Observations of the January 2010 Outburst of the Recurrent Nova U Scorpius using NASA's Swift

Presented by:

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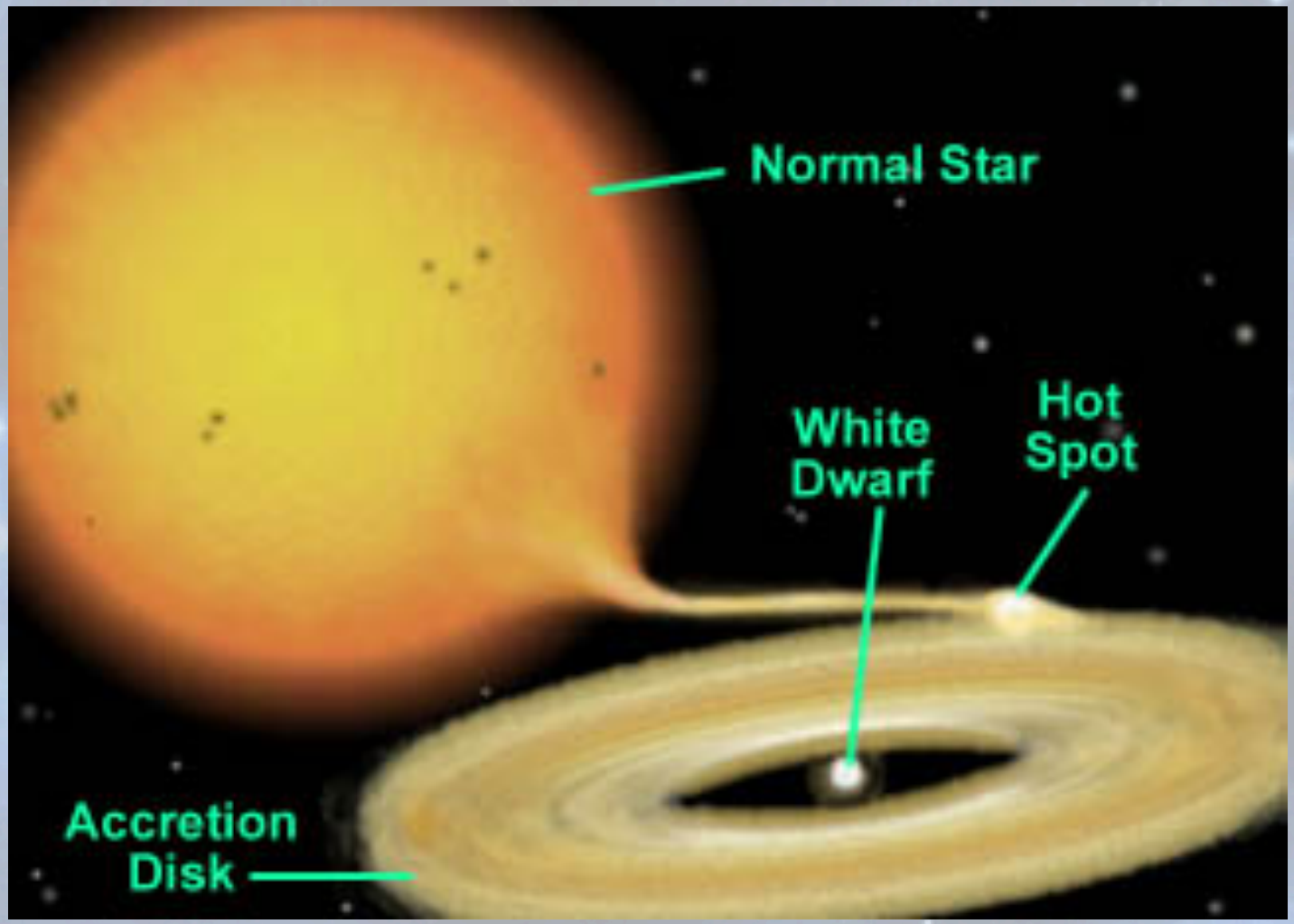
Background: Pleiades from Hubble Space Telescope

An Introduction to U Sco



Google Images: Cataclysmic Variables: <http://singularidad.wordpress.com/2007/02/>

U Sco/Recurrent Novae Statistics

- 10 known RNe in the Milky Way Galaxy.[2]
- U Sco's recurrence time ~10 years = shortest of known RNe.[3]
- U Sco's last burst in 1999, two X-Ray observations obtained.

