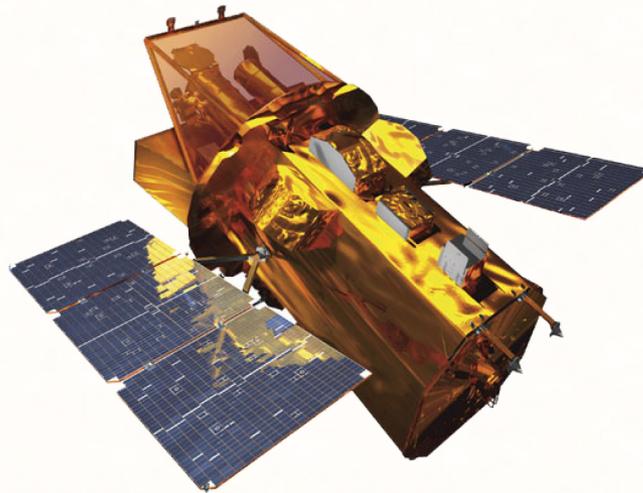


# Swift Monitoring of the Activity and Evolution of Oort Cloud Comets

## Comet C/2013 A1 (Siding Spring)



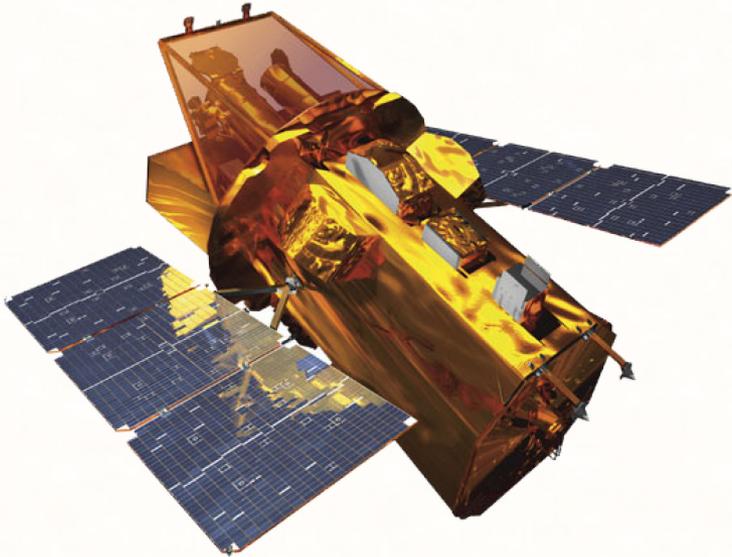
Dennis Bodewits, Mike Kelley,  
Tony Farnham, and Mike A'Hearn



# Goals

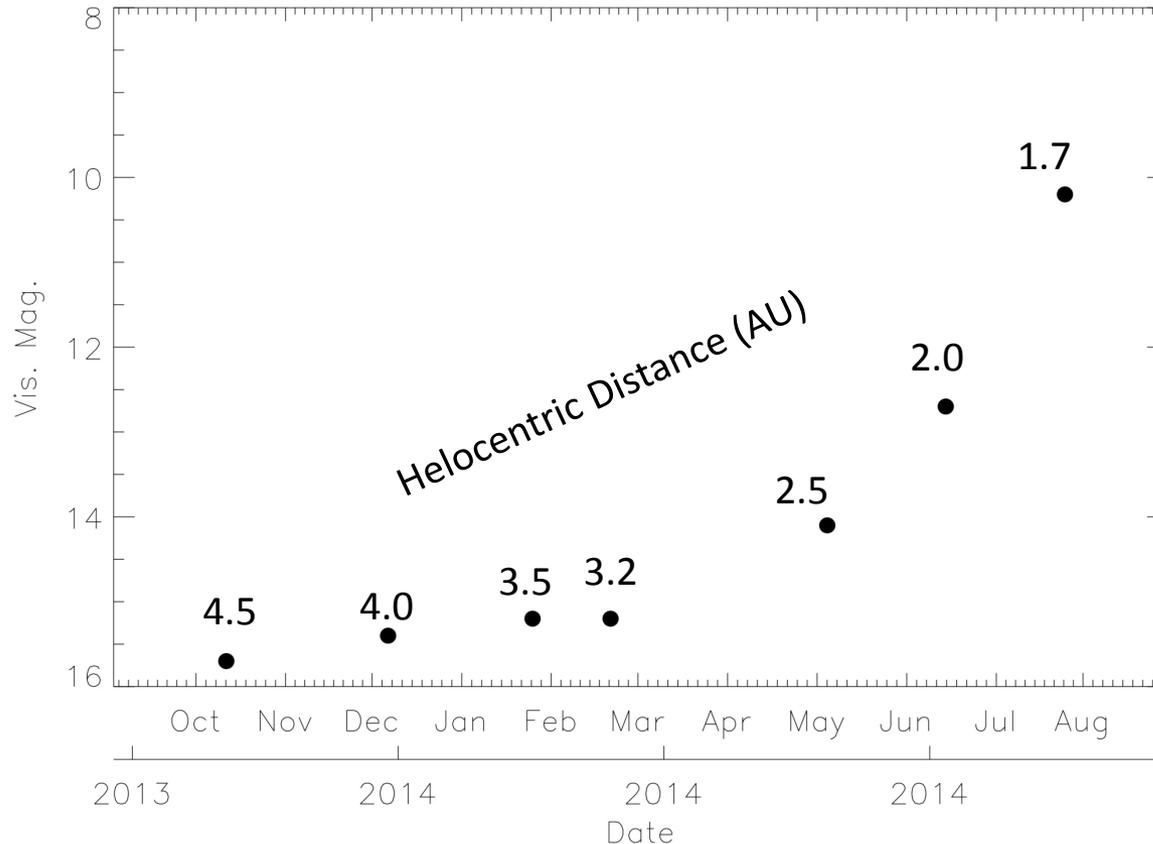
- Search for evidence of outburst activity in morphology and lightcurves
- Use photometry to determine dust and gas production curves
- Search for evidence of icy halos using active area estimates
- Use grism spectroscopy to determine production curves and mixing ratio of fragment species
- Develop geometrical insolation model to explain measured production curves
- Observe comet every 0.5 AU in heliocentric distance where possible (solar elon  $> 47$  deg)

