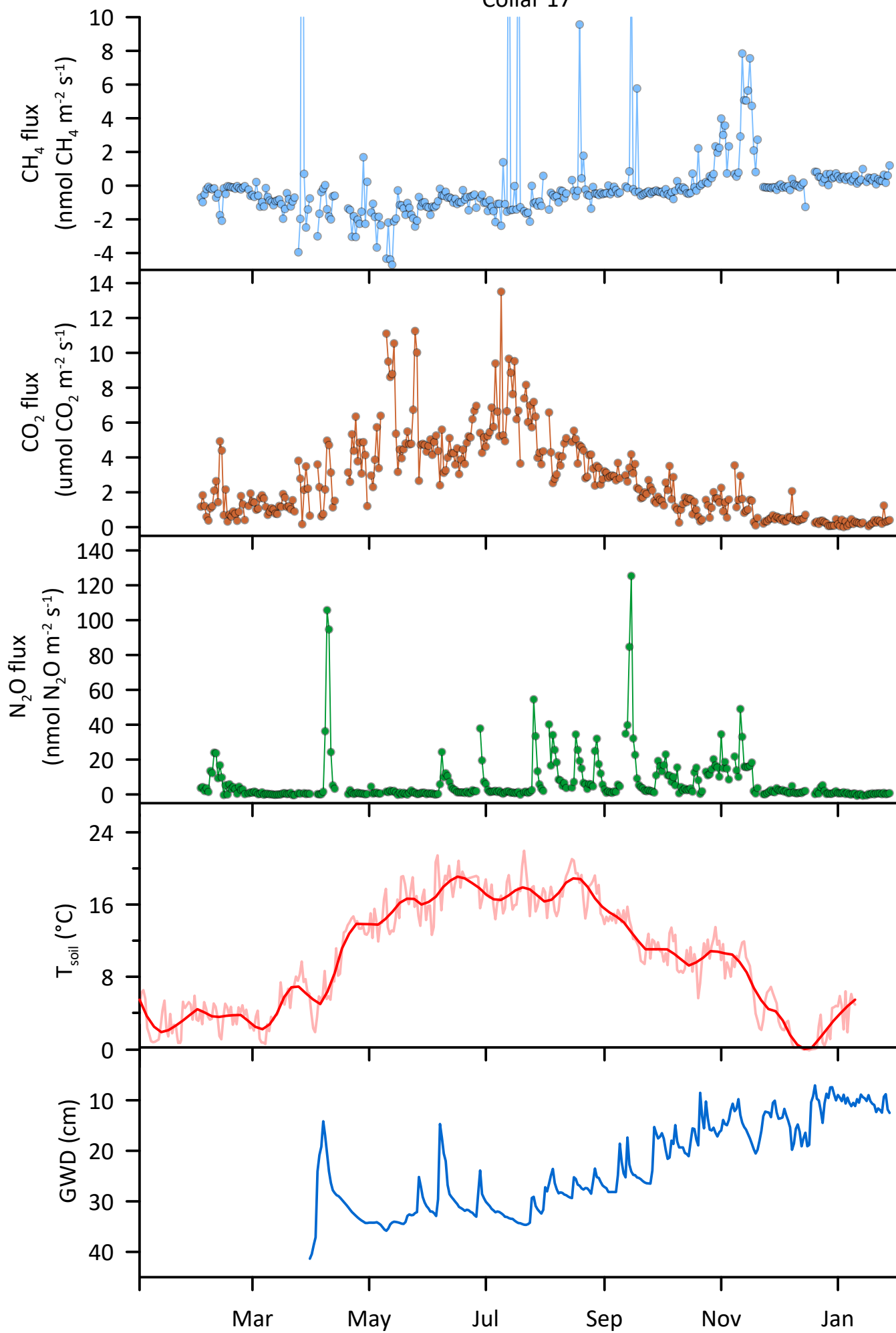
Collar 15



