Quasi retrieving method V2

Quasi retrieving method Version 2 (QV2)

Elastic signal: $P(\lambda_0, z) = \frac{C_0 P_0 O_0(z)}{z^2}[\beta_p(\lambda_0, z) + \beta_m(\lambda_0, z)] \exp\left\{-2\int_0^z [\alpha_p(\lambda_0, z') + \alpha_m(\lambda_0, z')]\mathrm{d}z'\right\}$

Raman signal: $P(\lambda_R, z) = \frac{C_R P_0 O_R(z)}{z^2} N(z) \frac{\mathrm{d}\sigma_R(\pi)}{\mathrm{d}\Omega} \exp\left\{-\int_0^z [\alpha_p(\lambda_0, z') + \alpha_p(\lambda_R, z') + \alpha_m(\lambda_0, z') + \alpha_m(\lambda_R, z')]\mathrm{d}z'\right\}$

$$C_R^* = C_R * \frac{\frac{\mathrm{d}\sigma_R(\pi)}{\mathrm{d}\Omega}}{\frac{\mathrm{d}\sigma_0(\pi)}{\mathrm{d}\Omega}} = C_R * const$$

$C_0 P_0$ and $C_R^* P_0$ can be obtained from polly processing program

$$P(\lambda_R, z) = \frac{C_R^* P_0 O_R(z)}{z^2} \beta_m(\lambda_0, z) \exp\left\{-\int_0^z [\alpha_p(\lambda_0, z') + \alpha_p(\lambda_R, z') + \alpha_m(\lambda_0, z') + \alpha_m(\lambda_R, z')]\mathrm{d}z'\right\}$$

aerosol backscatter coeff.

$$\beta_p(\lambda_0, z) = \left\{\frac{\boldsymbol{P(\lambda_0, z) z^2}}{\boldsymbol{P(\lambda_R, z) z^2}} * \frac{\boldsymbol{C_R^* P_0}}{\boldsymbol{C_0 P_0}} * \exp\left\{\left[1 - \left(\frac{\lambda_0}{\lambda_R}\right)^{Å_p}\right]\int_0^z \alpha_p(\lambda_0, z')\mathrm{d}z' + \left[1 - \left(\frac{\lambda_0}{\lambda_R}\right)^4\right]\int_0^z \alpha_m(\lambda_0, z')\mathrm{d}z'\right\} - 1\right\}\beta_m(\lambda_0, z)$$

Quasi retrieving method (QV2 vs QV1)

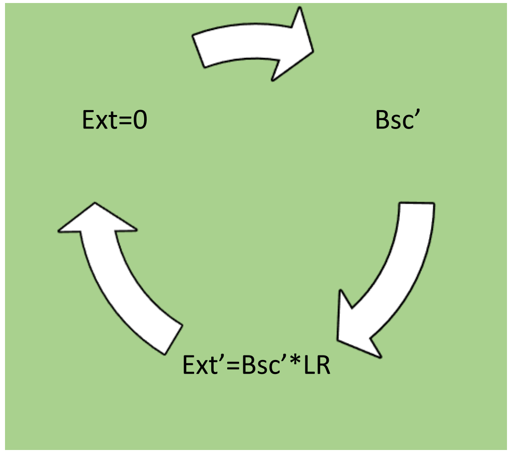
QV2: Angstroem exponent is the main contributor for bias (Å~0, no bias)

Low SNR at daytime and Far-Range

$$\beta_p(\lambda_0,z)=\left\{\frac{\boldsymbol{P(\lambda_0,z)z^2}}{\boldsymbol{P(\lambda_R,z)z^2}}*\frac{\boldsymbol{C_R^*P_0}}{\boldsymbol{C_0P_0}}*\exp\left\{\left[1-\left(\frac{\lambda_0}{\lambda_R}\right)^{Å_p}\right]\int_0^z\alpha_p(\lambda_0,z')\mathrm{d}z'+\left[1-\left(\frac{\lambda_0}{\lambda_R}\right)^4\right]\int_0^z\alpha_m(\lambda_0,z')\mathrm{d}z'\right\}-1\right\}\beta_m(\lambda_0,z)$$

QV1: AOD is the main contributor for bias (AOD > 0.2, relative bias > 20%)

$$\beta_p(\lambda_0,z)=\frac{\boldsymbol{P(\lambda_0,z)z^2}}{\boldsymbol{O_0(z)C_0P_0}}\exp\left\{2\int_0^z\alpha_p(\lambda_0,z')\mathrm{d}z'+2\int_0^z\alpha_m(\lambda_0,z')\mathrm{d}z'\right\}-\beta_m(\lambda_0,z)$$



