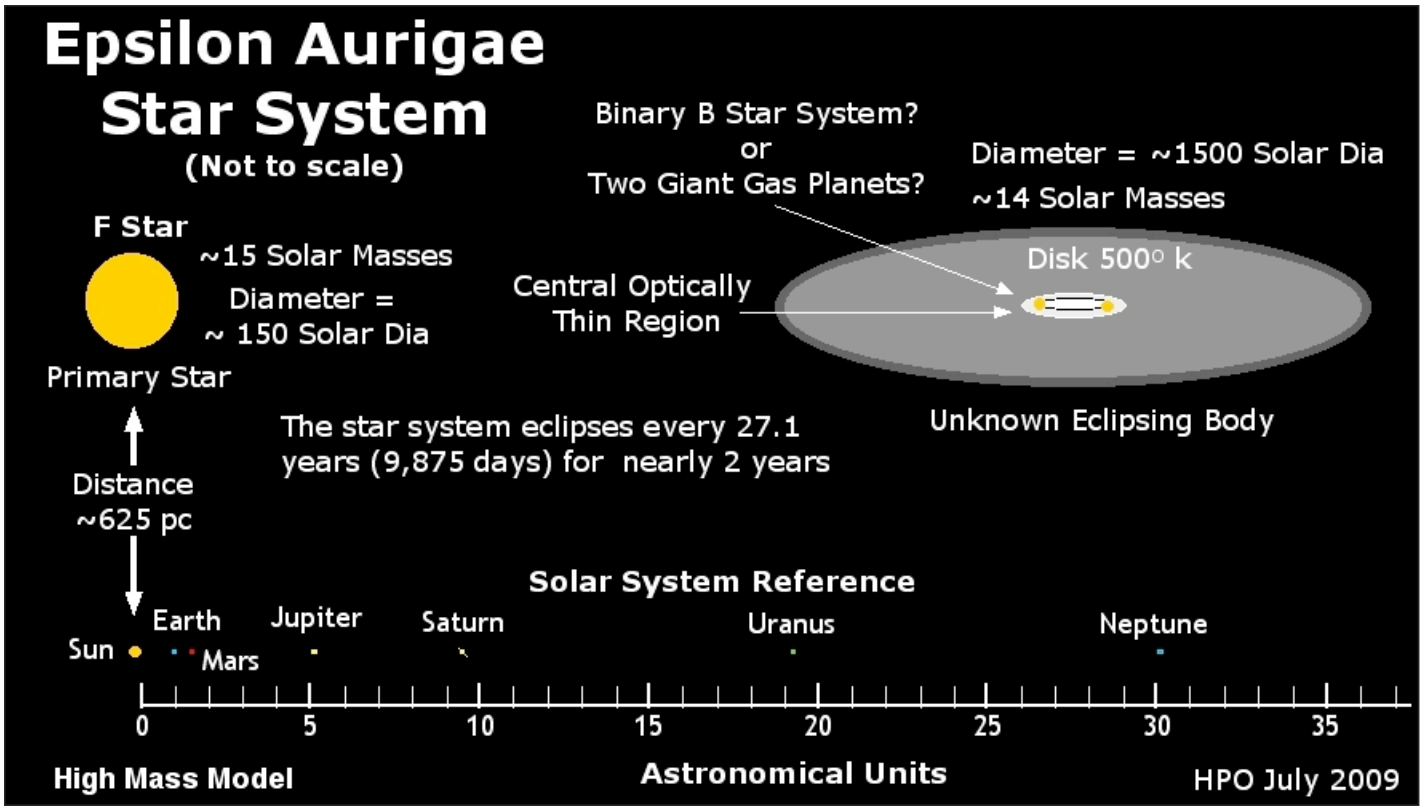
2009/2011
Epsilon Aurigae Eclipse
International Campaign Newsletter #17
Winter/Spring 2010 - Totality



Jeffrey L. Hopkins, Editor
Hopkins Phoenix Observatory

Dr. Robert E. Stencel, Co-editor
University of Denver

Robin Leadbeater, Co-editor
Three Hills Observatory

Campaign Web Site
http://www.hposoft.com/Campaign09.html
and
Epsilon Aurigae Forum
http://tech.groups.yahoo.com/EpsilonAurigae/
see also
https://twitter.com/epsilon_Aurigae

In This Newsletter

Editor's Remarks

Dear Colleagues,

We welcome Robin Leadbeater as a co-editor handling the spectroscopic reporting. Robin has many years experience and in addition to supplying some excellent spectroscopic data he has helped many get started with spectroscopy. We are very fortunate to have him helping.

Spring is here and the eclipse is well into totality. Currently it is in a fading mode, seen most prominently in the U and B bands. For many of us, myself included, the observing season for epsilon Aurigae is quickly coming to an end.

For those of you in a more northern latitude, I encourage you to get periodic observations as best can for as long as you can. One or two observations per week would be great. More even better. The coming phase of the eclipse has never been well observed and there is important data to be gotten about the mid-eclipse. Knowing the start of it precisely, the slope of the brightening, the morphology of the curve, the slope of the dimming and the date of the end will provide an excellent base of data for determining more about the system. There are discoveries to be made.

Both photometric and spectroscopic data are needed during this period. I fully understand the efforts needed and your data will be appreciated and acknowledged.

Below are the predicted times of the mid-eclipse. These are derived from the 1982/84 eclipse and have an error of several days at best. The OOE variations will again make analyzing the data a challenge.

Mid-Eclipse Brightening Start

Band	RJD	UT Date
V	55,325	08 May 2010
B	55,319	02 May 2010
U	55,334	17 May 2010

Mid-Eclipse Brightening Mid-Point

Band	RJD	UT Date
V	55,405	27 July 2010
B	55,399	21 July 2010
U	55,414	05 August 2010

Mid-Eclipse Brightening End

Band	RJD	UT Date
V	55,485	15 October 2010
B	55,479	09 October 2010
U	55,494	24 October 2010

Phil Bennett has some comments and suggestions for the summer observing, see the following page.

Summer Observing Prospects for epsilon Aurigae
Phil Bennett

The sun will be at conjunction on June 8 (+21 04'). The critical latitude is 55 15'N for a sun altitude of -12 deg at local midnight on June 8 and the altitude of epsilon Aurigae (at 55 15' N) is 9 deg.

Given Petr's comments about the difficulty of doing photometry at high airmass, I think we should slightly revise the proposed observing strategy. Basically, we have a trade off between observing at high airmass (low altitude) and in bright twilight sky. Although the problems of photometry at high airmass are probably surmountable (astronomers working, e.g., in the thermal IR or the millimeter radio continuum have to contend with a bright and highly variable sky all the time), it is not typically a problem that optical astronomers contend with and are prepared to handle. I think it is probably better to push against the bright sky limit rather than the airmass one. Most observers can probably correct for a somewhat brighter twilight sky, particularly for those with a small field of view (and therefore fewer sky photons) by sky subtraction with adding too much noise.

It is clear that we do not want to observe epsilon Aurigae at any elevation lower than 9 deg. We can observe at higher elevations (at local midnight on June 8) by going to higher observer latitudes, but at the cost of bringing the sun closer to the horizon and brightening the twilight sky. A sun elevation of -6 deg (onset of civil twilight) is probably brighter than feasible for photometry without a special setup. So I would suggest we aim for a maximum sun elevation at midnight of -8 deg, which implies an observer latitude of 59 15' N. So the latitude band for observing epsilon Aurigae in a reasonably dark (but still twilight) sky is about 55-59 deg N. To reiterate: for observers south of 55 N, epsilon Aurigae will not rise during the night, or be too low in the sky for useful observations, while observers north of 59 N will have a bright twilight sky at local midnight.

Most of the populated areas are in northern Europe and northwestern Canada. Here is a short list of the more populated areas between 55 and 59 N, eastwards from the International Date Line:

United States: Southeastern Alaska, including Haines, Juneau, Ketchikan
Canada: Northern British Columbia (BC), including the Terrace-Hazelton-Smithers corridor, Peace River country of northeastern BC: Chetwynd-Fort St John, Dawson Creek, and the adjoining area in Alberta: Grande Prairie, High Prairie, Peace River Churchill, Manitoba
Europe/Asia: Extreme northern Ireland, north of Derry Scotland, Denmark, including Copenhagen, Sweden, south of Stockholm, Lithuania, Latvia, and Estonia a wide swatch of Russia and Siberia, including Moscow, Nizny Novgorod, Kazan, Chelyabinsk, Omsk, Novosibirsk

Obtaining a continuous mid-summer sequence of epsilon Aurigae photometry is going to be a difficult task and will require advance preparation, especially given the difficulty of obtain photometry at high airmass and/or twilight conditions. This is especially so considering none of these areas have particularly good summer weather prospects.

Phil

Note: *While Phil Bennett is being careful in his assessment of low altitude photometry challenges, the reader should not be discouraged from making the effort to collect valid data during this extremely rare mid-eclipse opportunity.*

This observing season of epsilon Aurigae ended for me the night of 24/25 April as the battle between twilight and my observatory wall became a lost cause. I am planning to start my observing again in mid to late July.

Good luck to all of you and please post any information, questions, comments and data to the Campaign List!

Jeff Hopkins, Editor
Hopkins Phoenix Observatory
phxjeff@hposoft.com

IMPORTANT NOTICES

Data Copyright

Data in this and other Newsletters and on the Campaign web site are provided for viewing and downloading. Use of any data in any papers requires approval from the observer(s). Please contact me at phxjeff@hposoft.com or the specific observer(s) for more information and permission.

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Standard Deviation versus Standard Error

There has been some discussion about whether to use standard deviation or standard error when reporting photometric observational data.

It is preferred that photometric observations include a standard deviation of at least three data points for each observed band for the session. The purpose is not to report an error, which is actually not what is important, but to give an idea of the quality of the observation and an idea of the data spread. That is all it does and all that it needs to do.

Standard error is the standard deviation divided by the square root of the number of samples. By have a large number of samples the standard can be much less than the standard deviation, yet the data spread can be the same. These means that while the standard error may look very good and much better than someone else's standard deviation, it is very misleading.

Please submit photometric data as an average of at least three data points with a standard deviation of the data. Thank you!

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Yahoo Epsilon Aurigae Chat List Forum

We have start a chat list forum to enhance our communications. Lots of interesting things are happening and many time dependent. The Epsilon Aurigae Chat list will allow near instantaneous communication with everyone who is interested in the project. It's free and to sign up just go to

http://tech.groups.yahoo.com/EpsilonAurigae/

and sign up.

Photometry Report

by
Jeffrey Hopkins
Hopkins Phoenix Observatory

Previous Newsletters listed ingress data and this Newsletter will list data beginning approximately just before second contact or RJD = 5180. This will help reduce the amount of data in the Newsletters. Data to date is planned to be made available as an on-line archive this summer (2010).

Plot Observer Key

GHO - Golden Hill Observatory, Richard Miles, Dorset, England
JBO - Jim Beckmann Observatory, Paul J. Beckmann, Mendota Heights, MN USA
SGGO - S. Giovanni Gatano al Observatory, Tiziano Colombo, Pisa, Italy
DES - Des Loughney, Edinburgh, Scotland, UK
TP - Tom Pearson, Virginia Beach, Virginia USA
HGL - Hans-Goran Lindberg, Skultuna, Sweden
GVO - Grand View Observatory, Brian E. McCandless, Elkton, MD USA
HPO - Hopkins Phoenix Observatory , Jeff Hopkins, Phoenix, Arizona USA
FJM - Frank J. Melillo, Holtsville, NY USA
RES - Stencel/Long, University of Denver, Denver, Colorado USA
LO - Lindarberg Observatory, Snaevarr Gudmundsson, Hafnarfjordur, Iceland
GS - Gerard Samolyk, Greenfield, Wisconsin, USA
TK - Thomas Karlsson, Varberg Observatory, Varberg, Sweden
EAO - Elizabeth Observatory of Athens, Iakovos Marios Strikis**,** Haldrf (Athens) Greece
RLO - Roosbeek Lake Observatory, Hubert Hautecler, Boutersem Brabant, Belgium
JESO - Jalna Education Society Observatory, Dr. Mukund Kurtadikar, Maharashtra, India
EGO - East Greenwood Observatory, Charles Hofferber, East Grand Forks, Minnesota, USA
WWC- Warren Wilson College
MSO - Arvind Paranjpye, MVS IUCAA Observatory

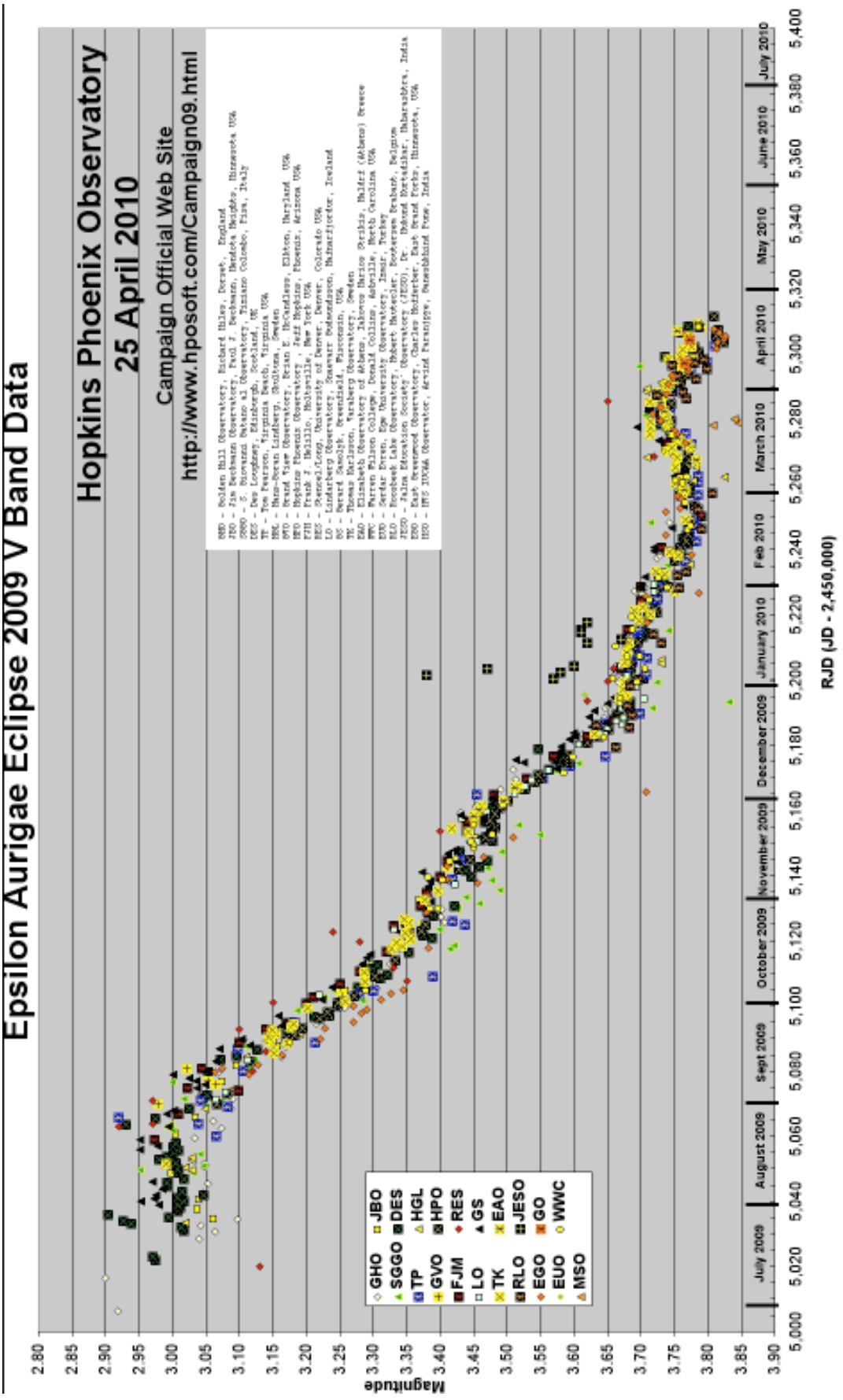
Note: Full resolution images of the following plots can be seen at:

