



Variabilia

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Redactie:

H. Feijth

Oer de Feart 7

9084 BP Goutum

WAARNEMINGSRESULTATEN MEI-SEPTEMBER 1992

In de maanden mei-september 1992 werden in totaal 2899 waarnemingen verricht door 10 waarnemers.

Waarnemer		MEI	JUN	JUL	AUG	SEP
R.J. Bouma	BMU	110		160/2	135/2	68/4
H.J. Bril	BHN		16			
G. Comello	CMG	4		15/4		258/31
H. Feijth	FJH	360/89	290/56	417/123	456/93	345/57
H. v.d. Hil	VDH	15		7		2
J. Holtrop	HOL			31	38	43
C.F. Johannink	JCH			4	10	
J. de Jong	JOJ	4				
P.C.A. Kerkvliet	KKP	13	9	8		
A. Schoiten	SAQ	15	8	5		
Totaal		521	323	647	639	716

Als nieuwe waarnemer kunnen wij begroeten de heer J. Holtrop uit Groningen, die al een opmerkelijke activiteit aan de dag heeft gelegd. Wellicht ten overvloede zij vermeld dat bij een aantal waarnemers achter / het aantal "inner sanctum" waarnemingen aangeduid is. Dit zijn positieve schattingen zwakker dan 13.7 alsmede negatieve waarnemingen (deze zijn uiteraard geen schattingen aangezien de ster niet gezien is) zwakker dan 14.0

OBSERVARIA

Ondanks dat het nu wisselvallig weer is kan veel waargenomen worden. Momenteel is X Cam in een zwak minimum (ca 14.0); Mira heeft in augustus een vrij helder maximum (ca 3.0) gehad en is nu nog net met het blote oog zichtbaar. Nova Cygni 1992 is nog steeds goed zichtbaar; zijn helderheid lijkt nauwelijks te verminderen. Van de dwergnovae werden maxima werden waargenomen van SS Cygni, RU Pegasi, Z Camelopardalis, RX Andromedae en enkele minder bekende dwergnovae. Z Cam en TZ Per zijn beide sinds kort in stilstand. Dat wil zeggen: de helderheid is constant ergens tussen de maximale en minimale helderheid. Ook de meest recente uitbarsting van de oude nova GK Per kon goed waargenomen worden. Vermeldenswaard is nog dat Bouma op 6 september U Geminorum in uitbarsting heeft gezien. De ster FG Sagittae (daarover later meer) is sinds augustus afgenomen van de negende naar de veertiende grootte.

PU VULPECULAE

PU Vulpeculae werd in april 1979 ontdekt door Honda als een ster van de negende grootte en aangekondigd als een nova. Het bleek al spoedig dat het niet een klassieke nova was maar een nova-achtig objekt. In 1977 al begon PU Vul van de veertiende grootte gestaag in helderheid toe te nemen. Nader onderzoek heeft uitgewezen dat PU Vul behoort tot de zogenaamde symbio- tische novae. Klassieke

novae zijn nauwe dubbelsterren bestaande uit een hoofdreeksster die qua helderheid vergelijk is met de zon en een witte dwerg. De componenten staan zo dicht bij elkaar dat via het binnenste Lagrange-punt massa-overdracht plaatsvindt van de hoofdreeksster naar de witte dwerg. Algemeen neemt men aan dat bij een nova-uitbarsting bij de witte dwerg als het ware een kritisch punt wordt overschreden en bij het oppervlak van de witte dwerg de overgedragen materie "ontbrandt" via kernreacties. Onduidelijk is nog wat het verschil is met de dwergnovae die uit soortgelijke dubbelstersystemen bestaan. Opmerkenswaard is nog dat de oude nova GK Per tegenwoordig U Gem-achtige uitbarstingen doormaakt. Daarom is wel de veronderstelling geopperd dat genoemde systemen verschillende stadia doorlopen, waarbij ze zich zowel als klassieke nova dan wel als dwergnova kunnen gedragen.

