

# Outburst Energies and Precursors to Outbursts for SS Cyg from AAVSO Data

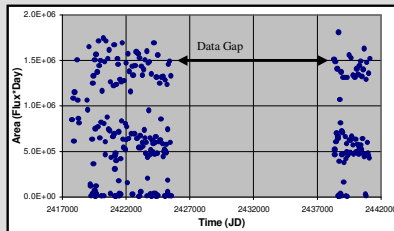
## Method: Outburst Energies

I obtained two data sets for SS Cyg. I was given the first data set by my adviser, Dr. Ron Kaitchuck. I downloaded the second data set from the AAVSO website.

The magnitudes were converted to fluxes using  $F(L) = 10^{-(0.4(\text{visual magnitude})+8.3)}$ .

The area of each outburst on a flux vs. time graph was determined using the Trapezoidal rule. The outburst area should be proportional to the energy released during the outburst.

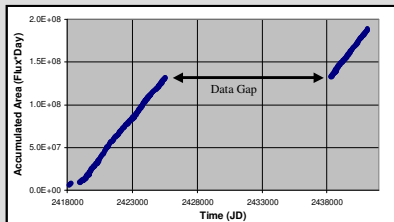
## Outburst Energies



### Implication

Three types of outbursts occur. They do not occur in a very regular pattern.

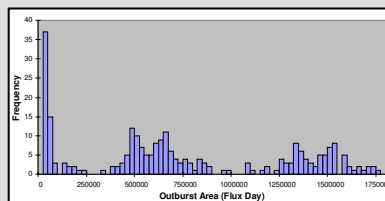
## Accumulated Outburst Energies



### Implication

The accumulation of outburst energy is linear over time. This implies that the average mass transfer rate for a year is the same as the mass transfer rate for another year.

## Outburst Energy Histogram



### Implication

Three types of outbursts occur. Two outburst types might be bimodal.

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## Method: Outburst Precursors

I obtained two data sets for SS Cyg. I was given the first data set by my adviser, Dr. Ron Kaitchuck. I downloaded the second data set from the AAVSO website.

The beginning of each outburst was set to be  $t = 0$  days. The data points before each outburst were phased relative to this. For example, an observation that occurred 2.5 days before the outburst was given a time of  $t = -2.5$  days

The data was binned in increments of 0.1 days.

The data was averaged according to the time before outburst.

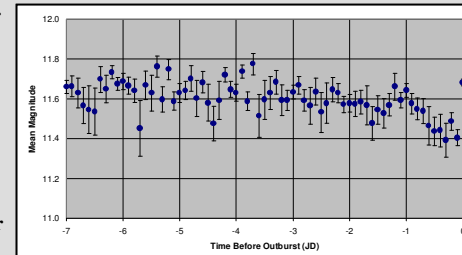
The data was normalized relative to the magnitude at the beginning of the outburst.

## Mean Magnitude Before Outburst

Dimmer



Brighter

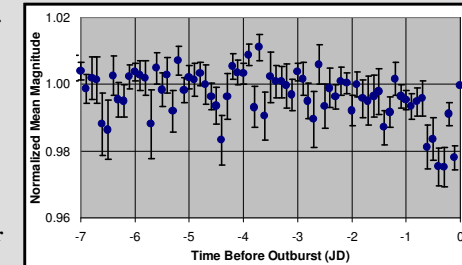


## Normalized Mean Magnitude Before Outburst

Dimmer



Brighter



### Implication

SS Cyg appears to brighten around 2% on the average on the day before going into outburst.

