We thank the reviewer for their critical and constructive comments on our manuscript, which have helped us to better support our findings and improve the quality of our presentation. Below, we provide detailed responses to the reviewer's comments (in italic blue font).

*The manuscript by Li et al. presents BVOC concentrations measured by PTR-TOF during six days in a natural Eastern Mediterranean forest (Beit Keshet Forest (Shibli) site) during autumn drought. The authors argue that instantaneous intraday changes in relative humidity can be used as a proxy for the mixing ratio of BVOCs over vegetation under drought conditions.*

*Thank you for giving me the opportunity to read this. The manuscript is rather well-written, but many of the figures are confusing.*

**Response**: We will fix the figures in accordance to the reviewer specific comments.

*It's clear that the intention was to measure not only the concentration of BVOCs, but also the ecosystem scale emission, but due to measurement problems that didn't happen. Considering that you measured BVOCs with enclosure in your companion manuscript and that your argumentation and conclusions are basically the same in both manuscripts, one should consider if it is really justified to publish two separate papers or if they should rather be combined.*

**Response**: We agree that the key finding of our manuscript aligns with that of Li et al. (2024). However, for the following reasons, we believe our study should be considered a standalone publication with a unique contribution:

**1. Use of different methodologies**: While the two manuscripts reach the same main conclusion regarding the significant role of instantaneous changes, particularly in relative humidity, on drought-related BVOC emission rates, they employ fundamentally different methodologies. **This independence in approach strengthens the robustness of the shared conclusion.**

2. **Different scope**: The companion manuscript by Li et al. (2024) focused on sampling measurements from **branches** of Phillyrea latifolia, whereas our study extends these findings to a **mixed Mediterranean vegetation forest** at a larger scale. This expansion broadens the applicability of the findings from individual branches to a forest ecosystem.

3. **Mixing ratios versus flux**: Li et al. (2024) used direct flux measurements to indicate that instantaneous intraday changes in meteorological parameters are a better proxy for BVOC emission rates. In contrast, the present study provides strong evidence (see our response to the next comment) that these instantaneous changes can also serve as a good proxy for BVOC mixing ratios.

4. **Additional insights**: In addition to the impact of meteorological changes on BVOC emission rates, our manuscript provides additional significant and unique insights:

a. **Required time scale for analysis**: Our analyses pointed to fundamentally different findings when comparing results for the entire daytime measurement period versus a single diurnal cycle (daytime only). Solar radiation was identified as the best proxy for drought effects on BVOC mixing ratios when the analysis encompassed the whole period (see Table 3). However, when analyzed separately for each diurnal cycle, the results indicated a significant influence of

intraday changes in relative humidity and temperature on BVOC emission rates. The artifact finding regarding the dominant effect of solar radiation is discussed in lines 455-460 and 587-595. This apparent contradiction underscores the importance of using a daily or shorter timescale for analyzing meteorological conditions on BVOC emissions under drought conditions.

b. **Biogenic source for 1,3-butadiene**: While 1,3-butadiene is frequently used as a proxy for anthropogenic emissions (e.g., Chang et al., 2014; Khan et al., 2018; Lewandowski et al., 2015), our analysis supports biogenic emission sources for 1,3-butadiene, in agreement with some previous studies (Huang et al., 2020; Asensio et al., 2007).

*The main issue is that your entire manuscript is based on the assumption that BVOC mixing ratios can be used as a proxy for BVOC emissions. I do not think this is a valid assumption and your argumentation does not convince me. I do not think the assumption is valid based on what existing publications show, considering that some of the BVOCs you deal with have lifetimes in the scale of days to weeks and it is well known that some of the BVOCs you consider are not only emitted from vegetation, but also produced in the atmosphere and that production makes up a significant fraction of the total BVOC concentrations. Either you should just skip this entire assumption and be honest to say that you are just investigating how the different environmental factors correlate with the concentration of BVOCs, or then you need to do much more to convince the reader that your assumption is valid. You could refer to previous studies - preferably from the same region - which present both BVOC emission and concentration measurements which support your assumption. You could analyse if your measured BVOC mixing ratios depend on the daily behaviour of your measured ozone concentration, BLH (reanalysis, etc), and use your light measurements as some proxy for the concentration of OH. You could also have left out the BVOCs with long lifetimes from your analysis. You should also state that one reason why you only include day time measurements in the analysis is to avoid a larger fraction of the BLH effect.*

**Response:** Thank you for this comment. Addressing the reviewer's suggestions enabled us to add more conclusive arguments to support our finding that instantaneous changes in relative humidity play a dominant role in the emission rate of BVOCs from the investigated fetch. Below, we summarize the new analyses along with complementary arguments to support our findings about the effect of temporal changes in relative humidity (RH) and temperature (T) on BVOCs emission rates.