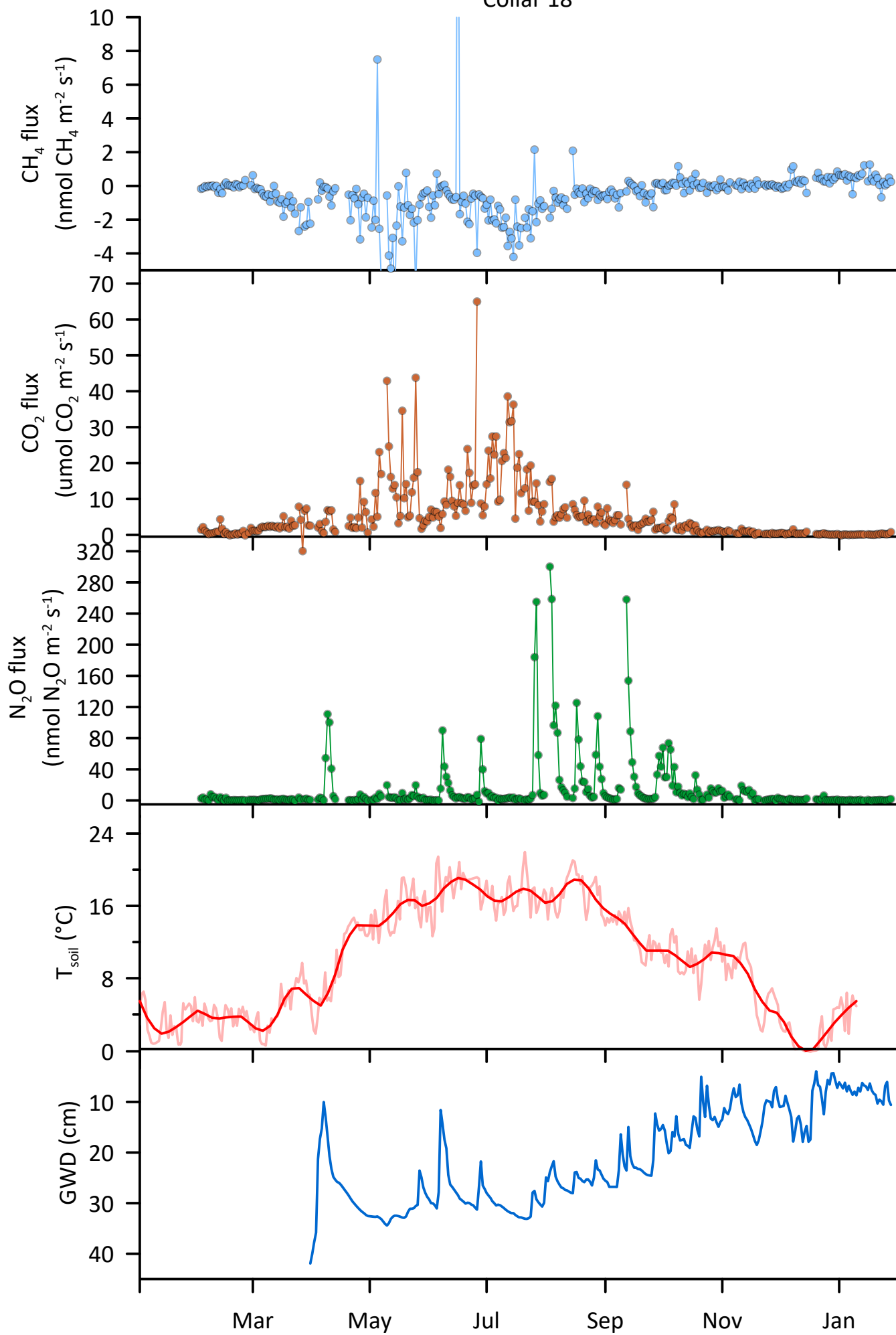
Collar 16



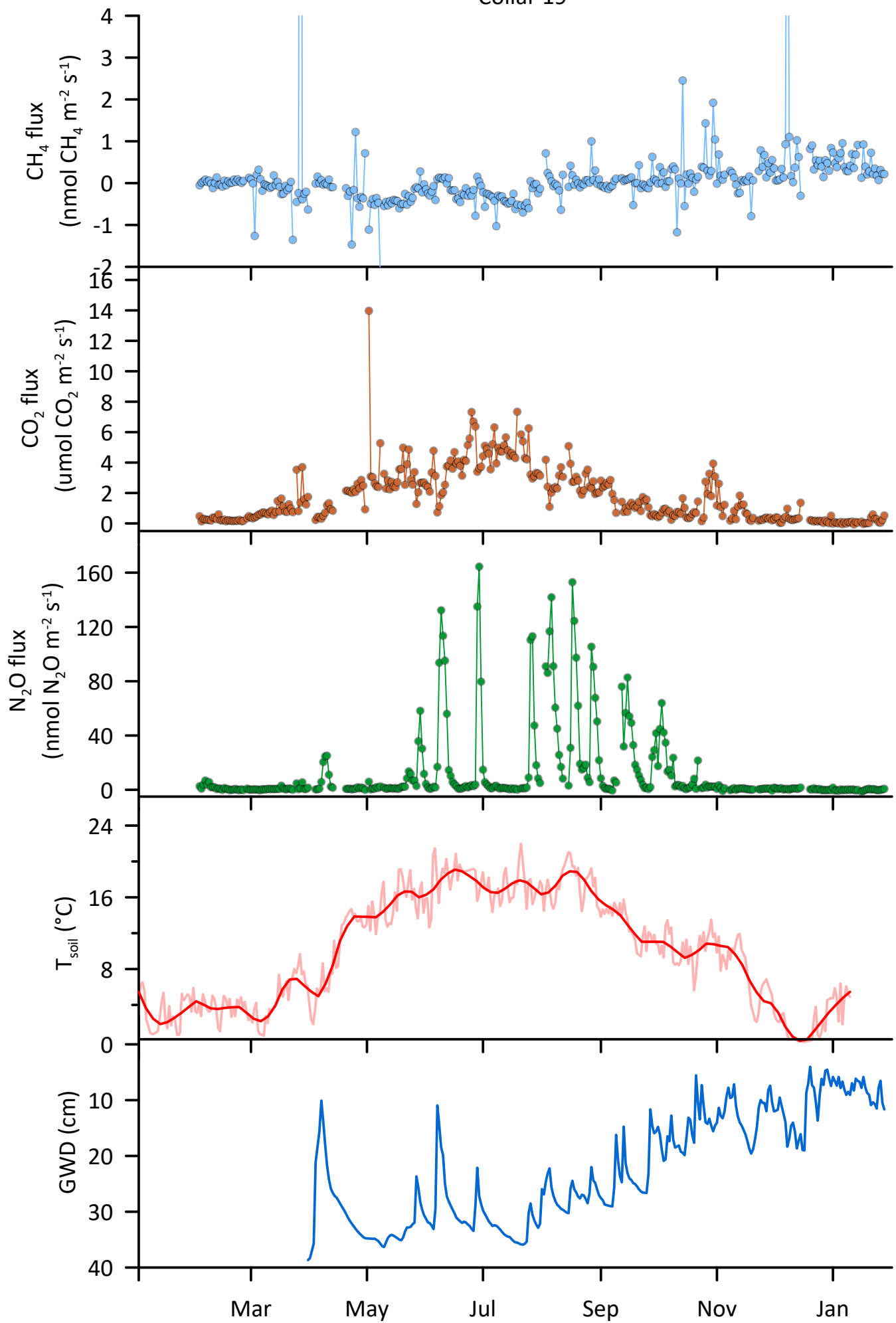
