Uccle O3S-DQA Homogenization Report

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1 Uccle Metadata timeseries

2 O3S-DQA corrections

The recommended and applied O3S-DQA corrections are summarized below.

1. Conversion efficiency
2. Background current
3. Pump temperature measurement
4. Pump flow rate, moistening effect
5. Pump flow efficiency at low pressures
6. Total ozone normalization: in O3S-DQA guide this correction factor is recommended to added in the data-set, but this is not extracted yet.
7. Radiosonde changes: RS80 radiosonde correction is applied.

2.0.1 Conversion efficiency

The absorption efficiency is applied if the cathode sensing solution is 2.5 cm^3. Among the data only 1 date folds into this, 2012-03-07. The stoichiometry correction is needed if not a sonde manufacturer and solution concentration among the recommended ones are launched. The recommended combinations are ENSCI $0.5\% - 0.5B$ and SPC $1.0\% - 1.0B$. This correction does not have an influence on the Uccle time-series since the volume of the cathode sensing solution has been always 3.0 cm^3 and ENSCI $0.5\% - 0.5B$ sondes have been launched since 1997-04-1, where the ECC launches started in Uccle. (Before 1997-04-01 Brewer–Mast sondes were launched.) The effect of the conversion correction is shown in Fig4.

2.0.2 Background current

Background correction applied to Uccle data is shown in Fig 5. If I_B exceeds $I_{B,\mathrm{Mean}} + 2\sigma_{IB}$ then I_B, it should be replaced by the more representative climatological value of $I_{B,\mathrm{Mean}}$, however with larger uncertainty of $2\sigma_{IB}$. This effect can be seen in Fig 5.

2.0.3 Pump temperature measurement

Truest pump temperature correction is applied according to Eq.13 of the O3S-DQA Guidelines. At 1998-12-01 the pump location changed from in the box to in the pump. Therefore Case-III correction is applied for the period before 1998-12-01 and case-V correction for the period after 1998-12-01. The effect of the temperature correction is shown in Fig 6.

2.0.4 Pump flow rate (moistening effect)

This correction, Eq.15 of the O3S-DQA Guidelines, is applied and shown in Fig7. Here only the temperature difference between the internal pump base temperatire and the ambient room temperature of the flowrate measurement is applied. The effect of this correction is shown in Fig 7.

2.0.5 Pump flow efficiency

This correction, Eq.22 of the O3S-DQA Guidelines, is applied using Table 6 of the O3S-DQA Guidelines. The interpolation of the correction factors are made using pressure. This method gives the same result as doing the interpolation using the logarithm of pressure and polynomial fit with an error of less than 0.03%. Uccle launches ENSCI sondes, therefire Komhyr 1995 correction factors are applied. The effect of this correction is shown in Fig8

2.0.6 Radiosonde correction

This correction (give a reference to the paper) is applied to correct the pressure offset difference. This correction is applied only to RS80 radiosondes which is before 2007-09-01. The effect of this correction is shown in Fig9.

The effect of all DQA correction with respect to no correction is shown in Fig10.

3 Comparison plots to AURA MLS v04

Here in Fig 11 we can see the comparison of MLS v04 with uccle data-set without any correction applied starting from, the beginning of the AURA MLS, 2004.

In Fig 12 the comparison of MLS v04 with Uccle data-set DQA corrections applied is shown. In Fig 13, all the DQA corrections except RS80 correction is applied.

In Fig 14 the comparison of MLS v05 with Uccle data-set DQA corrections applied is shown.

