



17722 - Seasonal and latitudinal variability of C₂H₂ in Uranus' stratosphere

Cycle: 32, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) URANUS	COS/FUV COS/NUV	1	05-Aug-2024 15:00:16.0	yes

1 Total Orbits Used

ABSTRACT

Acetylene (C₂H₂) is formed in Uranus' stratosphere from the solar photolysis of methane, which means that its abundance is highly dependent on both season and latitude. Photochemical models have been developed to predict the spatial and temporal variability of C₂H₂, but there have been limited observations to date that can be used to test these models. Spatially-resolved mid-infrared observations have recently been used to study the C₂H₂ distribution, but at those wavelengths there is a degeneracy between chemical abundances and stratospheric temperatures. Far-ultraviolet spectroscopic observations can be used to retrieve the disk-averaged C₂H₂ abundance and are not sensitive to the atmospheric temperature, providing complementary information to the infrared observations. In 2014, Uranus was observed by HST during its northern spring using the COS G140L

Proposal 17722 (STScI Edit Number: 0, Created: Monday, August 5, 2024 at 2:00:17 PM Eastern Standard Time) - Overview

grating. These observations show the clear spectral signature of C₂H₂ and have not yet been published. We request one HST orbit in order to repeat this observation during the 2024/2025 cycle, as Uranus approaches northern summer solstice. We will compare the C₂H₂ abundances obtained from these HST COS spectra, and from Voyager UVS spectra obtained during southern summer, with predictions from seasonal photochemical models. A difference between the model predictions and the observations could suggest that atmospheric circulation plays a significant role.

OBSERVING DESCRIPTION

We propose to use COS to observe Uranus for one orbit. We will use TIME-TAG spectroscopy with the FUV G140L gratings. The goal of this observations is to measure atmosphere absorption by C₂H₂.

The proposed observations follow the same method as Visit 4 from Proposal 14036, which was executed in November 2014. Using a consistent observing setup will allow to directly compare the new observations with the previous observations, in order to search for seasonal variability in the C₂H₂ abundance.

Proposal 17722 - Visit 01 - Seasonal and latitudinal variability of C2H2 in Uranus' stratosphere

Mon Aug 05 19:00:17 GMT 2024

Visit	Proposal 17722, Visit 01 Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	(Exposure 2 (Sequence 1-2 Non-Int in Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details. (Visit 01) Informational (Form): The Visit Planner and Spike may produce different schedulability results.									
Diagnosics										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(1)	URANUS	STD=URANUS				EARTH			
Comments: Description=Planet Uranus Extended=YES										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.192 9579)	(1) URANUS	COS/NUV, ACQ/IMAGE, BOA	MIRRORA			Sequence 1-2 Non-Int in Visit 01	30 Secs (30 Secs) [==>]	[1]
	2	(COS.sp.192 9438)	(1) URANUS	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=60 00; FP-POS=ALL		Sequence 1-2 Non-Int in Visit 01	336 Secs (1344 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]