Collar 17



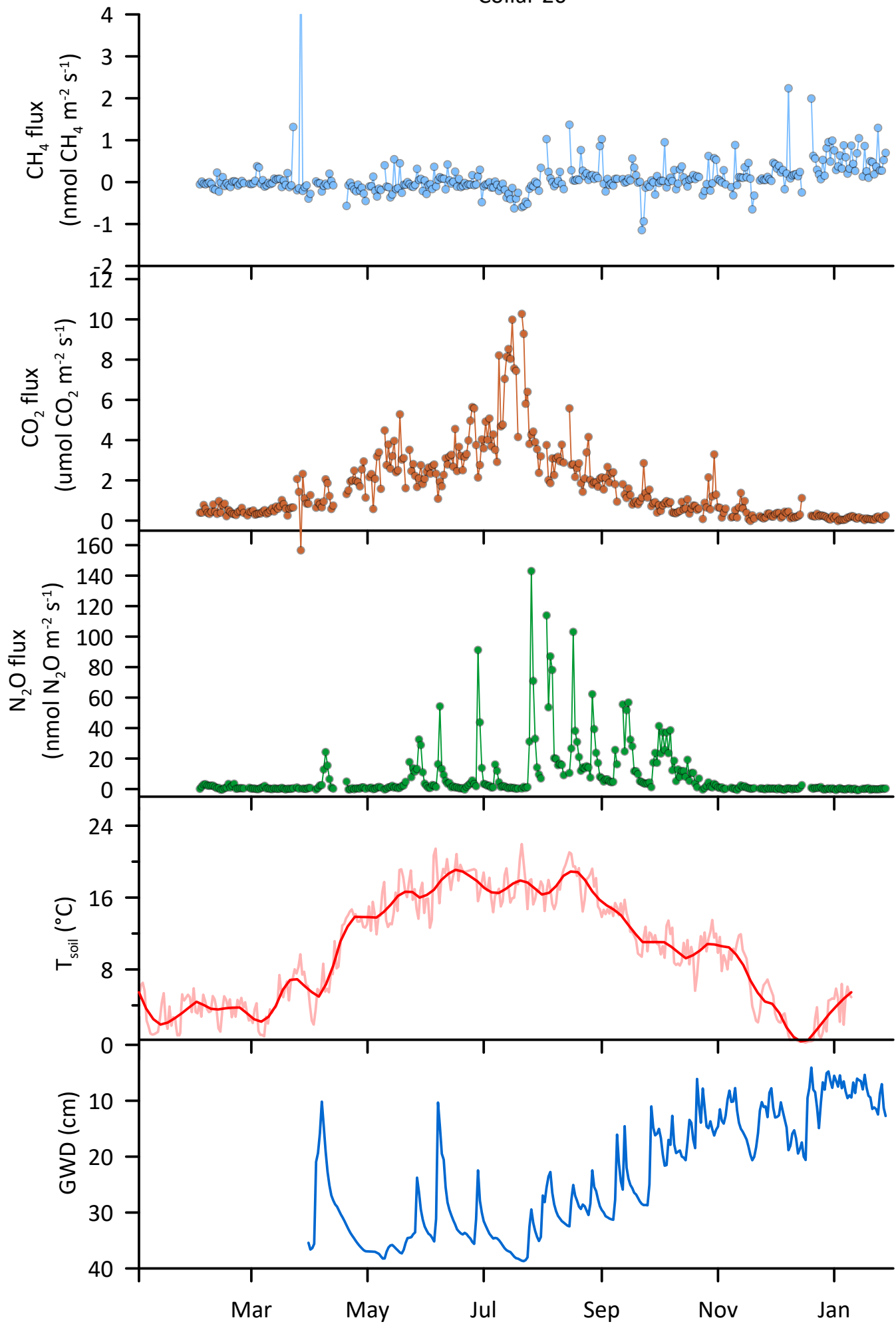
Collar 18