PU Vulpeculae behoort niet tot deze categorie; symbiotische sterren zijn per definitie dubbelsterren bestaande uit een min of meer rode reuzenster en een witte dwerg. Ook hier vindt massaoverdracht plaats naar de witte dwerg en wordt bij het begin van de uitbarsting een kritisch punt overschreden. Het verschil met de gewone novae is dat alle stadia van de uitbarsting veel langer duren. Het maximum kan wel tien jaar in beslag nemen. Het bijzondere bij PU Vul is dat de lichtkromme karakteristiek is voor zo'n trage nova, maar dat in 1980-81 een minimum plaatsvond. Hierbij daalde de helderheid van 9 naar 13.5. Tevens veranderde het spektrum van F naar M4. De Zwitserse astronomen Vogel en Nussbaumer interpreteren dit als een verduistering van de witte dwerg in uitbarsting door de rode component. Na deze verduistering was het spektrum van het systeem veranderd van F naar A. Na 1987 begon de helderheid gestaag af te nemen tot 11.5 in 1992. Opgemerkt moet nog worden dat lang niet alle symbiotische sterren novaachtig gedrag vertonen; de meeste zoals bijvoorbeeld Z Andromedae en CH Cygni vertonen helderheidswisselingen op bescheidener schaal.

Literatuur

1. N. Vogt, Sterne und Weltraum, 1983, 404
2. M. Vogel en H. Nussbaumer, Astronomy and Astrophysics, 259, 525 (1992)

FG SAGITTAE

FG Sagittae werd in 1943 ontdekt door C. Hoffmeister (Sonneberg, Duitsland). Deze ster is uniek in zijn soort. Bij de ontdekking was de helderheid 11.5. Nader onderzoek wees uit dat de helderheid in 1895 13.5 was gevolgd door een gestage toename in helderheid. Deze toename zette door tot 1960 toen de helderheid ongeveer 9.5 was geworden. Dit was tot augustus van dit jaar de helderheid. Toen ik in Puimichel begin augustus FG Sge iets zwakker schatte kon ik niet vermoeden dat een dramatische helderheidsafname op til was. Daarop werd ik geattendeerd door een circulaire van de AAVSO. Half september was de helderheid 11.5. Nu is deze afgenomen tot 14.3 en is de ster in een 25 cm kijker bepaald geen gemakkelijk object. Het spektrum van FG Sagittae veranderde vanaf de jaren zestig van B tot F. Uit het spektrum volgde bovendien dat FG Sge tot de superreuzen behoorde (klasse Ia). Andere methoden om de absolute helderheid te bepalen wijzen op een minder grote lichtsterkte. Foto's genomen met reuzentelescopen lieten een planetaire nevel bij FG Sge zien, die uitdijt met een snelheid van 70 km/sec. Volgens Guinan, Cook en Thrash (Villanova University) is sinds half augustus alle zichtbare straling in dezelfde mate afgezwakt. Voordat de afzwakking plaatsvond was FG Sge periodiek veranderlijk (periode 110-130 dagen, amplitude 0.2 grootteklasse). Zij suggereren dat de helderheidsafname het gevolg is door uitstoting van een stofwolk zodat FG Sge R Coronae Borealis-achtig gedrag vertoont. Degenen die FG Sge willen schatten kunnen gebruik maken van de bijgevoegde kaart. Let daarbij op de ster van grootte 12 die vlak bij FG Sge staat !