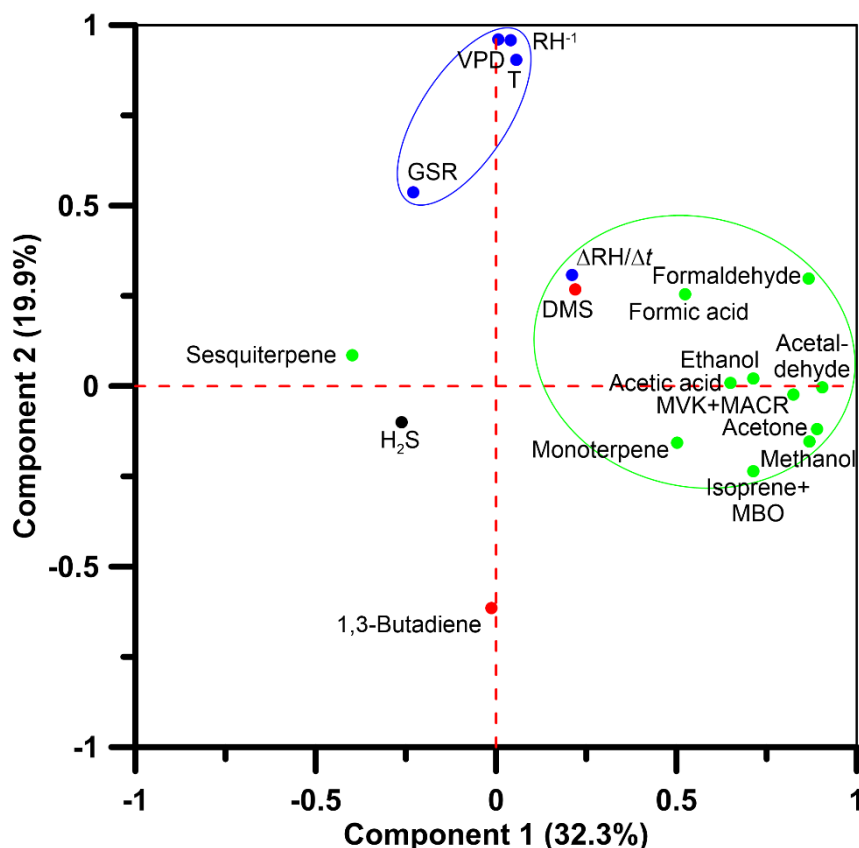
**1. Focusing the analyses on short-lived VOCs**: In response to the reviewer's suggestion, we repeated the analysis by including only short-lived VOCs to ensure that our findings are not biased by the transport of the investigated VOCs from outside the fetch. This analysis indicates that a relatively longer transport duration over the fetch, compared to out of the fetch, corresponded with a higher correlation between the measured BVOC mixing ratios and instantaneous changes in relative humidity. The new analysis was based on the following two stages:  i) **selection of VOCs with a short enough lifetime**. The daytime lifetimes of the various VOCs were calculated based on in situ measured $O_3$ mixing ratios and evaluated OH mixing ratios, using the onsite chemical and metrological conditions (Ehhalt and Rohrer 2000). Note that the resulting OH mixing ratios were in good agreement with those reported by Gabay and Tas (2019) and Gabay et al. (2020) for the same region and time during the year. Table 1 shows the resulting lifetimes for the various VOCs. In the following, "short-lived VOCs" refers

to those species that, at least during part of the measurements, were not affected by emissions outside the fetch, according to our calculations. Based on these calculations, isoprene, monoterpenes (MTs) and sesquiterpenes (SQTs) were selected for further analysis as representative of short-lived VOCs. Note that due to its fast reaction with $O_3$, all SQT concentration data are expected to originate from emissions within the fetch. The calculations indicate that MT and isoprene could be affected by emissions from outside the fetch during part of the time, as described in more detail below.

**Table 1.** *Rate constants of each VOC with OH and $O_3$ are presented, individually scaled on a normalized white–red scale. The lifetime range of each VOC against oxidation by OH and $O_3$ is also listed.*

| | OH rate constant at 25°C ($cm^3$ $molecule^{-1} s^{-1}$) | $O_3$ rate constant at 25°C ($cm^3$ $molecule^{-1} s^{-1}$) | Lifetime against OH (s) | Lifetime against $O_3$ (s) |
|---|---|---|---|---|
| Isoprene | 9.99E-11 | 1.28E-17 | 731~1820 | 3.3E4~8.3E4 |
| MT * | 1.36E-10 | 1.08E-16 | 537~1337 | 3923~9809 |
| SQT * | 2.44E-10 | 1.20E-14 | 299~745 | 35~88 |
| Acetone | 1.75E-13 | | 4.2E5~1.0E6 | |
| Acetaldehyde | 1.49E-11 | | 4.8E3~1.2E4 | |
| MVK | 1.88E-11 | | 3.9E3~9.7E3 | |
| Methanol | 8.96E-13 | | 8.1E4~2.0E5 | |
| Ethanol | 3.21E-12 | | 2.3E4~5.7E4 | |
| Formaldehyde | 8.49E-12 | | 8.6E3~2.1E4 | |
| Acetic acid | 7.40E-13 | | 9.9E4~2.5E5 | |
| Formic acid | 4.50E-13 | | 1.6E6~4.0E6 | |
| DMS | 4.84E-12 | | 1.5E4~3.8E5 | |
| $H_2S$ | 4.80E-12 | | 1.5E4~3.8E5 | |
| 1,3-Butadiene | 6.65E-11 | 6.33E-18 | 1098~2734 | |

ii) **Evaluation of the relative contribution of emissions from the fetch to the measured BVOCs mixing ratios**. First, we determined the distance between the fetch edge and the measurement point for each wind direction. For each time point, we calculated the travel time between the edge of the fetch and the measurement point, based on the wind speed and direction. Fig. 1 summarizes the PCA analysis previously shown in the manuscript (Fig. 6 in the manuscript) followed by a PCA for the short-lived species, MT, SQT, and isoprene (Fig. 2). The upper panel of this figure shows the same information as in Fig. 1 but only for these three species. Based on wind direction, speed, and the calculated BVOCs lifetime, the lower panels present three categories reflecting the extent to which the measured mixing ratios could be affected solely by emissions from the fetch. We have defined three categories- "60%", "80%" and "100%" - indicating that the travel time out of the fetch was 40%, 20% and 0% of the lifetime of the species, respectively.