Ext iterations

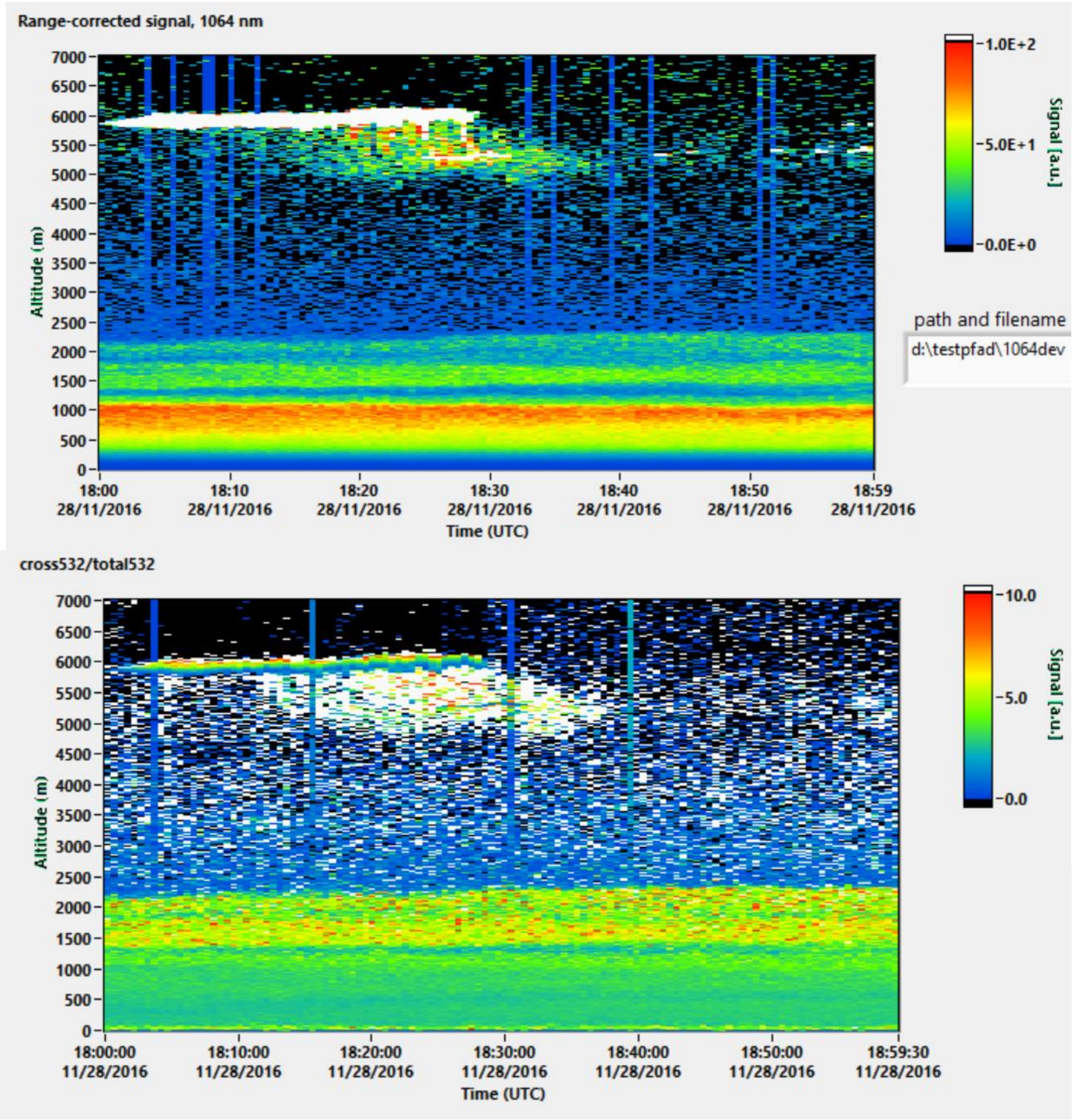
QV2 has no influence from laser energy fluctuation and overlap