Literatuur

1. Burnhams Celestial Handbook, Deel III
2. IAU Circular No. 5632

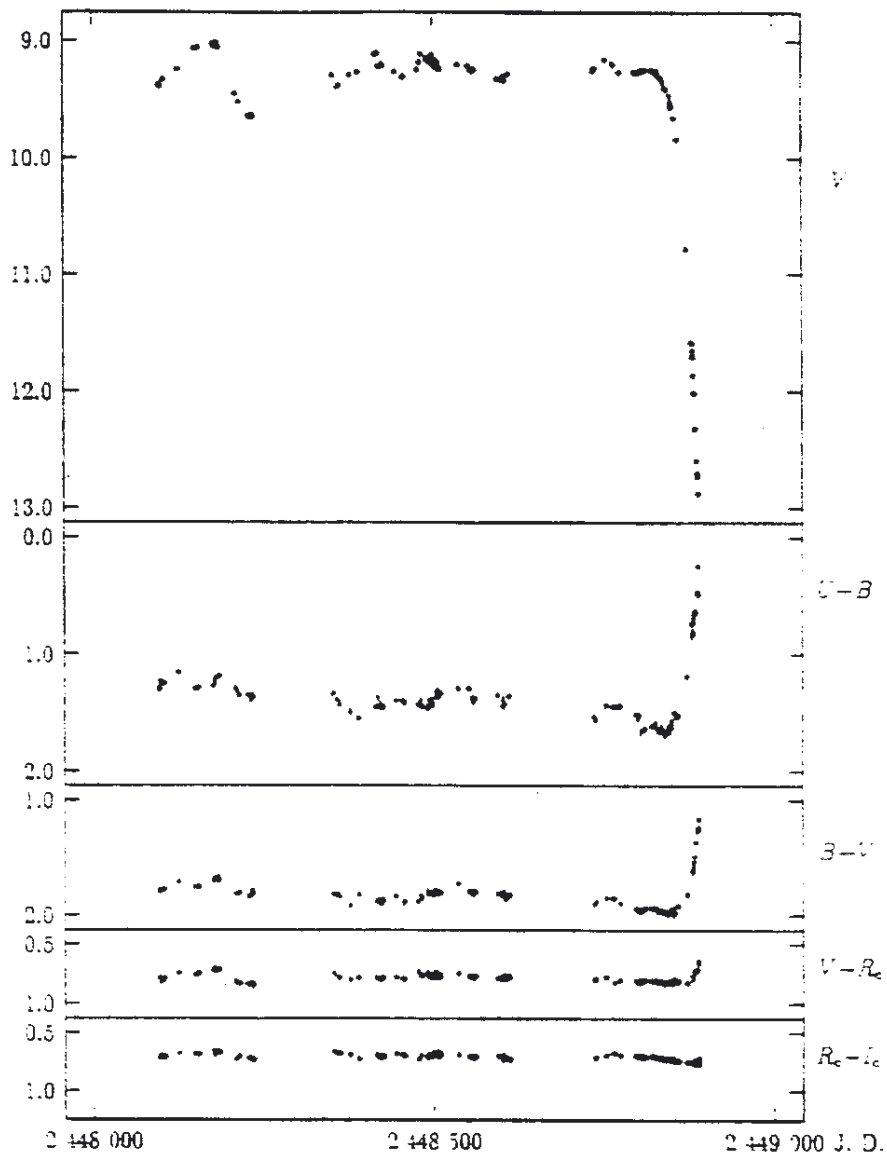


Figure 1. The V light curve and the colour curves of FG Sge in 1990, 1991 and 1992.

(Information Bull. on Variable Stars no.3775)