# Swift's UV-Optical Telescope



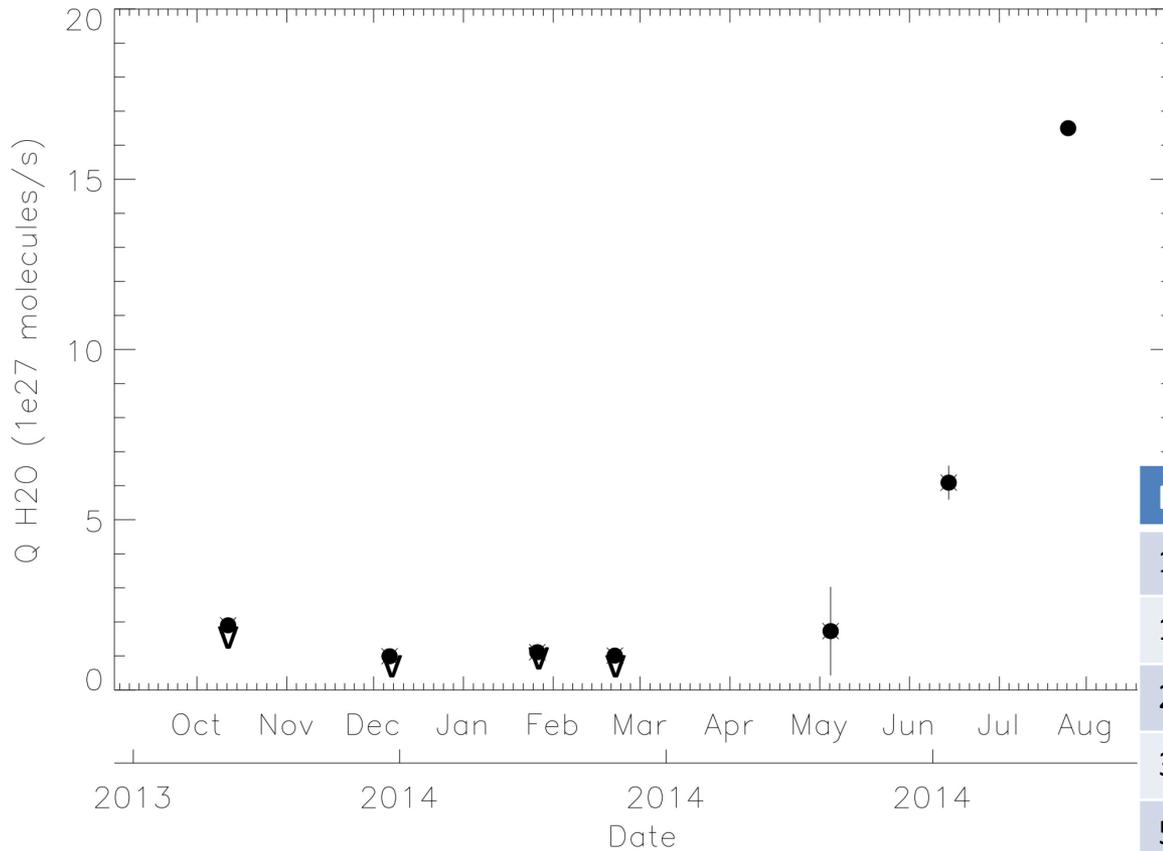
ULTRAVIOLET/OPTICAL TELESCOPE	
Telescope	Modified Ritchey-Chrétien
Aperture	30 cm diameter
F-number	12.7
Detector	Intensified CCD
Detector Operation	Photon Counting
Field of View	17 x 17 arcminutes
Detection Element	2048 x 2048 pixels
Telescope PSF	0.9 arcsec @ 350 nm
Location Accuracy	0.3 arcseconds
Wavelength Range	170 nm - 650 nm
Colors	6
Spectral Resolution (Grisms)	$\lambda/\Delta\lambda \approx 200$ @ 400 nm
Sensitivity	B = 24 in white light in 1000 sec
Pixel Scale	0.48 arcseconds
Bright Limit	$m_V = 7$ mag