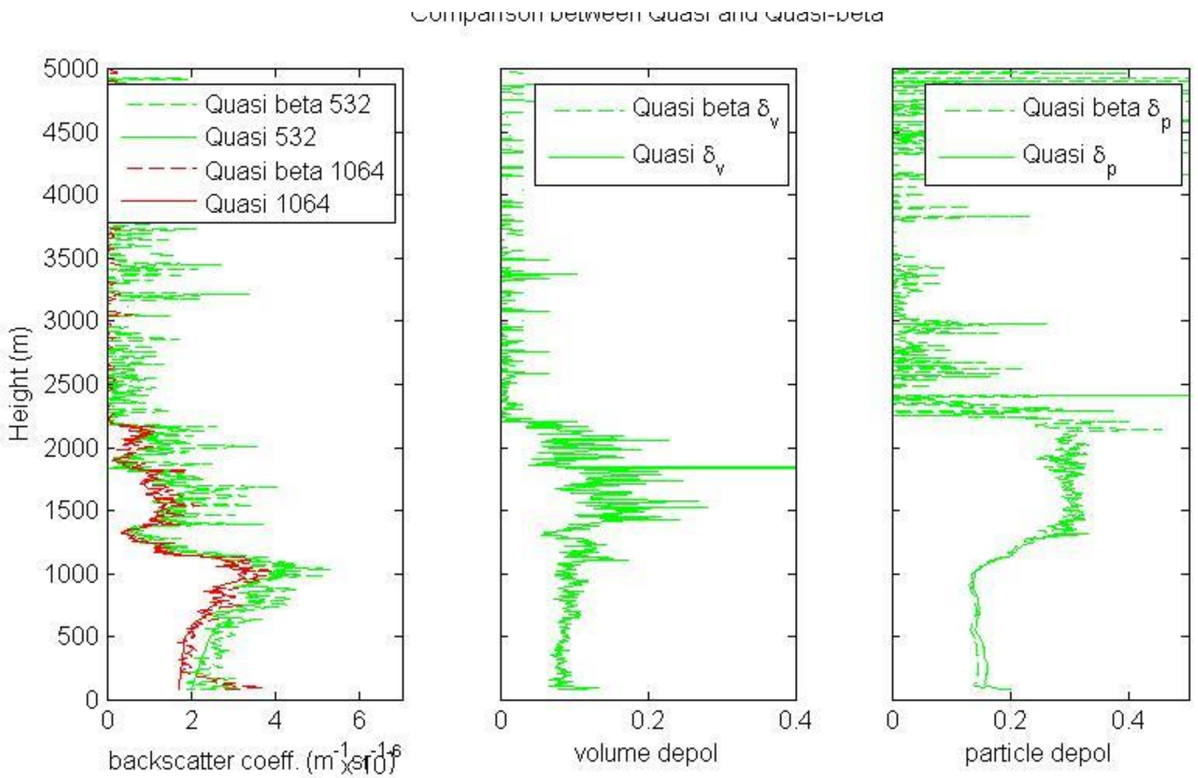
Formula for 1064 nm

$$\beta_{par}^{1064}(R)+\beta_{mol}^{1064}(R)=C^*\frac{P^{1064}(R)N_{mol}^{387}(R)}{P^{387}(R)}\frac{\exp\left(2\left(\frac{355}{1064}\right)^{Å}\int_{R_0}^{R}\left[\alpha_{par}^{355}(r)\right]dr\right)}{\exp\left(\left(1+\left(\frac{355}{387}\right)^{Å}\right)\int_{R_0}^{R}\left[\alpha_{par}^{355}(r)\right]dr\right)}\frac{\exp\left(2\int_{R_0}^{R}\left[\alpha_{mol}^{1064}(r)\right]dr\right)}{\exp\left(\int_{R_0}^{R}\left[\alpha_{mol}^{387}(r)\right]dr\right)\exp\left(\int_{R_0}^{R}\left[\alpha_{mol}^{355}(r)\right]dr\right)}$$