**Figure 1\*.** *PCA of ambient meteorological parameters, including meteorological parameters and the temporal derivative of RH, and the measured mixing ratios of VOCs. Colors indicate ambient meteorological parameters (blue), BVOCs (green), AVOCs (black), and either BVOCs or AVOCs (red). Note that the inverse of RH is presented rather than RH. \*identical to Fig. 6 in the main text.*

The PCA analysis presented in Fig. 2 shows similar patterns of association with the tested meteorological parameters for the short-lived BVOCs as observed for all other investigated BVOCs (Fig. 2). As mentioned in the manuscript, SQT was exceptional and showed agreement with previous studies (lines 544-548 in the manuscript; Bonn et al., 2019; Caser et al., 2019; see also Fig. 1). Fig. 2 further demonstrates a relatively strong correlation between the temporal derivative of RH ($\Delta RH/\Delta t$) and component 2 along with MT and isoprene, compared to the other meteorological parameters. Moreover, the difference in correlation levels between MT, isoprene and $\Delta RH/\Delta t$, consistently decreased (from 0.489 to 0.184, as indicated in the figure) when shifting from "60%" to "80%" and "100%", i.e., for reduced potential contributions from outside the fetch. This trend is indicated by the red values. This indicates that as the potential for contribution from outside the fetch decreases, the $\Delta RH/\Delta t$ effect plays a larger role, which reinforces our conclusions. This analysis will be included in the revised manuscript.

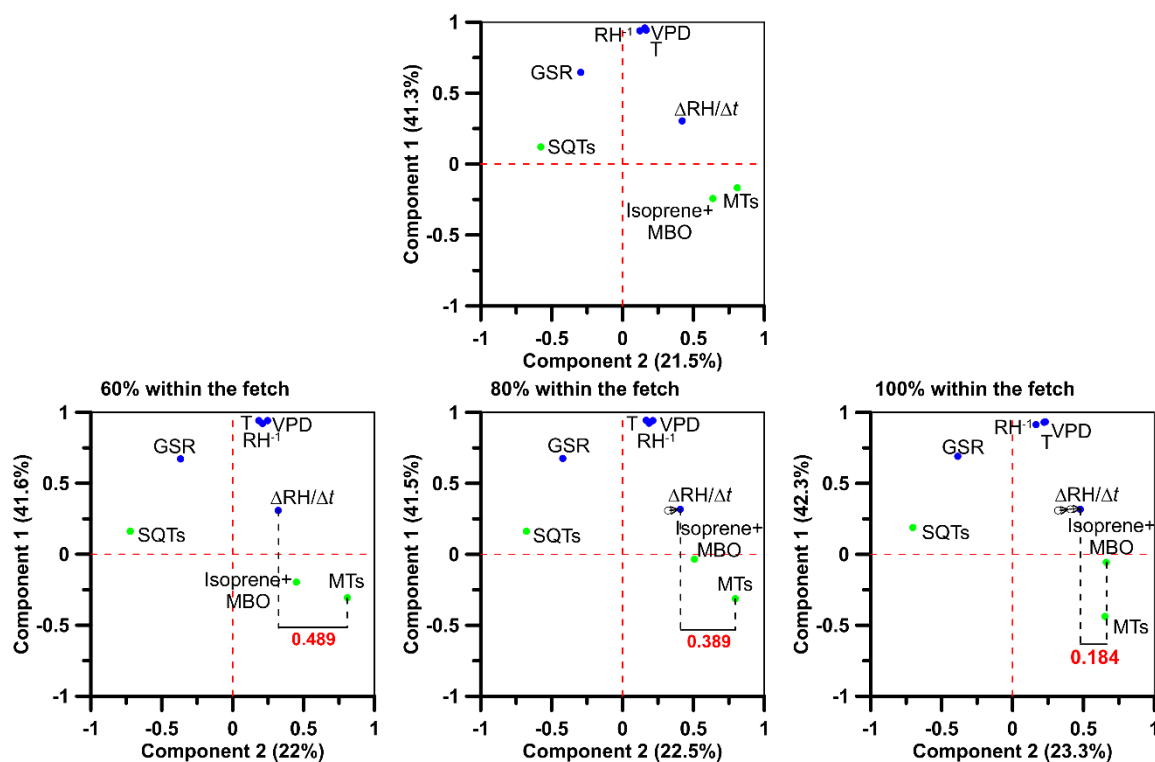



**Figure 2.** *PCAs of ambient meteorological parameters, including meteorological parameters and the temporal derivative of RH, and the measured mixing ratios of the short-lived BVOCs (isoprene, MTs, SQTs). The upper panel presents the PCA analysis for the full dataset including the short-lived BVOCs, while the lower three panels show the PCA analysis for different categories - "60%", "80%" and "100%" - indicating that the travel time out of the fetch was 40%, 20% and 0% of the species' lifetime, respectively.*

2. **Ruling out a potentially dominant effect of mixing height on the measured VOCs mixing ratios**: We performed model simulation using the Weather Research and Forecast (WRF) model (Skamarock et al., 2019) to simulate the planetary boundary layer height (PBLH), and thereby investigate the potential effect of changing mixing height on BVOCs mixing ratios. Version 4.2.2 was used for the simulation. The domain configuration consisted of one parent and two one-way nested grids with horizontal resolutions of 9 km (d01), 3 km (d02), and 1 km (d03), all centered over northern Israel (see Fig. 3). The set of physical parameterizations applied in this study are summarized in Table 2 and include the Yonsei University (YSU) PBL scheme (Hong et al., 2006), the Unified Noah land surface model, the Rapid Radiative Transfer Model for global circulation models (GCMs) for longwave and shortwave radiation, the Thompson microphysics scheme, the Moisture-advection-based Trigger for the Kain-Fritsch cumulus scheme (only for the d01 domain), and the Revised MM5 surface layer scheme. The modeling simulations covered the entire measurement period, including a 72-hour spin-up time. Initial and boundary meteorological conditions were obtained from the high-resolution European Centre for Medium-Range Weather Forecasts (ECMWF) Integrated Forecasting System (ISF) with a spatial resolution of 0.1° x 0.1° and a temporal resolution of 1 hour. The vertical grid was configured with 54 eta-levels, with the model top set at 5 hPa; eight of these levels are within the first kilometer above ground level (AGL) to ensure good representation of the PBL. An output temporal resolution of 15 minutes was chosen for representing PBLH.