000451 SS Cas Mira HIP	001838 R And Mira HIP	004533 RR And Mira	005840 RX And UGZ	011272 S Cas Mira	013937 AR And UGSS
8746.5 12.1 BMU	8892.5 9.4 HOL	8842.5 :16.0 FJH	8889.32 13.9 BMU	8865.4 12.4 FJH	8826.50 12.7 FJ
8761.4 11.1 BMU	8894.3 9.5 FJH	8864.5 14.8 FJH	8890.31 13.8 BMU	8890.4 12.7 CMG	8848.47 12.6 FJ
8771.5 10.5 BMU		8871.5 14.4 FJH	8890.54 13.9 CMG	8891.5 12.7 FJH	8867.45 12.8 FJ
8779.5 10.4 BMU	0019-09 S Cet Mira	8890.5 13.1 CMG	8891.44 13.7 FJH		8871.54 14.6 FJ
8803.5 10.6 FJH	8890.6 13.4 CMG	8891.4 12.9 FJH	8893.31 11.4 CMG	011712 U Psc Mira	8888.44 12.5 FJ
8832.5 11.9 FJH			8893.44 11.0 FJH	8831.5 12.1 FJH	8891.45 11.9 FJ
8833.4 11.6 BMU	002230 YZ And Mira	004746A RV Cas Mira	8894.31 11.4 CMG	8890.5 :14.5 CMG	8893.44 11.9 FJ
8842.5 12.0 BMU	8890.5 13.6 CMG	8831.5 :15.5 FJH	8894.33 11.4 BMU	8891.4 14.3 FJH	8894.42 12.3 FJ
8842.5 12.7 FJH		8842.5 15.4 FJH	8894.33 11.4 FJH		
8852.5 12.9 FJH	002725A TU And Mira HIP	004958 W Cas Mira HIP	8895.34 11.4 BMU		014958 X Cas Mira HIP
8873.4 12.7 FJH	8818.5 13.1 FJH	8757.4 10.1 KKP	8896.32 11.9 BMU	012020 RX Psc Mira	8889.3 11.9 CMG
8889.3 11.2 CMG	8831.5 12.6 FJH	8761.4 10.4 BMU	8896.58 12.5 CMG	8842.5 :15.0 FJH	
000928 UW And Mira	8845.4 11.6 FJH	8771.5 10.6 BMU		8890.5 14.2 CMG	015254 U Per Mira HIP
8799.5 11.7 FJH	8890.5 10.0 CMG	8779.5 10.9 BMU	0101-02 Z Cet Mira		8757.4 :10.7 KKP
8810.5 13.2 FJH	8894.5 9.7 FJH	8786.5 11.4 FJH	8890.6 9.6 CMG	012031 TY Psc UGSU	8763.4 10.3 KKP
8831.5 13.8 FJH		8801.5 11.3 FJH		8842.57 :15.8 FJH	8777.5 9.6 BMU
8871.5 :15.6 FJH	003162 TY Cas Mira	8812.5 11.7 FJH	010621A X Psc Mira	8871.54 12.9 FJH	8833.4 8.5 BMU
	8786.5 13.4 FJH	8832.5 11.9 FJH	8831.5 13.7 FJH	8873.36 14.2 FJH	8864.4 8.2 BMU
001046 X And Mira	8810.5 :14.5 FJH	8833.4 11.7 BMU	8842.5 13.9 FJH		8889.3 8.3 BMU
8799.5 :14.6 FJH	8831.4 14.8 FJH	8842.4 11.9 FJH	8864.5 14.2 FJH	012350 RZ Per Mira	8889.4 8.3 CMG
8811.5 14.7 FJH		8842.5 11.9 BMU		8770.5 10.2 BMU	
8831.4 14.3 FJH	003179 Y Cep Mira	8853.4 11.9 FJH	010937 FO And UG	8889.4 13.5 CMG	015457 V666 Cas Mira