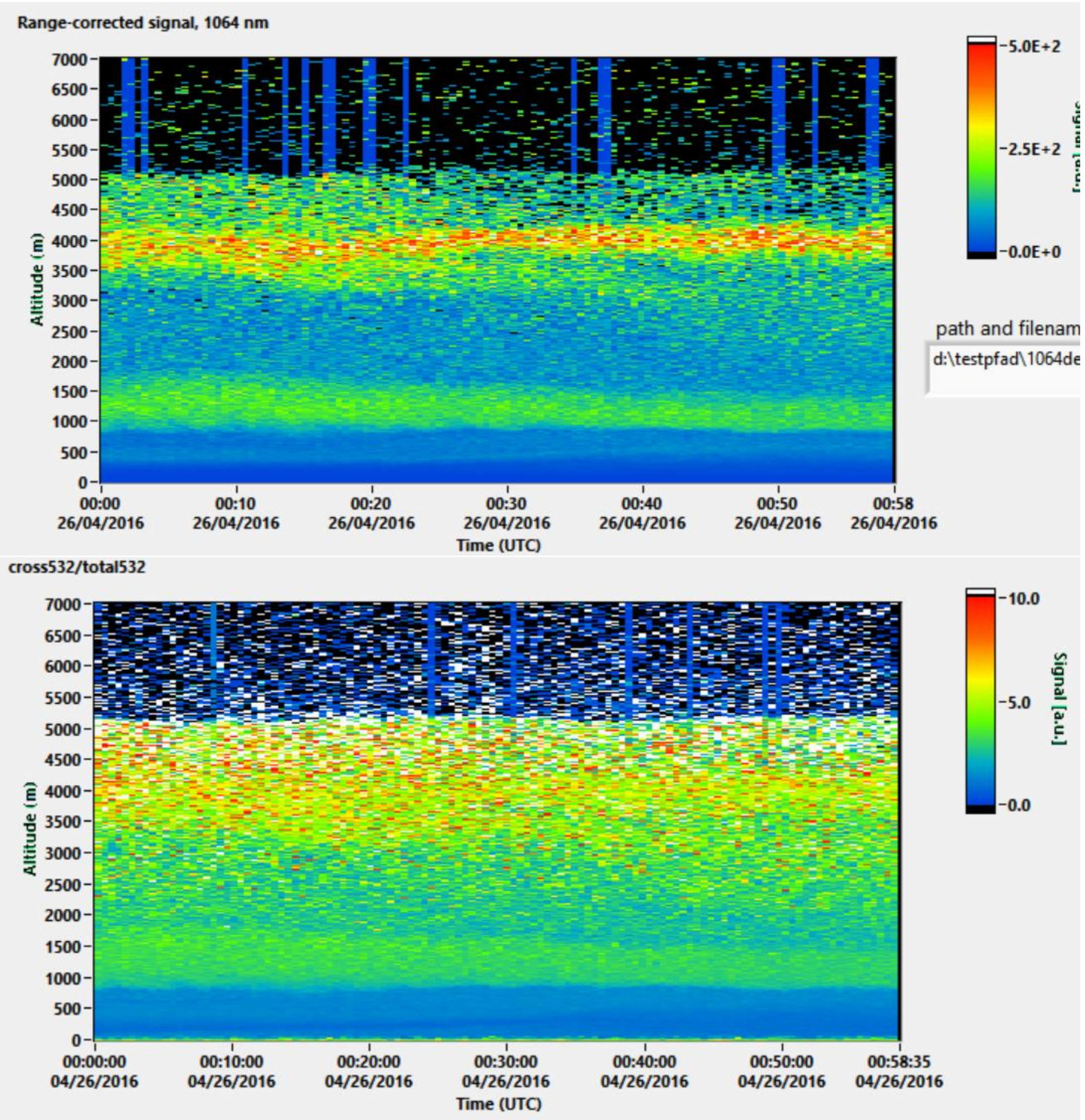
(from H. Baars)