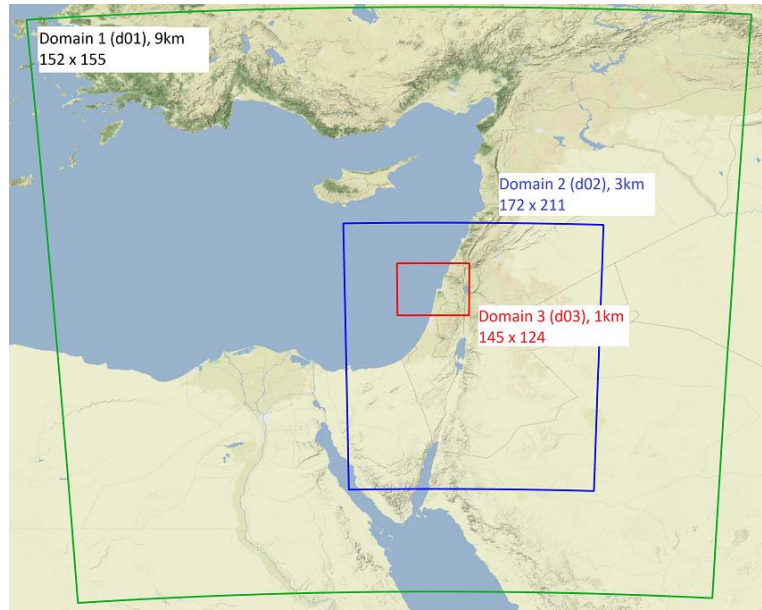



**Fig. 3.** *WRF Model computational domains of the simulation including three successive nested domains, centered at northern Israel with grid spacing of 9km (do1; 152x152 grid points), 3km (d02; 172x211 grid points), and 1 km (d01; 145x124 grid points).*

**Table 2**. *WRF parametrization schemes, used to simulate PBLH over the measurement area*

| WRF namelist option | Parametrization scheme | Reference |
|---|---|---|
| Micro Physics Options (*mp_physics*) | Aerosol–aware & Hail/Graupel/Aerosol Thompson Schemes | (Thompson and Eidhammer, 2014) |
| Cumulus Parameterization Options (*cu_physics*) - only d01 | Moisture–advection–based Trigger for Kain–Fritsch Cumulus Scheme | (Ma and Tan, 2009) |
| Shortwave (*ra_sw_physics*) and Longwave (*ra_lw_physics*) Options | RRTMG Shortwave and Longwave Schemes | (Iacono et al., 2008) |
| Planetary Boundary Layer (PBL) Physics Options (*bl_pbl_physics*) | Yonsei University Scheme (YSU) | (Hong et al., 2006) |
| Surface Layer Options (*sf_sfclay_physics*) | Revised MM5 Scheme | (Jiménez et al., 2012) |
| Land Surface Options (*sf_surface_physics*) | Unified Noah Land Surface Model | (Tewari, 2004) |

A PCA figure including the simulated PBLH is presented below (Fig. 4). Figure 4 indicates that PBLH correlated with basic meteorological parameters and had a negligible correlation (r=-0.09) with component 1. The BVOC mixing ratios, however, showed a higher correlation with component 1. Note that while this figure indicates a relatively high correlation between ΔRH/Δt and BVOCs, our analysis suggests that the correlation between BVOCs and meteorological parameters should be investigated on a diurnal cycle scale (see lines 510-513, 587-595 in the manuscript). Table 3 below (similar to Table 4 in the manuscript, which is based on a daily scale analysis) indicates that on a daily basis, ΔRH/Δt exhibited a higher correlation with the BVOCs mixing ratios, as can be inferred from Fig. 4. Based on both Fig. 4 and Table 3, PBLH exhibited almost no correlation with the BVOCs mixing ratios. Overall, the analysis presented in Fig. 4 and Table 3 indicate that during the daytime measurement, PBLH, as well as the absolute values of the investigated meteorological parameters, did not play a notable role in the BVOC mixing ratios. This analysis will be included in the revised manuscript.

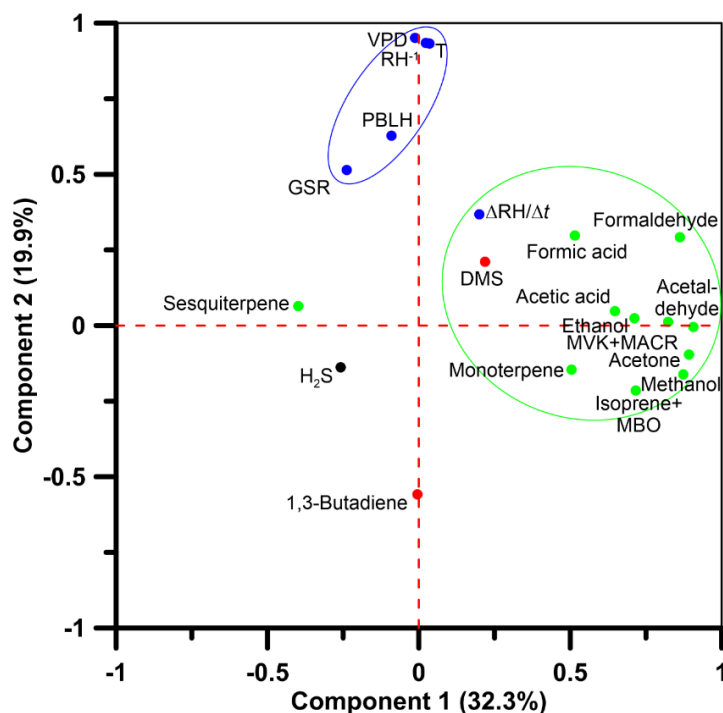



**Figure 4.** *PCA of ambient meteorological parameters, including meteorological parameters, planetory boundary layer height (PBLH) and the temporal derivative of RH (ΔRH/Δt), and the measured mixing ratios of VOCs. Colors indicate ambient meteorological parameters (blue), BVOCs (green), AVOCs (black), and either BVOCs or AVOCs (red). Note that the inverse of RH is presented rather than RH.*