V Band Plot:
http://www.hposoft.com/Plots09/VFall09.jpg

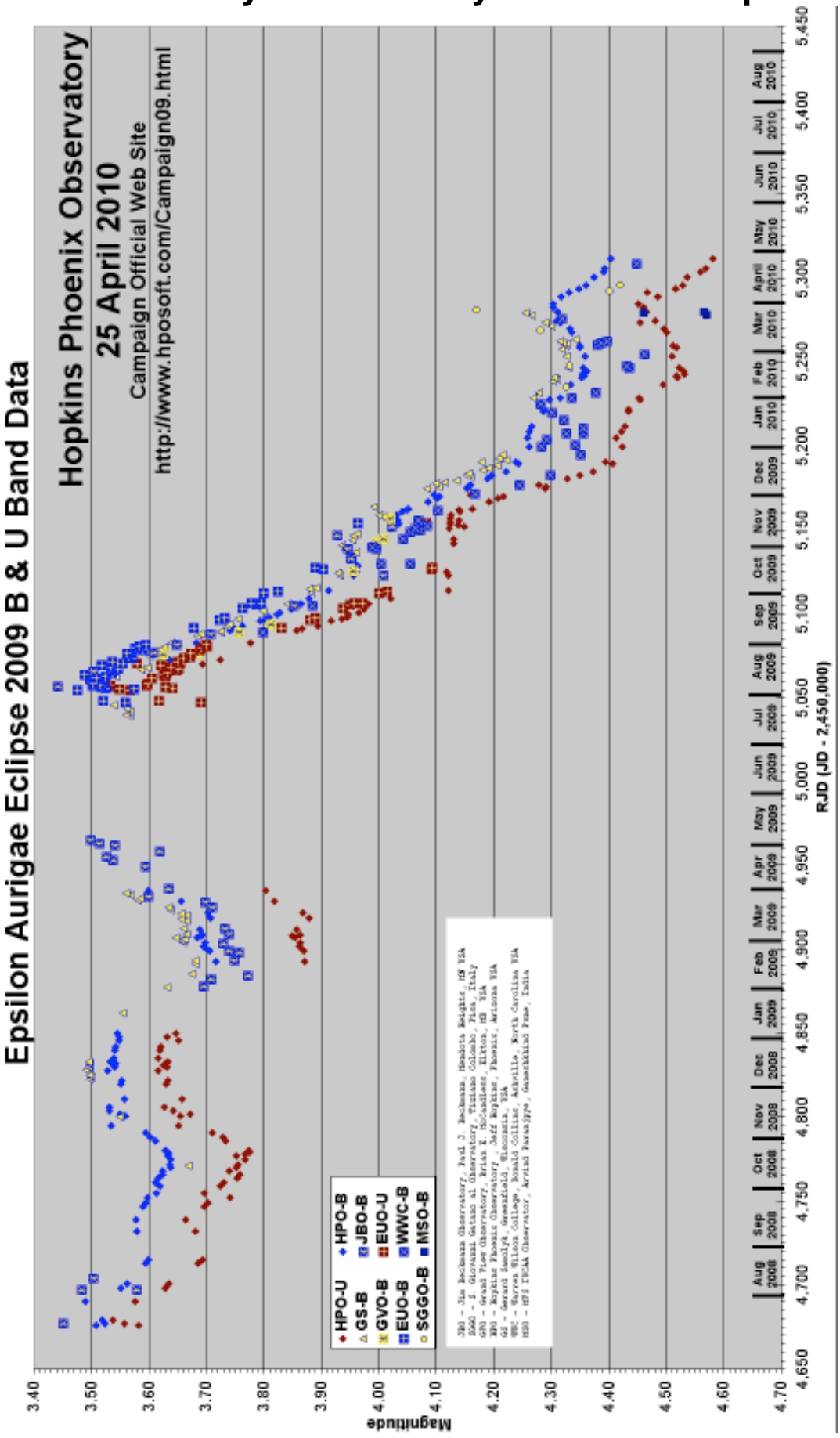
UB Band Plots:
http://www.hposoft.com/Plots09/UBFall09.jpg

RI Band Plots:
http://www.hposoft.com/Plots09/RIFall09.jpg

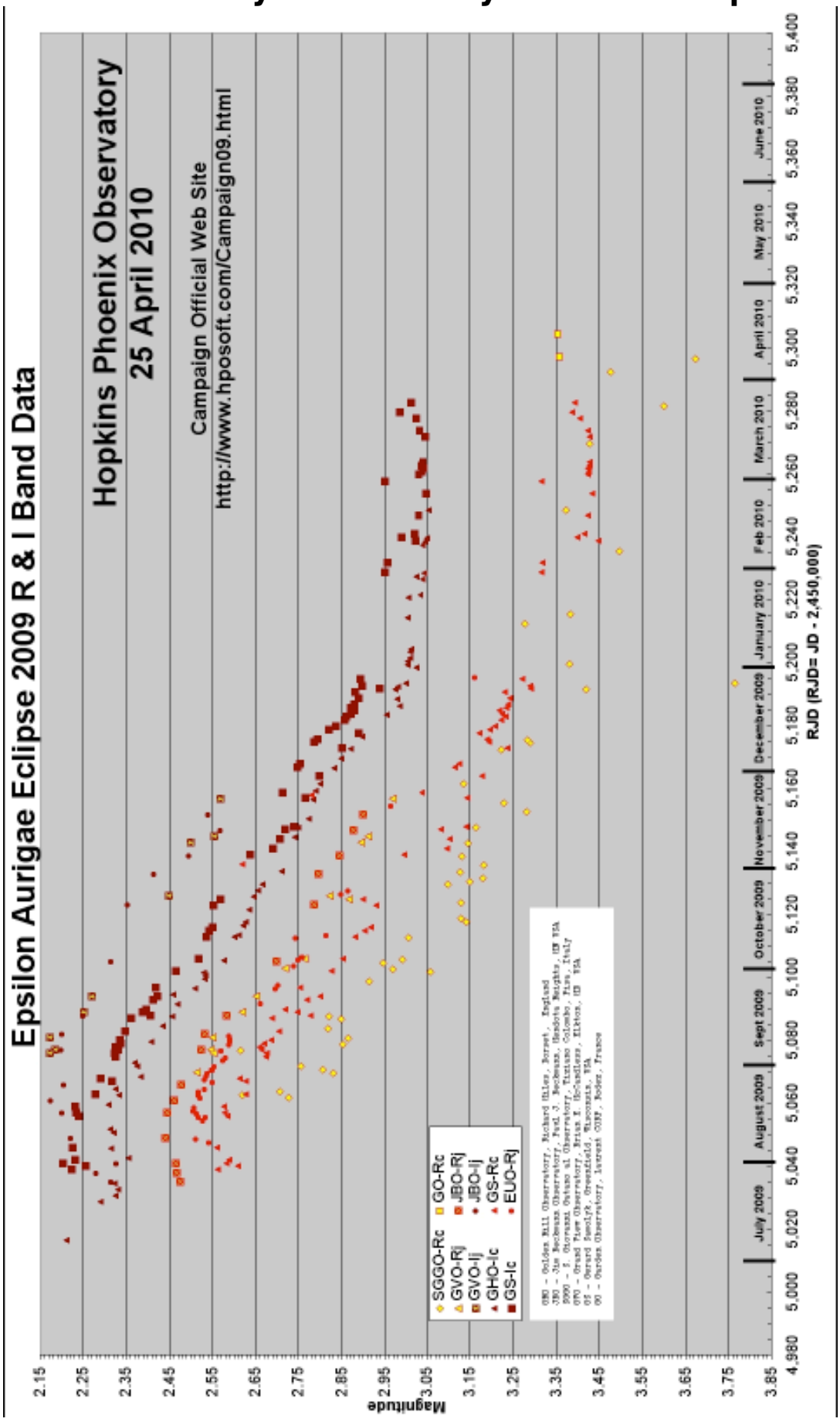
Ingress and Totality Photometry V Data Composite Plot



Ingress and Totality Photometry UB Data Composite Plot



Ingress and Totality Photometry RI Data Composite Plot



Photometric Observers

Robert E. Stencel, University of Denver (RES-UD)
Denver, Colorado USA
DSLR V Band Data, Comparison Star eta Aurigae assumed to be V-3.17

RJD	V	SD
5193.61	3.62	0.07
5199.56	3.65	0.14
5203.59	3.66	0.03
5250.72	3.79	
5268.68	3.72	0.02
5258.65	3.65	0.05

RJD = JD - 2,450,000

Dr. Mukund Kurtadikar, Jalna Education Society Observatory (JESO)
Maharashtra, India
Team:
1. Dr.M.L. Kurtadikar, J.E.S.College, Jalna 431 203, India.
2. A.N. Ardad, Shiv Chatrapati College, Aurangabad 431 003, India.
3. Dr.P.M. Kokne, Barwale College , Jalna 431 203.
4. A.D. Dashrath, High Tech Polytechnic and Eng. College, Aurangabad.
5. S.K. Pandit, Barwale College , Jalna 431 203.

Postgraduate Department of Physics
Jalna Education Society's
R.G.B.Arts , S.B.Lakhotia Commerce & R.Bezonji Science College
Optec SSP-3

Date	RJD	V	SD
14/15 January 2010	5211.3616	3.62	0.02
15/16 January 2010	5212.5871	3.67	0.02
17/18 January 2010	5214.6358	3.61	0.01
18/19 January 2010	5215.5664	3.61	0.02
20/21 January 2010	5217.6194	3.62	0.01

RJD = JD - 2,450,000

Laurent Corp, Garden Observatory (GO),
Rodez, France
SBIG ST7 Cooled CCD - temp -20°C
50mm f/2.2 non diaphragmé
Comparizons: 3.261 / 2.949

Date	UT	RJD	V	SD	Rc	SD
10/11 April 2010	19.30	5297.3125	3.765	0.003	3.359	0.002
17/18 April 2010	19:45	5304.3233	3.773	0.001	3.355	0.003

RJD = JD - 2,450,000

Snaevarr Gudmundsson, Lindarberg Observatory (LO)
Hafnarfjordur, Iceland
Location (WGS 84) Latitude: +64d 03.740 Longitude: 21d 55.297
Optec SSP-3 on 12" Meade LX 200

Double Date	RJD	V	#	SD	X
14/15 December 2009	5180.4242	3.608	3	0.012	1.60
17/18 December 2009	5183.4477	3.647	3	0.047	1.12
17/18 December 2009	5183.5820	3.640	3	0.000	1.08
18/19 December 2009	5184.5133	3.630	3	0.006	1.07
18/19 December 2009	5184.5762	3.630	3	0.006	1.80
19/20 December 2009	5185.5838	3.650	3	0.030	1.09
20/21 December 2009	5186.5185	3.673	3	0.043	1.07
21/22 December 2009	5187.5361	3.664	3	0.011	1.07
22/23 December 2009	5188.5052	3.675	3	0.017	1.07
25/26 December 2009	5191.4865	3.672	3	0.008	1.07
26/27 December 2009	5192.5244	3.677	3	0.006	1.07
27/28 December 2009	5193.3420	3.670	3	0.000	1.27
28/29 December 2009	5194.4718	3.705	3	0.049	1.07
29/30 December 2009	5195.5133	3.680	3	0.007	1.07
01/02 January 2010	5198.4427	3.685	3	0.006	1.08
02/03 January 2010	5199.3332	3.693	3	0.006	1.25
04/05 January 2010	5201.5401	3.680	3	0.000	1.09
07/08 January 2010	5204.4585	3.670	3	0.008	1.07
11/12 January 2010	5208.3418	3.685	3	0.005	1.17
30/31 January 2010	5227.3459	3.720	3	0.016	1.10
01/02 February 2010	5229.3782	3.720	3	0.000	1.07
03/04 February 2010	5231.4277	3.725	3	0.006	1.07
05/06 February 2010	5233.3454	3.733	3	0.006	1.08

RJD = JD - 2,450,000

Richard Miles, Golden Hill Observatory (GHO)
Stourton Caundle, Dorset, England
Latitude/Longitude/Altitude (ASL): West 2.405 deg, North 50.931 deg
Time Zone: GMT = 0 hours
Telescope: 0.06-m Refractor (Takahashi FS60C)
Filters: Johnson V=4.71 for lambda Aurigae, Cousins Ic= 3.99 for HD32655
Detector: CCD Camera (Type: Starlight Xpress SXV-H9)
Note: as of 01 January 2010 all previous data has been corrected. The following data is an updated list of the correct data.

Observation Date	RJD	V mag	SD	Ic	SD
17/18 December 2009	5183.333	3.613	0.008	2.954	0.009
20/21 December 2009	5186.241	3.644	0.012	2.984	0.012
22/23 December 2009	5188.372	3.645	0.014	2.978	0.009
25/26 December 2009	5191.328	3.646	0.012	2.975	0.016
26/27 December 2009	5192.327	3.651	0.006	2.980	0.006
27/28 December 2009	5193.390	3.664	0.004	2.999	0.006
01/02 January 2010	5198.361	3.674	0.007	3.024	0.008
02/03 January 2010	5199.2320	3.666	0.006	3.003	0.005
03/04 January 2010	5200.2770	3.671	0.006	3.004	0.006
04/05 January 2010	5201.2850	3.659	0.004	3.009	0.006

Richard Miles, Golden Hill Observatory (GHO) continued

Observation Date	RJD	V mag	SD	Ic	SD
06/07 January 2010	5203.4090	3.660	0.003	3.010	0.006
07/08 January 2010	5204.2550	3.663	0.006	3.011	0.005
17/18 January 2010	5214.2600	3.681	0.004	3.003	0.008
23/24 January 2010	5220.5460	3.690	0.007	3.023	0.008
24/25 January 2010	5221.2840	3.688	0.006	3.034	0.007
29/30 January 2010	5226.3570	3.701	0.003	3.039	0.005
30/31 January 2010	5227.2830	3.690	0.004	3.024	0.005
31 Jan/01 Feb 2010	5228.3040	3.707	0.003	3.043	0.004
09/10 February 2010	5237.3050	3.724	0.003	3.039	0.007
10/11 February 2019	5238.3110	3.728	0.004	3.045	0.002
11/12 February 2010	5239.3370	3.726	0.004	3.049	0.004
20/21 February 2010	5248.3200	3.743	0.004	3.054	0.003

RJD = JD - 2,450,000

Iakovos Marios Stkis, Elizabeth Observatory of Athens (EAO)
Haldrf (Athens) Greece
ATIC Monochrome CCD Camera with 55 mm lens at f 6.3, 30 images, 9 second exposures

UT Date	RJD	V	SD
30/31 January 2010	5227.2375	3.751	0.003
01/02 March 2010	5257.4583	3.763	0.002
02/03 March 2010	5258.4285	3.765	0.002
04/05 March 2010	5260.3993	3.760	0.004
05/06 March 2010	5261.3958	3.761	0.004
11/12 March 2010	5267.4028	3.782	0.004
15/16 March 2010	5271.3750	3.775	0.004
16/17 March 2010	5272.3750	3.769	0.004
17/18 March 2010	5273.3819	3.759	0.004
18/19 March 2010	5274.3924	3.755	0.004
22/23 March 2010	5278.3854	3.740	0.003
23/24 March 2010	5279.4167	3.736	0.003
25/26 March 2010	5281.3023	3.739	0.004
26/27 March 2010	5282.4201	3.734	0.003
28/29 March 2010	5284.3438	3.730	0.003
29/30 March 2010	5285.3958	3.729	0.005
31/01 March 2010	5287.3750	3.733	0.003
02/03 April 2010	5289.3438	3.738	0.004
03/04 April 2010	5290.3474	3.740	0.003
04/05 April 2010	5291.3451	3.742	0.003
05/06 April 2010	5292.3653	3.749	0.003
07/08 April 2010	5294.3264	3.755	0.003
08/09 April 2010	5295.3313	3.766	0.003
09/10 April 2010	5296.3438	3.771	0.003
11/12 April 2010	5298.3333	3.779	0.003
20/21 April 2010	5307.2646	3.754	0.003

RJD = JD - 2,450,000

Hans-Goran Lindberg, Kaerrbo Observatory (KO)
Skultuna, Sweden
Observation using: (50 mm fl camera lens, HX-516 B/W Camera, y2-filter
Exp 30*3 sec, .fits images stacked, TeleAuto software, with Superstar)
Comp star lambda Aurigae at V= 4.71

RJD	CV
5242.2576	3.771
5238.2083	3.770
5235.3729	3.773
5206.1854	3.730
5205.1806	3.731
5154.6389	3.481
5249.2321	3.714
5251.2187	3.778
5261.2514	3.779
5262.2708	3.825
5265.2431	3.783
5266.2354	3.769
5268.2347	3.709
5269.2917	3.742
5270.2347	3.741
5271.2500	3.739
5272.2778	3.762
5276.4583	3.737
5277.3056	3.734
5288.4931	3.708
5289.3333	3.709
5290.3750	3.733
5291.3333	3.731
5296.3264	3.747
5297.3472	3.749
5598.3542	3.753
5299.3569	3.756
5300.3653	3.765
5301.3701	3.771
5303.3611	3.813
5504.3681	3.812
5305.3694	3.818

RJD = JD - 2,450,000

Hubert Hautecler, Roosbeek Lake Observatory (RLO)
Boutersem , Brabant, Belgium
DSLR Camera - Canon 400D w/85 mm lens
Five sets of 10 images.