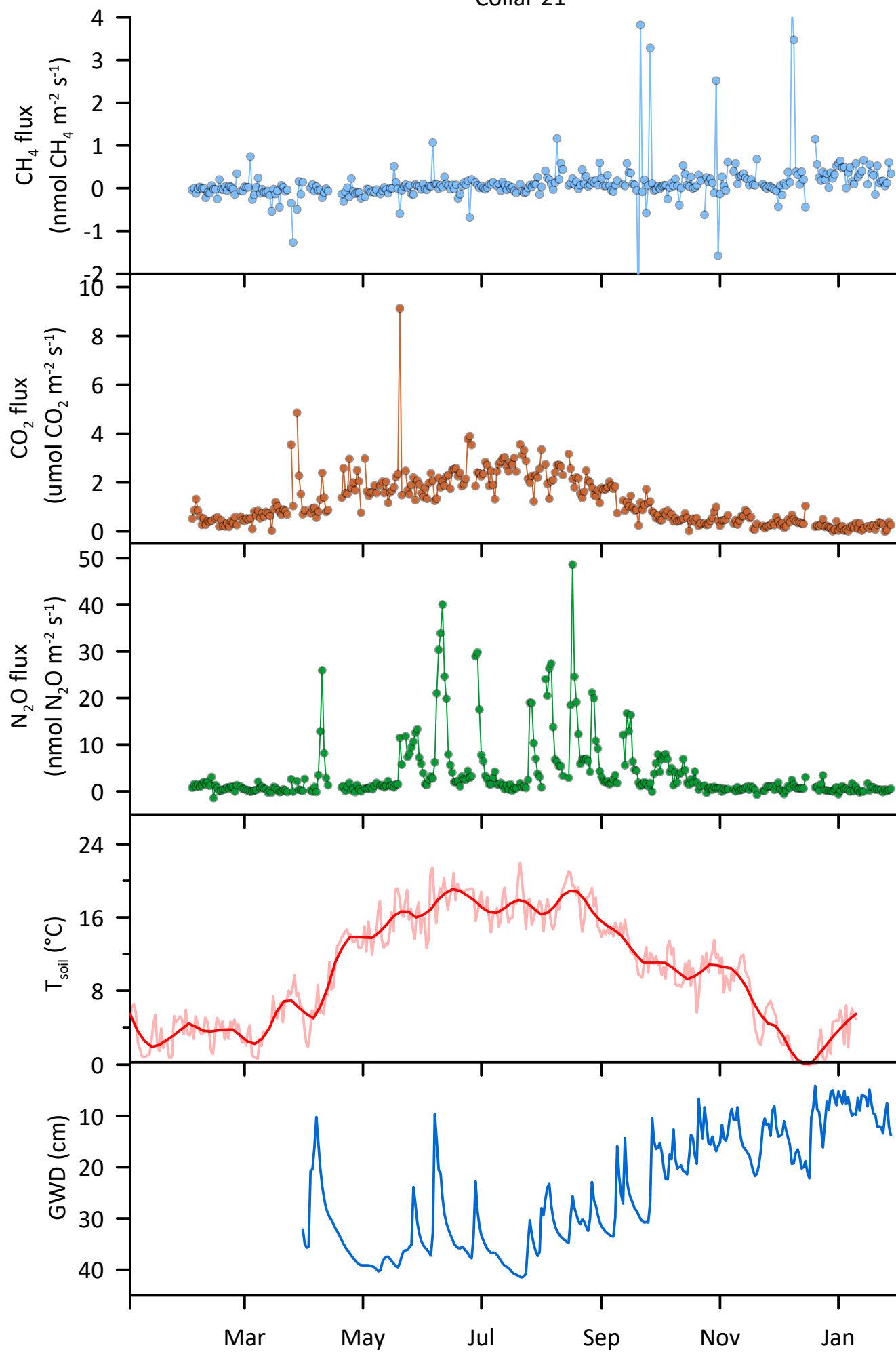
Collar 19