**Table 3.** Correlation of the investigated VOCs with various meteorological parameters. Presented is the number of VOCs for which a non-statistically significant and statistically significant R with various meteorological conditions and their temporal derivatives ( $\frac{\Delta T}{\Delta t}$ , $\frac{\Delta RH}{\Delta t}$ , $\frac{\Delta VPD}{\Delta t}$ , $\frac{\Delta GSR}{\Delta t}$ and $\frac{\Delta RH}{\Delta t}$ are the temporal derivatives of T, RH, VPD, GSR and RH, respectively, and PBLH ) was observed. Red and blue shading indicate positive and negative correlation, respectively. Darker color (red or blue) indicates statistically significant correlation ($P < 0.05$), while light color indicates a non-statistically significant correlation, with $0.1 > P > 0.05$.

| | $T$ | $\frac{\Delta T}{\Delta t}$ | $RH$ | $\frac{\Delta RH}{\Delta t}$ | $VPD$ | $\frac{\Delta VPD}{\Delta t}$ | $GSR$ | $\frac{\Delta GSR}{\Delta t}$ | $PBLH$ |
|---|---|---|---|---|---|---|---|---|---|
| **DMS** | | | | | | | | | |
| **H₂S** | | | | | | | | | |
| **1,3-Butadiene** | | | | | | | | | |
| **MT** | | | | | | | | | |
| **Isoprene+MBO** | | | | | | | | | |
| **SQT** | | | | | | | | | |
| **Acetone** | | | | | | | | | |
| **Acetaldehyde** | | | | | | | | | |
| **MVK+MACR** | | | | | | | | | |
| **Methanol** | | | | | | | | | |
| **Ethanol** | | | | | | | | | |
| **Formaldehyde** | | | | | | | | | |
| **Acetic acid** | | | | | | | | | |
| **Formic acid** | | | | | | | | | |
| | *2* | *6*+*3* | *1* | *8*+*2*+*1* | *2*+*1* | *8*+*1* | *1* | *2* | *2* |

3. **The potential effect of chemical reactions on the measured VOC mixing ratios**: We calculated the lifetime of each BVOC against oxidation by $O_3$ or by OH (with estimated mixing ratios for OH; see Sect. 1 above) and evaluated the potential impact of these oxidation processes on the evaluated daytime drought stress index (DDSI) values, which we defined in Sect. 3.3 in the manuscript for the drought effect on BVOC mixing ratios during the daytime. The analysis indicates that chemical kinetics could contribute, on average, up to 5% to the evaluated DDSI values. Notably, DMS, monoterpenes, and sesquiterpenes exhibited chemical kinetic effects of up to 20–30% of the DDSI value. Note that $H_2S$ exhibited a DDSI value near zero, regardless of whether its chemical oxidation was accounted for. This analysis is included in Sect. S6 of the Supplementary.

**4. Distinct correlations of BVOCs and AVOCs with instantaneous changes in meteorological conditions:** Our analysis indicated a shared response of the investigated BVOCs to the meteorological parameters. The PCA analysis presented in Fig. 4 shows that all investigated BVOCs exhibit a dominant correlation with the same principal component (component 1in Fig. 4), except for SQT, which aligns with previous findings regarding SQT emission under drought conditions (lines 544-548 in the manuscript; Bonn et al., 2019; Caser et al., 2019). Similarly, Table 3 demonstrates that the temporal gradients of the meteorological parameters have a statistically significant correlation with the mixing ratios of the vast majority of investigated BVOCs. In contrast, $H_2S$ and 1,3-butadiene exhibited fundamentally different responses to the investigated meteorological parameters, as shown in both Fig. 4 and Table 3. These latter two compounds are expected to be emitted from anthropogenic sources, with some contributions from soil and vegetation for 1,3-butadiene (lines 415-421 in the manuscript).

Considering that the measurement of meteorological parameters was performed locally on-site and the analysis was conducted at a temporal resolution of half an hour, it is unlikely that the correlation between instantaneous changes in meteorological conditions and BVOC mixing ratios was significantly affected by the transport of VOCs from outside the fetch. This is further supported by the analysis presented above, which focuses solely on short-lived species. Moreover, the fact that the companion manuscript by Li et al. (2024) also highlights the dominant role of intraday instantaneous changes in relative humidity and temperature on BVOC emission rates, based on direct emissions measurements, suggests that the observed BVOC mixing ratios in our study effectively represent the emission rates of the investigated BVOCs.

5. **Fundamentally different responses of BVOCs vs. AVOCs to meteorological conditions:** Overall, our analysis indicates that the response of the mixing ratios of the investigated BVOCs aligns with reported patterns for the response of stomatal conductance and BVOC emission to meteorological conditions under drought. For instance, previous studies have shown that under these conditions, stomatal conductance typically demonstrates morning and afternoon peaks, associated with the so-called midday depression (e.g., Li et al., 2019; Seco et al., 2017). Fig. 4 in the manuscript clearly shows a midday depression in BVOC mixing ratios, which is not observed for $H_2S$—used as a reference to examine the impact of meteorological conditions on anthropogenic VOCs (AVOCs) (see also daytime drought stress index (DDSI) values in Fig. 4 in the manuscript).

6. **Similarity between BVOC emissions and their mixing ratios in previous study:** Following the reviewer's suggestion we present here a comparison of the mixing ratios of MTs with their emission rates in Birya forest, which is located about 30 km from the measurement

site which was used for the current study (Shibli). This figure is taken from Seco et al. (2017). Both sites are exposed to humid Mediterranean climate conditions. While we don't have the raw data to calculate the correlation between BVOC mixing ratios and emission rates, we believe that the figure demonstrates a high correlation between MT mixing ratios and emission rates. Note that Yatir Forest is exposed to semiarid climate conditions, which are different from the conditions that the Shibli site is exposed to. We don't know of any additional study that compared BVOC mixing ratios and emission rates in the same region.