UT Date	RJD	V Mag	SD
13/14 December 2009	5179.3521	3.662	0.005
19/20 December 2009	5185.2347	3.683	0.028
21/22 December 2009	5186.2271	3.633	0.023
23/24 December 2009	5189.2486	3.687	0.028
26/27 December 2009	5192.2340	3.680	0.016
01/02 January 2010	5198.2493	3.684	0.020
03/04 January 2010	5200.2257	3.696	0.031
14/15 January 2010	5211.4257	3.730	0.022
17/18 January 2010	5214.2354	3.719	0.009
31 Jan/01 Feb 2010	5228.4082	3.757	0.008
04/05 February 2010	5232.2576	3.755	0.045
05/06 February 2010	5233.3000	3.768	0.016
18/19 February 2010	5246.2917	3.790	0.008
24/25 February 2010	5252.3063	3.785	0.027
01/02 March 2010	5257.3014	3.806	0.006
30/31 March 2010	5286.3646	3.768	0.019
31 Mar/01 Apr 2010	5287.3674	3.734	0.074
01/02 April 2010	5288.3333	3.762	0.023
05/06 April 2010	5292.3194	3.783	0.015
06/07 April 2010	5293.3333	3.754	0.039
08/09 April 2010	5295.3313	3.798	0.011
09/10 April 2010	5296.3736	3.746	0.030
10/11 April 2010	5297.3507	3.780	0.034
11/12 April 2010	5298.3299	3.795	0.009
20/21 April 2010	5307.3507	3.816	0.025
21/22 April 2010	5308.3465	3.787	0.019

RJD = JD – 2,450,000

Dr. Tiziano Colombo . S. Giovanni, Gatano al Observatory (SGGO)
Pisa, Italy
CCD Camera: Mead DSI Pro, 2 sec exposures, 20 images stacked , F 2.8

RJD	B Mag	SD	V Mag	SD	Rc Mag	SD
5191.3007			3.717	0.005	3.419	0.104
5193.2882			3.832	0.017	3.765	0.039
5199.3856			3.724	0.020	3.380	0.032
5212.2708			3.672	0.006	3.277	0.026
5215.2326			3.741	0.012	3.382	0.105
5235.2674	4.327	0.018	3.740	0.081	3.497	0.006
5248.2604	4.333	0.040	3.715	0.010	3.372	0.017
5269.3542	4.282	0.002	3.772	0.080	3.427	0.080
5281.2917	4.170	0.132	3.706	0.032	3.601	0.056
5292.3146	4.402	0.036	3.783	0.001	3.477	0.096
5296.3368	4.420	0.013	3.697	0.032	3.674	0.102

RJD = JD – 2,450,000

Des Loughney
Edinburgh, Scotland, UK
Canon DSLR . 200 ISO . f4 . 85 mm lens. Exposure 5 seconds
Eta Aurigae used as the comparison star at V = 3.18
Des uses a remote switch to activate the Canon 200 Digital Single Lens Reflex (DSLR) camera with 85 mm lens. He takes between 10 and 20 exposures stacks and processes 5 sets of them with AIP4WIN.

RJD	Date UT	V Mag	SD
5185.421	19/20 December 2009	3.647	0.008
5188.513	22/23 December 2009	3.675	0.005
5189.394	23/24 December 2009	3.664	0.009
5193.3917	27/28 December 2009	3.684	0.003
5200.383	03/04 January 2010	3.704	0.005
5202.513	05/06 January 2010	3.680	0.007
5203.2939	06/07 January 2010	3.685	0.010
5204.523	07/08 January 2010	3.679	0.004
5213.388	16/17 January 2010	3.703	0.003
5214.29	17/18 January 2010	3.707	0.005
5215.358	18/19 January 2010	3.702	0.005
5219.283	22/23 January 2010	3.711	0.007
5227.252	30/31 January 2010	3.722	0.004
5228.377	31 Jan/01 Feb 2010	3.721	0.013
5230.415	02/03 February 2010	3.734	0.004
5238.392	10/11 February 2010	3.761	0.019
5243.44	15/16 February 2010	3.763	0.006
5244.298	16/17 February 2010	3.768	0.01
5248.367	20/21 February 2010	3.775	0.004
5250.304	22/23 February 2010	3.790	0.011
5257.425	01/02 March 2010	3.772	0.010
5260.435	04/05 March 2010	3.760	0.021
5265.491	09/10 March 2010	3.763	0.018
5266.3271	10/11 March 2010	3.765	0.007
5271.373	15/16 March 2010	3.737	0.017
5276.346	20/21 March 2010	3.744	0.004
5278.398	22/23 March 2010	3.728	0.015
5283.4041	27/28 March 2010	3.713	0.012
5288.335	01/02 April 2010	3.729	0.004
5291.363	04/05 April 2010	3.756	0.020
5294.367	07/08 April 2010	3.766	0.009
5297.427	10/11 April 2010	3.750	0.006
5299.369	12/13 April 2010	3.736	0.016
5302.36	15/16 April 2010	3.780	0.016

RJD = JD - 2,450,000

Tom Pearson
Virginia Beach, Virginia USA
DSLR Canon 20 D, 400 ISO, f5.6, 58 mm lens/70 mm FL,
Exposure 5 seconds 30 Images Stacked

RJD	UT Date	UT	V Mag	SD	X
5182.6153	16/17 December 2009	02:46	3.637	0.007	1.0160
5186.6090	20/21 December 2009	02:37	3.646	0.006	1.0134
5189.6417	23/24 December 2009	03:24	3.698	0.015	1.0128
5193.6382	27/28 December 2009	03:19	3.672	0.004	1.0169
5194.6000	28/29 December 2009	02:24	3.678	0.005	1.0090
5199.6396	02/03 January 2010	03:21	3.690	0.024	1.0322
5201.6784	04/05 January 2010	04:14	3.708	0.003	1.1030
5203.5743	06/07 January 2010	01:47	3.679	0.007	1.0093
5205.6104	08/09 January 2010	02:39	3.688	0.006	1.0204
5206.6535	09/10 January 2010	03:41	3.709	0.015	1.0830
5207.6611	10/11 January 2010	03:52	3.699	0.003	1.0560
5209.5549	12/13 January 2010	01:19	3.690	0.010	1.0100
5210.5556	13/14 January 2010	01:20	3.689	0.005	1.0092
5212.5500	15/16 January 2010	01:12	3.694	0.011	1.0092
5215.5410	18/19 January 2010	00:59	3.696	0.004	1.0094
5222.5535	25/26 January 2010	01:17	3.714	0.009	1.0137
5224.6660	27/28 January 2910	03:59	3.725	0.005	1.2789
5228.6556	31 Jan/01 Feb 2010	03:44	3.733	0.006	1.2789
5236.6306	07/08 February 2010	03:06	3.766	0.009	1.2550
5239.5326	11/12 February 2010	00:47	3.741	0.003	1.0348
5242.5021	14/15 February 2010	00:03	3.783	0.009	1.0155
5244.5576	16/17 February 2010	01:23	3.773	0.005	1.1000
5247.6257	19/20 February 2010	03:01	3.783	0.007	1.3985
5251.5542	23/24 February 2010	01:18	3.784	0.009	1.1398
5256.6819	28 Feb/01 Mar 2010	04:22	3.785	0.008	2.2955
5260.5972	04/05 March 2010	02:20	3.785	0.007	1.4432
5262.5861	06/07 March 2010	01:38	3.785	0.006	1.3068
5272.5160	16/17 March 2010	00:23	3.776	0.006	1.0853
5275.6007	19/20 March 2010	02:25	3.767	0.004	1.4627
5279.5466	23/24 March 2010	01:07	3.718	0.009	1.2324
5283.5792	27/28 March 2010	01:54	3.744	0.013	1.4649
5288.5240	01/02 April 2010	00:49	3.747	0.012	1.2847
5295.5715	09/10 April 2010	01:43	3.774	0.007	1.6979
5297.5410	10/11 April 2010	00:59	3.798	0.004	1.4651
5298.5187	11/12 April 2010	00:27	3.778	0.013	1.3453
5302.5583	15/16 April 2010	01:24	3.811	0.017	1.7306

RJD = JD - 2,450,000

Thomas Karlsson, Varberg Observatory (VO)
Varberg, Sweden
Observation using: Canon 450D 6 second exposures EF 35 - 80 mm
Comparison star is lambda Aurigae V= 4.705

Date	RJD	V	SD
17/18 December 2009	5183.3028	3.631	0.016
28/29 December 2009	5194.2215	3.668	0.010
29/30 December 2009	5165.2771	3.679	0.019
30/31 December 2009	5196.2028	3.676	0.010
31/01 Dec/Jan 09/10	5197.2278	3.675	0.009
02/03 January 2010	5199.2069	3.676	0.010
08/09 January 2010	5205.2237	3.676	0.008
10/11 January 2010	5207.3646	3.679	0.023
11/12 January 2010	5208.2389	3.679	0.008
14/15 January 2010	5211.3410	3.682	0.002
21/22 January 2010	5218.3340	3.697	0.019
23/24 January 2010	5220.2569	3.715	0.025
24/25 January 2010	5221.2257	3.690	0.012
25/26 January 2010	5222.2417	3.702	0.015
04/05 February 2010	5232.3451	3.736	0.025
05/06 February 2010	5233.2444	3.723	0.024
10/11 February 2010	5238.2681	3.756	0.004
11/12 February 2010	5239.2514	3.742	0.017
21/22 February 2010	5249.2486	3.766	0.140
02/03 March 2010	5258.2750	3.767	0.008
04/05 March 2010	5260.3403	3.752	0.009
09/10 March 2010	5265.2776	3.752	0.002
12/13 March 2010	5268.3042	3.755	0.017
14/15 March 2010	5270.3083	3.738	0.010
15/16 March 2010	5271.2917	3.747	0.005
19/20 March 2010	5275.3312	3.713	0.005
21/22 March 2010	5277.3250	3.715	0.016
23/24 March 2010	5279.3042	3.714	0.005
29/30 March 2010	5285.3104	3.713	0.008
01/02 April 2010	5288.3576	3.725	0.006
09/10 April 2010	5296.3410	3.751	0.006
11/12 April 2010	5298.3597	3.741	0.009
12/13 April 2010	5299.3486	3.759	0.010
14/15 April 2010	5301.3611	3.762	0.015
15/16 April 2010	5302.3611	3.776	0.005
18/19 April 2010	5305.4111	3.773	0.005
21/22 April 2010	5308.3806	3.791	0.019
22/23 April 2010	5309.3764	3.785	0.004

RJD = JD - 2,450,000

Jeff Hopkins, Hopkins Phoenix Observatory (HPO)
Phoenix, Arizona USA
Latitude: 33.5017 North, Longitude: 112.2228 West, Altitude: 1097 feet ASL
Time Zone: MST (UT -7) Telescope: C-8 8" SCT, Filter Set: UBV Standard
Detector: 1P21 PMT in Photon Counting Mode, Differential Photometry
lambda Aurigae as Comparison star: V= 4.71; B= 5.34; U= 5.46
Data transformed and corrected for nightly extinction.

UT Date	RJD	U	SD	B	SD	V	SD
14/15 December 2009	5180.7329	4.3274	0.0039	4.1895	0.0068	3.6197	0.0057
16/17 December 2009	5182.7232	4.3501	0.0064	4.1973	0.0064	3.6343	0.0058
18/19 December 2009	5184.7232	4.3720	0.0029	4.2220	0.0035	3.6520	0.0056
23/24 December 2009	5189.7253	4.4068	0.0094	4.2436	0.0011	3.6781	0.0023
24/25/December 2009	5190.7183	4.3941	0.0110	4.2384	0.0032	3.6701	0.0091
02/03 January 2010	5199.6753	4.4235	0.0097	4.2616	0.0040	3.6912	0.0026
07/08 January 2010	5204.6815	4.4122	0.0077	4.2577	0.0061	3.6859	0.0017
11/12 January 2010	5208.6774	4.4221	0.0082	4.2615	0.0026	3.6871	0.0045
14/15 January 2010	5211.6739	4.4283	0.0049	4.2659	0.0037	3.6959	0.0009
23/24 January 2010	5220.6836	4.4342	0.0013	4.2867	0.0017	3.7236	0.0016
24/25 January 2010	5221.6468	4.4343	0.0022	4.2883	0.0003	3.7209	0.0020
30/31 January 2010	5227.6343	4.4544	0.0244	4.2977	0.0026	3.7236	0.0053
31 Jan/01 Feb 2010	5228.6531	4.4529	0.0060	4.3150	0.0118	3.7418	0.0144
08/09 February 2010	5236.6329	4.4953	0.0063	4.3337	0.0058	3.7504	0.0053
12/13 February 2010	5240.6822	4.5199	0.0058	4.3522	0.0069	3.7587	0.0053
13/14 February 2010	5241.6329	4.5185	0.0058	4.3566	0.0086	3.7709	0.0103
14/15 February 2010	5242.6315	4.5322	0.0093	4.3549	0.0043	3.7686	0.0027
16/17 February 2010	5244.6336	4.5298	0.0095	4.3620	0.0041	3.7702	0.0039
18/19 February 2010	5246.6051	4.5218	0.0052	4.3558	0.0044	3.7713	0.0029
25/26 February 2010	5253.6003	4.5103	0.0159	4.3594	0.0003	3.7801	0.0057
02/03 March 2010	5258.6183	4.5185	0.0081	4.3494	0.0105	3.7739	0.0052
03/04 March 2010	5259.6058	4.5119	0.0113	4.3491	0.0022	3.7691	0.0018
11/12 March 2010	5267.6267	4.5007	0.0055	4.3362	0.0011	3.7717	0.0050
13/14 March 2010	5269.6336	4.4969	0.0039	4.3327	0.0018	3.7710	0.0105
17/18 March 2010	5273.7114	4.4549	0.0122	4.3152	0.0048	3.7454	0.0022
18/19 March 2010	5274.6406	4.4803	0.0056	4.3099	0.0097	3.7489	0.0066
23/24 March 2010	5279.6315	4.4652	0.0128	4.3103	0.0035	3.7449	0.0021
26/27 March 2010	5282.6322	4.4606	0.0015	4.3039	0.0060	3.7290	0.0022
28/29 March 2010	5284.6322	4.4509	0.0063	4.3032	0.0069	3.7452	0.0121
01/02 April 2010	5288.6489	4.4860	0.0110	4.3178	0.0070	3.7453	0.0043
04/05 April 2010	5291.6447	4.4664	0.0343	4.3313	0.0048	3.7605	0.0077
06/07 April 2010	5293.6426	4.5165	0.0040	4.3475	0.0072	3.7705	0.0051
08/09 April 2010	5295.6406	4.5288	0.0096	4.3608	0.0161	3.7705	0.0042
13/14 April 2010	5300.6440	4.5363	0.0052	4.3736	0.0064	3.7865	0.0075
16/17 April 2010	5303.6350	4.5600	0.0085	4.3916	0.0094	3.8235	0.0246
18/19 April 2010	5305.6378	4.5680	0.0086	4.3929	0.0062	3.8114	0.0113
24/25 April 2010	5311.6350	4.5810	0.0132	4.4043	0.0011	3.8096	0.0062