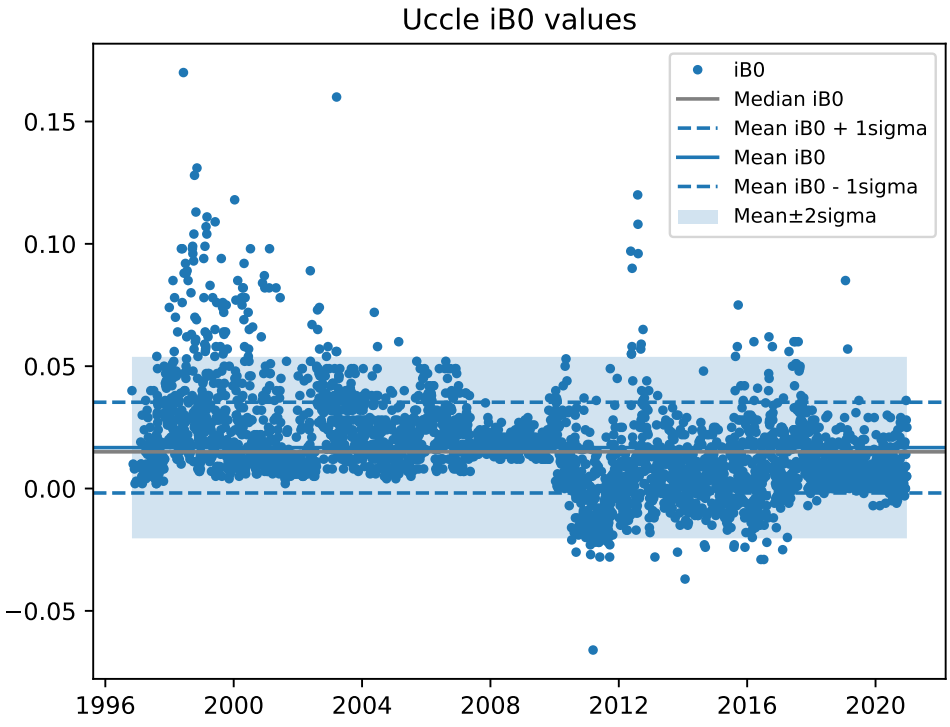

Figure 1: Uccle iB0 timeseries

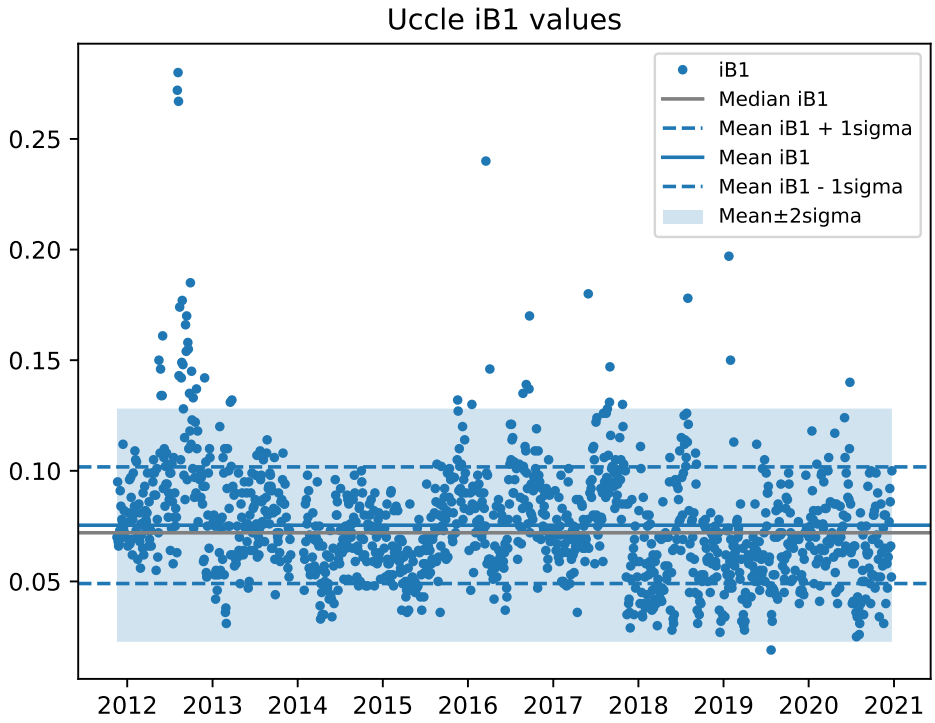

Figure 2: Uccle iB1 timeseries

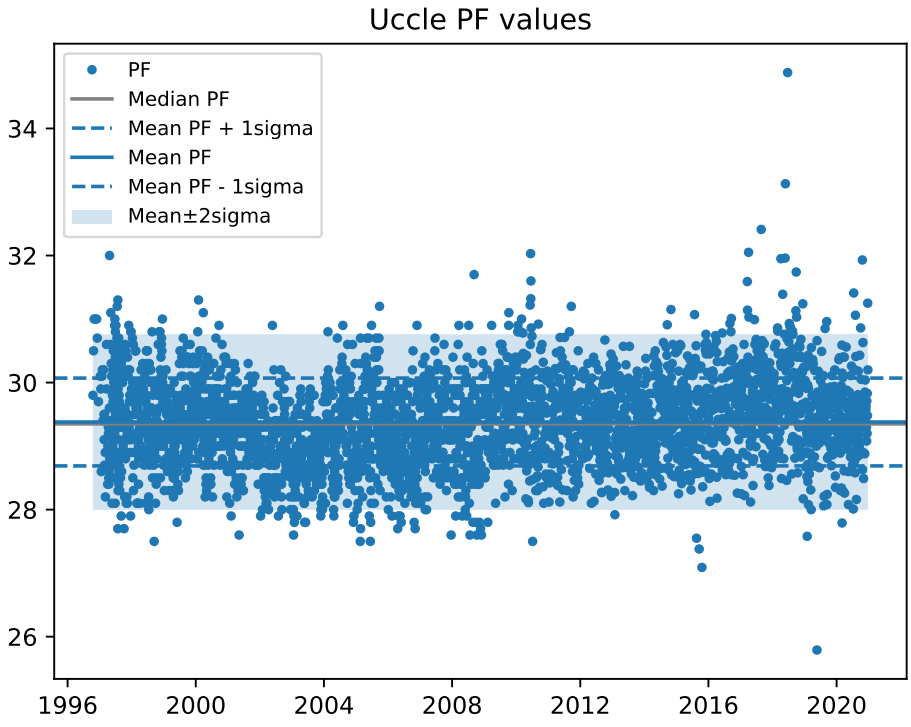

Figure 3: Uccle pump flow rate timeseries