Overall, we believe that even though Fig. 5 demonstrates that the mixing ratios are affected by factors other than the BVOCs emission rates, there is a fair correlation between BVOCs emission rates and mixing ratios. Apparently, the level of correlation between BVOCs mixing ratios and emission rates in our study, was enough to reinforce the finding presented in the companion paper (Li et al., 2024) about the correlation between $\Delta RH/\Delta t$ and BVOCs emissions, based on mixing ratios.

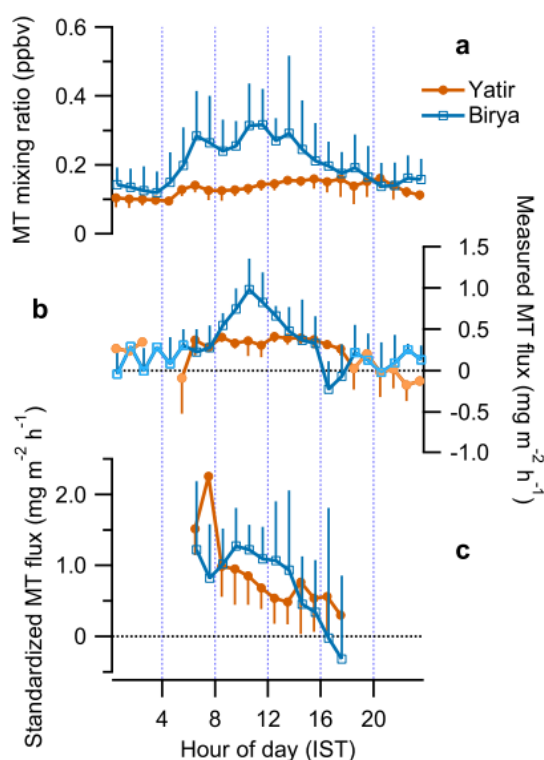



**Figure. 5** *[Adapted from Seco et al. (2017)]. Hourly averaged diel cycles of the monoterpene (MT) mixing ratios (a, top panel), measured MT fluxes (b, middle panel), and standardized MT fluxes (c, bottom panel). Nighttime measured fluxes should be viewed as upper limits and are colored lighter in panel b. Standardized fluxes were computed to account for light, temperature, and tree density differences between sites and only when PAR > 150 μmol m$^{-2}$ s$^{-1}$. Error bars indicate plus or minus one standard deviation for each hourly average.*

**8. Similar finding based on direct BVOCs flux measurements**: The fact that an independent study, described in the companion manuscript by Li et al. (2024), also indicates a dominant role of intraday instantaneous changes in relative humidity and temperature on BVOC emission rates, further suggests that the observed BVOCs mixing ratios fairly represent the emission of BVOCs from the local vegetation. Moreover, the study by Li et al. (2024) is based on direct flux measurements.

*Specific comments:*

*Page 2, L30-32: "Notably, our analysis revealed that instantaneous changes in meteorological conditions, especially in relative humidity, can serve as a better proxy for drought related changes in BVOC emission rate than the absolute values of meteorological parameters" - I think you can't claim this - at least not in so strong* words *- because you did not measure the emission of BVOCs, only the concentration. Also, the word "reveal" is quite strong considering that you only have six days of measurements.*

**Response**: We have amended this sentence to refer now to mixing ratios rather than emission rate: "Notably, our analysis indicated that instantaneous changes in meteorological conditions, particularly relative humidity, served as a more effective proxy for drought-related changes in BVOC mixing ratios compared to the absolute values of meteorological parameters."

As mentioned before, we believe that one of the unique contributions of the present manuscript is its demonstration of the relatively strong correlation between $\Delta RH/\Delta t$ and mixing ratios, while the companion manuscript indicates the correlation of $\Delta RH/\Delta t$ with BVOC emission rates.

*Sec 2.4: Firstly, I do not understand why you included MEGAN simulation output, because to my understanding you only use it for calculating the H value for MT in Table 2 and that is perhaps not super crucial. Secondly, why did you use MEGAN v2.1 when MEGAN v3 was published already 5 years ago? Do your BVOC emission simulations only include a drought stress algorithm for isoprene? Perhaps this would be good to spell out for the reader as some might think drought affects your simulations of the emission of all BVOCs. I think it's good that you have chosen the minimalistic approach In Sec 2.4 and left out equations which can be found in other papers, but perhaps you could elaborate a bit on the Wang et al.'s PDS algorithm - like what are the parameters it includes and what is the main underlying idea of how drought impacts the BVOC emission. Most of your readers probably know MEGAN quite well, but perhaps less know the Wang algorithm and drought is the focus of your manuscript.*

Response: For the first question, we included MEGAN simulation output (Table 1) to better understand the prediction of BVOC emission rate from this area since no other studies or local simulation are available as a reference. In addition, these simulations helped us estimate the composition of MT or SQT for Henry's law constant calculation (Table 2 in the manuscript). We aimed to present the MEGAN results concisely.

For the second question, the reason is that the MEGAN analysis was done before MEGAN v3 was published, and the broadening of MEGAN v3 could not contribute to our specific analysis. We managed to customize our MEGAN v2.1 with the implementation of Wang et al. (2022), which fits our specific study, and was implemented only for isoprene. We will add a concise description of the Wang et al. algorithm to the revised manuscript:

"BVOC emission rates were evaluated using the Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGANv2.1; Guenther et al., 2012). An updated drought stress algorithm for isoprene emission was implemented in our MEGAN model simulation from Wang et al. (2022). This algorithm incorporates two new aspects: 1. a reliable method for quantifying the severity of the impacts on inhibiting vegetation biochemical substrates; and 2. the indirect effect of drought on increasing isoprene emissions due to high leaf temperatures (Wang et al., 2022). The empirical coefficients for the algorithm were derived from the canopy isoprene flux measurement campaign at the MOFLUX site in 2012."