8839.5 14.4 CMG	8762.4 10.4 FJH	8876.3 11.8 FJH	8837.50 15.0 FJH		8803.5 12.7 FJH
8841.5 14.1 FJH	8784.5 10.4 FJH	8889.3 11.7 CMG	8842.54 :15.4 FJH	012502 R Psc Mira	8818.5 12.6 FJH
8852.5 13.9 FJH	8801.5 10.4 FJH	8893.4 11.8 FJH	8871.54 14.9 FJH	8890.5 14.5 CMG	8843.5 12.6 FJH
8864.5 13.2 FJH	8818.5 10.8 FJH		8873.36 :14.4 FJH		8891.5 11.2 FJH
8876.4 12.7 FJH	8832.5 11.1 FJH	005840 RX And UGZ		012746 SX And Mira	8891.5 11.5 CMG
8890.5 11.6 CMG	8843.5 11.2 FJH	8786.52 10.8 FJH	010940 U And Mira	8771.6 12.3 FJH	
8891.5 11.2 FJH	8889.5 13.3 CMG	8811.51 13.3 BMU	8831.5 12.9 FJH	8803.5 11.1 FJH	020227 Z Tri Mira
	8893.5 13.3 FJH	8812.52 10.8 FJH	8839.4 12.4 BMU	8818.5 10.2 FJH	8831.5 11.1 FJH
001726 T And Mira		8818.50 11.0 FJH	8841.5 12.0 FJH	8833.5 10.1 FJH	8843.5 11.1 FJH
8803.5 13.0 FJH	004047 U Cas Mira	8826.50 13.7 FJH	8848.5 11.8 FJH	8846.4 10.2 FJH	
8810.5 12.9 FJH	8746.4 8.7 KKP	8831.46 13.9 BMU	8873.4 11.5 FJH	8876.4 10.1 FJH	020356 UV Per UGSS
8826.5 12.5 FJH	8746.6 8.5 SAQ	8832.43 13.9 BMU	8890.5 12.1 CMG	8894.4 11.1 FJH	8837.50 :16.0 FJ
8842.4 11.7 FJH	8756.6 8.6 SAQ	8832.47 13.7 FJH			
8848.5 11.4 FJH	8763.4 9.0 BMU	8833.44 14.1 CMG	011041A UZ And Mira	013050 KT Per UGZ	020657A TZ Per UGZ
8864.5 9.7 FJH	8765.4 9.3 FJH	8833.44 13.8 FJH	8864.5 14.7 FJH	8826.51 12.6 FJH	8826.51 12.8 FJ
8876.4 9.4 FJH	8771.5 9.3 BMU	8834.43 10.9 BMU	8871.5 15.0 FJH	8837.50 14.2 FJH	8831.53 13.8 FJ
8890.5 9.0 CMG	8779.5 9.8 BMU	8834.46 11.6 BMU	8890.5 14.5 CMG	8841.56 12.7 FJH	8832.47 14.2 FJ
8894.3 8.9 FJH	8786.5 10.5 FJH	8835.44 11.0 FJH	8891.5 14.4 FJH	8842.48 13.1 FJH	8837.50 12.8 FJ
	8802.5 11.8 FJH	8837.50 11.0 FJH		8843.48 13.6 FJH	8841.57 12.8 FJ
001755 T Cas Mira HIP	8812.5 12.7 FJH	8838.42 11.9 BMU	011055A VZ Cas Mira	8852.48 12.6 FJH	8843.48 12.8 FJ
8761.5 11.5 BMU	8831.5 13.5 FJH	8839.40 12.5 FJH	8803.5 12.3 FJH	8853.44 13.1 FJH	8846.47 13.4 FJ
8765.4 11.6 FJH	8841.5 14.0 FJH	8839.41 12.9 BMU	8831.4 13.0 FJH	8864.42 12.5 FJH	8850.46 12.9 FJ
8771.5 11.6 BMU	8852.5 14.6 FJH	8839.45 12.9 CMG	8843.4 12.9 FJH	8865.45 11.9 FJH	8852.48 13.1 FJ