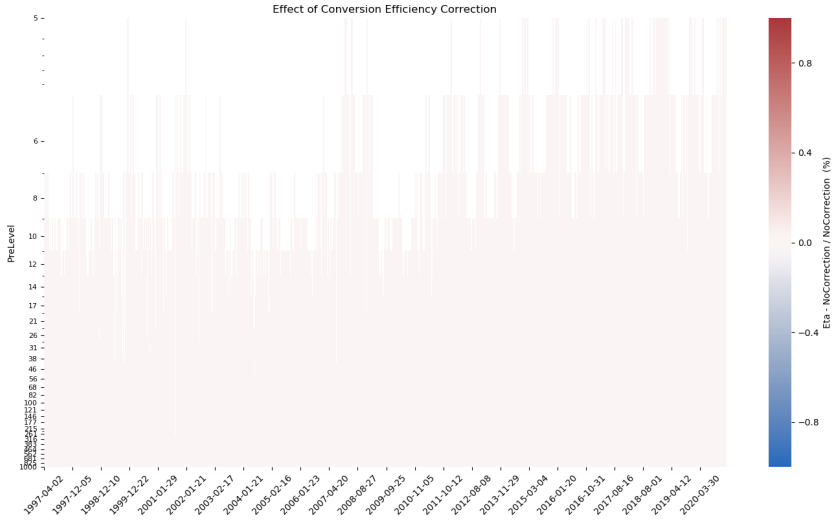

Figure 4: Conversion efficiency correction applied

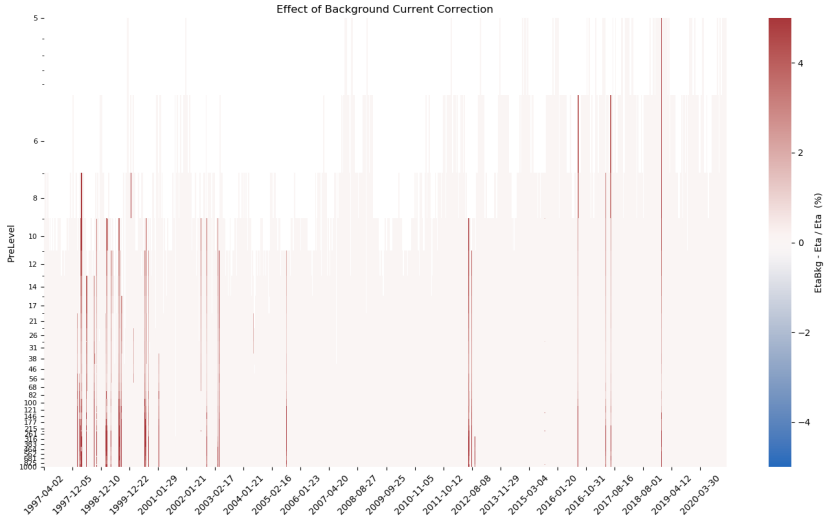

Figure 5: Background current correction applied

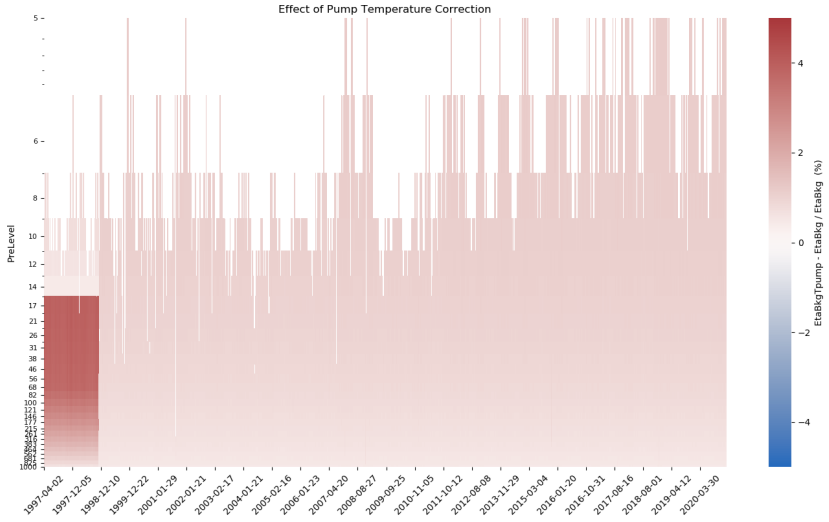

