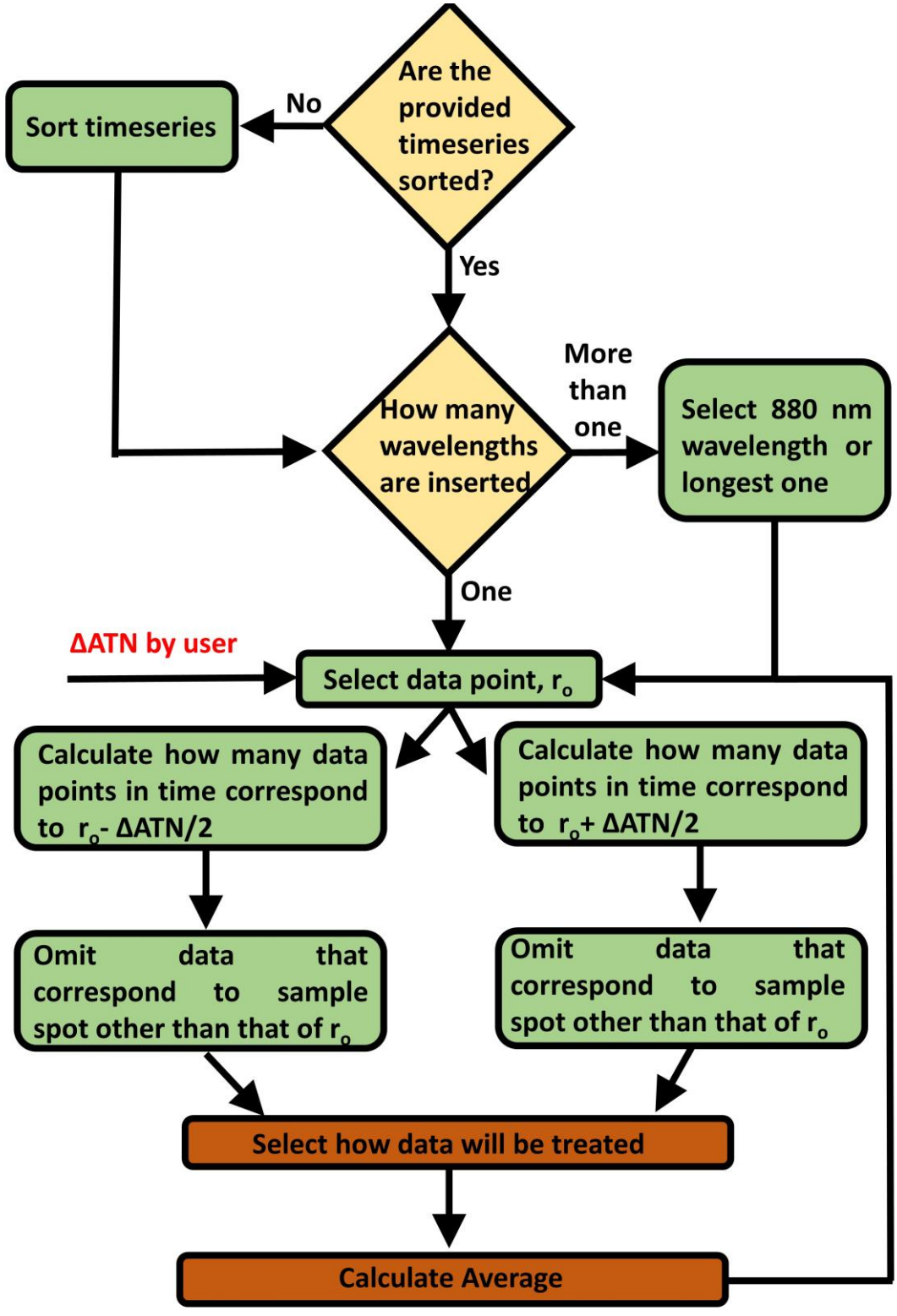
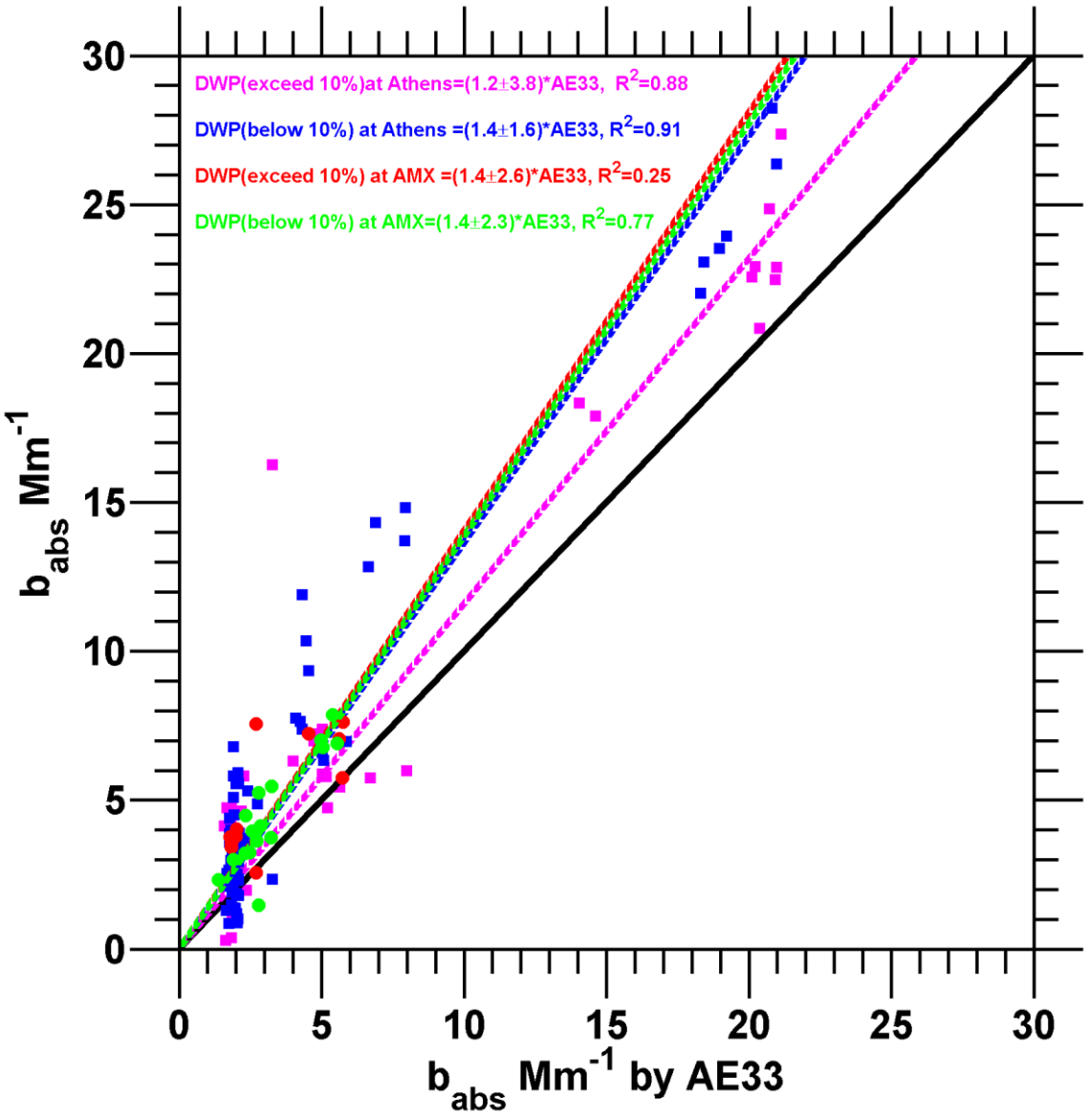
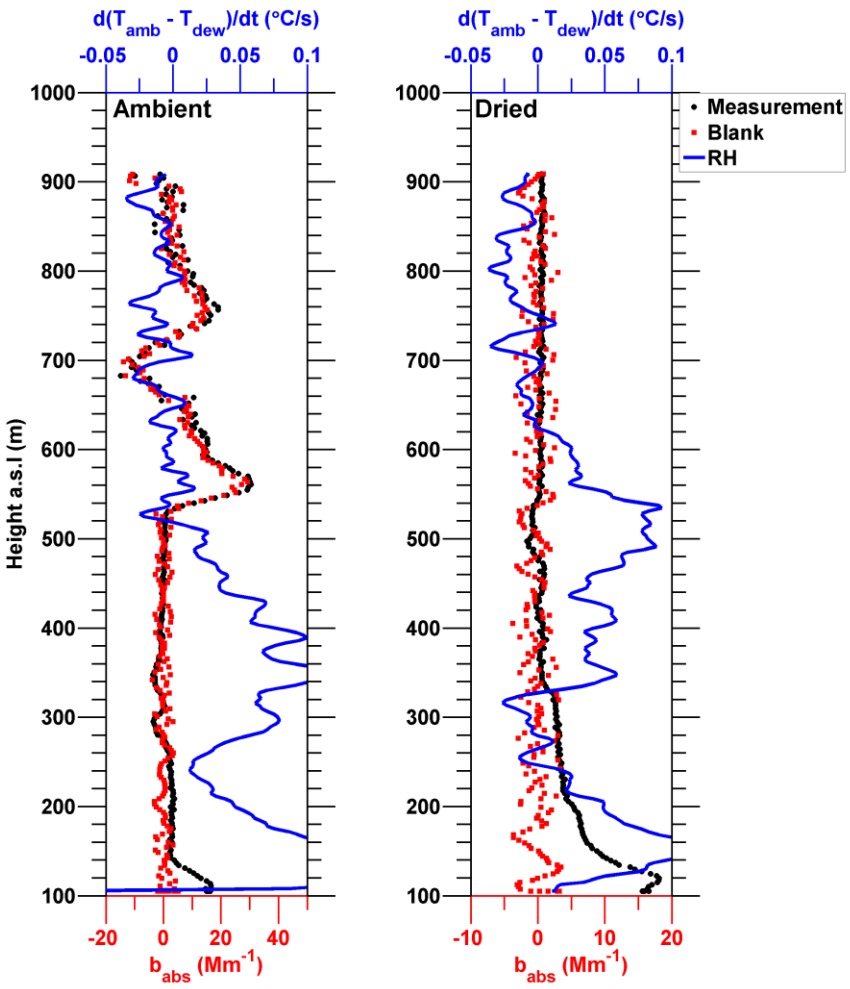


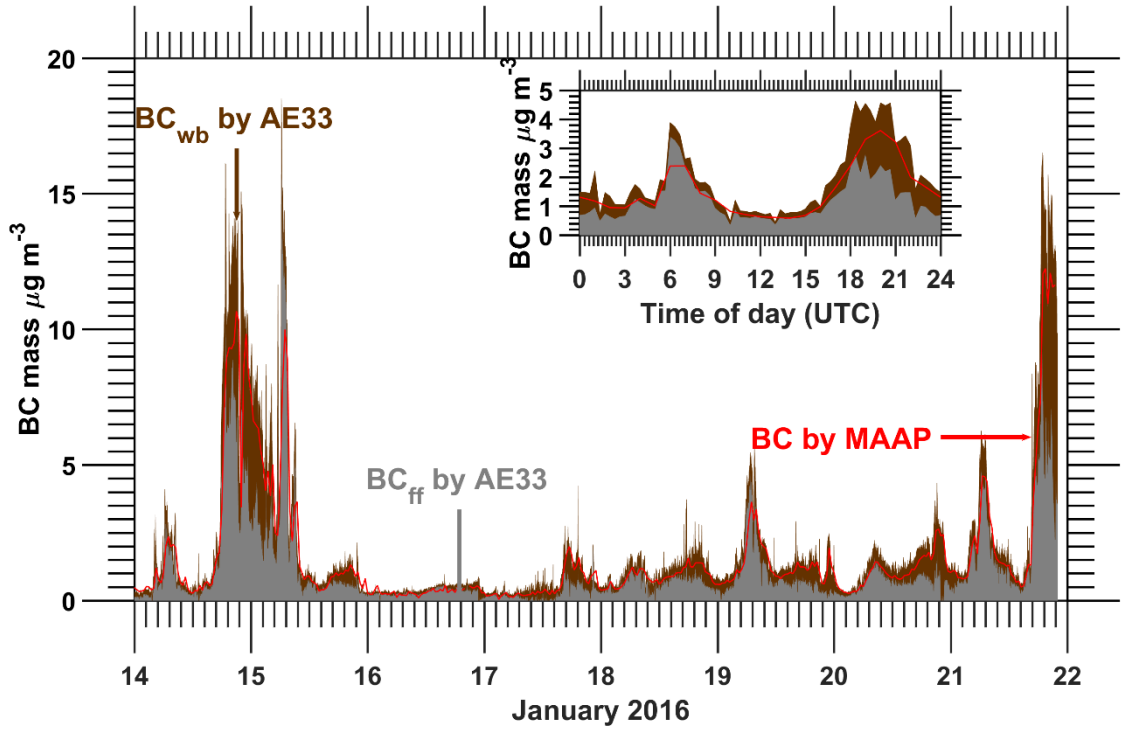
Supplemental Figure 1: Flow diagram of the improved ONA smoothing algorithm. The algorithm can be found at https://www.mathworks.com/matlabcentral/fileexchange/71108-aethsmoothing/?s_tid=LandingPageTabfx or https://caonetwork.tk/downloads/aethsmoothing



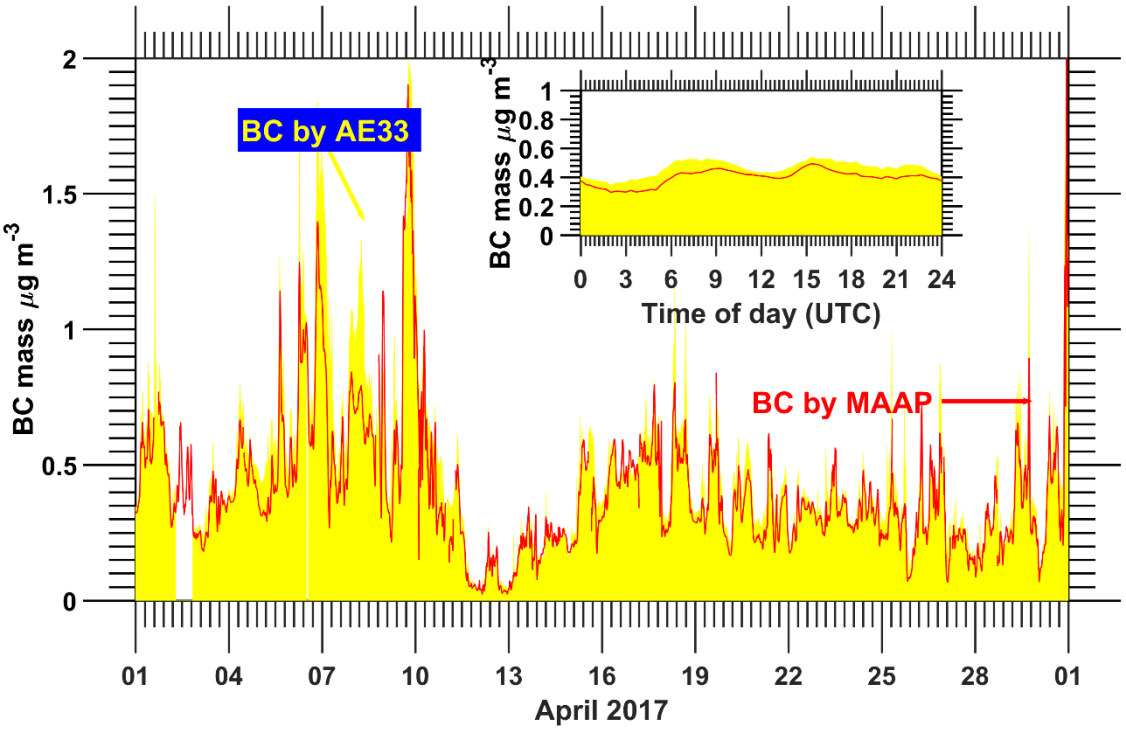
Supplemental Figure 2: Comparison results of DWP against AE33 during flights when attenuation of the DWP filter spot exceeded 10%. How the two instruments compared during take-off, when the sampling spot was unused, and during landing when an attenuation exceeded 10% is shown. No significant difference is found between the two states suggesting that a loading factor equal of 1 can be assumed.



Supplemental Figure 3: The effect of humidity on sampling eBC using miniature sensors is shown. Two DWP sensors were measuring in series. The first monitored the ambient concentrations (black dots) and the second should be measuring a constant blank (red dots). This was the case when the sample was dried. Under ambient conditions the blank measurement deviated from zero when the time gradient of ambient temperature against the dew point was negative suggesting measurement bias. It is noted that the sampling and blank monitors show similar values under this condition.



Supplemental Figure 4: Time series and diurnal profile of eBC during the Athens campaign provided by MAAP (red line) and AE33. The calculated contribution of biomass (brown area) and fossil fuel (grey area) consumption to the eBC is shown.



Supplemental Figure 5 Time series and diurnal profile of eBC during the Cyprus campaign provided by MAAP (red line) and AE33 (yellow area).