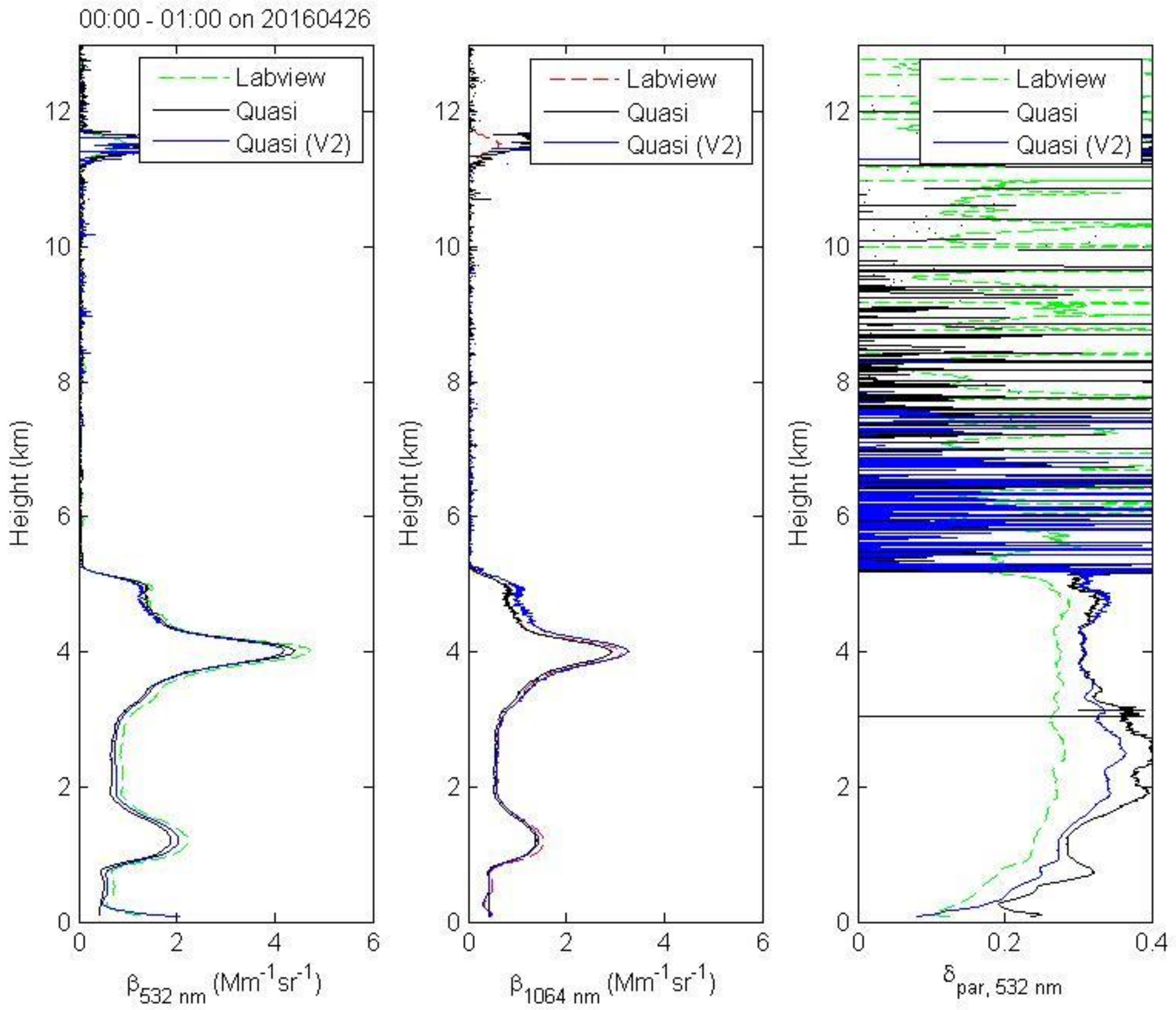
Two Quasi methods



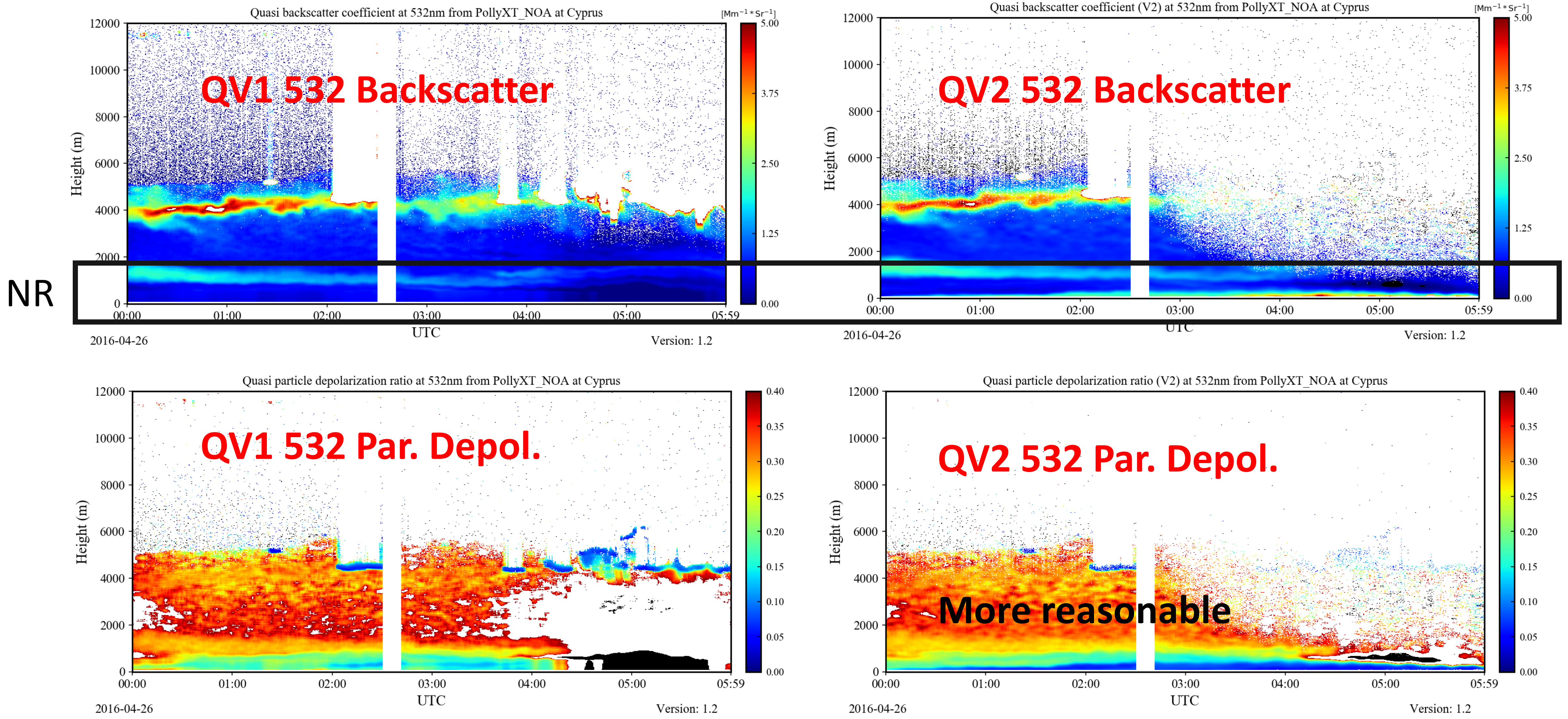


Two Quasi methods

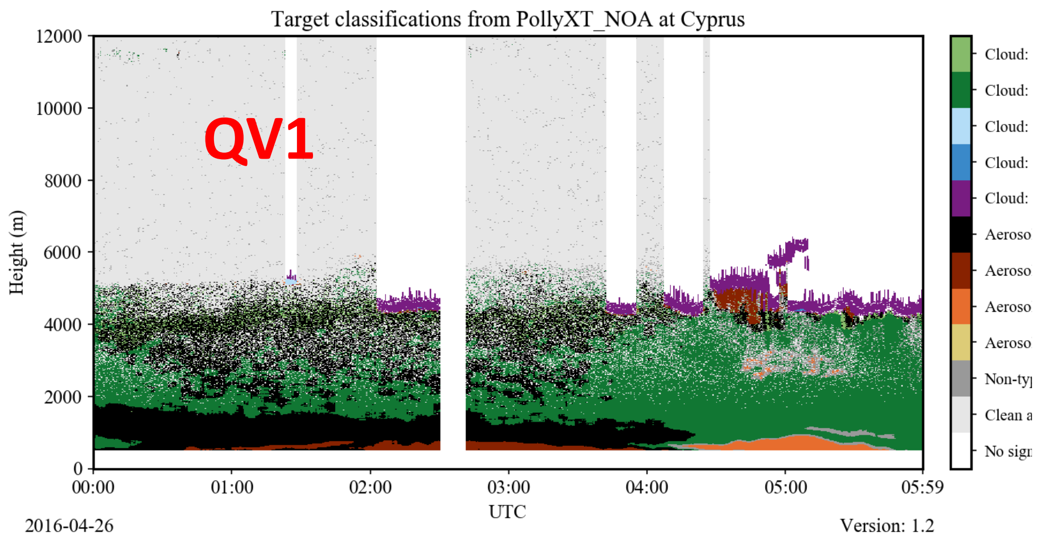