Figure 6: Pump temperature correction applied

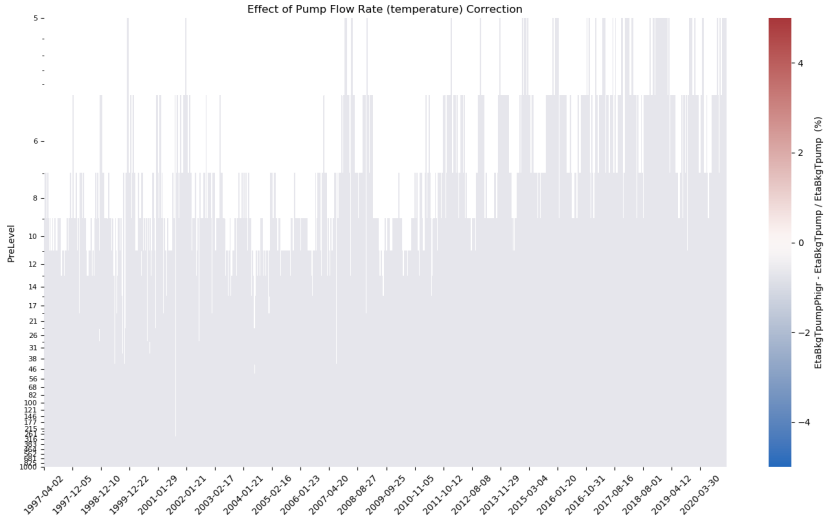

Figure 7: Pump flow rate correction applied

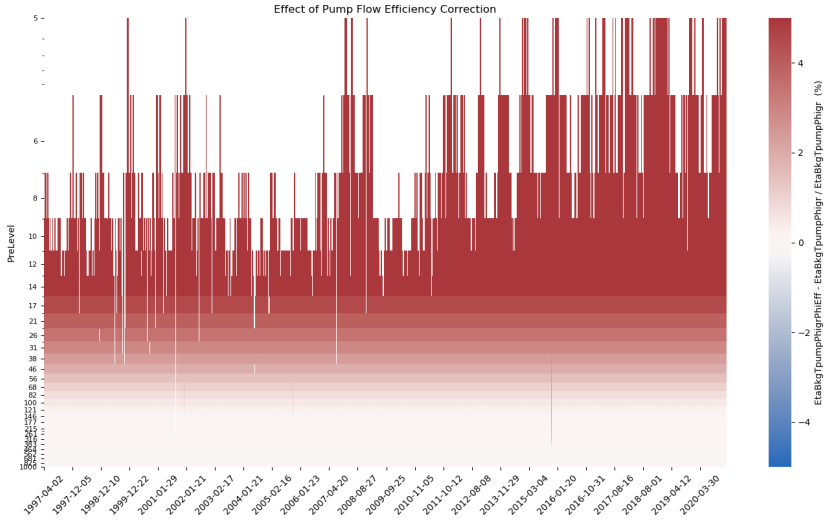

Figure 8: Pump flow rate correction applied

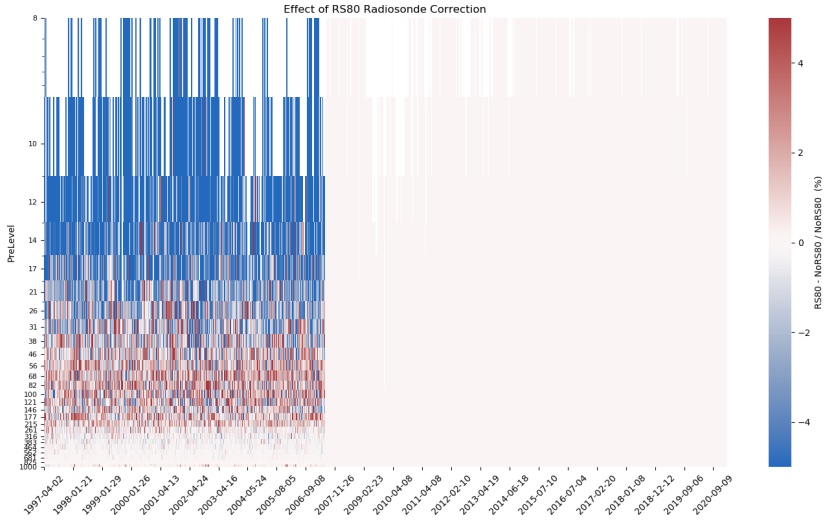