Citations: [2] (Schaefer 2010, ApJS, 187, 275), [3](Schaefer 2010, ApJS, 187, 275)

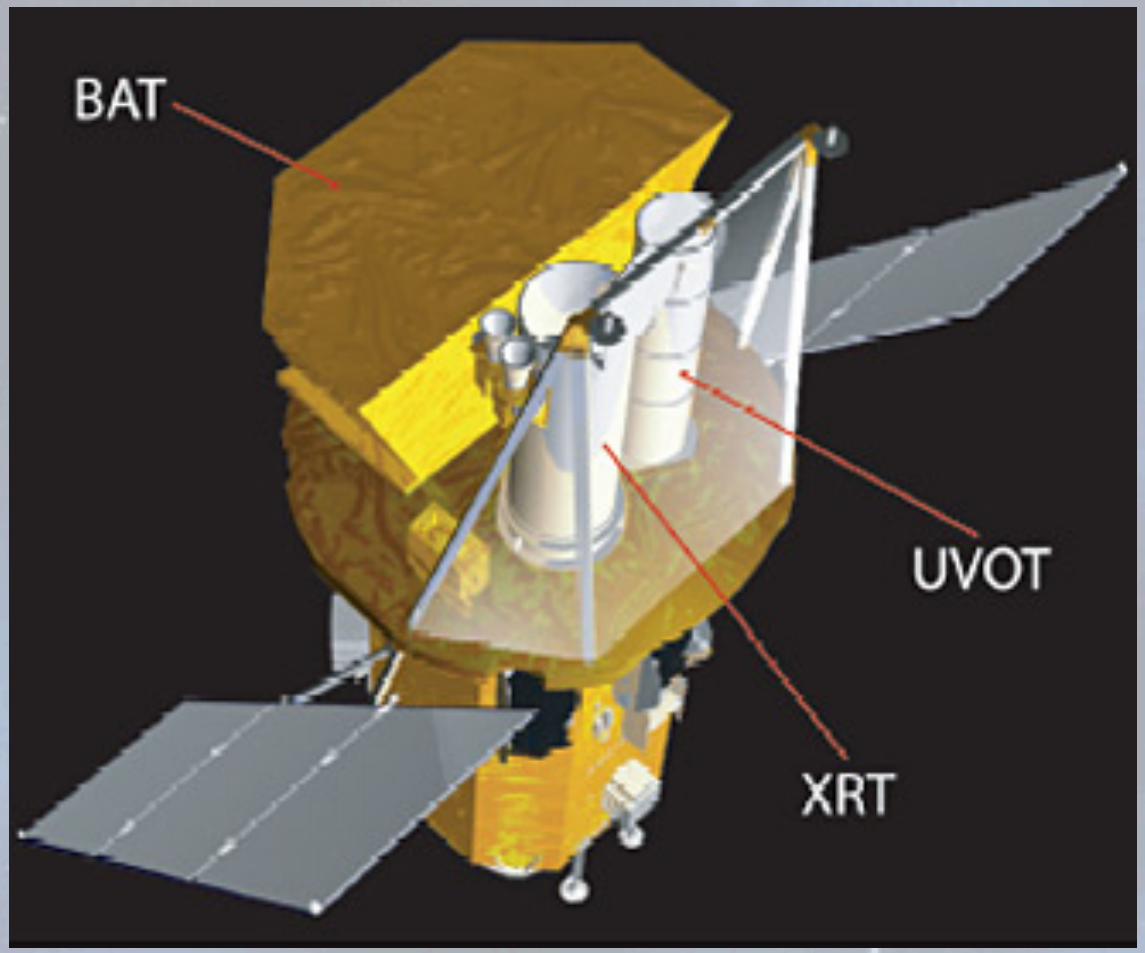
Why U Sco is Important

- Fastest known recurrent nova: fades 3 mag from optical maximum in ~2.6 days
- Possible progenitor for a Type Ia Supernova
- Chandrasekhar Limit ≈ 1.4 $M_{\odot}$