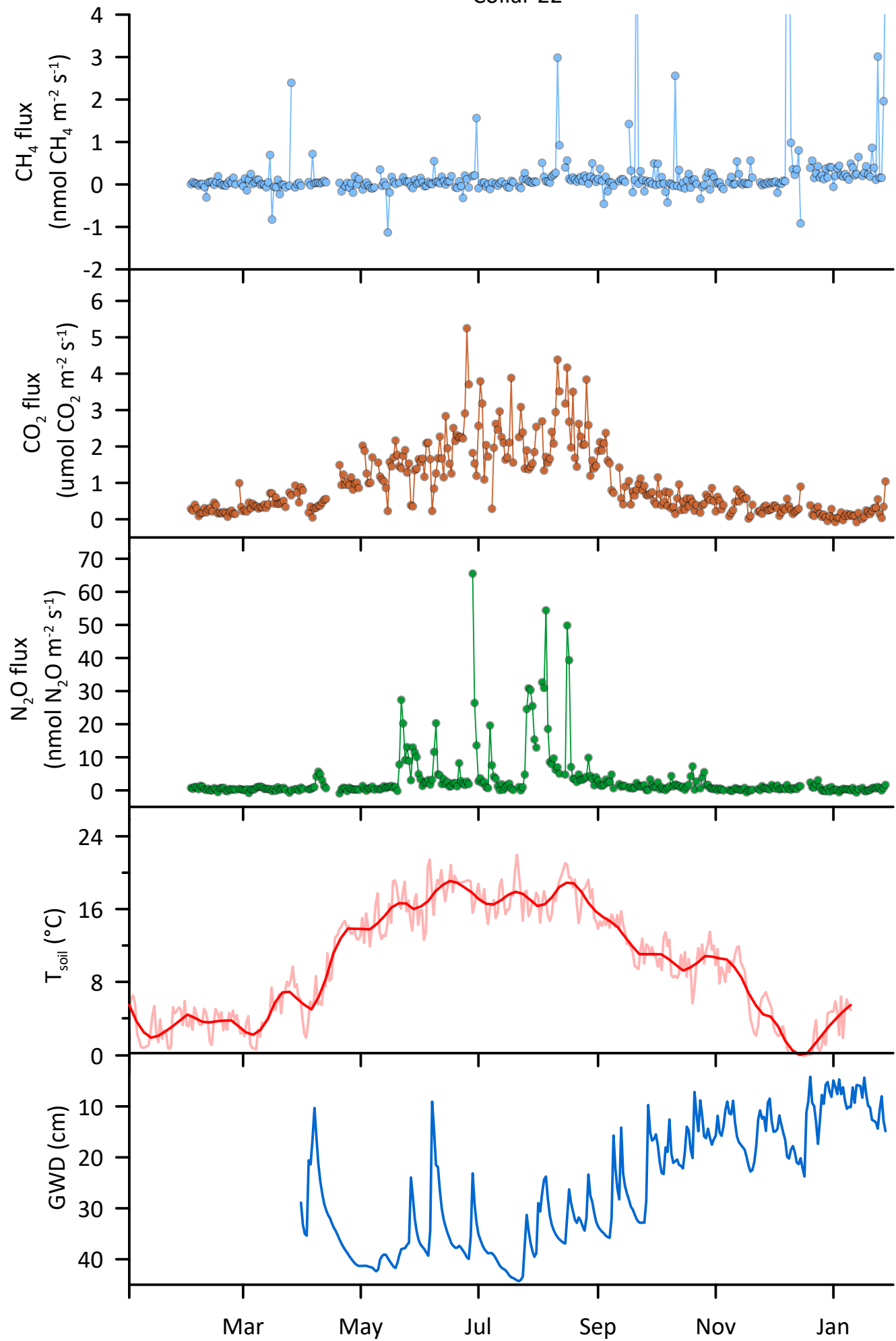
Collar 20



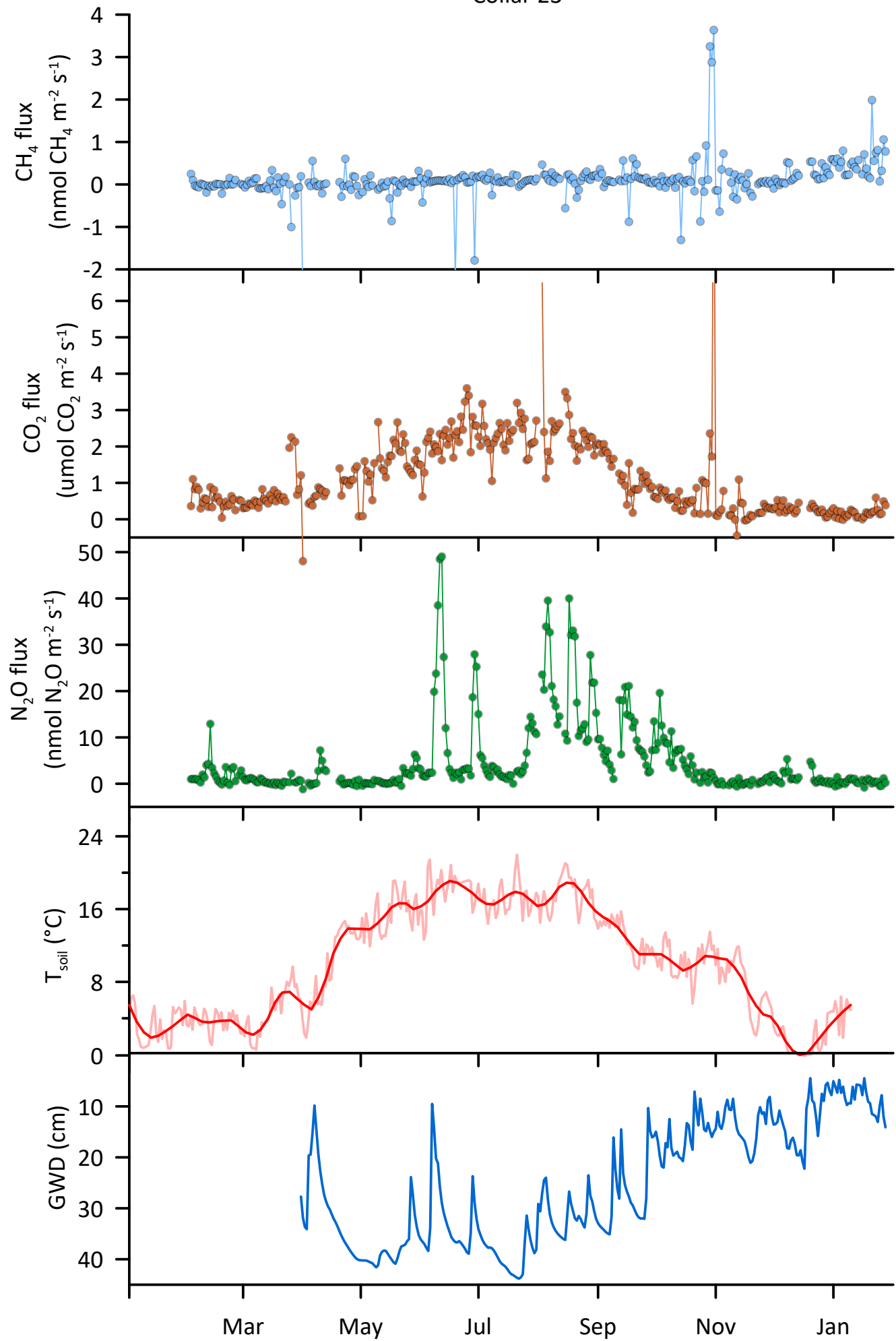