Figure 9: RS80 correction applied

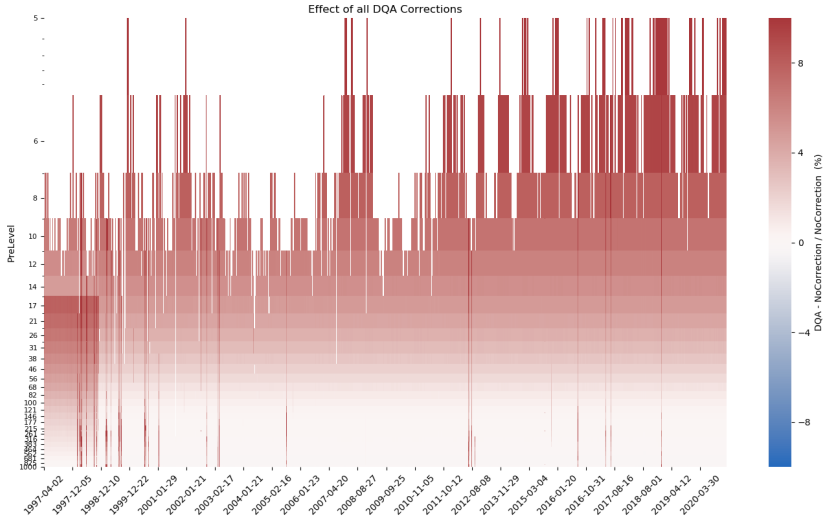

Figure 10: Effect of all DQA corrections

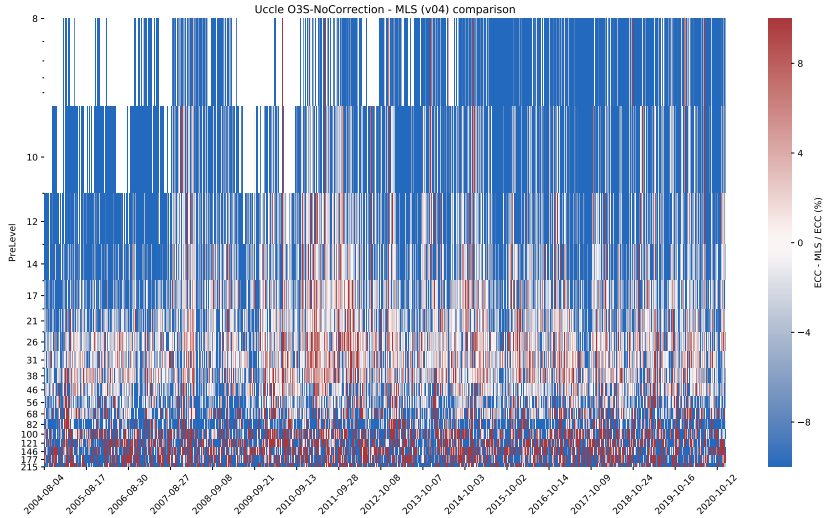

Figure 11: Raw Uccle-MLS comparison

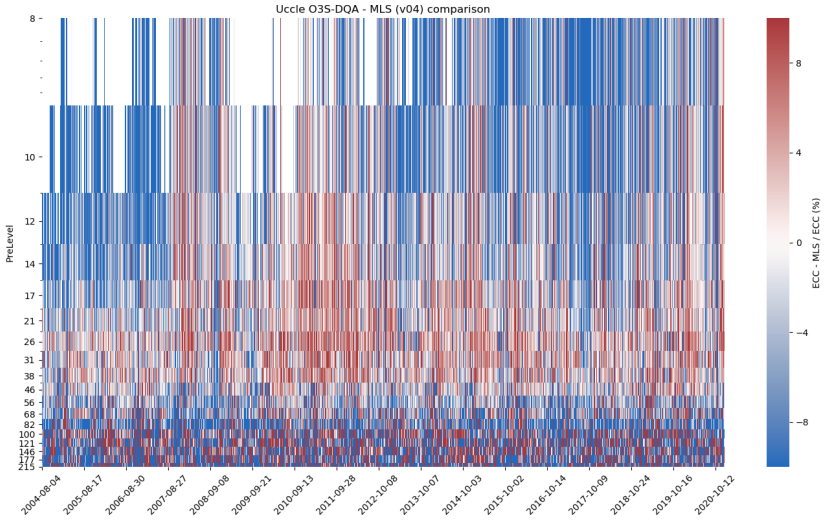