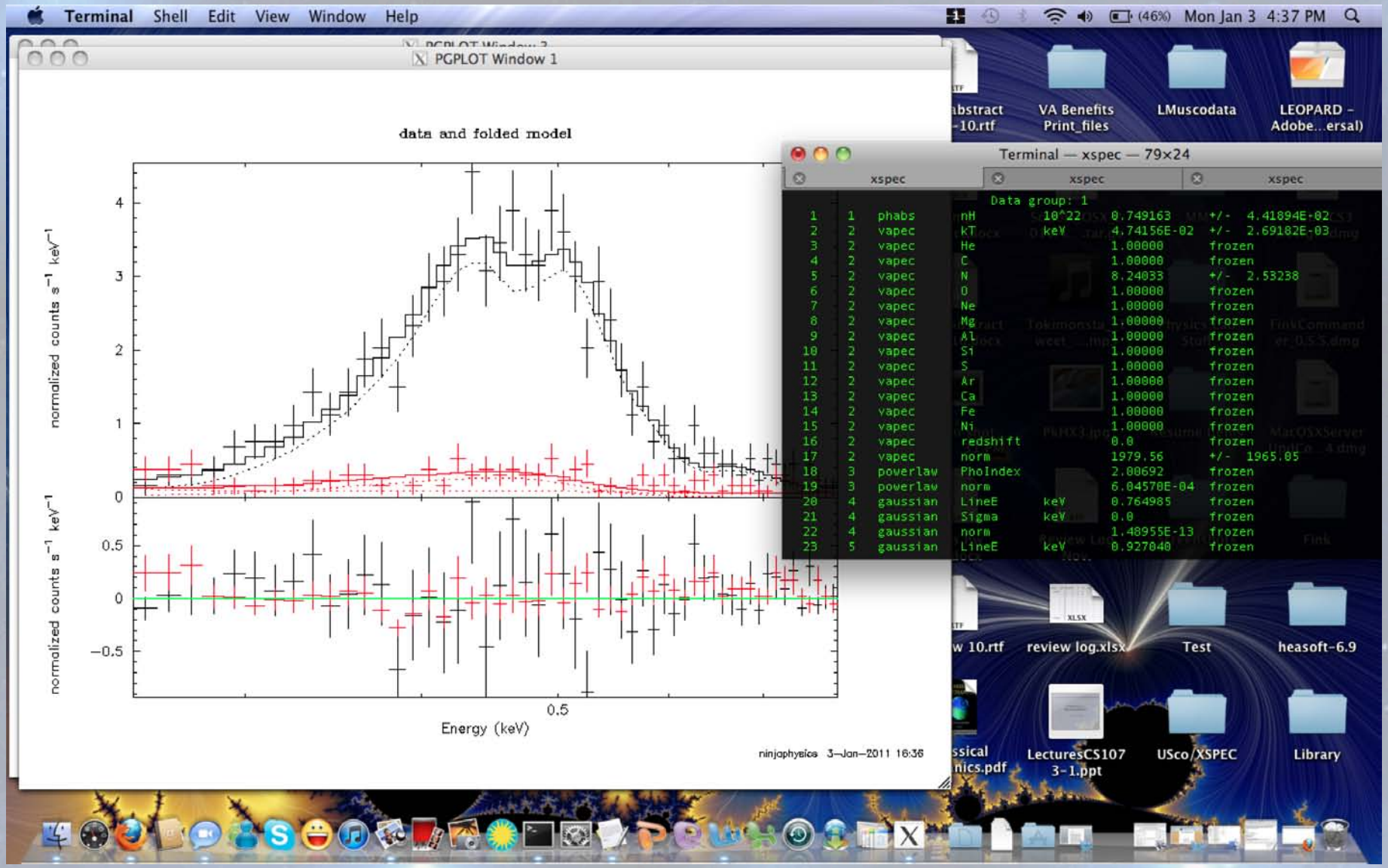
Questions

- Does column density fluctuate throughout the burst?
- Do novae/recurrent novae accumulate mass throughout a burst?
- What is the size of the emitting area?

