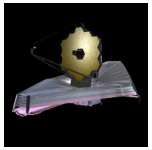

10498 - A Search for Volcanism on L 98-59 d with JWST/NIRSPEC

Cycle: 5, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Transit Observations of L98-59d				
	1	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	2	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	3	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	4	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	5	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	6	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	7	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	8	G395H	NIRSpec Bright Object Time Series	(1) L-98-59
	9	G395H	NIRSpec Bright Object Time Series	(1) L-98-59

ABSTRACT

Characterizing super-Earth exoplanets to constrain the processes operating on them is one of the leading goals of the exoplanet community. In particular, understanding exoplanet outgassing is a priority as it links to interior composition, atmospheric evolution, and biosignature gas false

positives. A recent JWST observation found tentative evidence for a sulfur-rich atmosphere on the super-Earth L98-59 d, consistent with volcanic outgassing. We propose to observe 9 additional transits of L98-59 d to confirm the hypothesis that L98-59 d is volcanically active. With these data, we will be able to detect a sulfur-rich atmosphere, proposed in the literature as a strong diagnostic of a volcanically active L98-59 d, and constrain carbon species to discriminate non-volcanic scenarios. Overall, our observations will be sensitive to every volcanic outgassing scenario proposed in the literature for L98-59 d as well as novel scenarios not previously elucidated. If confirmed, L98-59 d will be the first known volcanically active planet beyond the Solar System, supporting the Solar System-based hypothesis that volcanism is ubiquitous and the source of secondary atmospheres on Earth-sized planets. This would provide the first opportunity to study the interior of a super-Earth via its atmosphere, providing an unprecedented benchmark for geodynamical and geochemical models. Tidal heating studies show that out of all currently known exoplanets, L98-59 d is the best candidate for exhibiting volcanic activity. Therefore, this is exoplanet community's best opportunity to detect exovolcanism, and open the era of studying interior-atmosphere interactions on small exoplanets.

OBSERVING DESCRIPTION

We propose for nine new transit observations of L98-59 d using JWST/NIRSpec G395H.

We repeat the succesful observing strategy of previous programs (GTO 1224 and GO 4098) observing this planet with this mode. L98-59 d's transit duration is 0.84 hours and we request 2.86 hours of out-of-transit baseline, for 3.7 hours of science time per transit. This corresponds to 2121 6.3 s integrations.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.* *Category=Star* *Description=[Exoplanet Systems, Exoplanets]*				
(2)	ACQ-STAR-FOR-L98-59	RA: 08 18 18.2248 (124.5759367d) Dec: -68 18 42.85 (-68.31190d) Equinox: J2000	Proper Motion RA: -14.046 mas/yr Proper Motion Dec: 13.134 mas/yr Parallax: 0.0020161" Epoch of Position: 2016.0	
Comments: Teff 4140.3 *2MASS 08181825-6818430* *RAJ2000 124.576056* *DEJ2000 -68.311951* *Jmag 13.844* *Hmag 13.128* *Kmag 12.998* *Category=Star* *Description=[K stars]*				

Observation

Proposal 10498, Observation 1: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 1)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 2: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 2)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 3: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 3)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 4: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 4)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 5: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 5)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 6: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 6)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 7: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 7)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 8: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 8)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 10498, Observation 9: G395H

Fri Mar 13 19:08:43 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(G395H (Obs 9)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	L-98-59	RA: 08 18 7.6214 (124.5317558d) Dec: -68 18 46.81 (-68.31300d) Equinox: J2000	Proper Motion RA: 94.794 mas/yr Proper Motion Dec: -340.08400002676353 mas/yr Parallax: 0.0942664" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	2 ACQ-STAR-FOR-L98-59	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	217255.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G395H/F290LP	NRSRAPID	6	2121	1	1	2121	13435.432	217255.8

Special Requirements	
	Phase 0.986774457 to 0.992366653 with period 7.4507290 Days and zero-phase 2458362.73980 HJD Time Series Observation No Parallel Attachments