# Swift Observations



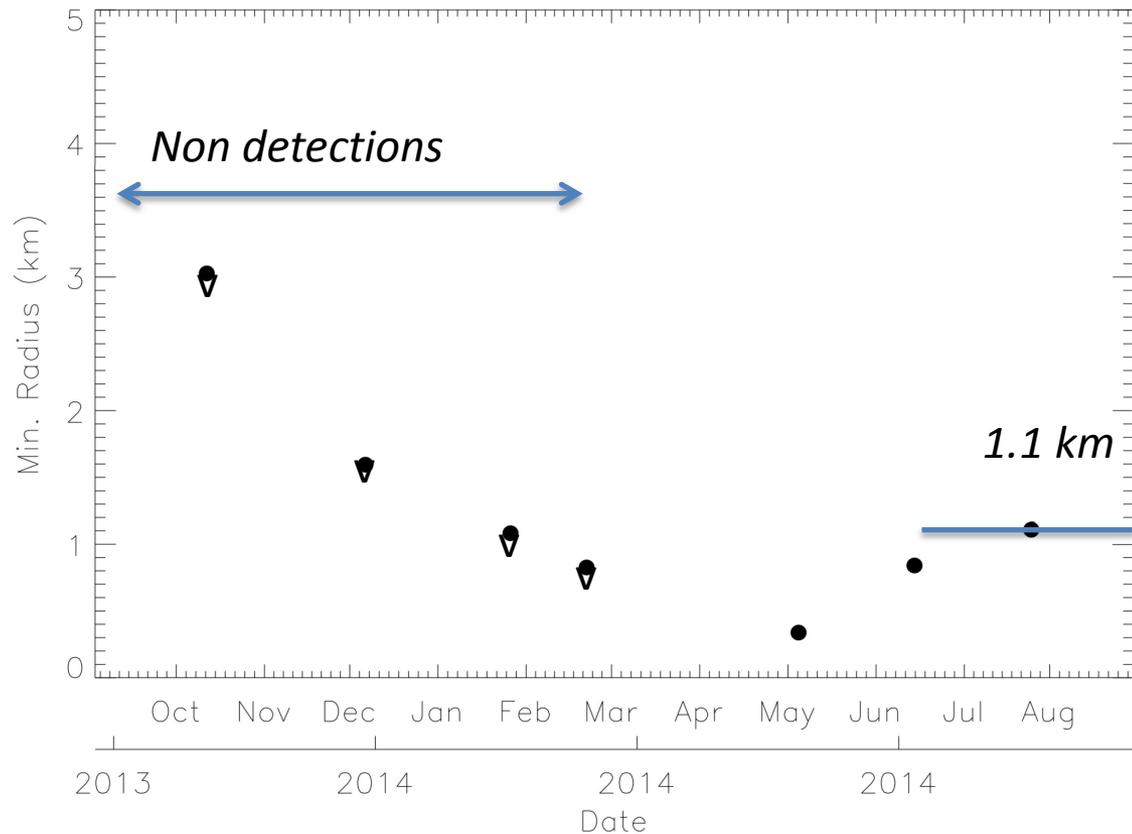
- Swift observing Campaign: Started Nov 2, 2013 at  $r_h = -4.5$  AU
- Systematic sampling every 0.5 AU in  $r_h$  when outside solar constraint (47 deg)
- Observations scheduled until 2015/03 (+2.5 AU)