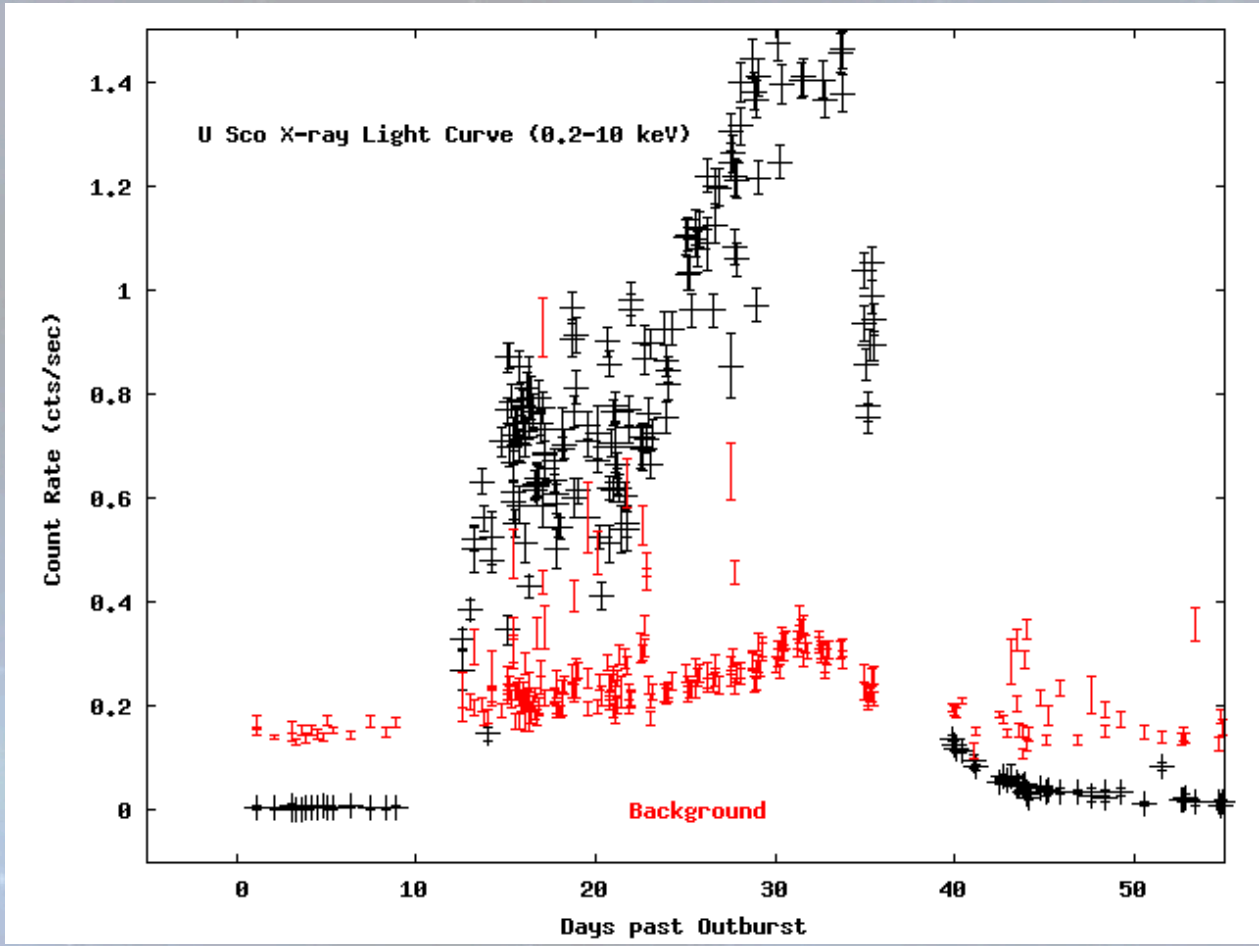
A Glance at Swift



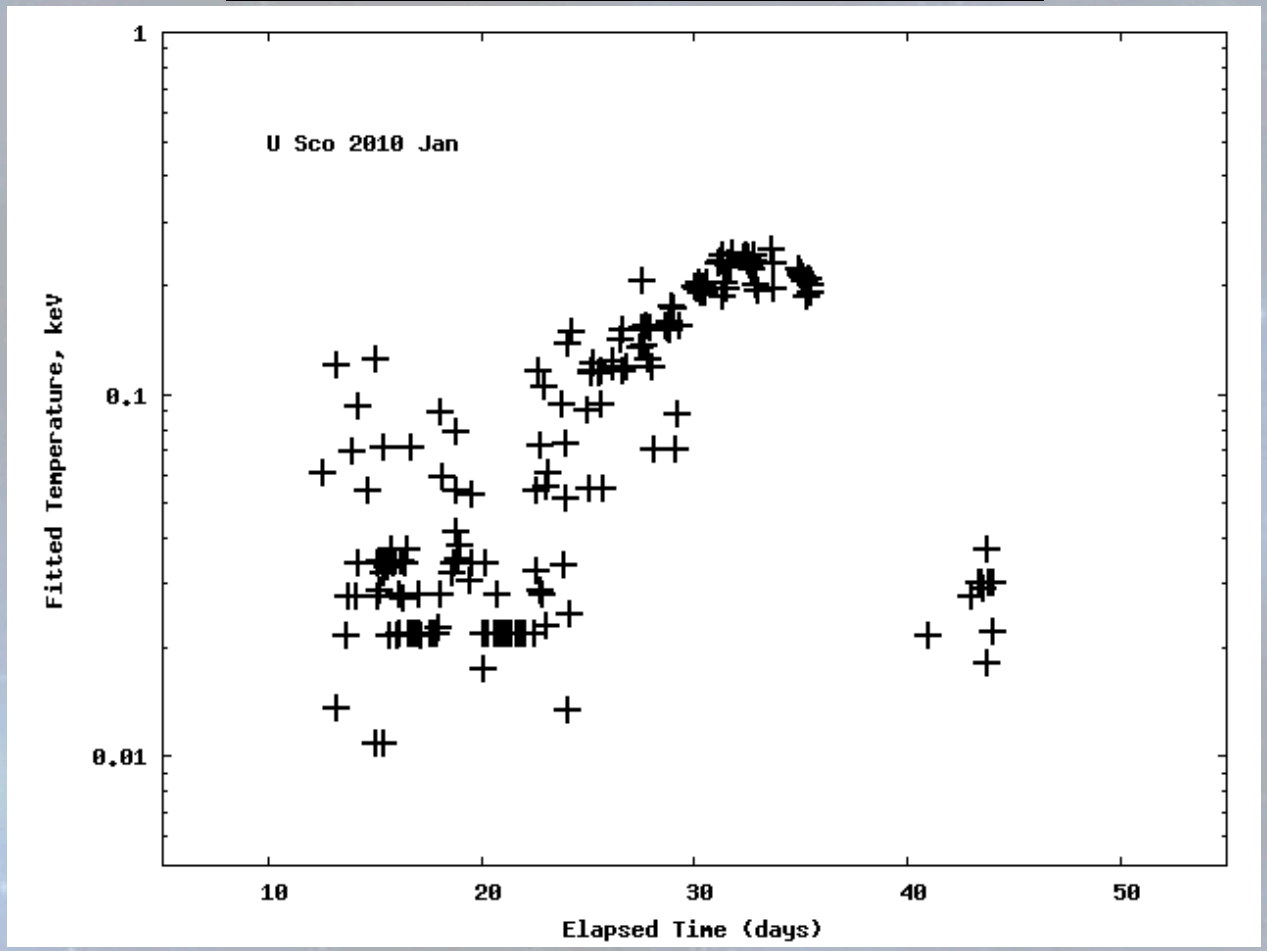