*P9, L184 + Table 1: Since VOC emissions and concentrations are not comparable quantities, they should not be compared. I think it is fine enough that you include both emission estimates and concentration measurements in Table 1, but you should avoid using the word "compare" and you should change the column titles to emphasis that you are showing emission rates and concentrations in order to avoid readers believing that both columns show emission rates (for example, that's what I thought you had when I first browsed the manuscript). For example, you could write "MEGAN simulated BVOC emission rates (mg m-2 h-1)" and "Measured BVOC mixing ratio (ppbv)". You should also already here (in text and table) clarify for what time frame (24hr mean, 8:00-17:00 mean, ...?) your values are. In general, the information that you only include daytime concentrations in your analysis comes very late and it's also basically only obvious from the figures what is meant by "daytime".*

**Response**: We will exclude "compare" from this text and change the column titles to clarify that we are comparing mixing ratios and emission rates. The values in Table 1 refer to the entire measurement period, and not only for daytime. In the revised version, we will separately include values for daytime only. We will ensure that daytime is defined earlier in the text.

*Figure 2: I don't understand the figure. What do those 10 and 20% refer to? How large a fraction of the time the compound comes from the different wind directions? What's the values in the boxes? Concentrations? Then I guess a unit is missing? What's the values in the box for the "time" plot? To be more transparent and illustrative, you could consider instead to add the individual mixing ratio data points (or half hour averages) and let the circular lines represent the windspeed. Then the reader would have a better idea about if the VOCs you measure are more local or from far away.*

**Response**: The figure represents wind rose charts. The radial axis (showing values such as 10%, 20%, etc.) represents the frequency of the 12 wind direction sectors (with all wind sectors summing up to 100%). The fraction of time for each wind sector can be inferred from the given percentage values in relation to the total measurement duration.

The figure caption includes the information that the values represent mixing ratios, and we will add the units (ppbv) to the figure. "Time" corresponds to values in hours, and we will also add the units (hour) to the figure. This figure is used to assess potential inhomogeneity in the measured BVOCs mixing ratios that could arise from variations in the fetch, associated with different wind directions at different time periods. We believe that our new analysis, which incorporates the lifetime of the VOCs and wind speed, addresses the reviewer's request for more information on the local are contributions to the measured VOCs.