RJD = JD - 2,450,000

Frank J. Melillo
Holtsville , NY USA
Lat:+ 40d 40' Long: 73 W Elevation: 100'
Instrument: Optec SSP-3, Telescope: C-8 8"
Gate Time: 10 Seconds

RJD	Date	UT	V Mag	#SD	
5182.6315	16/17 December 2009	03:15	3.62	12	0.017
5187.7218	21/22 December 2009	05:10	3.66	12	0.012
5193.6325	27/28 December 2009	03:10	3.67	12	0.012
5203.5209	06/07 January 2010	00:30	3.67	12	0.017
5207.6319	10/11 January 2010	03:10	3.68	12	0.016
5211.5226	14/15 January 2010	00:40	3.68	12	0.028
5215.5294	18/19 January 2010	00:40	3.68	12	0.036
5219.7585	22/23 January 2010	06:05	3.69	12	0.029
5224.5104	27/28 January 2919	00:15	3.70	12	0.014
5228.7049	31 Jan/01 Feb 2010	04:50	3.70	12	0.027
5240.7160	12/13 February 2010	05:10	3.73	8	0.022
5247.7135	19/20 February 2010	05:00	3.77	12	0.016
5256.6319	28 Feb/01 Mar 2010	03:05	3.76	12	0.022
5262.5299	06/07 March 2010	00:35	3.76	16	0.017
5272.6431	16/17 March 2010	03:23	3.74	12	1.800
5280.6494	24/25 March 2010	03:35	3.73	16	0.023
5288.6549	01/02 April 2010	03:45	3.74	16	0.029
5301.5674	14/15 April 2010	01:35	3.78	12	0.017
5306.6293	19/20 April 2010	13:05	3.76	12	0.024

RJD = JD - 2,450,000

Gerard Samolyk
Greenfield, Wisconsin . USA
Equipment, CCD Camera and Camera Lens , ST9XE + 50 mm lens
Comparison star lambda Aurigae; B= 5.329; V= 4.705; Rc= 4.340; Ic= 3.998

RJD	V	SD	B	SD	Rc	SD	Ic	SD
5181.6654	3.594	0.015	4.160	0.026	3.222	0.014	2.857	0.017
5182.6946	3.603	0.017	4.154	0.011	3.232	0.012	2.860	0.011
5183.6410	3.600	0.011	4.157	0.009	3.224	0.011	2.872	0.012
5184.63937					3.219	0.017	2.880	0.008
5185.6091	3.626	0.016	4.181	0.013	3.235	0.018	2.872	0.010
5186.6826	3.648	0.008	4.190	0.005	3.238	0.005	2.880	0.006
5188.6217	3.623	0.012	4.206	0.015	3.243	0.007	2.890	0.010
5190.6191	3.631	0.015	4.178	0.023	3.230	0.015	2.881	0.012
5191.7336	3.685	0.019	4.221	0.011	3.291	0.018	2.939	0.006
5192.6316	3.650	0.014	4.209	0.012	3.289	0.012	2.898	0.011
5194.6619	3.660	0.015	4.215	0.024	3.271	0.010	2.894	0.011
5228.52505	3.700	0.004	4.270	0.016	3.315	0.010	2.951	0.012
5231.53404	3.707	0.006	4.279	0.013	3.318	0.008	2.956	0.007
5238.60381	3.738	0.011	4.303	0.016	3.448	0.005	3.022	0.011
5239.69120	3.720	0.011	4.309	0.006	3.400	0.006	2.988	0.009
5240.72427	3.720	0.012	4.304	0.021	3.415	0.014	3.020	0.006
5246.58767	3.747	0.006	4.330	0.014	3.424	0.008	3.030	0.009
5253.56561	3.764	0.014	4.327	0.018	3.433	0.013	3.047	0.007
5257.5712	3.756	0.007	4.319	0.012	3.424	0.015	3.030	0.009
5259.5982	3.751	0.010	4.325	0.010	3.426	0.007	3.037	0.010
5260.5938	3.751	0.011	4.328	0.013	3.423	0.003	3.042	0.007
5261.5499	3.752	0.006	4.320	0.011	3.427	0.008	3.035	0.007
5262.5505	3.750	0.010	4.316	0.019	3.427	0.007	3.040	0.008
5263.5478	3.766	0.006	4.342	0.021	3.428	0.007	3.045	0.005
5271.5507	3.755	0.012	4.300	0.014	3.424	0.008	3.032	0.005
5273.5738	3.727	0.007	4.290	0.012	3.406	0.007	3.024	0.012
5277.6073	3.695	0.057	4.266	0.036	3.386	0.019	2.985	0.031
5279.5489	3.714	0.013	4.255	0.021	3.392	0.005	3.012	0.007
5282.5519	3.710	0.007	4.267	0.016	3.393	0.006	3.003	0.012

RJD = JD – 2,450,000

Donald Collins, Warren Wilson College (WWC)
Ashville, North Carolina USA
DSLR - Canon XT1, 35 mm lens , f 5.6
All data corrected for extinction and transformed

RJD	V mag	SD	B mag	SD	X
5088.924	3.176	0.013	3.799	0.036	1.0215
5104.938	3.289	0.024	3.885	0.028	1.0118
5129.923	3.385	0.030	4.003	0.091	1.1903
5129.926	3.397	0.025	4.055	0.086	1.2034
5138.692	3.404	0.019	3.996	0.034	1.2602
5139.681	3.383	0.028	3.988	0.018	1.2969
5144.661	3.414	0.029	4.042	0.031	1.3307
5148.694	3.451	0.020	4.054	0.044	1.1473
5149.673	3.451	0.038	4.071	0.053	1.2127
5150.697	3.446	0.019	4.064	0.022	1.1235
5152.698	3.478	0.021	4.084	0.022	1.1056
5155.663	3.451	0.017	4.068	0.026	1.1875
5161.684	3.495	0.013	4.103	0.035	1.0784
5171.726	3.585	0.023	4.168	0.031	1.0025
5176.664	3.599	0.013	4.245	0.021	1.0455
5182.627	3.645	0.030	4.298	0.036	1.0820
5194.571	3.669	0.035	4.351	0.063	1.1372
5199.654	3.695	0.015	4.283	0.020	1.0228
5200.681	3.658	0.028	4.342	0.043	1.0124
5203.599	3.706	0.014	4.292	0.017	1.0324
5207.516	3.680	0.012	4.355	0.021	1.2072
5207.62	3.699	0.016	4.327	0.010	1.0080
5210.633	3.663	0.026	4.356	0.062	1.0052
5215.646	3.688	0.019	4.322	0.033	1.0178
5219.629	3.686	0.024	4.301	0.031	1.0131
5224.661	3.713	0.019	4.282	0.021	1.0704
5228.583	3.740	0.016	4.336	0.023	1.0051
5231.629	3.727	0.023	4.377	0.064	1.0484
5246.526	3.771	0.023	4.436	0.031	1.0051
5247.513	3.775	0.012	4.431	0.028	1.0072
5254.5103	3.766	0.029	4.462	0.028	1.0050
5260.522	3.762	0.023	4.381	0.033	1.0162
5261.5183	3.752	0.024	4.387	0.036	1.0183
5262.5230	3.769	0.022	4.398	0.037	1.0253
5275.5543	3.746	0.017	4.318	0.029	1.1530
5308.5583	3.786	0.032	4.448	0.041	1.7305

RJD = JD – 2,450,000

Serdar Evren, Ege University Observatory (EUO)
Izmir, Turkey
High speed three channel Vilnius Photometer , 48 cm Cassegrain Telescope, F/13

RJD	U	B	V	Rj
55047.5646	3.690	3.559	2.992	2.541
55048.5707	3.618	3.521	2.975	2.511
55054.5696	3.567	3.475	2.922	2.527
55055.4819	3.548	3.575	3.011	2.534
55055.5783	3.641	3.525	2.976	2.518
55056.5600	3.629	3.517	2.977	2.513
55057.5079	3.533	3.515	2.973	2.508
55057.5636	3.596	3.502	2.975	2.505
55058.5419	3.598	3.504	2.967	2.507
55061.5825	3.606	3.508	2.977	2.522
55062.5621	3.629	3.525	2.981	2.518
55063.5397	3.626	3.488	2.986	2.517
55064.5397	3.632	3.536	2.995	2.532
55066.5432	3.649	3.539	3.011	2.550
55067.5606	3.651	3.547	3.010	2.531
55068.5470	3.637	3.534	2.999	2.536
55069.5406	3.621	3.518	2.991	2.537
55070.4762	3.579	3.555	3.010	2.550
55070.5739	3.655	3.545	3.015	2.548
55071.5745	3.650	3.536	3.023	2.555
55073.5171	3.661	3.572	3.031	2.574
55074.5225	3.672	3.564	3.032	2.580
55076.5503	3.674	3.562	3.041	2.570
55078.5766	3.688	3.590	3.041	2.589
55079.5233	3.692	3.576	3.047	2.590
55080.5435	3.701	3.584	3.049	2.590
55081.5082	3.700	3.594	3.058	2.589
55091.5552	3.831	3.678	3.133	2.661
55096.5137	3.880	3.722	3.173	2.696
55097.5518	3.889	3.732	3.178	2.703
55103.5189	3.938	3.763	3.207	2.740
55105.4965	3.950	3.788	3.232	2.749
55106.5042	3.958	3.779	3.233	2.760
55106.5192	3.972	3.795	3.239	2.758
55112.4393	4.000	3.800	3.223	2.743
55113.4183	4.014	3.825	3.276	2.814
55126.4251	4.092	3.903	3.332	2.849
55127.4214	4.093	3.889	3.347	2.865
55154.3479	4.082	3.963	3.434	2.964
55195.3645	4.375	4.156	3.616	3.161

RJD = JD - 2,450,000

Arvind Paranjpye, MVS IUCAA Observatory (MSO)
Inter-University Centre for Astronomy And Astrophysics Ganeshkhind Pune, India
Instrument: CCD ST7 with Lens: 50mm 1:1.8

Double Date	RJD	UT	V	#	SD	B	#	SD	Air Mass
22/23 March 2010	5278.1357	15:10	3.84	20	0.062	4.57	20	0.081	1.393
23/24 March 2010	5279.1079	14:27	3.808	20	0.029	4.461	20	0.062	1.535
24/25 March 2010	5280.1079	14:43	3.845	20	0.043	4.565	20	0.063	1.515

RJD = JD - 2,450,000

Charles Hofferber, East Greenwood Observatory (EGO)
East Grand Forks, Minnesota, USA
Nikon D100 DSLR , 50mm F1.4 stopped down, Sky Light filter to improve TC
8 sec exposures averaged, Lambda Epsilon V 4.705 / Eta Epsilon V 3.172 comparison.

Double Date	RJD	V	SD	#
03/04 Sep 2009	5078.7639	3.081	.081	3
04/05 Sep 2009	5079.7972	3.115	.025	4
05/06 Sep 2009	5080.8188	3.064	.030	6
06/07 Sep 2009	5081.8694	3.075	.040	4
09/10 Sep 2009	5084.8160	3.128	.009	3
14/15 Sep 2009	5089.7944	3.164	.030	4
17/18 Sep 2009	5092.9625	3.221		1
19/20 Sep 2009	5094.9125	3.228	.014	5
22/23 Sep 2009	5097.8146	3.271	.014	3
23/24 Sep 2009	5098.8584	3.282	.021	10
24/25 Sep 2009	5099.7985	3.291	.031	10
26/27 Sep 2009	5101.8670	3.270	.018	9
28/29 Sep 2009	5103.8976	3.312	.011	10
29/30 Sep 2009	5104.8646	3.327	.016	10
12/13 Oct 2009	5117.6721	3.345	.017	9
23/24 Oct 2009	5128.7327	3.383	.017	8
01/02 Nov 2009	5137.7883	3.380	.017	8
02/03 Nov 2009	5138.6837	3.456	.022	10
06/07 Nov 2009	5142.8476	3.410	.016	10
09/10 Nov 2009	5145.5940	3.411	.024	10
15/16 Nov 2009	5151.6771	3.465	.017	10
29/30 Nov 2009	5165.7458	3.509	.009	6
20/21 Jan 2010	5217.5431	3.708	.036	10
28/29 Jan 2010	5225.5558	3.709	.021	10
29/30 Jan 2010	5226.6560	3.708	.021	10
10/11 Feb 2010	5238.5673	3.787	.018	10
16/17 Feb 2010	5244.5577	3.776	.022	10
23/24 Feb 2010	5251.6625	3.737	.011	8
24/25 Feb 2010	5252.5814	3.737	.032	7
27/28 Feb 2010	5255.6285	3.759	.027	9
28/01 Feb/Mar 2010	5256.6535	3.760	.024	11
04/05 Mar 2010	5260.5922	3.754	.019	10
16/17 Mar 2010	5272.5712	3.756	.021	10
19/20 Mar 2010	5275.5698	3.767	.025	9
20/21 Mar 2010	5276.5946	3.755	.028	9
23/24 Mar 2010	5279.5982	3.750	.026	10
25/26 Mar 2010	5281.6280	3.717	.031	10
27/28 Mar 2010	5283.5835	3.729	.019	20

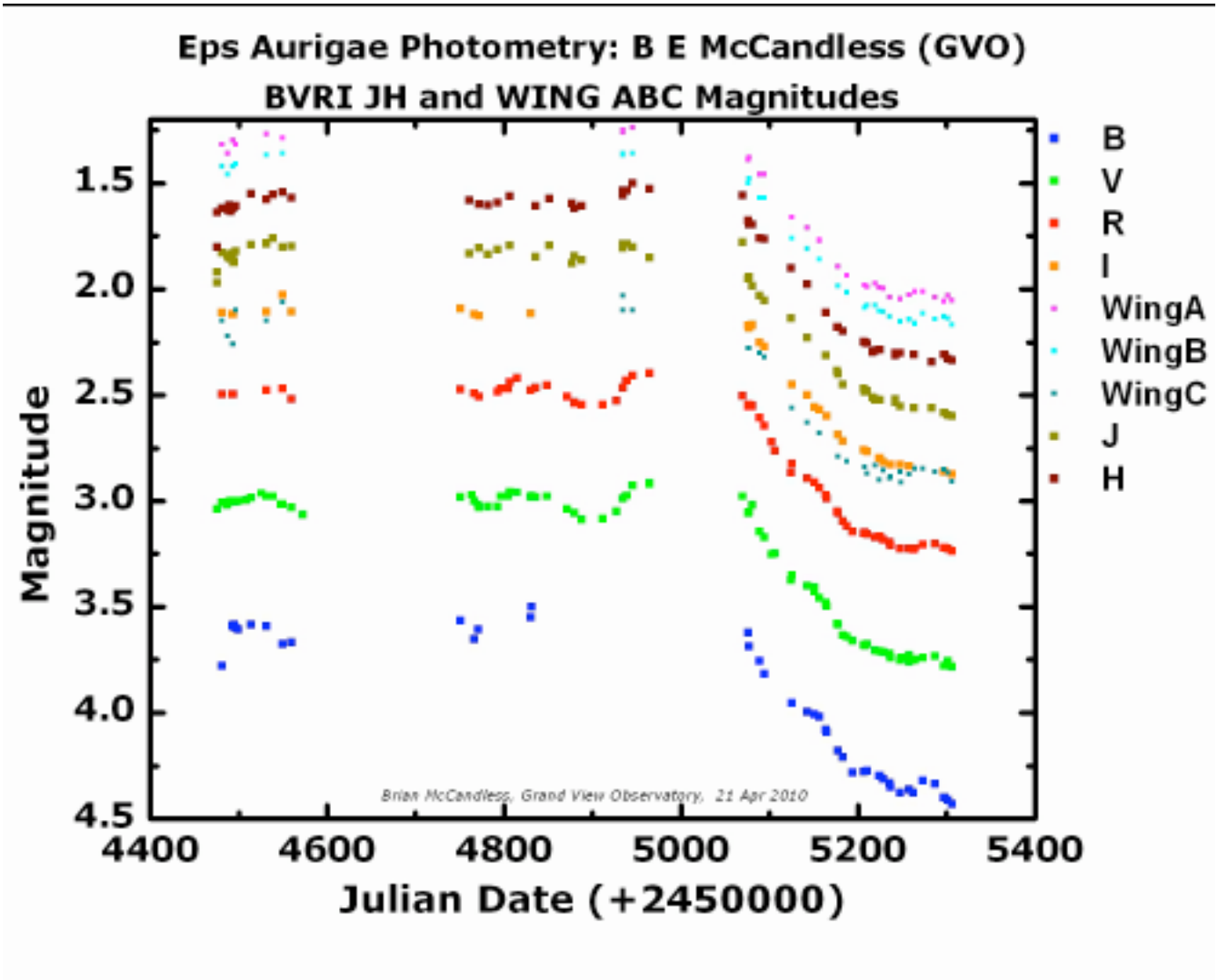
Charles Hofferber, East Greenwood Observatory (EGO) continued