Fitting Data using NASA's XSPEC



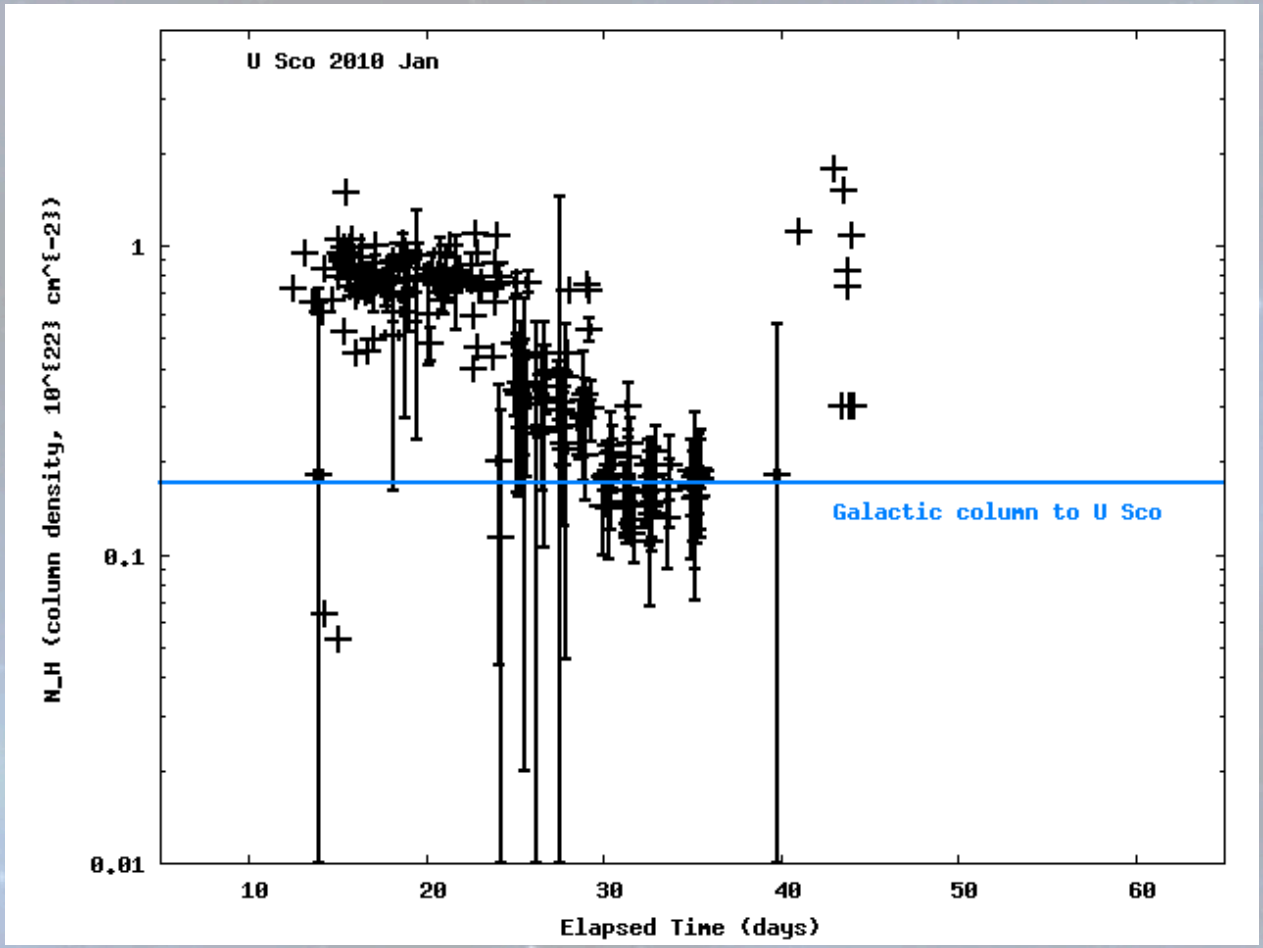
Flux Plot: Source (Black), Background (Red)