Collar 21



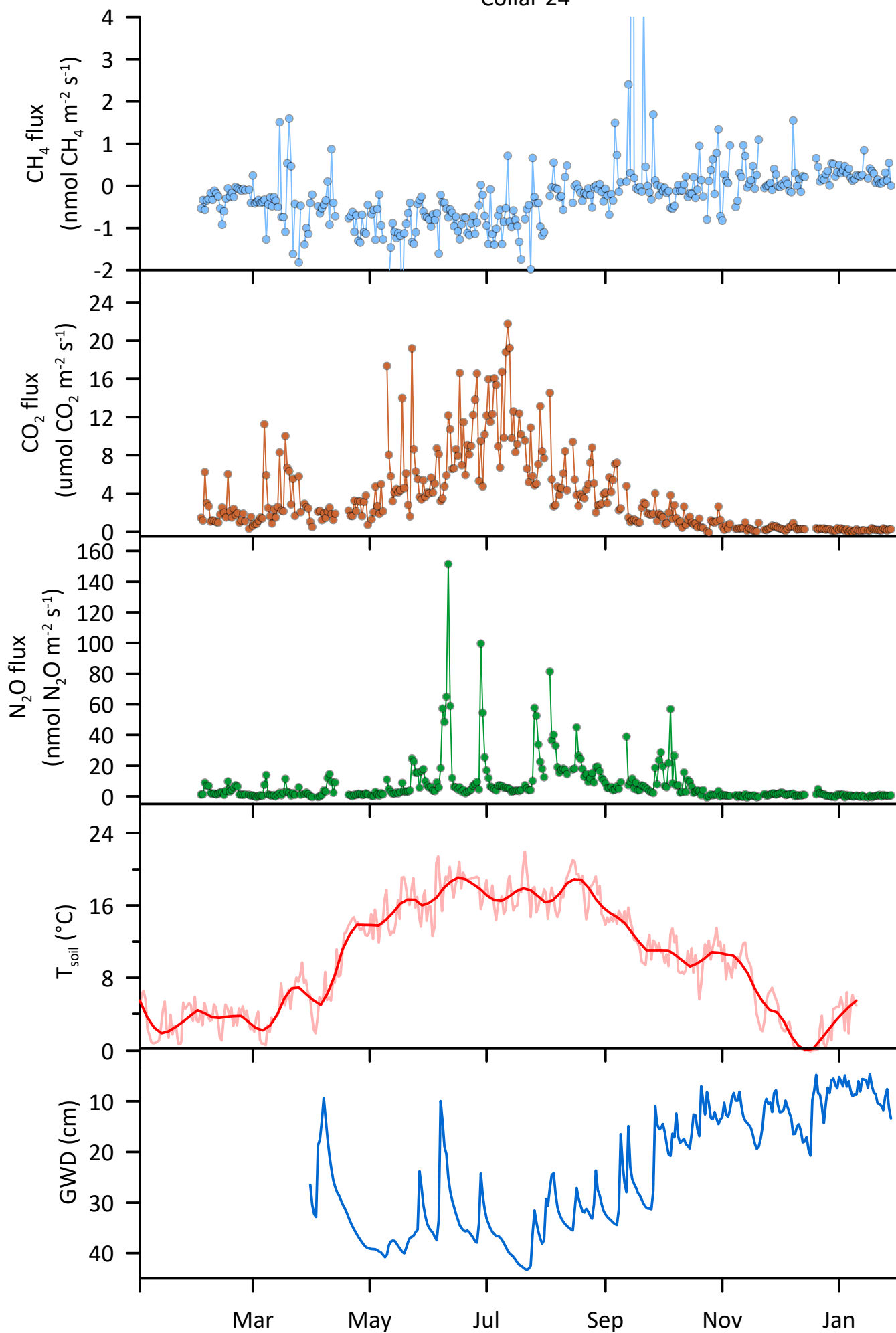
Collar 22