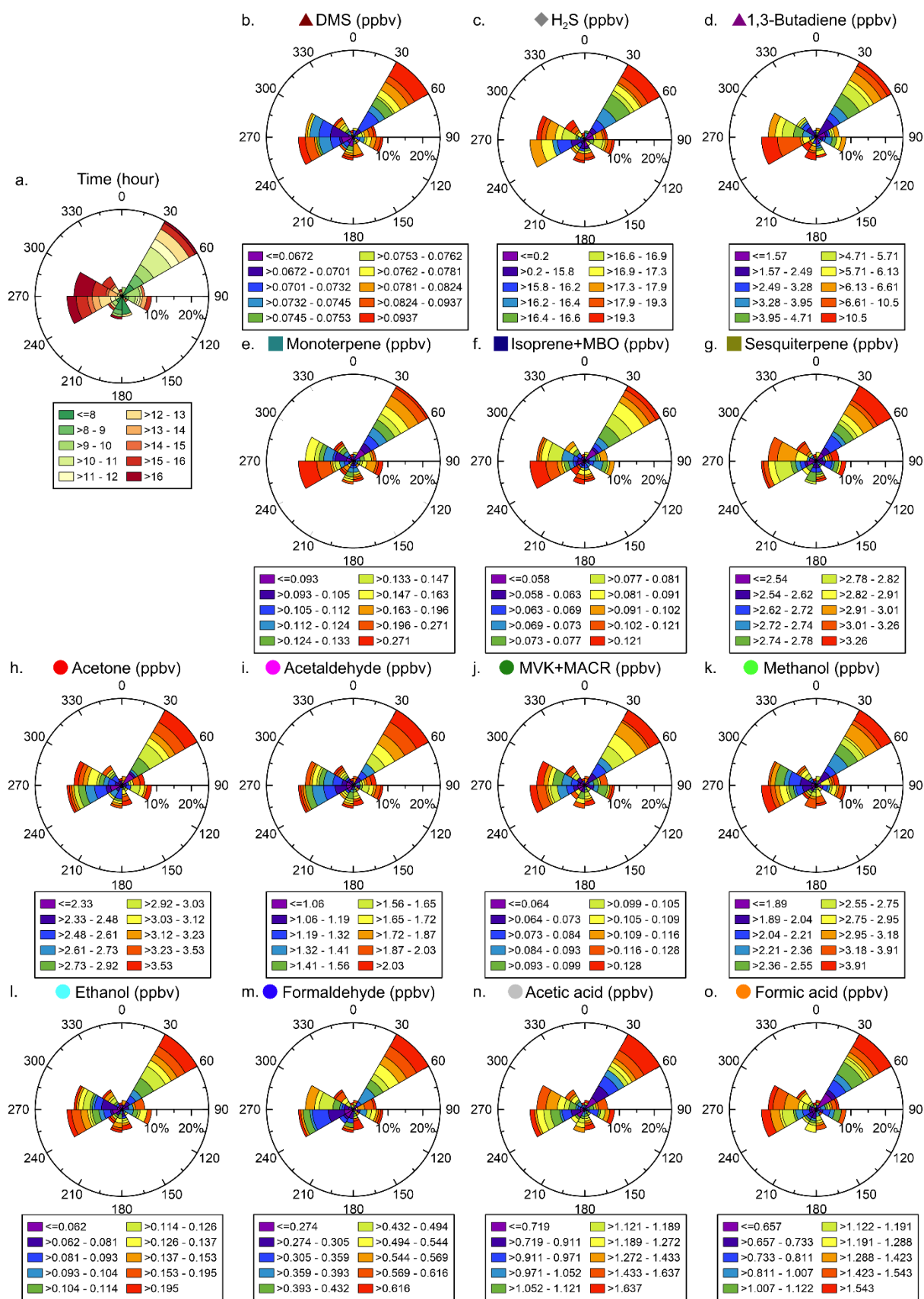



**Figure 6.** *Mixing ratio vs. wind direction for selected VOCs during the daytime. Presented is the percentage of time for which the measured mixing ratios of VOCs fall in a specific range, specified by an evenly distributed color scale, individually for each of 12 wind sectors. Circular symbols represent presumed soluble BVOCs, squared symbols represent presumed insoluble BVOCs, rhombus symbols represent presumed AVOCs, and*

*triangular symbols represent either presumed AVOCs or insoluble BVOCs. See more information on VOC solubility in Table 2.*

*L430-432: OK to how you calculated the H value for MT and SQT, but why didn't you use a similar approach to calculate the OH and O3 rate coefficients?*
**Response**: Response: The reason is that we were able to find the rate constant in the literature for only 5 out of the MTs and 3 SQTs. Therefore, the rate constants for OH and $O_3$ were averaged based on the available kinetic information for these species.

*Figure 6 and related text: Delta RH/ delta time has the highest association with the BVOC mixing ratios, except for with the concentration of sesquiterpenes. At the same time, only the concentration of sesquiterpenes is short-lived. Could the difference in lifetime (and hence source) be an explanation for this? It would also be interesting to see a wind rose plot for delta RH/delta time to see if the cause of the correlation is RH or wind direction.*

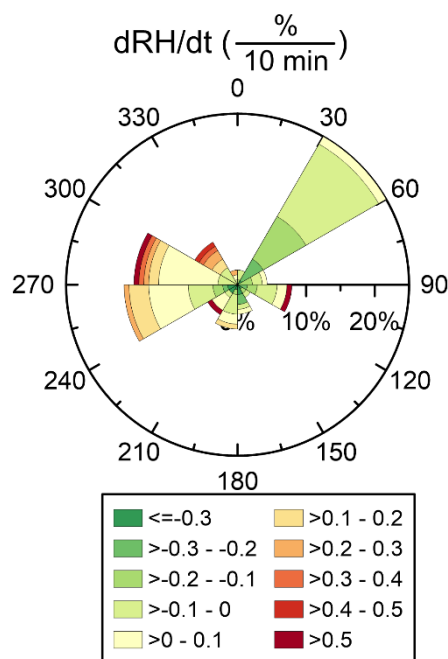
**Response:** Indeed, the PCA analysis indicated that SQT displayed a unique dependency on component 1, in contrast to all other investigated BVOCs. As suggested by the reviewer, we

analyzed the lifetime of all VOCs and found that, at least during some periods, MT and isoprene also had short enough lifetimes to minimize or negate potential contributions from outside the fetch. Additional PCA analysis, presented above, revealed that as the potential contribution from outside the fetch to the mixing ratios of MT and isoprene decreased, their association with ΔRH/Δt strengthened. We believe this indicates that the strong correlation between MT and isoprene with ΔRH/Δt is not due to emissions from outside the fetch. The different response of SQT to meteorological conditions under drought compared to other BVOCs is consistent with previous findings (e.g., lines 544-548 in the manuscript; Bonn et al., 2019; Caser et al., 2019). A wind rose plot is presented below (Fig. 6), showing no clear correlation between ΔRH/Δt and wind direction.

**Figure 6.** *ΔRH/Δt vs. wind direction for the daytime. Presented is the percentage of time for which the ΔRH/Δt falls in a specific range, specified by an evenly distributed color scale, individually for each of 12 wind sectors.*

*I wonder if "proxy" is the correct word to use in this manuscript, because it gave me the expectation that you would also present an equation for estimating the concentration of BVOCs. So, for example in the title, would it be more fitting to say that instantaneous changes in meteorological conditions is a better indicator for changes in the concentration of BVOCs during drought than the absolute values of those parameters? Or something like that?*

**Response**: In statistics, a "proxy" refers to a measurable variable used in place of a variable that cannot be measured. For a variable to be a good proxy, it must have a close correlation with the variable of interest. Therefore, we believe that the use of "proxy" in our manuscript is appropriate. At this stage, we cannot suggest an equation to account for the mathematical relationship between $\Delta RH/\Delta t$ and BVOCs emission rates. Particularly, the fact that we rely in our analysis on mixing ratios, rather than emission rates, limits our ability to develop such an equation. However, we believe that highlighting the dominant correlation between BVOCs emission rates and $\Delta RH/\Delta t$, based on this study and the companion manuscript, is important for advancing in this direction. A more complex mathematical expression that reflects the association between $\Delta RH/\Delta t$ and BVOCs emission rates would likely account for additional environmental and biological parameters than $\Delta RH/\Delta t$.

*Technical corrections:*
*P10, L186-187: You should mention that you are referring to the measured concentrations, not the modelled emissions.*

**Response**: We have modified the sentence as follows:-It is remarkable that the measured SQT mixing ratios are approximately 1.5 orders of magnitude higher than those of the MTs, highlighting the significance of the measurement site for studying the effects of drought on atmospheric chemistry through changes in SQT emission."

*Table 2: Spell out DDSI and in general all abbreviations in tables and figures so one does not need to go dig the text to figure out what you show. In the text (L396-7) it says you didn't include DOY306, but in the table caption it says you did.*

**Response**: Thank you for pointing out this issue. DDSI will be spelled out in every table and figure. We will also correct the table caption to indicate that DOY 306 was not included in the calculations of DDSI.

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