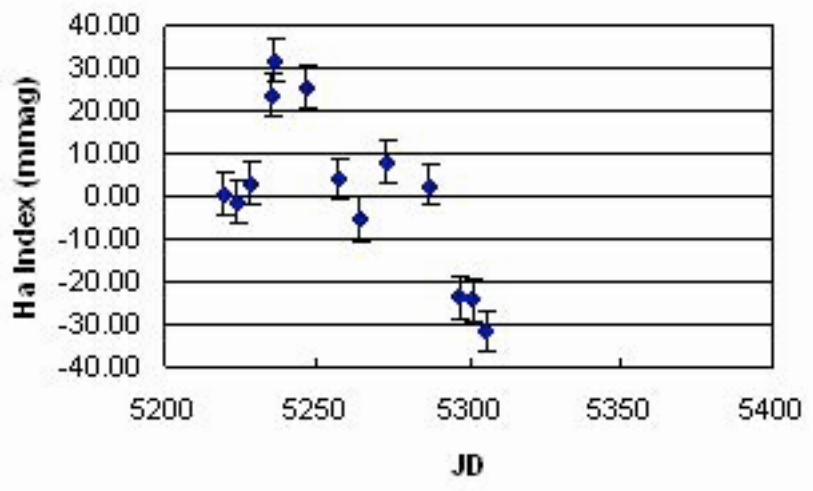
Double Date	RJD	V	SD	#
31/01 Mar/Apr 2010	5287.6329	3.738	.054	20
03/04 Apr 2010	5290.6304	3.741	.021	20
05/06 Apr 2010	5292.5769	3.748	.033	20
06/07 Apr 2010	5293.5908	3.746	.028	20
07/08 Apr 2010	5294.6030	3.770	.033	20
08/09 Apr 2010	5295.6079	3.770	.038	20
09/10 Apr 2010	5296.6254	3.768	.023	20
10/11 Apr 2010	5297.6336	3.772	.021	20
14/15 Apr 2010	5301.6052	3.813	.030	20
16/17 Apr 2010	5303.6213	3.814	.021	10
17/18 Apr 2010	5304.6098	3.825	.092	60
18/19 Apr 2010	5305.6090	3.826	.083	10
19/20 Apr 2010	5306.6143	3.817	.042	30
20/21 Apr 2010	5307.6211	3.809	.048	30

RJD = JD - 2,450,000

Brian E. McCandless, Grand View Observatory (GVO)
Elkton, MD USA
Telescope: CGE1400 Detector *(BVRI): SSP-3 Detector (JH): SSP-4 @ T= - 40C

No numeric data submitted.





Hα Index vs JD

Spectroscopy Report

by
Robin Leadbeater
Three Hills Observatory

Overview

To keep track of the spectra submitted by amateurs to the campaign, a web page listing all spectra has been created with links to the spectra and observers' web sites http://www.threehillsobservatory.co.uk/epsaur_spectra.htm Further information for observers wanting to contribute spectra or researchers wishing to use the data can be found here on the main campaign web site http://www.hposoft.com/EAur09/Robin.html
There are currently over 300 spectra in the list with 75 submitted so far this year which I suspect makes it the biggest ever amateur spectroscopic campaign on a single object.

A big thank you to all contributors!

Spectra Archive 01 January – 09 April 2010

		WAVELENGTH					
JD	DATE	TIME	START	END	RANGE		OBSERVER
(2400000+)		(UT)	(Å)	(A)	(A)	(A/pixel)	
55296.418	09-Apr-10	22:02	6500	6750	250		Ribeiro
55295.340	08-Apr-10	20:10	4312	7282	2970	2.14	Teyssier
55294.357	07-Apr-10	20:34	7674	7723	49	0.13	Leadbeater
55292.297	05-Apr-10	19:07	6497	6607	110	0.17	Garrel
55290.358	03-Apr-10	20:36	7674	7723	49	0.13	Leadbeater
55288.356	01-Apr-10	20:33	7674	7723	49	0.13	Leadbeater
55288.289	01-Apr-10	18:56	6497	6607	110	0.17	Garrel
55282.319	26-Mar-10	19:39	6497	6607	110	0.17	Garrel
55278.384	22-Mar-10	21:13	7674	7723	49	0.13	Leadbeater
55276.343	20-Mar-10	20:14	7674	7723	49	0.13	Leadbeater
55273.277	17-Mar-10	18:39	4279	7113	2834	0.1	Buil
55272.295	16-Mar-10	19:05	4301	7265	2964	2.14	Teyssier
55271.399	15-Mar-10	21:35	6520	6680	160	0.11	Mauclaire
55271.282	15-Mar-10	18:46	4279	7113	2834	0.1	Buil
55269.389	13-Mar-10	21:20	6520	6680	160	0.11	Mauclaire
55269.374	13-Mar-10	20:59	7674	7723	49	0.13	Leadbeater
55269.277	13-Mar-10	18:39	4279	7113	2834	0.1	Buil
55268.687	13-Mar-10	04:29	5777	5977	200	0.13	Gorodenski
55268.665	13-Mar-10	03:58	5777	5977	200	0.13	Gorodenski
55266.366	10-Mar-10	20:47	6497	6607	110	0.17	Garrel
55266.346	10-Mar-10	20:18	7674	7723	49	0.13	Leadbeater
55266.277	10-Mar-10	18:39	4279	7113	2834	0.1	Buil
55263.470	07-Mar-10	23:16	6487	6656	169		Schanne
55263.444	07-Mar-10	22:39	5705	5903	198		Schanne
55263.356	07-Mar-10	20:33	7674	7723	49	0.13	Leadbeater
55262.373	06-Mar-10	20:57	7674	7723	49	0.13	Leadbeater
55261.453	05-Mar-10	22:52	7674	7723	49	0.13	Leadbeater
55261.354	05-Mar-10	20:30	4029	6878	2849	2.14	Teyssier

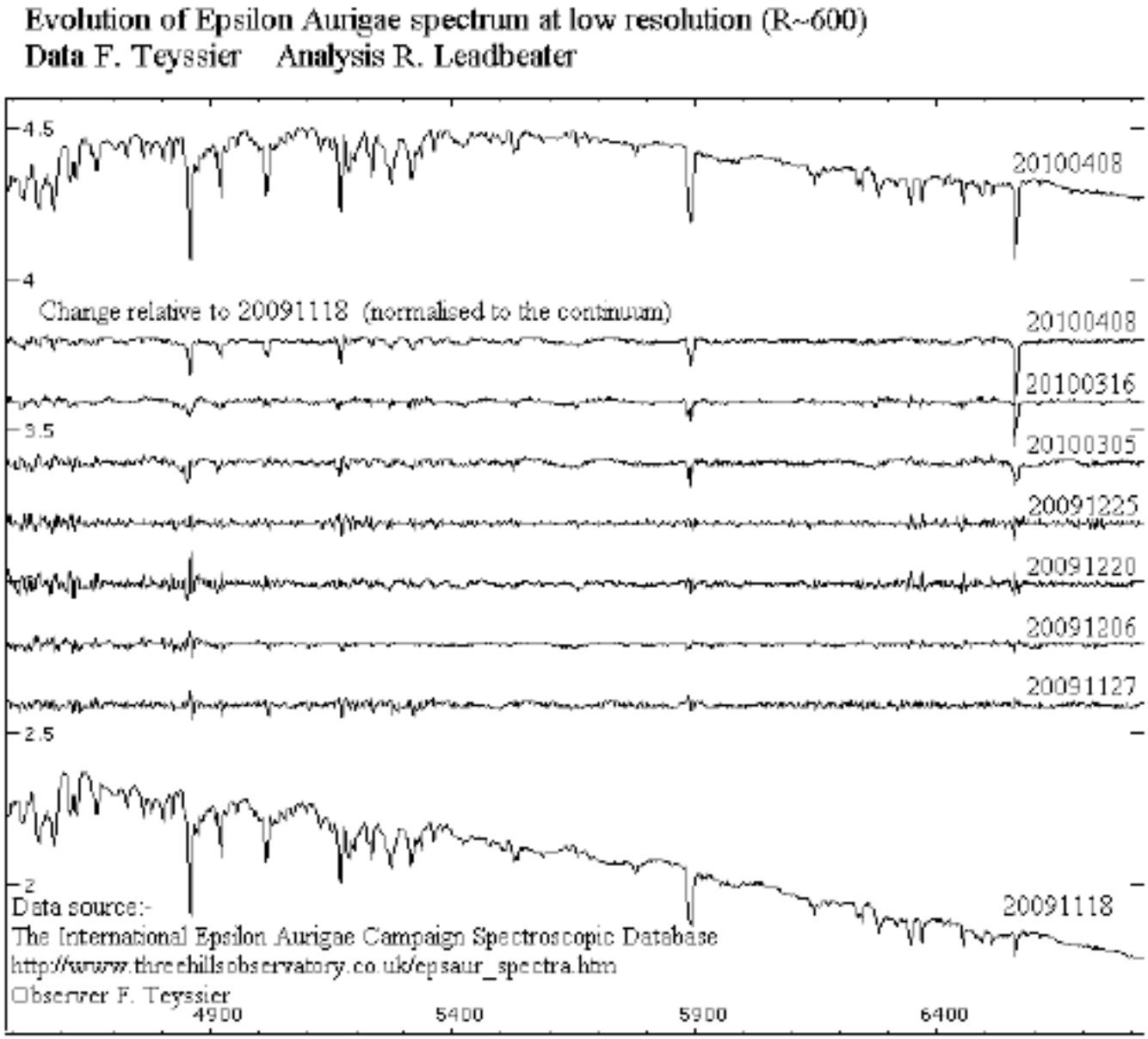
		WAVELENGTH					
JD	DATE	TIME	START	END	RANGE		OBSERVER
(2400000+)		(UT)	(Å)	(A)	(A)	(A/pixel)	
55261.350	05-Mar-10	20:24	6530	6690	160	0.11	Mauclaire
55259.479	03-Mar-10	23:30	7674	7723	49	0.13	Leadbeater
55258.354	02-Mar-10	20:30	7674	7723	49	0.13	Leadbeater
55257.268	01-Mar-10	18:26	4279	7113	2834	0.1	Buil
55254.272	26-Feb-10	18:32	4279	7113	2834	0.1	Buil
55252.273	24-Feb-10	18:33	6530	6690	160	0.11	Mauclaire
55251.325	23-Feb-10	19:48	4279	7113	2834	0.1	Buil
55250.338	22-Feb-10	20:07	7674	7723	49	0.13	Leadbeater
55248.319	20-Feb-10	19:40	7674	7723	49	0.13	Leadbeater
55248.315	20-Feb-10	19:34	6530	6690	160	0.11	Mauclaire
55247.266	19-Feb-10	18:23	4279	7113	2834	0.1	Buil
55246.403	18-Feb-10	21:40	7674	7723	49	0.13	Leadbeater
55245.290	17-Feb-10	18:58	7674	7723	49	0.13	Leadbeater
55240.703	13-Feb-10	04:53	5777	5977	200	0.13	Gorodenski
55240.299	12-Feb-10	19:11	6530	6690	160	0.11	Mauclaire
55238.457	10-Feb-10	22:58	4279	7113	2834	0.1	Buil
55237.472	09-Feb-10	23:19	7674	7724	50	0.13	Leadbeater
55234.272	06-Feb-10	18:32	7674	7724	50	0.13	Leadbeater
55233.313	05-Feb-10	19:31	6520	6680	160	0.11	Mauclaire
55233.258	05-Feb-10	18:12	4279	7113	2834	0.1	Buil
55231.240	03-Feb-10	17:45	6520	6680	160	0.11	Mauclaire
55230.276	02-Feb-10	18:37	7674	7724	50	0.13	Leadbeater
55230.259	02-Feb-10	18:13	4279	7113	2834	0.1	Buil
55228.293	31-Jan-10	19:02	4279	7113	2834	0.1	Buil
55228.285	31-Jan-10	18:50	7674	7724	50	0.13	Leadbeater
55228.270	31-Jan-10	18:29	6530	6690	160	0.11	Mauclaire
55228.243	31-Jan-10	17:49	6497	6607	110	0.084	Garrel
55226.294	29-Jan-10	19:03	7674	7724	50	0.13	Leadbeater
55224.263	27-Jan-10	18:19	7674	7724	50	0.13	Leadbeater
55224.240	27-Jan-10	17:46	4279	7113	2834	0.1	Buil
55219.242	22-Jan-10	17:48	4279	7113	2834	0.1	Buil
55217.255	20-Jan-10	18:07	6497	6607	110	0.084	Garrel
55215.333	18-Jan-10	20:00	4279	7113	2834	0.1	Buil
55215.277	18-Jan-10	18:39	6530	6690	160	0.11	Mauclaire
55215.244	18-Jan-10	17:52	7674	7724	50	0.13	Leadbeater
55214.251	17-Jan-10	18:01	7674	7724	50	0.13	Leadbeater
55212.417	15-Jan-10	22:00	6497	6607	110	0.084	Garrel
55212.244	15-Jan-10	17:51	4279	7113	2834	0.1	Buil
55208.500	12-Jan-10	6500	6650	150			McCandless
55208.500	12-Jan-10	7000	7500	500			McCandless
55208.380	11-Jan-10	21:07	4279	7113	2834	0.1	Buil
55207.443	10-Jan-10	22:37	6497	6607	110	0.084	Garrel
55207.273	10-Jan-10	18:33	6530	6690	160	0.11	Mauclaire
55207.240	10-Jan-10	17:46	4279	7113	2834	0.1	Buil
55205.606	09-Jan-10	02:32	6490	6740	250	0.34	Ribeiro
55205.239	08-Jan-10	17:44	7674	7724	50	0.13	Leadbeater
55204.258	07-Jan-10	18:11	6524	6605	81	0.11	Leadbeater

		WAVELENGTH					
JD	DATE	TIME	START	END	RANGE		OBSERVER
(2400000+)		(UT)	(Å)	(A)	(A)	(A/pixel)	
55203.316	06-Jan-10	19:35	6530	6690	160	0.11	Mauclaire
55203.286	06-Jan-10	18:52	6524	6604	80	0.11	Leadbeater
55203.224	06-Jan-10	17:23	4265	4377	112	0.15	Leadbeater
55202.318	05-Jan-10	19:37	6450	6618	168		Schanne
55202.244	05-Jan-10	17:51	7674	7724	50	0.13	Leadbeater
55199.256	02-Jan-10	18:09	7674	7724	50	0.13	Leadbeater
55199.242	02-Jan-10	17:48	6497	6607	110	0.17	Garrel

The brightness leveled off early in the year but the spectrum has continued to evolve as we approach mid-eclipse.