8779.5 11.5 BMU	8864.5 :15.2 FJH	8840.40 13.3 CMG	8852.5 12.6 FJH	8867.46 12.2 FJH	8854.49 13.4 FJ
8786.5 11.8 FJH		8840.43 13.5 BMU	8852.5 12.6 FJH	8871.54 13.1 FJH	8864.42 12.8 FJ
8801.5 11.8 FJH	004132 RW And Mira	8841.42 13.7 BMU	8889.3 10.7 CMG	8883.38 13.2 FJH	8871.54 13.5 FJ
8812.5 11.7 FJH	8842.5 15.2 FJH	8841.45 13.8 CMG	8894.4 10.2 FJH	8893.44 12.4 FJH	8877.50 12.9 FJ
8831.4 11.6 FJH	8864.5 15.3 FJH	8841.52 13.5 FJH		8894.42 12.7 FJH	8883.38 12.9 FJ
8841.4 10.8 FJH	8871.5 15.3 FJH	8842.44 13.8 BMU	011208 S Psc Mira		8893.44 12.8 FJ
8842.5 11.3 BMU		8842.46 13.5 FJH	8831.5 14.3 FJH	013338 Y And Mira	8894.45 13.3 FJ
8848.5 10.9 FJH	004435 V And Mira	8843.44 13.6 FJH	8842.5 13.7 FJH	8803.5 11.0 FJH	
8876.4 10.3 FJH	8771.6 11.3 FJH	8845.39 13.7 FJH	8890.5 10.5 CMG	8818.5 10.2 FJH	021024 R Ari Mira HIP
8889.3 9.8 CMG	8799.5 13.2 FJH	8846.43 13.7 FJH	8893.5 10.1 FJH	8833.5 10.3 FJH	8832.5 9.0 FJH
8894.3 9.6 FJH	8810.5 14.0 FJH	8848.43 13.7 FJH		8839.5 10.3 CMG	8843.5 9.5 FJH
	8831.5 15.0 FJH	8848.50 13.7 FJH	011272 S Cas Mira	8841.5 10.3 FJH	8877.5 11.9 FJH
001838 R And Mira HIP	8837.5 15.1 FJH	8850.45 11.0 FJH	8761.4 10.4 BMU	8848.4 10.6 FJH	8889.3 12.8 CMG
8799.5 :15.1 FJH	8842.5 15.1 FJH	8852.40 11.2 FJH	8762.4 10.5 FJH	8861.5 11.2 FJH	8891.5 12.8 FJH
8810.5 15.1 FJH	8864.5 15.1 FJH	8853.43 11.5 FJH	8779.5 10.6 BMU	8867.5 11.3 FJH	
8831.5 14.3 FJH	8871.5 15.2 FJH	8854.49 12.4 FJH	8803.5 11.8 FJH	8876.4 12.0 FJH	021143A W And Mira HIP
8833.4 14.3 CMG	8890.5 14.1 CMG	8855.43 12.9 FJH	8818.5 12.0 FJH	8883.4 12.6 FJH	8771.5 11.4 FJH
8835.4 14.3 FJH	8891.4 14.2 FJH	8864.41 14.5 FJH	8832.5 12.1 FJH	8890.5 13.2 CMG	8786.5 11.7 FJH
8842.5 14.2 FJH		8865.51 14.5 FJH	8842.5 11.7 BMU	8894.4 13.1 FJH	8803.5 11.8 FJH
8842.5 14.2 FJH		8867.45 14.2 FJH	8843.5 12.2 FJH		8831.5 12.9 FJH
8850.5 13.4 FJH		8871.53 14.2 FJH	8853.4 12.0 FJH		8841.5 13.0 FJH
8864.5 12.1 FJH		8871.61 13.9 BMU			8864.5 13.8 FJH
8873.4 10.8 FJH		8873.36 10.7 FJH			8871.5 14.1 FJH
8890.5 9.6 CMG		8876.38 10.6 FJH			8890.5 14.5 CMG
		8877.49 10.8 FJH			
		8883.38 13.0 FJH			
		8888.44 13.8 FJH			