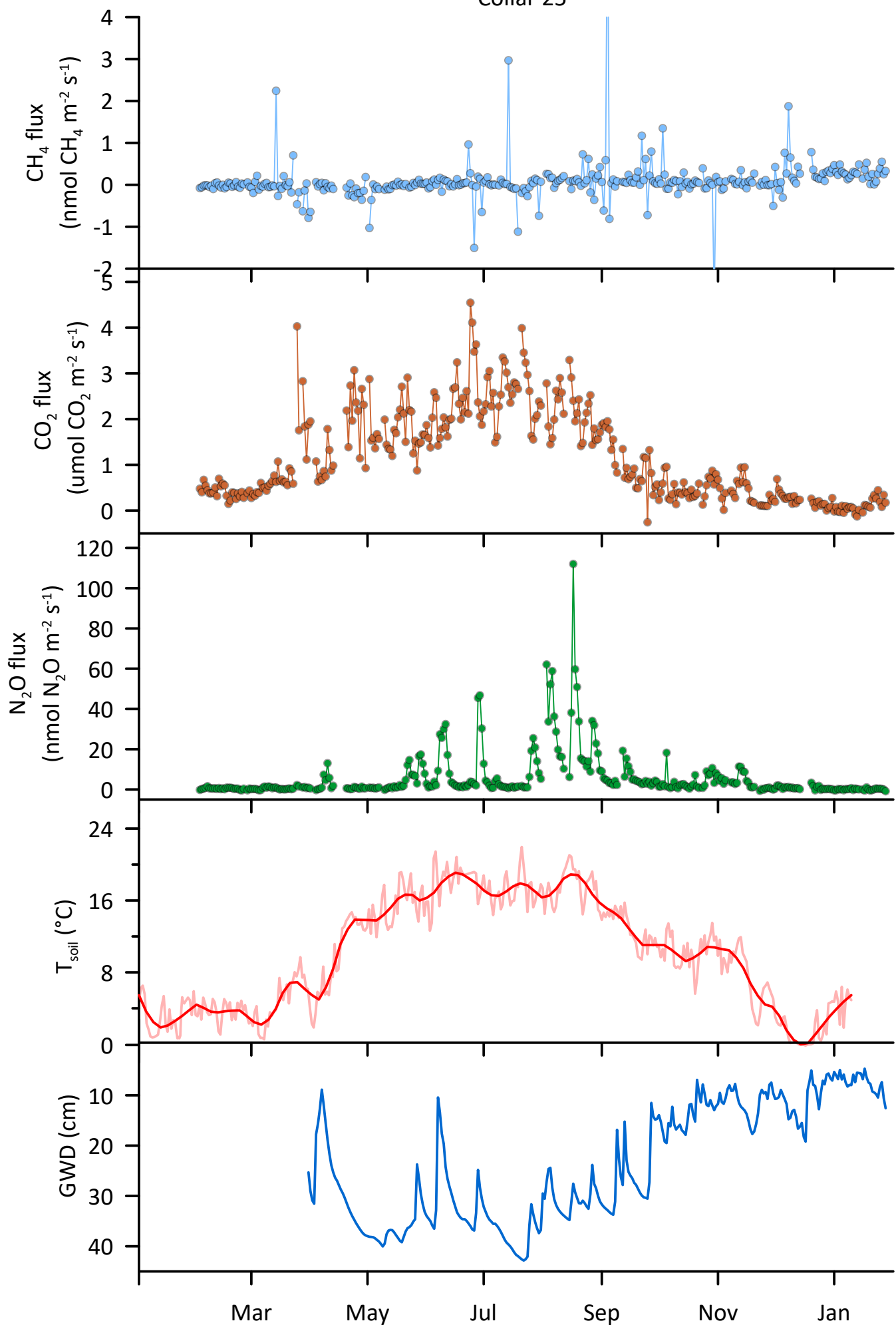
Collar 23