Figure 12: DQA Uccle-MLS v04 comparison

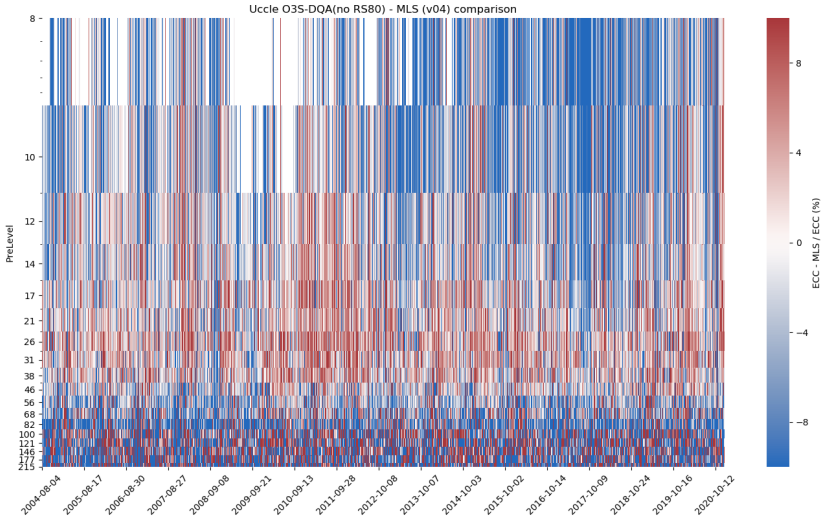

Figure 13: DQA Uccle-MLS v04 comparison without RS80 correction

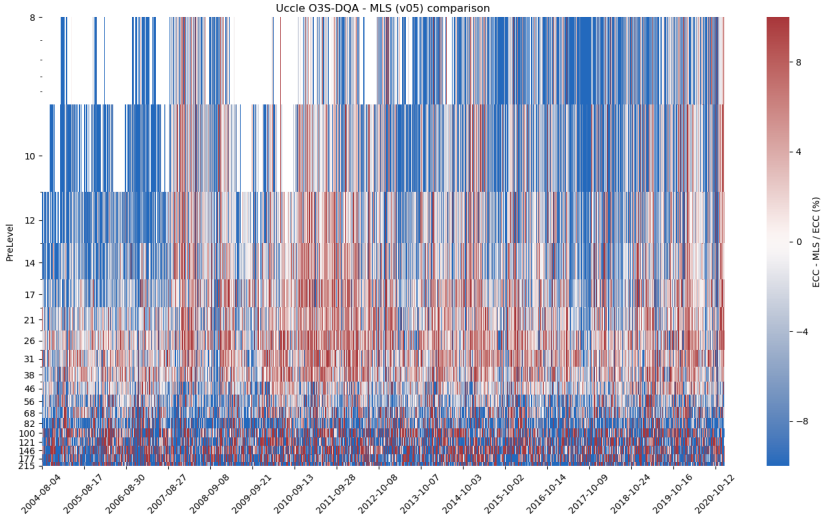

Figure 14: DQA Uccle-MLS v05 comparison