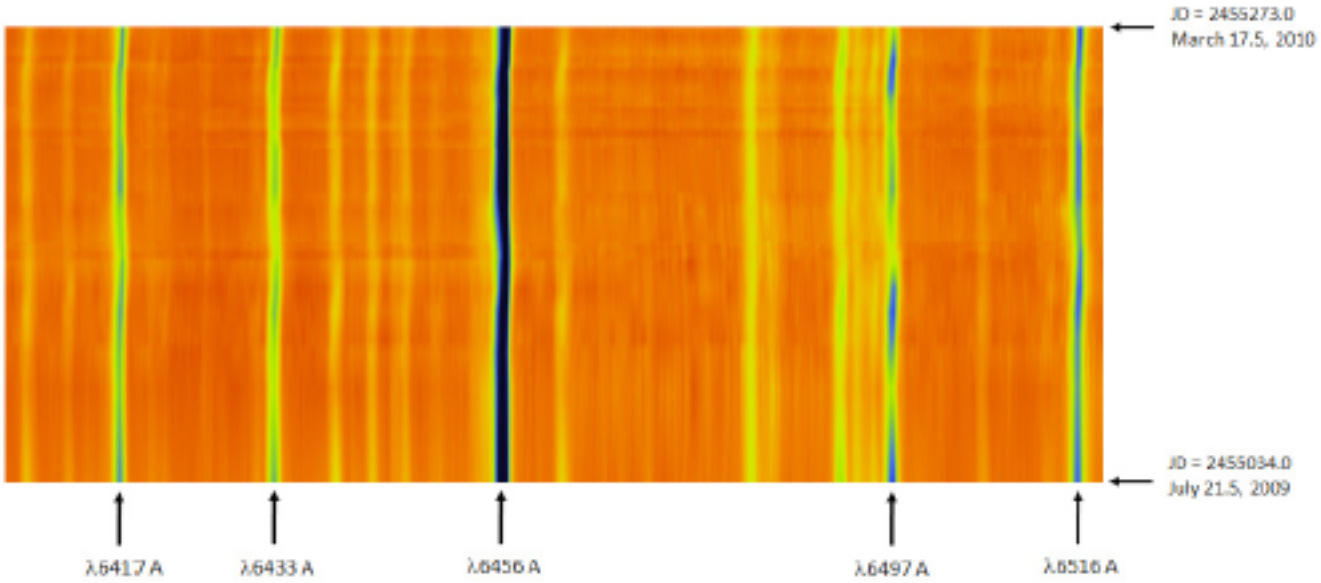
Low Resolution spectra

Data from Francois Theysier demonstrates that the eclipsing object is visible even in low resolution (R~600) spectra as an increase in intensity of several absorption lines.



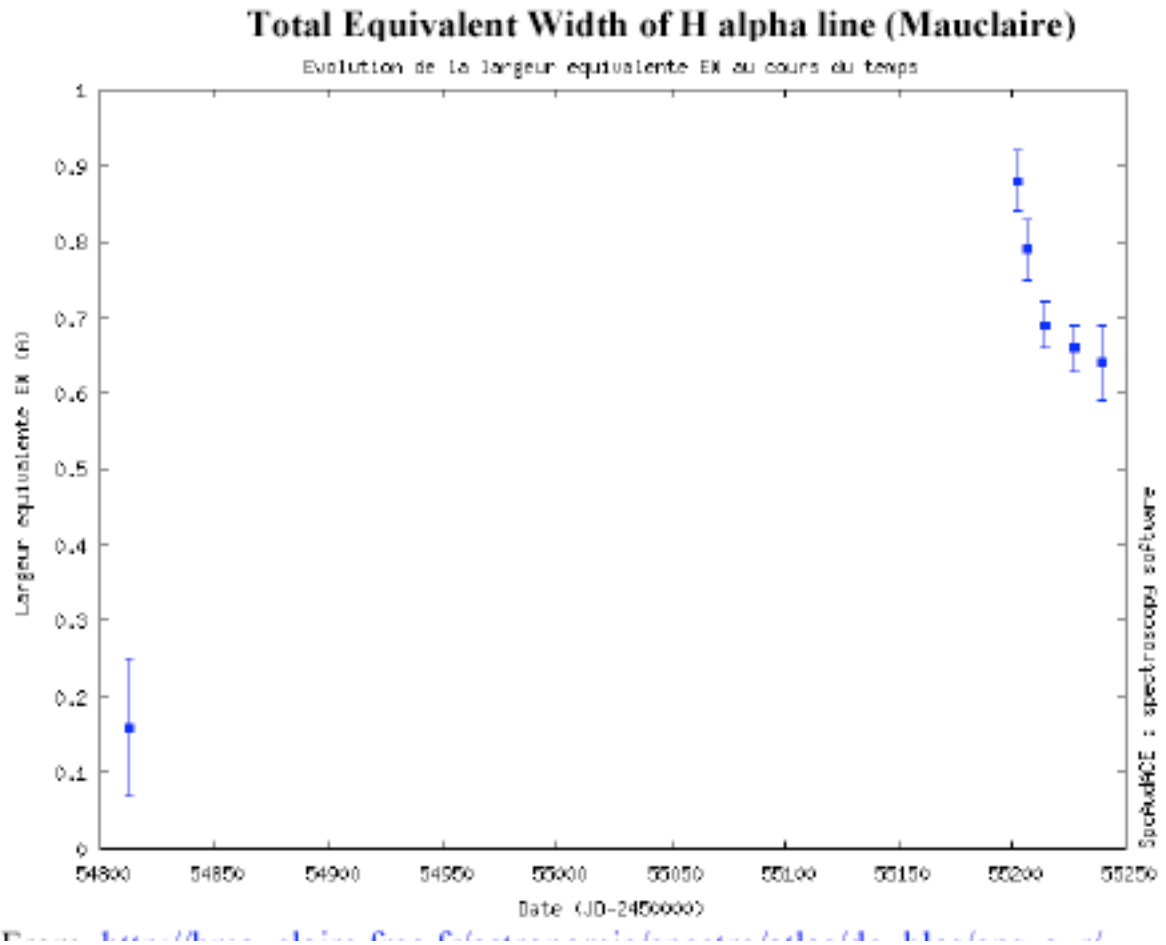
EW and RV Variations in Echelle Spectra
Christian Buil is able to measure radial velocity with high precision over a wide spectral range using his fiber fed echelle spectrograph and reports variations in intensity and RV in several lines not followed in previous eclipses.

False color display of time series spectra centered on the 6456 Å line (Buil)



Further examples on Buil's web site http://astrosurf.com/buil/star/epsaur/epsaur.htm

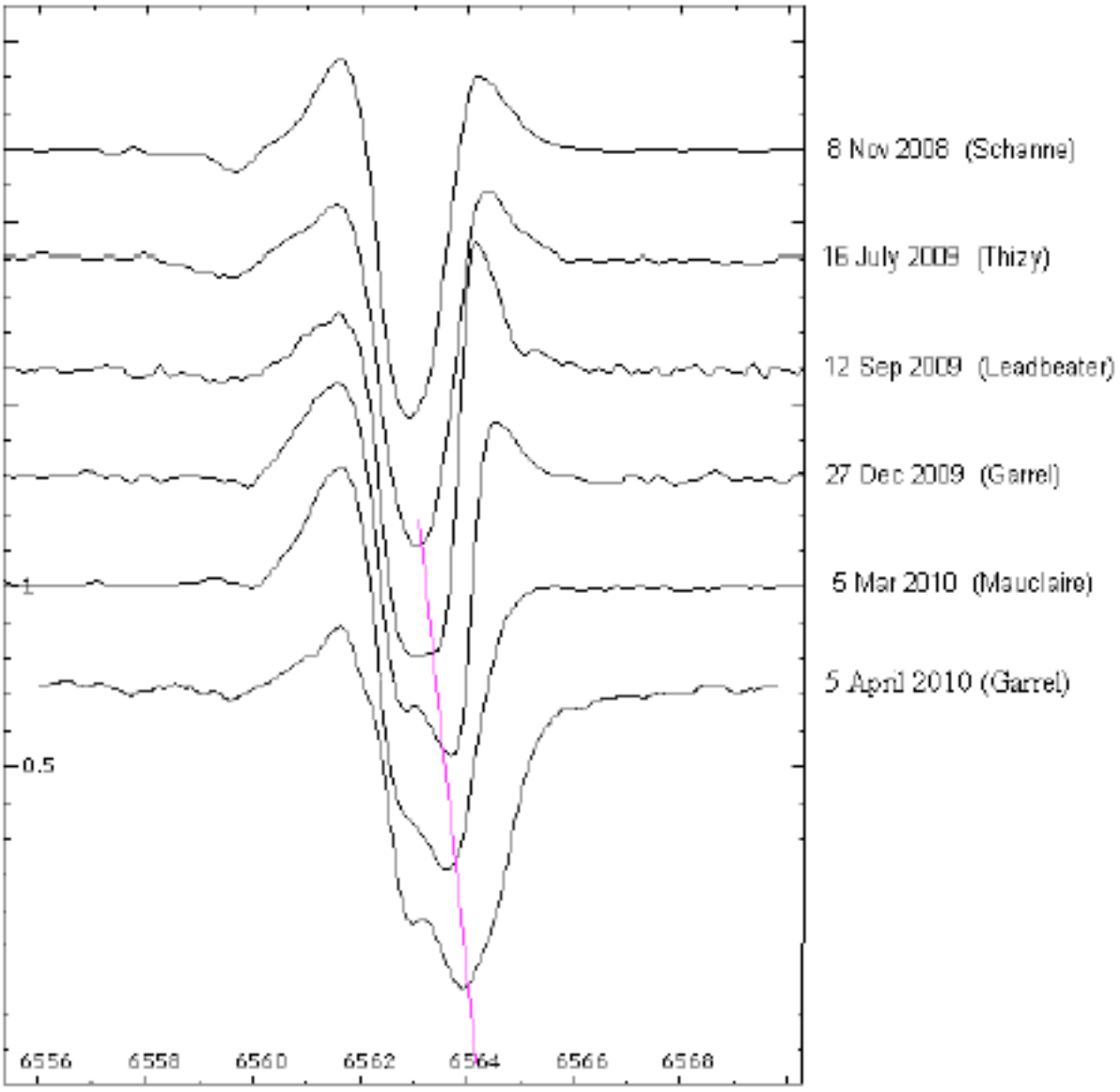
The Hydrogen Alpha Line
Several observers are following the hydrogen alpha line and Benji Mauclaire's graph of total equivalent width shows it is currently significantly higher than pre-eclipse.



From http://bmauclaire.free.fr/astronomie/spectro/atlas/doubles/eps_aur/

We have good coverage of this line throughout the eclipse so this plot could be enhanced to include data from other observers and the EW broken down into separate components from the absorption core and emission wings.

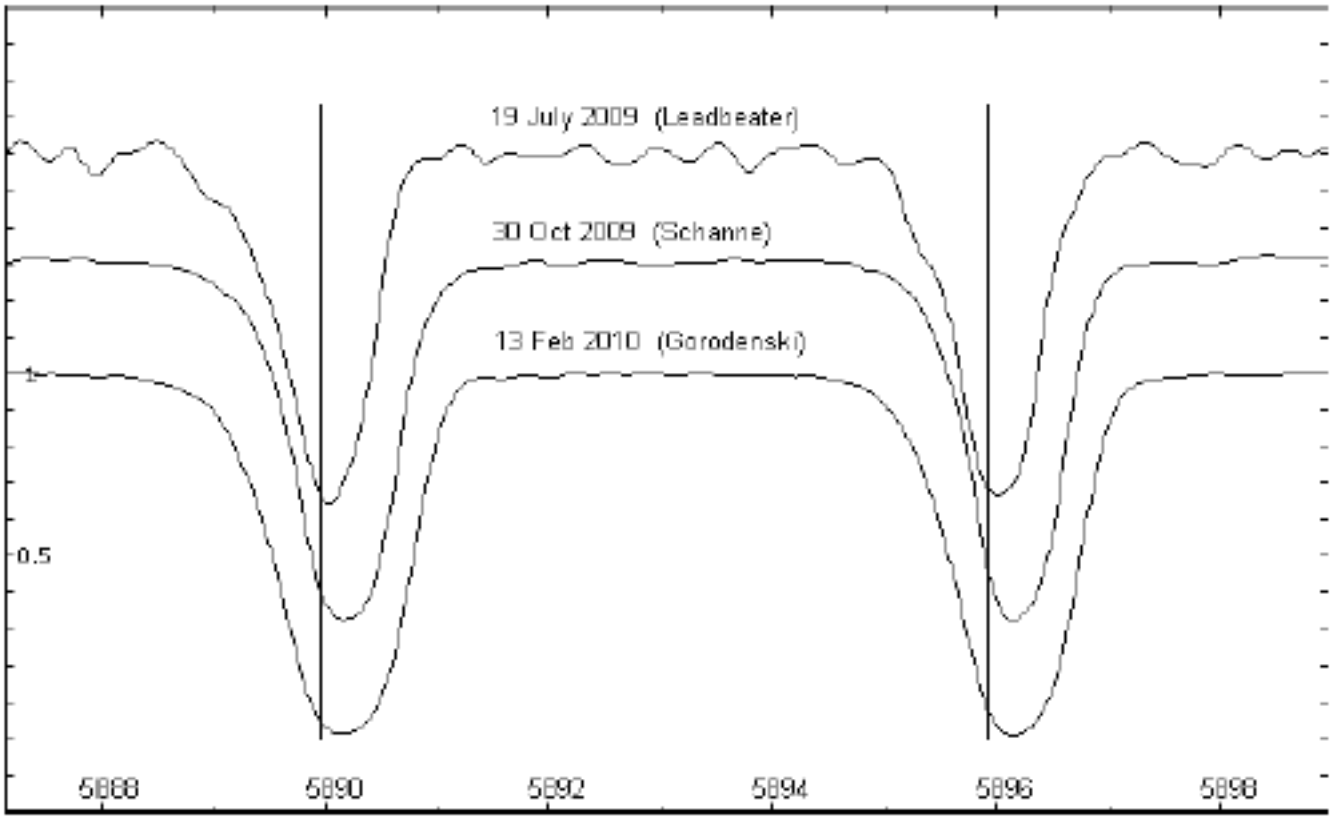
Analysis of the changes in profile of the hydrogen alpha line is complicated by variability which is also present outside eclipse . particularly in the red and blue emission wings, but it appears that an increasingly red shifted component from the eclipsing object emerged from behind the absorption component from the F star late last year and may now also be attenuating the variable red emission wing.