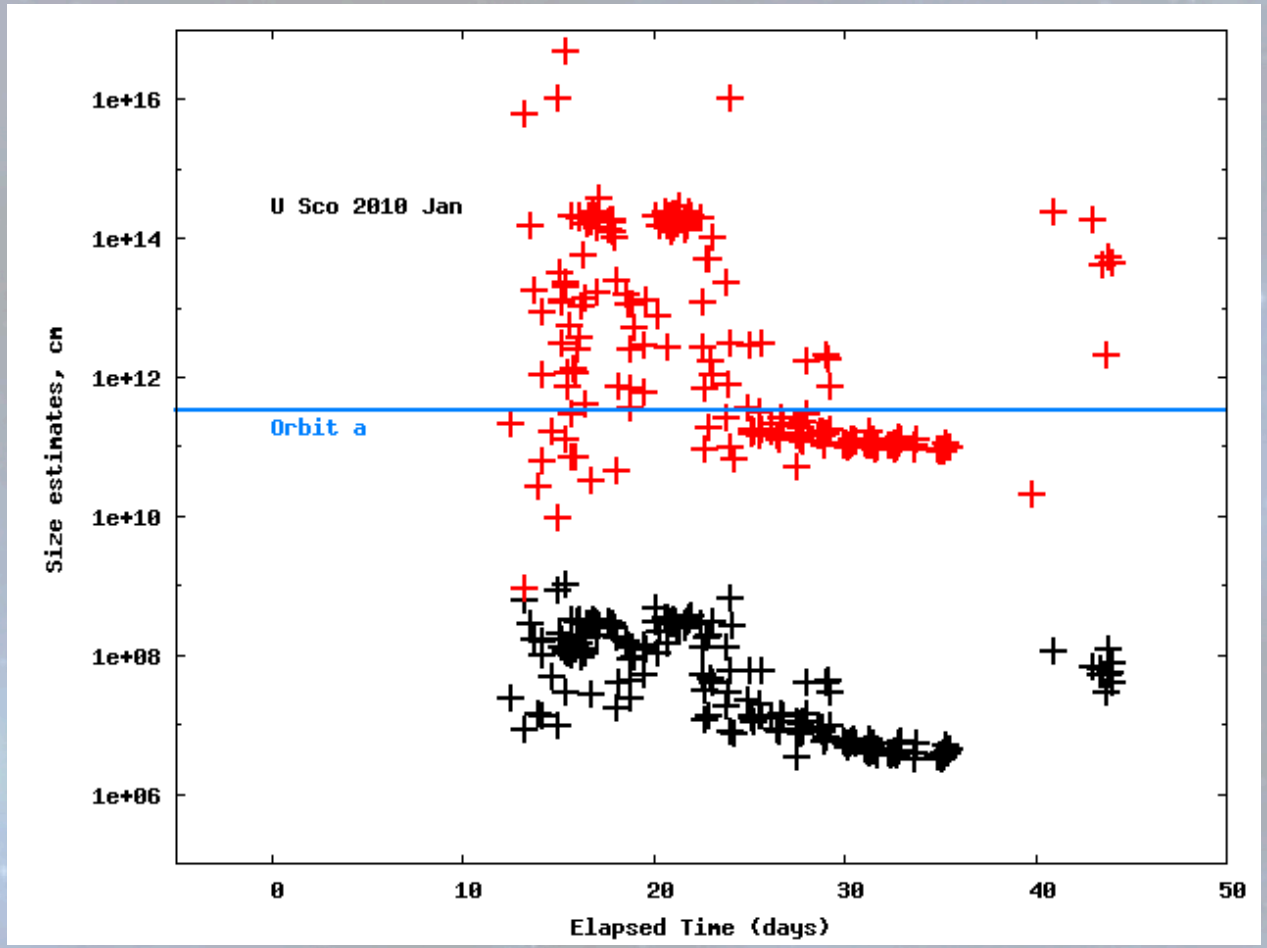
Temperature Plot



Column Absorption Plot



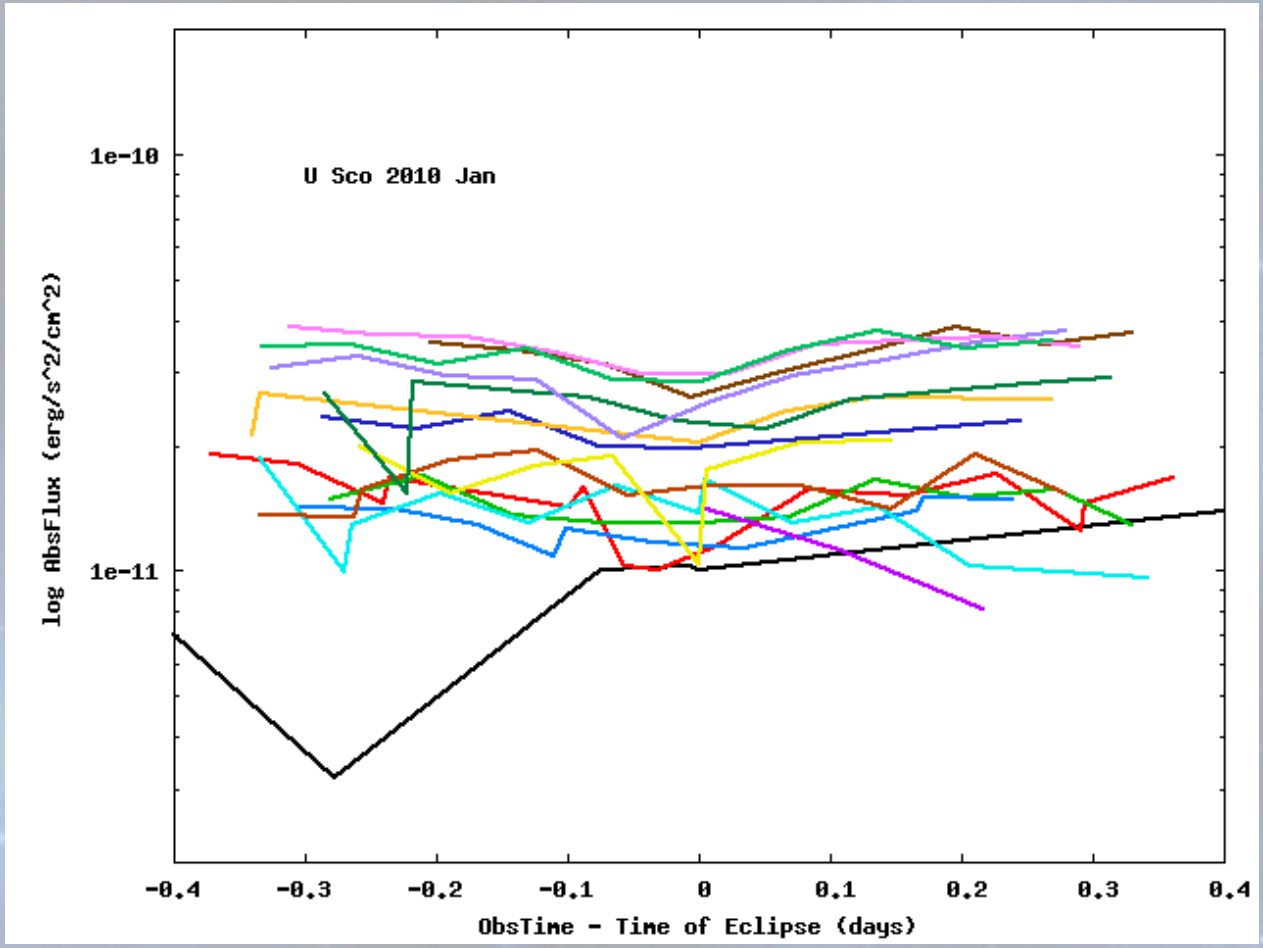
Emitting Area Plot: kT (Black), norm (Red)