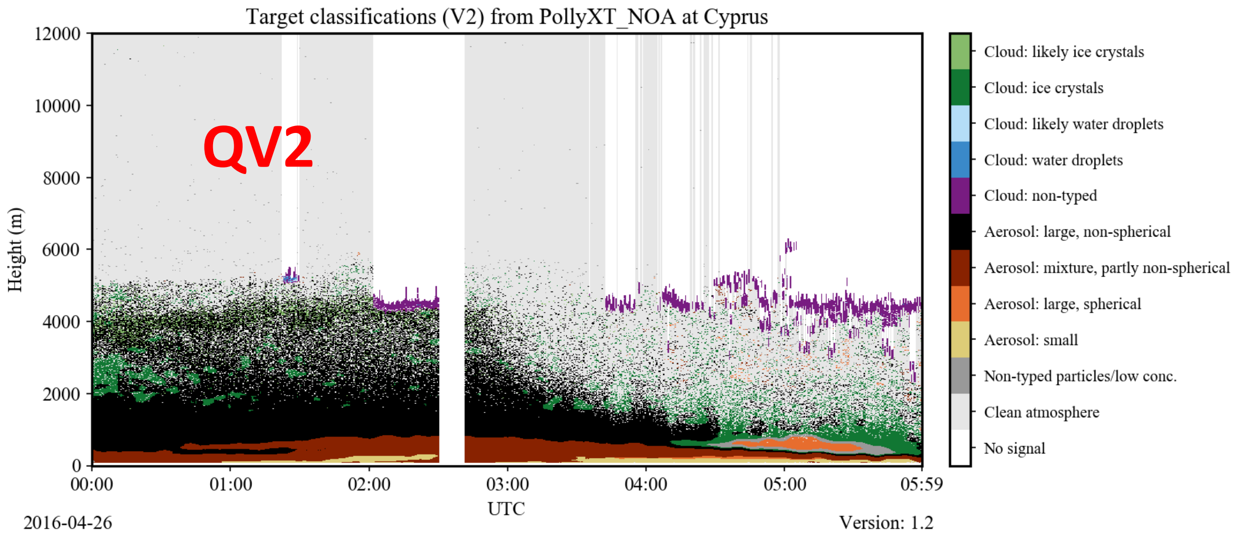


Two Quasi methods 2016-04-26 Cyprus

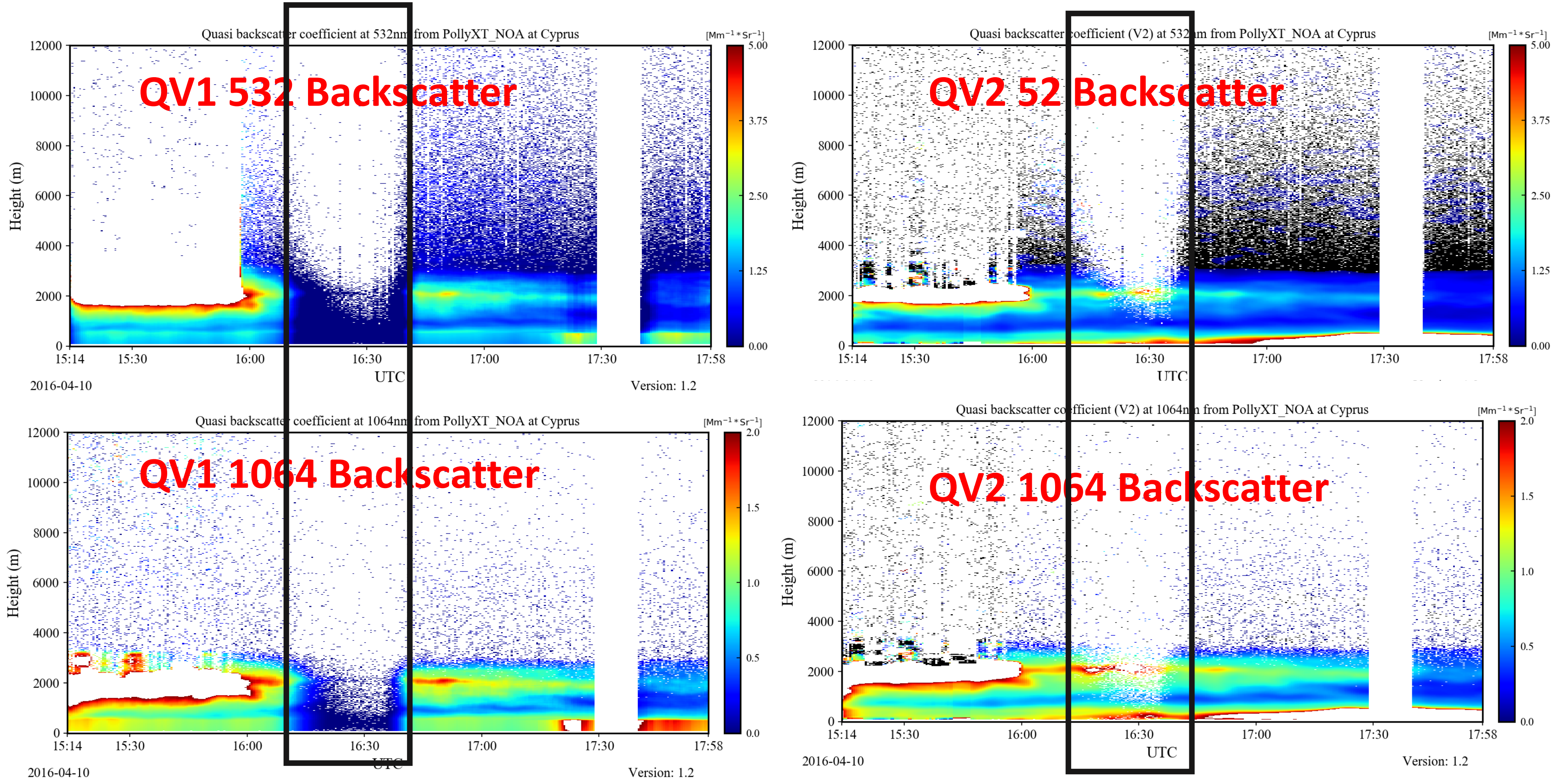


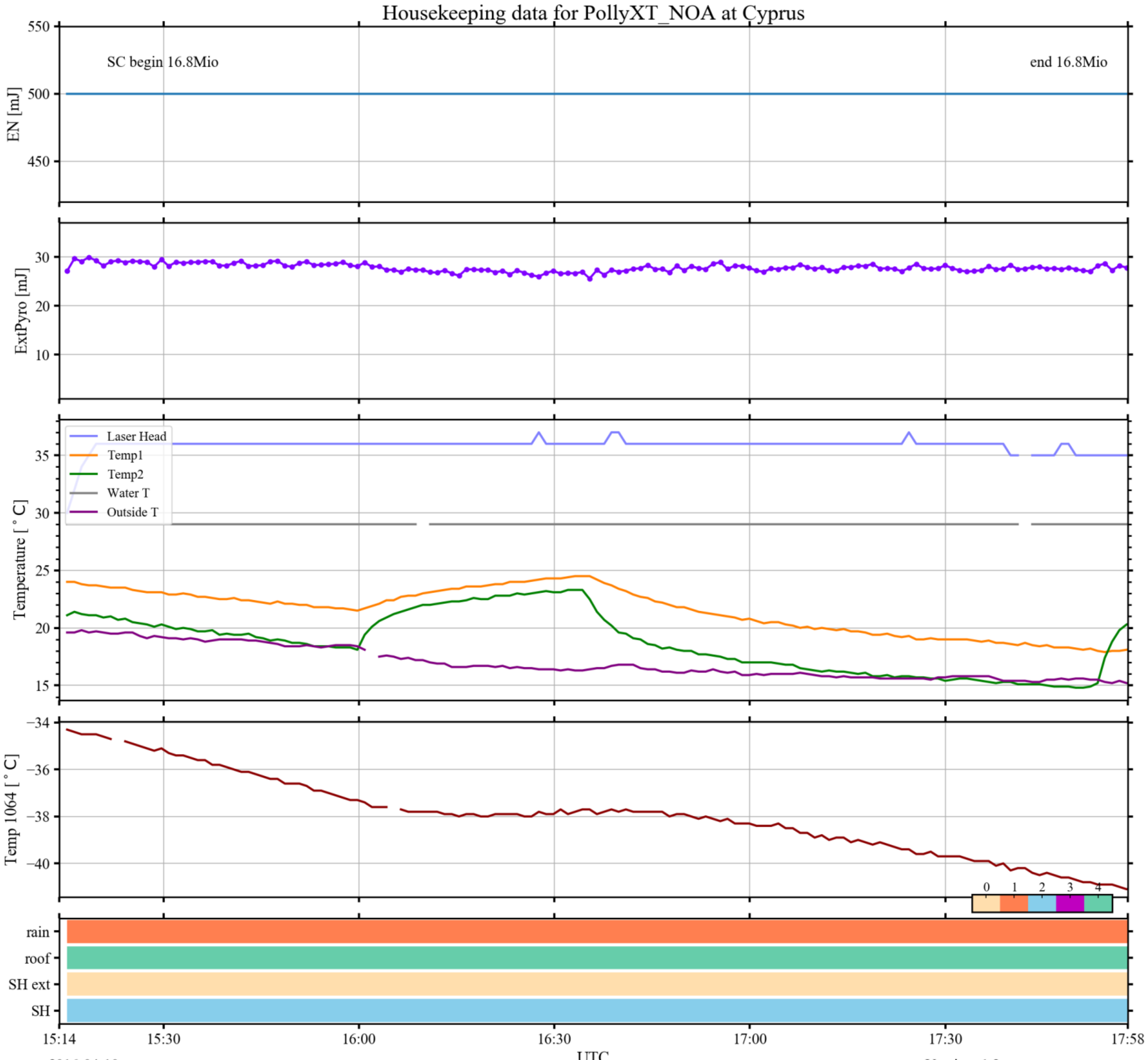
Two Quasi methods 2016-04-26 Cyprus





Two Quasi methods 2016-04-10 Cyprus





Housekeeping data for PollyXT_NOA at Cyprus
SC begin 16.8Mio
end 16.8Mio
EN [mJ]
ExtPyro [mJ]
Laser Head
Temp1
Temp2
Water T
Outside T
Temperature [° C]
Temp 1064 [° C]
rain
roof
SH ext
SH
15:14
15:30
16:00
16:30
17:00
17:30
17:58
UTC