Hydrogen Alpha Line Evolution

The Sodium D lines

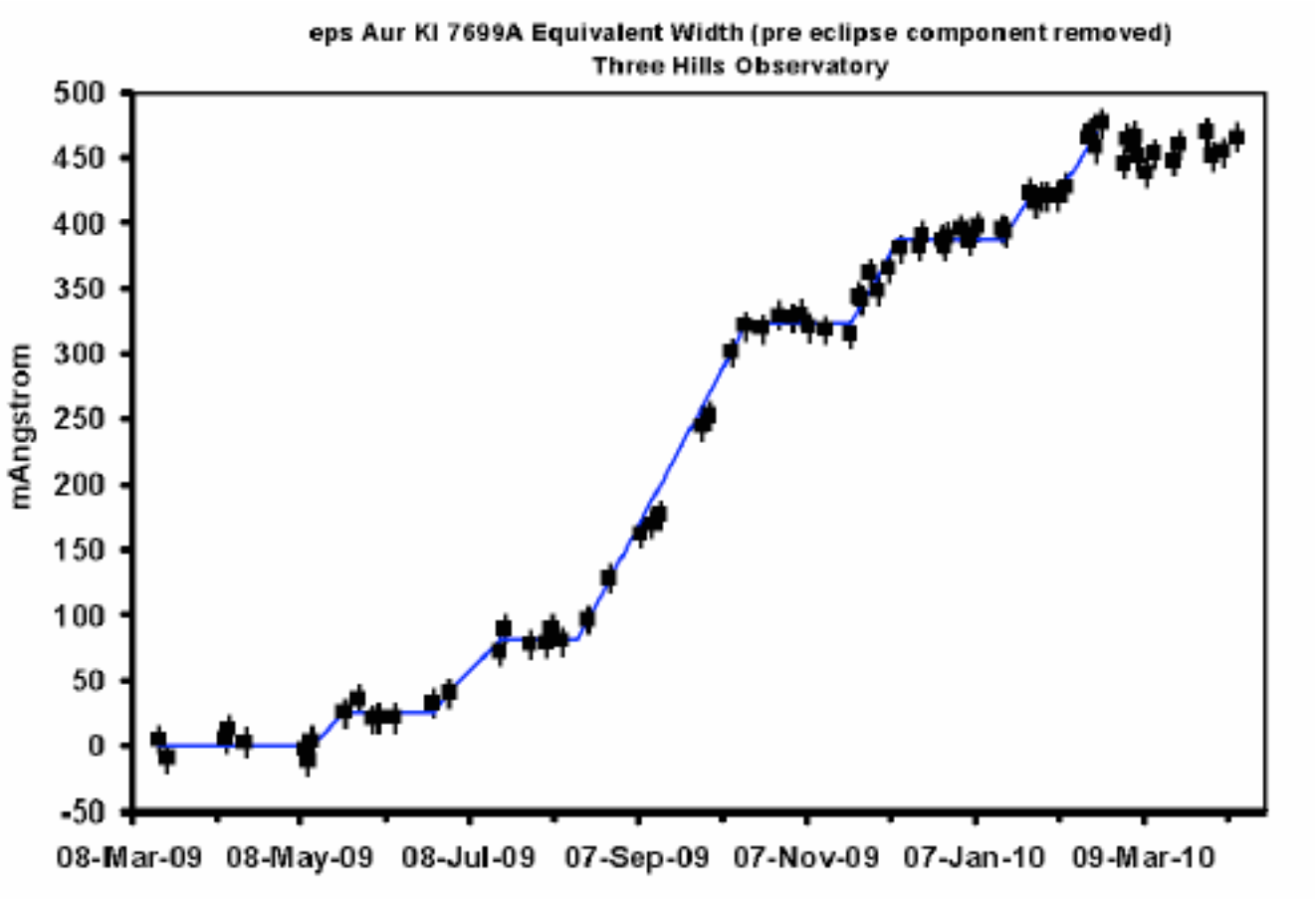
A similar effect may also be present in the evolution of the Sodium D lines, as reported by Stan Gorodenski



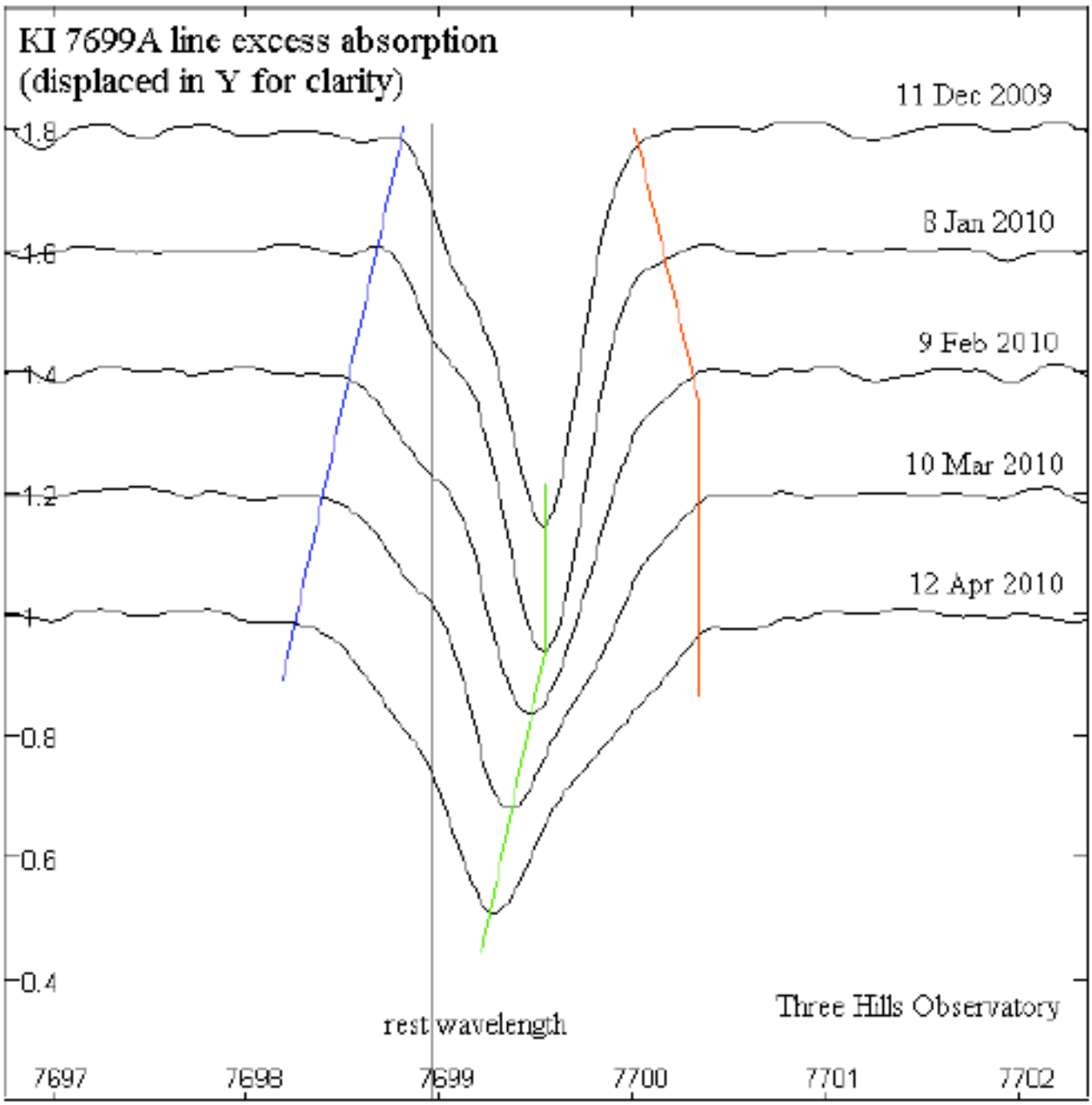
Sodium D Line Evolution

The 7699 Å Potassium line

Here at Three Hills Observatory I am continuing to track the Neutral Potassium line at 7699 Å The equivalent width peaked and leveled off around 22 February 2010.



The line profile has continued to widen and more recently has moved to the blue with signs of absorption to the blue of the rest wavelength which is unexpected since we are not predicted to reach the point in the eclipse when the opposite side of the disc reaches the F star for some time yet.

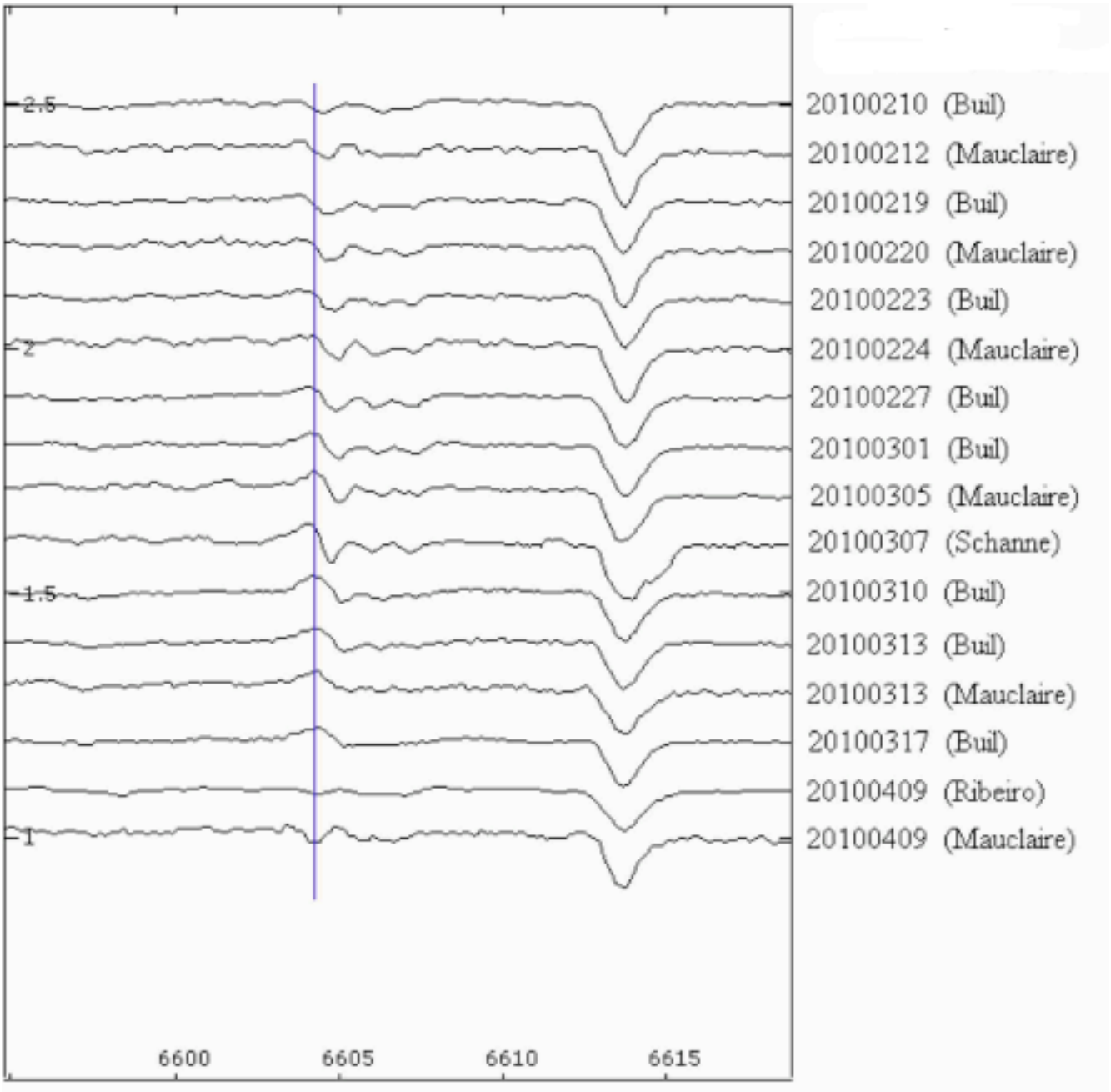


Dr. Bob and I have published a paper which interprets the variations in this line in terms of ring like variations in density of the disc material.

Leadbeater . R and Stencel . R E. 2010 *Structure in the disc of epsilon Aurigae: Spectroscopic observations of neutral Potassium during eclipse ingress.* http://arxiv.org/abs/1003.3617

Transient emission at 6605 Å

Buil reported an unidentified line in emission at 6605 Å in a spectrum taken 10th March. This was confirmed in an earlier spectrum from Mauclaire 5th March. Examining all available spectra it appears to have emerged around 27th Feb . peaked around 7th March and had disappeared by 9th April.



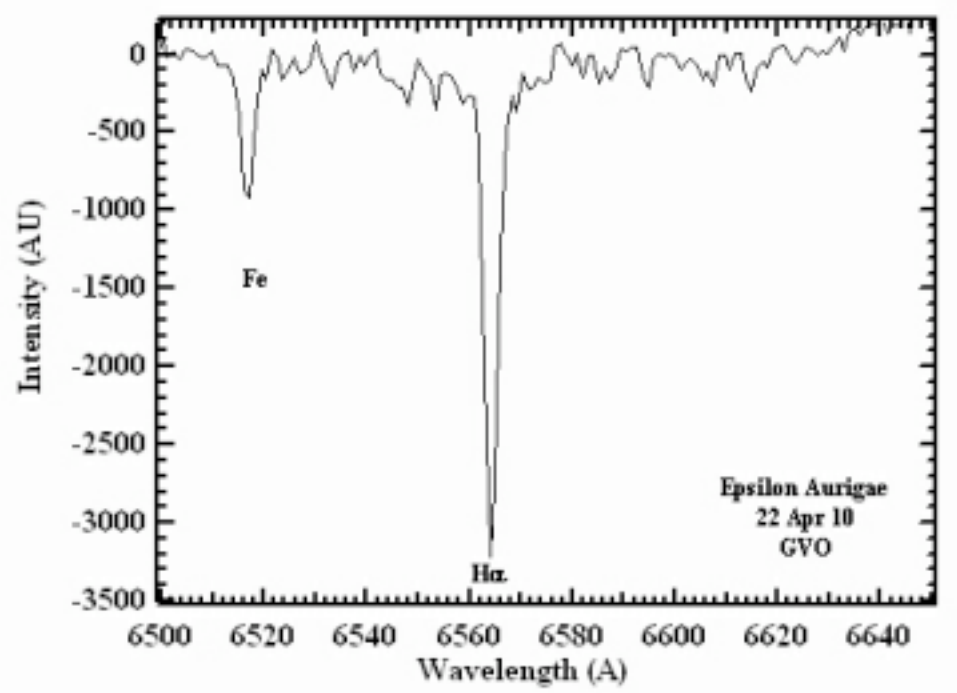
Epsilon Aurigae Transient Emission at 6605 Å

Looking forward

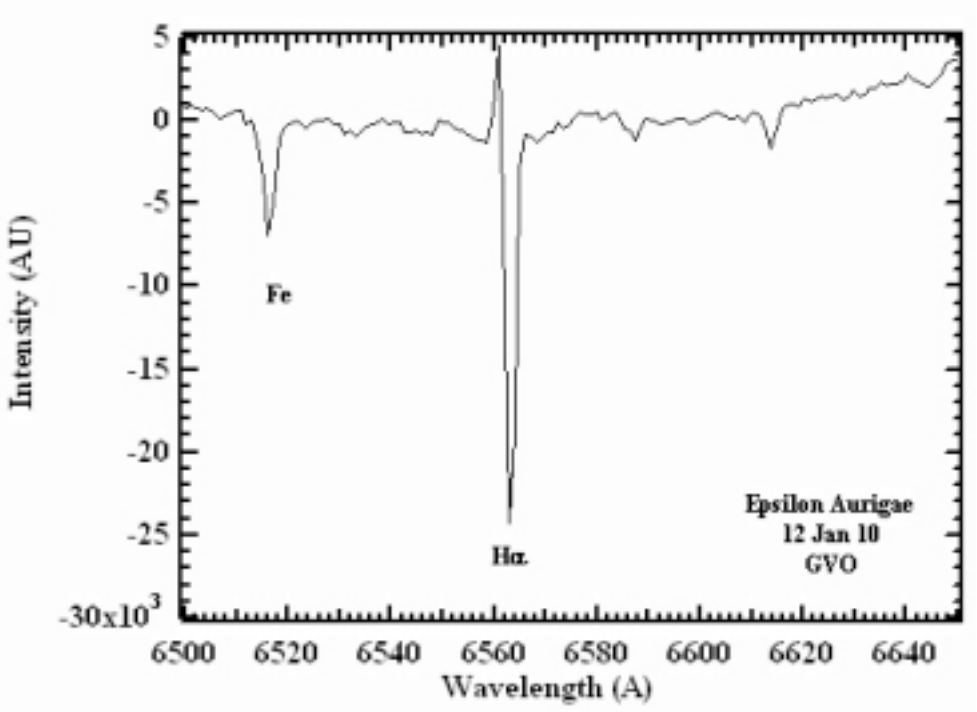
We are now approaching a difficult time for observing as epsilon Aurigae closes in on the Sun, but it is important that we gather as much spectroscopic information around mid-eclipse as possible to investigate the mid eclipse brightening phenomenon. Observers further north are best positioned but spectroscopy of such a bright object is possible from early twilight which extends the window.

