



## 12119 - Rapid Response: Unexpected Jupiter Impact

Cycle: 17, Proposal Category: GO/DD

(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) JUPITER-IMPACT	WFC3/UVIS	1	04-Jun-2010 21:09:44.0	yes

1 Total Orbits Used

### ABSTRACT

On 3 June 2010, amateur astronomers A. Wesley and C. Go independently captured observations of an impact on Jupiter: the bright flash of an impact itself, not the dark aftermath as seen in 2009. This event was completely unexpected given the recent impact in 2009, and contradicts recently revised predictions of jovian impact rates. Three circumstances make this 2009 event unique: first, the event was captured on video; second, it was on the jovian day-side and hence fully visible from Earth; and third, it was at low latitude (i.e., favorably placed on the planet). These factors will

permit a lightcurve to be extracted, which is critical for determining the energy of the explosion and hence the size of the impacting body (not available for the 2009 event and available for only a few 1994 events by Galileo). As of this writing, no dark impact site has been detected with telescopes of any aperture, including the Gemini North telescope. Hubble may be the only facility with high enough spatial resolution to detect the 2010 impact site. If Hubble images show a site, then the body's trajectory might be obtainable. If no site is detected, then Hubble will confirm that this is the first observation of a meteor on another atmosphere-bearing planet. If an event of this size occurred on Earth, it would be likely be termed a Type 1 Low-Altitude Airburst, like Tunguska or larger. Thus, this new event could become the best-observed analogue of a terrestrial airburst of the size that dominates the impact threat to humans. The observations we propose should provide independent constraints on penetration depth and atmospheric effects. This data will strongly inform our understanding of terrestrial airbursts and allow better quantification of the associated threat. We request a single orbit to image the impact latitude on the planet's central meridian. Of critical importance are Hubble's unique UV sensitivity (critical for assessing aspects of the 2009 impact, and not obtainable from any ground-based facility) and Hubble's high spatial resolution (also not obtainable in the visible form any ground-based telescope).

## **OBSERVING DESCRIPTION**

We use 2K x 2K subarrays in quadrant A to take a series of images of Jupiter in multiple filters, including FQ889N, which **MUST** be in quadrant A. The other frames use the same pointing to minimize observatory overhead. Jupiter fits easily within the 2K x 2K subarray; larger array readouts would reduce the number of available exposures due to the WFC3 buffer dump overhead.

Two windows were identified for Sunday 6 June: 06:41 and 16:37 UT. We prefer the window at 16:37 because it has a longer visibility. No timing constraints (other than avoiding transits by Galilean satellites) have been included in the proposal.

Visit	<b>Proposal 12119, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center		
	(1)	JUPITER-IMPACT	STD=JUPITER		TYPE=PGRAPHIC, LONG=159, LAT=-16, ALT=0		NOT TRANSIT OF IO ACROSS JUPITER FROM EARTH, NOT TRANSIT OF EUROPA ACROSS JUPITER FROM EARTH, NOT TRANSIT OF GANYMEDE ACROSS JUPITER FROM EARTH, NOT TRANSIT OF CALLISTO ACROSS JUPITER FROM EARTH	EARTH		
Exposures	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	FQ889N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ889N	CR-SPLIT=NO			60 Secs [==>]	[1]
	2	F953N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F953N	CR-SPLIT=NO			15 Secs [==>]	[1]
	3	F225W	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F225W	CR-SPLIT=NO			150 Secs [==>]	[1]
	4	F631N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F631N	CR-SPLIT=NO			4 Secs [==>]	[1]
	5	F502N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F502N	CR-SPLIT=NO			4 Secs [==>]	[1]
	6	F395N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F395N	CR-SPLIT=NO			12 Secs [==>]	[1]
	7	F502N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F502N	CR-SPLIT=NO			4 Secs [==>]	[1]
	8	F631N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F631N	CR-SPLIT=NO			4 Secs [==>]	[1]
	9	F275N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F275W	CR-SPLIT=NO			40 Secs [==>]	[1]
10	F343N	(1) JUPITER-IMPACT	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F343N	CR-SPLIT=NO			7 Secs [==>]	[1]	