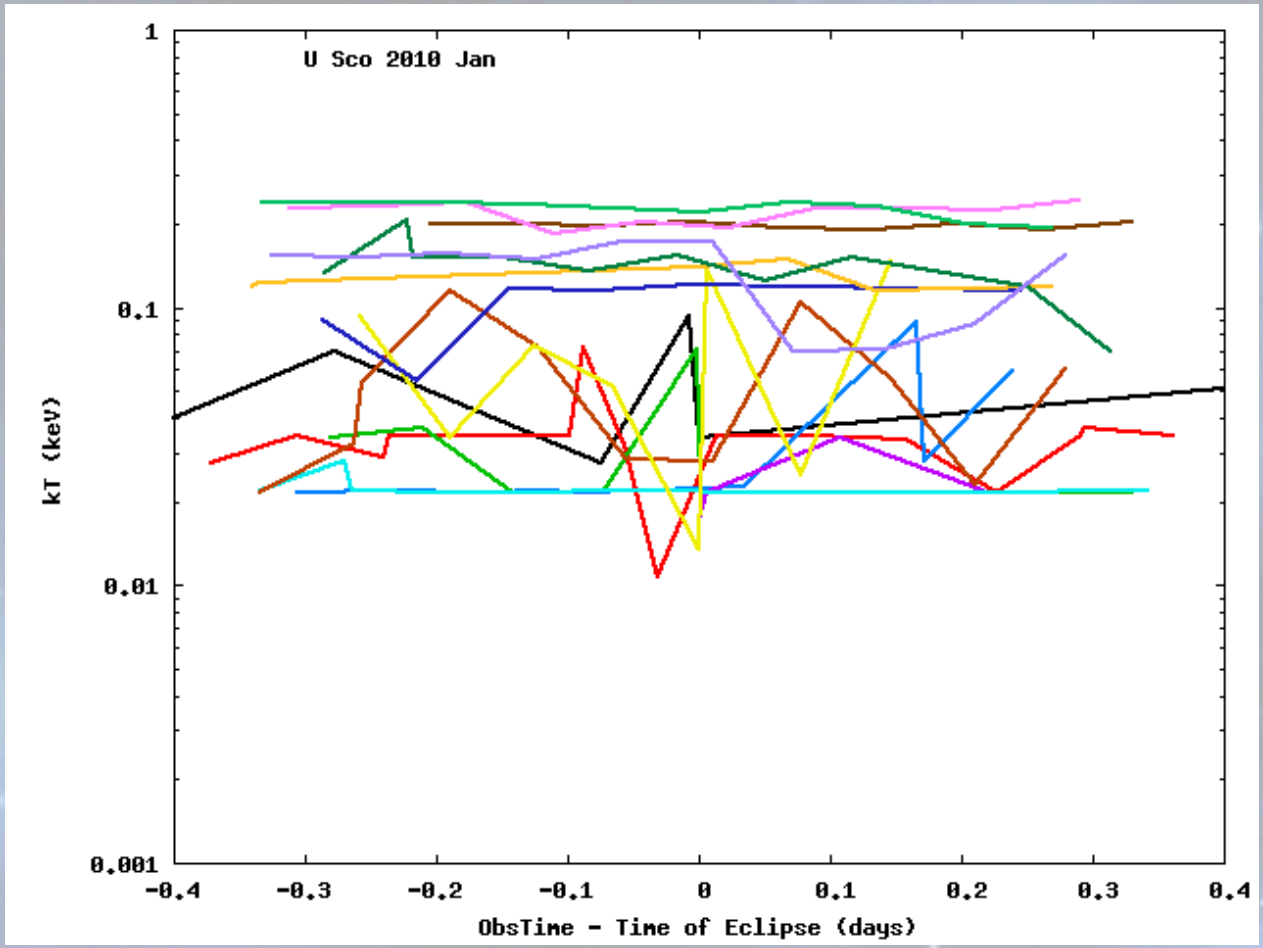
U Sco Eclipse Behavior

Google Images: Eclipses. <http://i2.crtcdn1.net/images/asset/905/610/69/e10296_260x195.jpgg>

