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Cycle 22 COS FUV Internal/External Wavelength Scale Monitor

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ABSTRACT

We report on the results of the monitoring of the COS FUV wavlength scale zero-points during Cycle 22. Only the G130M/1096 and G140L/1105-1280 configurations were monitored in this program. Monitoring of the standard G130M and G160M modes was part of the calibration phase associated with the move of COS FUV operations to LP3 and will be presented in a separate ISR.

Contents

1. Introduction

This program monitors the offset between the internal and external wavelength scales. This offset is referred to as "DELTA" in the wavelength dispersion solution reference file and corrects for the shift between the WCA and PSA in TV03 versus the shift between the WCA and PSA on orbit: $(WCA - PSA)_{TV03} - (WCA - PSA)_{orbit}$. Analysis of TV data indicates that this DELTA (offset) is cenwave and FPPOS independent for a particular grating, but it is grating dependent (Oliveira et al. 2010, ISR2010-06). To monitor this effect, this calibration program would normally observe the extreme cenwaves at different FP-POS positions for all FUV gratings and G130M/1222-1096. In Cycle 22, however, this program only monitored the G130M/1096 and G140L/1105-1280 cenwaves since monitoring of the standard G130M and G160M modes was performed during the calibration phase of the move of FUV operations to lifetime position 3 (LP3) in program 13931 (LCAL2). In this ISR, we only report the results from the monitoring of the 3 configurations included in this yearly monitor. The results obtained from analsyis of the LCAL3 data will be reported elsewhere.

2. Execution

This program is comprised of a 1-orbit visit to monitor the wavelength scales of the G130M/1096, and the G140L/1105-1280 configurations using the external SMC target AV75. V01 executed successfully on July 18, 2015. FP-POS=2&4 were used for the G130M data to mitigate gain-sag effects and FP-POS=3 was used for G140L.

3. Analysis and Results

A cross-correlation analysis was performed between archival STIS/E140M data and the COS data using known ISM absorption lines present along the sight line to AV75 (Sonnentrucker et al. 2013, ISR2013-06). For the configurations monitored this cycle we find that measured offsets are within the 1σ error goals for the COS/FUV wavelength scales, of 5.7-7.5 pix for G130M and 7.5-12.5 pix for G140L (see Oliveira et al. 2010, ISR 2010-06). Table 1 summarizes our findings.

Target	Grating	Offset range (pixel)
AV75	G130M-1096	-3.9, +4.5
AV75	G140L-1280	-4.7, +0.8
AV75	G140L-1105	-5.3, +1.5

4. Continuation Plan

This program was continued in Cycle 23 under PID 14437 for a total of 3 orbits as the regular monitor sequence was resumed for all FUV gratings during monitoring at LP3.

Change History for COS ISR 2016-06

Version 1: 20 September 2016 – Original Document

References

Oliveira C., Beland S., Keyes C. , & Niemi S., 2010, Instrument Science Report COS 2010-06, "SMOV COS FUV Wavelength Calibration"

Sonnentrucker P., Roman-Duval J., Ely J., Oliveira C., Proffitt C., & Aloisi A., 2013, Instrument Science Report COS 2013-06, "COS FUV Dispersion Solution Verification at the New Lifetime Position"