# Preliminary Results: H<sub>2</sub>O



Date	R <sub>h</sub> (AU)	Q <sub>H2O</sub> (/s)
11/2/13	4.54	<2e27
12/29/13	4.01	<1e27
2/17/14	3.49	<1e27
3/16/14	3.23	<1e27
5/29/14	2.46	1.7 +/- 1.3 x 10 <sup>27</sup>
7/10/14	2.06	6.1 +/- 0.5 x 10 <sup>27</sup>
8/19/15	1.69	1.7 +/- 0.2 x 10 <sup>28</sup>

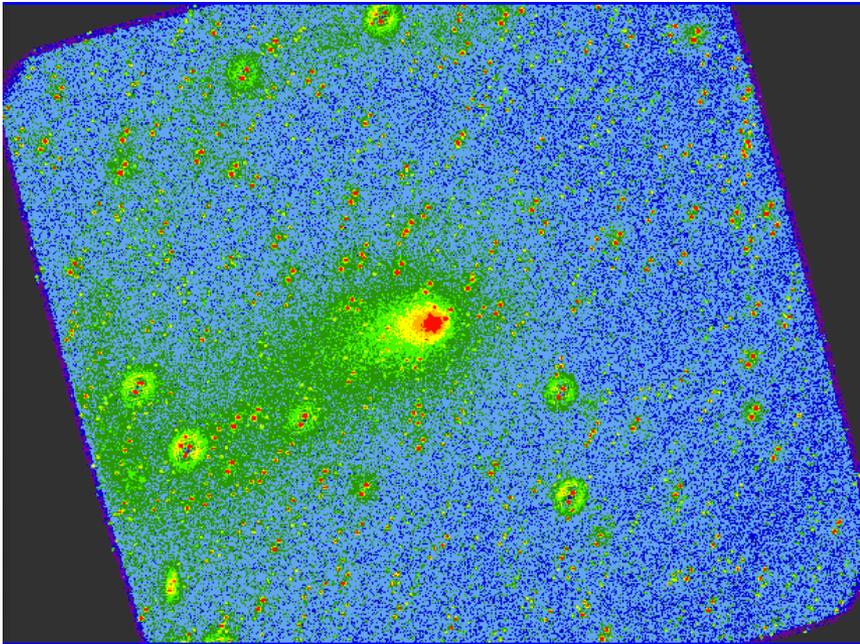
# Preliminary Results: Minimal Radius



Based on QH2O + dQ and assuming a rapid rotator model (Cowan & A'Hearn '78)

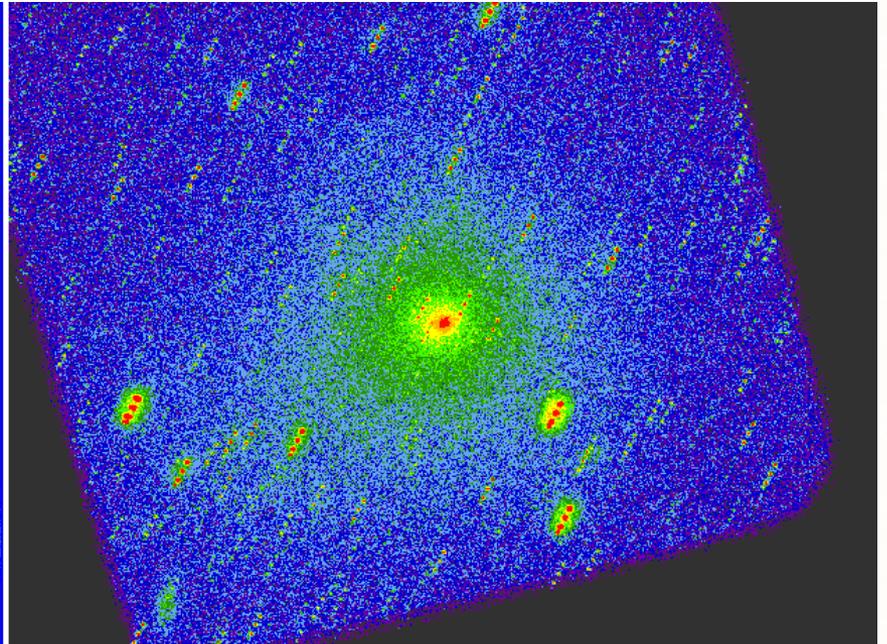
# New observations: yesterday (9/18)

V-band



Dust

UVW1-band



OH

# What's next?

- Observations yesterday/today
- Observations around Closest Approach:  
Before <10/17 and after >10/22 (avoid Mars)
- We will request an additional observation window to support HST and MRO observations
- Observations confirmed until 2014/04.
- Comet not observable Nov 1 - Jan 28 (Sun)
- Campaign will likely continue to Sep. 2015 (4 AU)