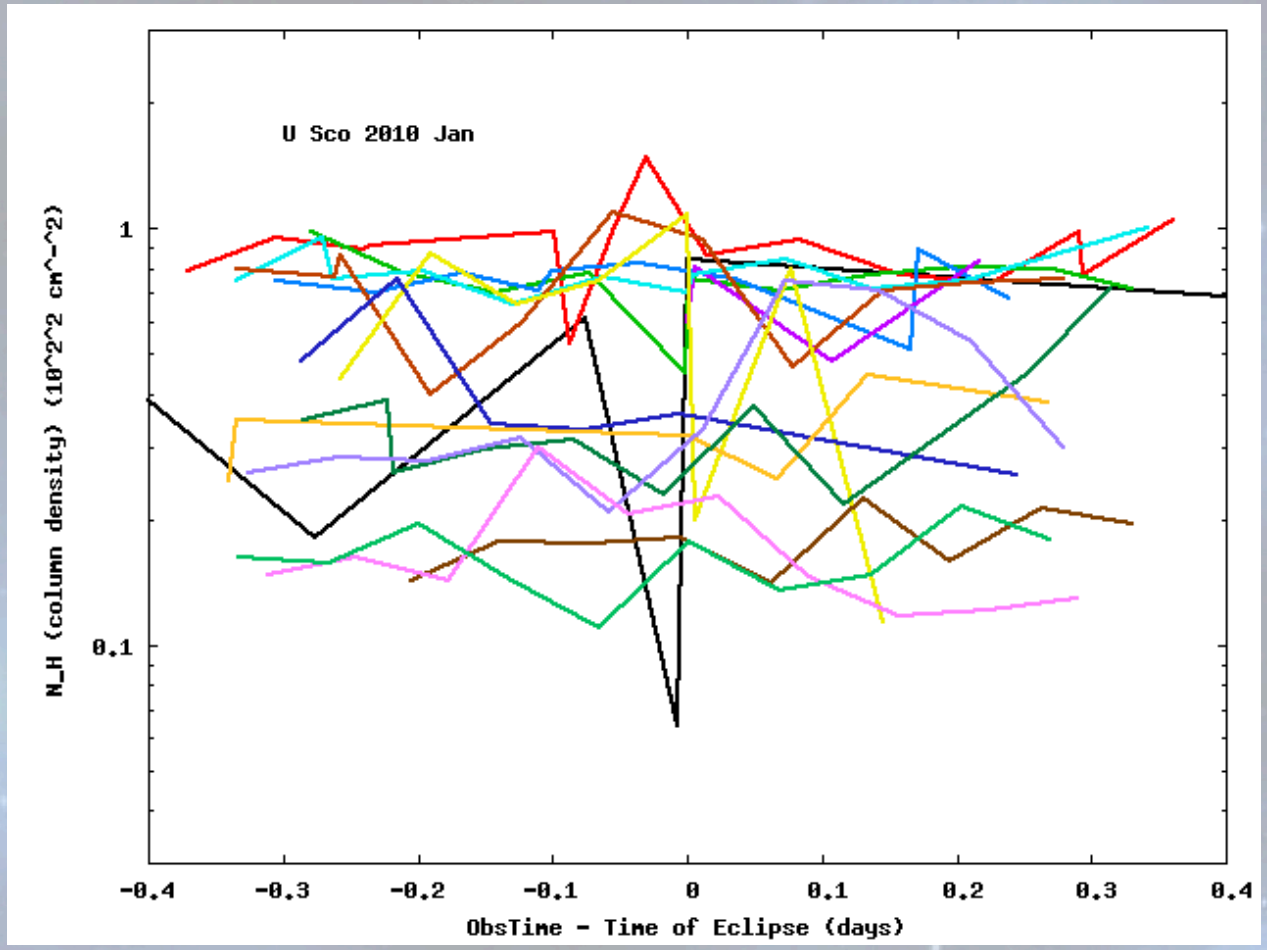
Eclipse Flux Plot



Eclipse Temperature Plot



Eclipse Absorption Column Plot



Eclipse Questions

- Size of X-Ray emitting area?
  - If WD size and smaller, should see eclipses in X-Ray band
  - Do not see any deep eclipses
  - Two possible reasons:
    - Out of eclipse plane
    - Eclipsing object is a small fraction of the projected X-Ray emitting area

Conclusions and Future Prospects

- Check expansion rate in optical spectrum to estimate X-ray expansion
- Possible Type Ia Supernova progenitor
- Enhanced N in some spectra; survey all spectra to find possible trend.

Questions?