Brian E. McCandless, Grand View Observatory
Elkton, MD USA

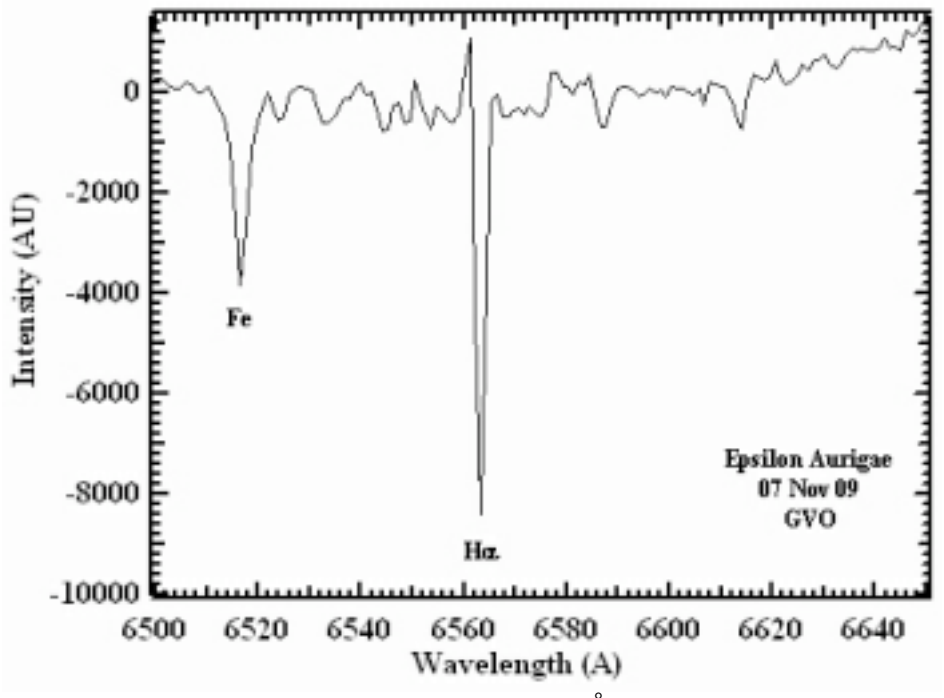
Equipment:
Celestron CGE1400 (35cm f/10)
SBIG SGS spectrograph with ST7XME CCD camera
(Operates at f/6.3, 400-800 nm spectral range, grating 600 l/mm, dispersion = 0.107 nm/pixel, R = 0.22 nm at 650 nm, R ~ 3000)



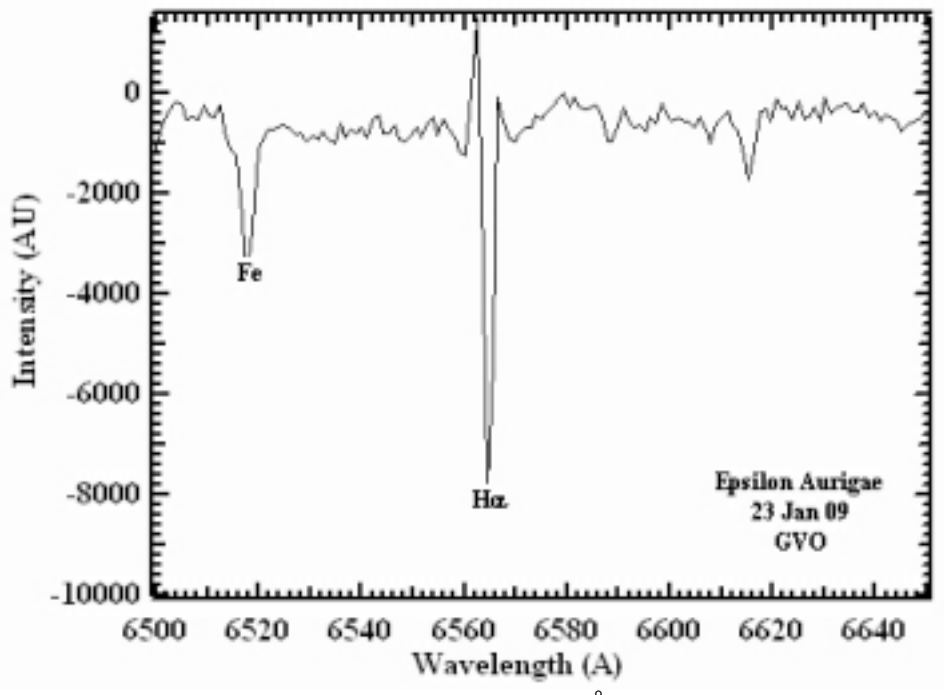
Hα FWHM = 4.0 Å



Hα FWHM = 2.5 Å



Hα FWHM = 2.0 Å



Hα FWHM = 2.0 Å

INTERFEROMETRY REPORT

by
Dr. Robert Stencel
University of Denver

Successful images of the dark disk during ingress were captured in November and December 2009 - see below image and Dr. Bob's report for details.

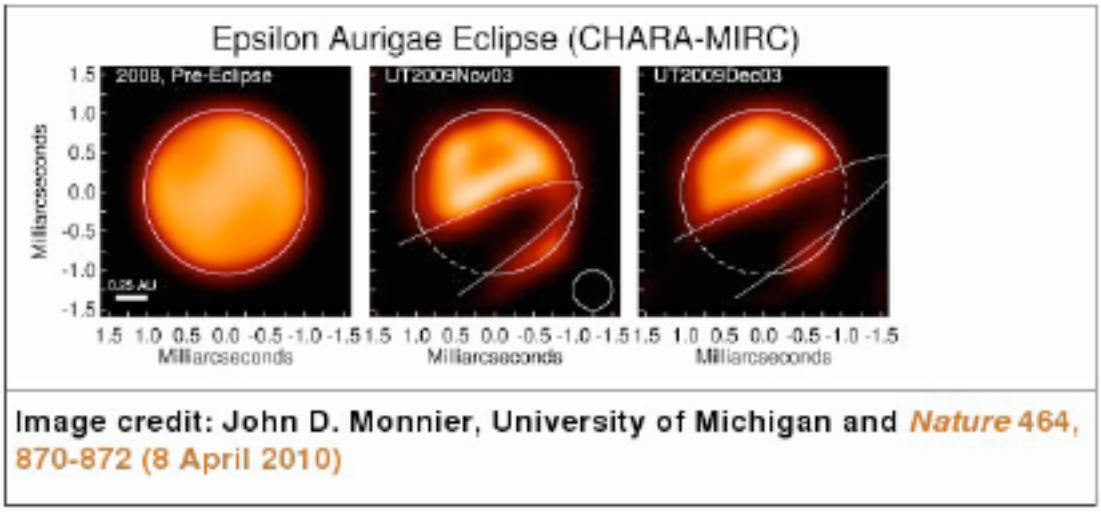


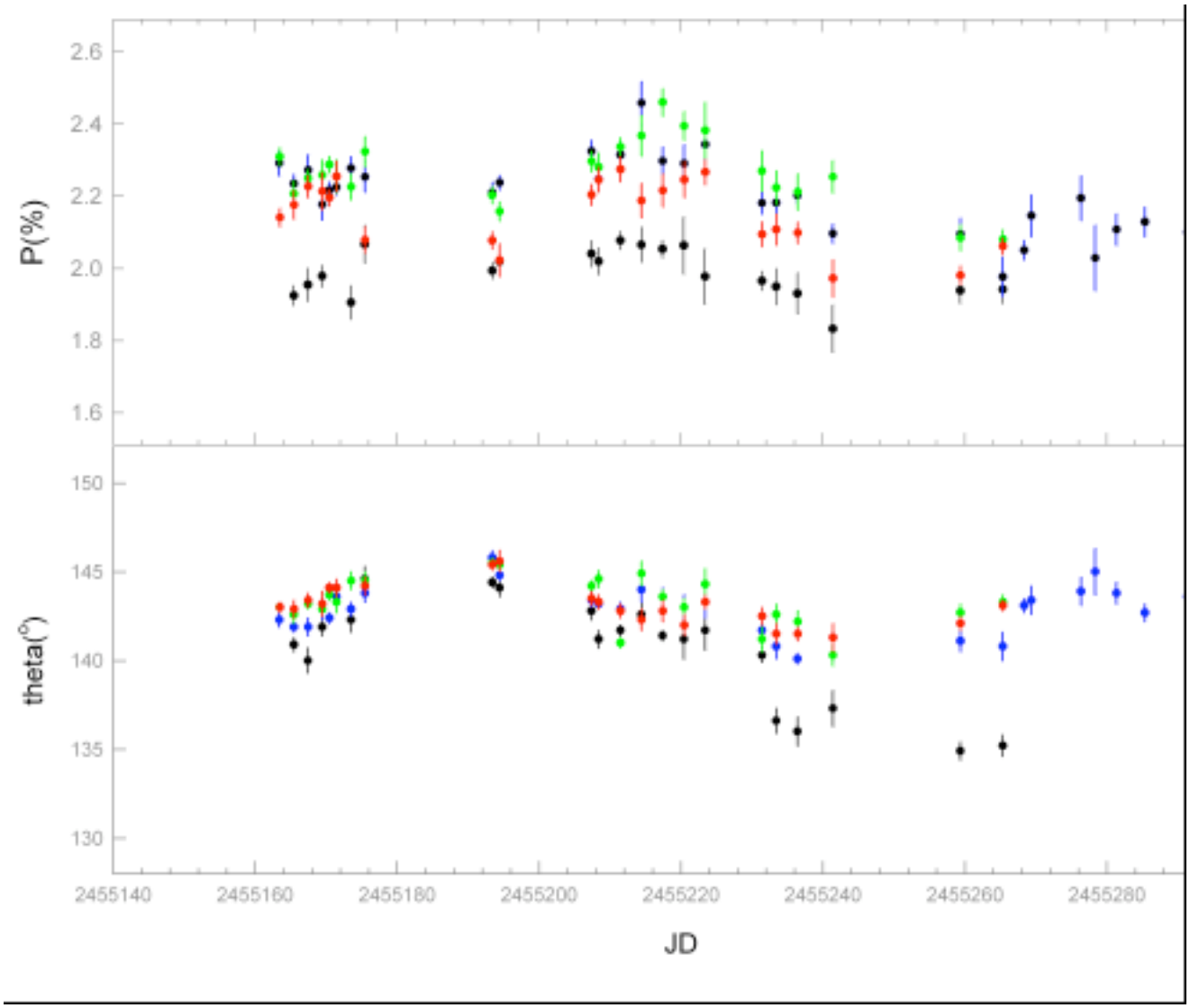
Image credit: John D. Monnier, University of Michigan and *Nature* 464, 870-872 (8 April 2010)

POLARIMETRY REPORT

By
Dr. Robert Stencel
University of Denver

We have received notices from several observers of their progress in measurements and work with new instruments to monitor the eclipse in polarimetric modes. The most complete report received was from Andrei Berdyugin, Tuorla Observatory, University of Turku, Väisäläntie 20, FIN-21500 Piikkiö , Finland, who writes:

"I am sending you results of my UBVR polarimetry. Unfortunately . the weather at La Palma was not so good during winter and spring and there are periods with no data on the plot. First measurements were done at 27th of November and the last ones at 6th of April. Plot shows variations of polarization P in percents and polarization angle Theta in degrees. U-band data shown with the black color . B-band with blue . V-band with green and R-band with red. Now the weather at La Palma is bad again and the star is getting lower and lower. It will soon be not accessible for my telescope and most likely new data from me will not come till this fall. "
Cheers . Andrei Berdyugin <andber@utu.fi>



From Dr. Bob

Dr. Robert E. Stencel . Co- Editor
University of Denver Astronomy Program
<rstencel@du.edu>
https://twitter.com/epsilon_Aurigae

First, let me thank all the observers who are making this campaign the most successful in the history of epsilon Aurigae eclipse observing. Keep up the good work!

Next, this has been a productive few months in terms of breakthroughs in making sense of the system. A trifecta of new reports are beginning to reveal unprecedented details about the nature of the epsilon Aurigae system:

Development #1 - The complete spectral energy distribution:
http://arxiv.org/PS_cache/arxiv/pdf/1003/1003.3694v1.pdf
Synopsis: The observed spectral energy distribution can be reproduced using a three component model consisting of a 2.2+0.9/-0.8 Msun F type post-asymptotic giant branch star, and a 5.9+/-0.8 Msun B5+/-1 type main sequence star that is surrounded by a geometrically thick, but partially transparent, disk of gas and dust. At the nominal HIPPARCOS parallax distance of 625 pc, the model normalization yields a radius of 135+/-5 Rsun for the F star, consistent with published interferometric observations. The dusty disk is constrained to be viewed at an inclination of i > 87 degree, and has effective temperature of 550+/-50 K with an outer radius of 3.8 AU and a thickness of 0.95 AU.

This paper was just published in the May, 2010 Astrophysical Journal, vol. 714, pp. 549-560.

Development #2 - Interferometric imaging of the disk during eclipse ingress:
http://arxiv.org/pdf/1004.2464
Synopsis: Interferometric images obtained during autumn 2009 show the opaque disk crossing the southern hemisphere of the F star. The measured change over the course of two observations a month apart indicate relative motion . which in combination with well-known orbit of the F star, argue for a mass ratio of 0.6 - which means the F star is lighter than the disk and its contents. Disk opacity can be used to estimate the dust mass of the disk, to be less than one earth mass. This paper also just appeared, in 2010 April 8 issue of Nature, vol. 464, pp. 870-872 , along with insightful articles by Eric Hand about interferometry, and remarks by Ed Guinan about the significance of these new observations (recommended reading).

Development #3 - Substructure inside the disk:
http://arxiv.org/ftp/arxiv/papers/1003/1003.3617.pdf
Synopsis: Variations in the equivalent width of the neutral potassium line at 7699 Å are reported,

during ingress and into totality of the current eclipse of the enigmatic eclipsing binary epsilon Aurigae. The increase and plateaus of line strength are correlated with new system parameters and interferometric imaging constraints, plus ancillary data being reported contemporaneously. Together, these data reveal structural details of the transiting disc, never before measured.

An update on this result will be discussed at the SAS meeting in May 2010, and future reports will elaborate on the significance of these continuing observations.

Interesting Papers

Epsilon Aurigae: An improved spectroscopic orbital solution - Stefanik et al. http://arxiv.org/pdf/1001.5011 and Astronomical Journal, March 2010.

Abstract: A rare eclipse of the mysterious object epsilon Aurigae will occur in 2009–2011. We report an updated single-lined spectroscopic solution for the orbit of the primary star based on 20 years of monitoring at the CfA, combined with historical velocity observations dating back to 1897. There are 518 new CfA observations obtained between 1989 and 2009. Two solutions are presented. One uses the velocities outside the eclipse phases together with mid-times of previous eclipses, from photometry dating back to 1842, which provide the strongest constraint on the ephemeris. This yields a period of 9896.0 ± 1.6 days (27.0938 ± 0.0044 years) with a velocity semi-amplitude of 13.84± 0.23 km/s and an eccentricity of 0.227 ± 0.011. The middle of the current on-going eclipse predicted by this combined fit is JD 2,455 ,413.8 ± 4.8 . corresponding to 2010 August 5. If we use only the radial velocities, we find that the predicted middle of the current eclipse is nine months earlier.

This would imply that the gravitating companion is not the same as the eclipsing object. Alternatively, the purely spectroscopic solution may be biased by perturbations in the velocities due to the short-period oscillations of the supergiant.

(no new poster papers reported)

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Anyone wishing to contribute to the Newsletter, is most welcome. Please send contributions to me at phxjeff@hposoft.com.

Clear Skies!

Jeff

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