Instrument Science Report COS 2017-08

Cycle 23 COS NUV Internal/External Wavelength Scale Monitor

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21 July, 2017

ABSTRACT

We report on the results of the monitoring of the COS NUV wavelength scale zero-points during Cycle 23 in PID14443. Select cenwaves for all NUV gratings were monitoring in this program with a structure that remained unchanged since Cycle 21. The program was reduced from 3 to 2 visits per year in Cycle 23.

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, ISR2010-05). To monitor this effect, this calibration program takes data for all NUV gratings and seect cenwaves that span the full NUV range.

2. Execution

Program 14443 is comprised of 2 visits, 1-orbit each, to monitor the wavelength scales of the G185M/2010, G225M/2217, G285M/2676, and G230L/2635/2950/3000 (FPPOS=3). External target HD6655 is used, as in previous cycles. V01 and V02 executed successfully on Feb 24 and Sep 25, 2016.

3. Analysis and Results

Archival STIS/E230M and G230M data were cross-correlated against the COS data using known ISM absorption lines present along the sight line to HD6655 (see Sonnentrucker et al. 2012, ISR2013-06). When no overlap with the STIS data exist, offsets were measured relative to Cy19 data taken at the same epoch in PID12722. Within the 1σ error goals our measured offsets are consistent with the COS specifications (1.7 – 2.4 pix for G185M, 2.3 – 3.2 pix for G225M, 2.3 – 3.5 pix for G285M, and 2.0 – 3.7 pix for G230L; see Oliveira et al. 2010, ISR 2010-06).

Visit	Stripe	G185M 2010	G225M 2217	G285M 2676	G230L 2635	G230L 2950	G230L 3000
Feb. 24	A B C	No STIS overlap	no overlap no overlap -5.0	+2.2 +1.4 +2.2	no overlap +0.9 contam*	low S/N +2.3 contam*	low S/N +1.2 contam*
Sept. 25	A B C	No STIS overlap	no overlap no overlap +3.4	+3.4 +2.8 +3.6	no overlap +2.7 contam	low S/N +3.9 contam	low S/N +2.4 contam*
COS-COS	Comparison with Cy19 data**						
Feb . 24	A B C	+0.4 +0.6 +0.5	+0.4 +0.2 +0.1	+0.4 +0.2 +0.1	low S/N +0.1 contam*	-0.3 -0.2 contam*	-0.4 -0.9 contam*
Sept. 25	A B C	+2.4 +2.1 +2.5	+2.1 +2.4 +4.2	+2.8 +2.2 +2.3	low S/N +2.3 contam*	+2.6 +2.2 contam*	+2.9 +2.3 contam*

* Contamination by 2nd order light -- ** Cy19 data were reprocessed with the most recent DISPTAB reference file for this analysis (see Plesha et al. , 2017 COS ISR, under review).

4. Continuation Plan

This program was continued in Cycle 24 under PID 14859 using the same cadence and structure.

References

Oliveira C., Beland S., Keyes C. , & Niemi S., 2010, Instrument Science Report COS 2010-05, “SMOV COS NUV 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”