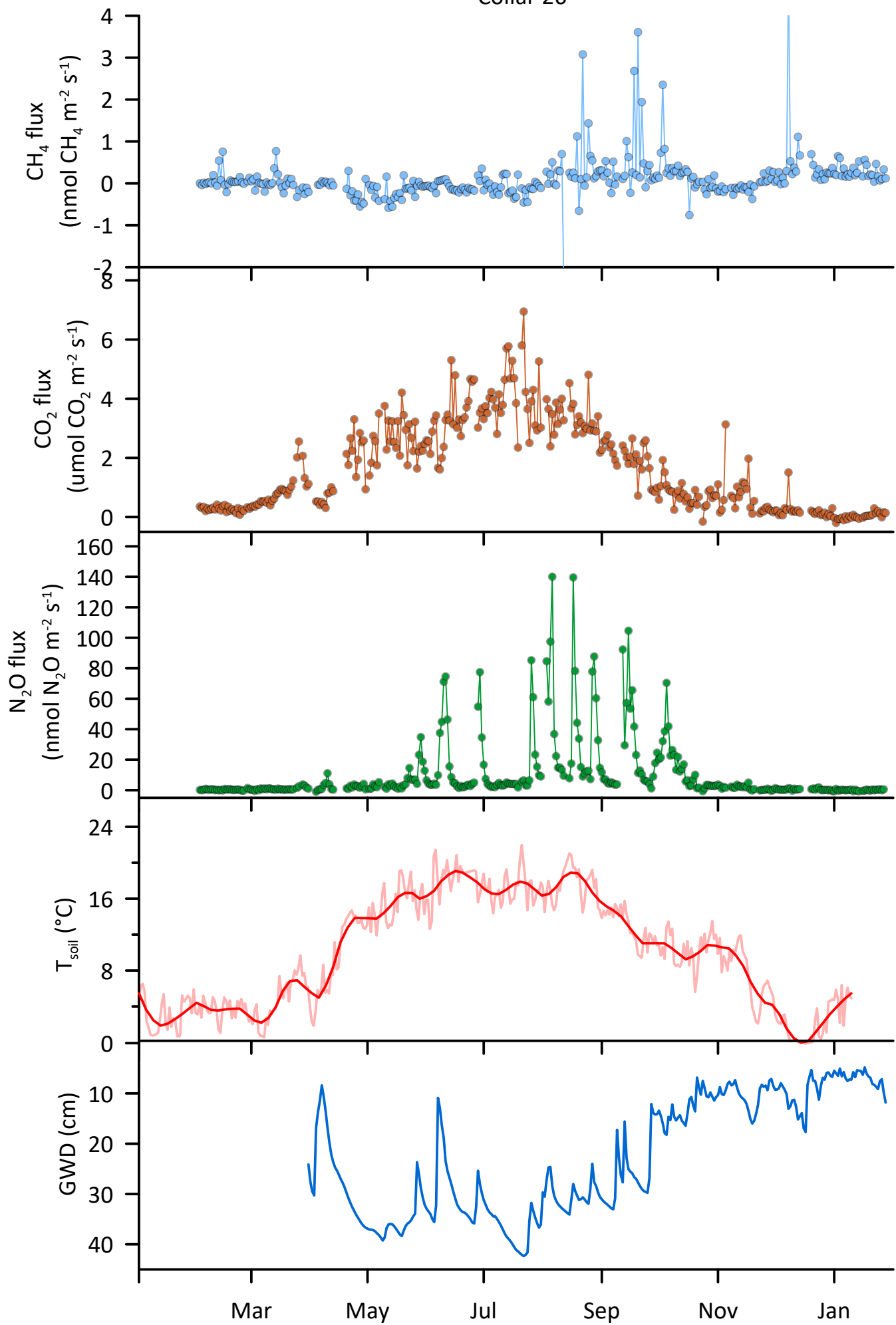
Collar 24



Collar 25



Collar 26



Collar 27