021143A W And Mira HIP 8891.5 14.7 FJH	030514 U Ari Mira 8843.5 9.6 FJH 8877.5 10.8 FJH 8894.4 12.0 FJH 8894.4 12.3 CMG	032443 GK Per Na 8889.42 13.5 CMG 8891.46 12.9 FJH 8894.31 13.4 CMG 8895.34 13.1 BMU	050953 R Aur Mira HIP 8747.4 12.2 FJH 8826.5 13.3 FJH 8832.5 13.4 FJH 8839.5 13.5 BMU 8871.5 12.9 FJH 8891.5 12.5 CMG	061275 W Cam Mira 8891.3 12.4 CMG	073234 ST Gem Mira HIP 8746.4 9.8 FJH 8765.4 10.5 FJH 8896.6 13.4 CMG	
021281 Z Cep Mira 8832.5 12.1 FJH 8843.6 10.9 FJH 8889.5 11.1 CMG 8893.5 11.2 FJH	031170 V667 Cas Mira 8891.5 10.9 FJH	034532 RX Per Mira 8842.5 15.6 FJH	052036 W Aur Mira 8871.5 13.3 FJH 8877.5 12.5 FJH 8894.4 11.0 CMG	061647 V Aur Mira HIP 8747.4 9.9 BHM 8894.4 12.6 CMG	073508 U CMi Mira HIP 8896.6 9.3 CMG	
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0220-00 R Cet Mira HIP 8890.6 8.4 CMG	032335 R Per Mira 8841.6 13.9 FJH 8877.5 11.5 FJH 8889.4 10.7 CMG 8893.5 9.9 FJH	043065 T Cam Mira 8761.4 11.0 FJH 8779.5 12.1 BMU 8784.5 12.2 BMU 8786.5 12.6 FJH 8826.5 13.6 FJH 8831.5 13.8 FJH 8852.5 14.0 FJH 8871.5 13.7 FJH 8891.3 12.3 CMG 8894.4 12.0 FJH	053531 U Aur Mira 8871.5 12.9 FJH 8894.4 12.6 CMG	063159 U Lyn Mira 8891.5 13.8 CMG	074922 U Gem UGSS+E 8746.35 12.2 FJH 8871.62 9.3 BMU	
022150 RR Per Mira 8831.5 11.0 FJH 8843.5 10.6 FJH 8854.5 10.0 FJH 8889.4 10.3 CMG	032443 GK Per Na 8811.48 11.3 BMU 8823.46 10.7 BMU 8826.43 10.6 BMU 8826.49 10.5 FJH 8827.43 10.6 BMU 8831.44 10.3 BMU 8831.49 10.4 CMG 8831.50 10.4 FJH 8832.41 10.4 BMU 8832.45 10.4 CMG 8833.41 10.4 BMU 8833.45 10.5 FJH 8834.42 10.5 BMU 8834.43 10.4 BMU 8838.40 10.4 CMG 8838.42 10.4 BMU 8839.41 10.5 BMU 8839.47 10.4 CMG 8840.41 10.5 CMG 8840.42 10.6 BMU 8840.49 10.6 JCH 8841.42 10.6 BMU 8841.49 10.6 CMG 8841.57 10.5 FJH 8842.43 10.6 BMU 8843.52 10.4 FJH 8846.46 10.6 FJH 8846.46 10.7 BMU 8848.49 10.7 FJH 8854.52 10.8 FJH 8864.39 12.4 BMU 8865.51 12.4 FJH 8865.58 12.4 BMU 8871.61 12.6 BMU 8877.51 12.4 FJH 8889.32 13.0 BMU	043208 RX Tau Mira HIP 8894.5 11.7 CMG	053538 SZ Aur Mira 8871.5 14.9 FJH	063444A AA Aur Mira 8894.4 13.5 CMG	080362 SU UMa UGSU 8744.47 13.0 FJH 8746.38 13.6 FJH 8760.39 12.7 FJH 8761.42 13.0 FJH 8762.40 13.8 FJH 8765.41 14.3 FJH 8766.43 14.2 FJH 8768.41 14.2 FJH 8769.41 14.2 FJH	
02228-13 U Cet Mira HIP 8894.5 9.5 CMG	043274 X Cam Mira HIP 8747.4 11.4 FJH 8761.4 12.4 FJH 8766.4 12.4 FJH 8771.5 12.2 FJH 8784.5 11.4 FJH 8796.5 9.5 SAQ 8799.5 9.3 BMU 8810.5 8.5 BMU 8832.5 7.7 FJH 8833.4 7.7 BMU 8843.4 8.1 FJH 8852.4 8.2 FJH 8876.4 10.4 FJH 8891.3 12.1 CMG 8894.4 12.6 FJH	043274 X Cam Mira HIP 8747.4 11.4 FJH 8761.4 12.4 FJH 8766.4 12.4 FJH 8771.5 12.2 FJH 8784.5 11.4 FJH 8796.5 9.5 SAQ 8799.5 9.3 BMU 8810.5 8.5 BMU 8832.5 7.7 FJH 8833.4 7.7 BMU 8843.4 8.1 FJH 8852.4 8.2 FJH 8876.4 10.4 FJH 8891.3 12.1 CMG 8894.4 12.6 FJH	054615A Z Tau Mira 8896.6 13.6 CMG	064030 X Gem Mira HIP 8871.6 10.4 BMU 8894.5 12.4 CMG 8895.5 12.0 BMU	065111 Y Mon Mira HIP 8894.5 10.5 CMG	080428 YZ Cnc UGSU 8746.38 14.0 FJH 8896.58 13.1 CMG
022980 RR Cep Mira 8762.4 14.8 FJH 8832.5 14.6 FJH 8889.5 13.6 CMG 8893.5 13.8 FJH	044617 V Tau Mira 8877.5 9.7 FJH 8894.4 9.4 CMG	045307 R Ori Mira HIP 8894.5 13.5 CMG	054615C RU Tau Mira 8896.6 10.4 CMG	065355 R Lyn Mira HIP 8891.5 10.6 CMG	080523 RR Cnc Mira HIP 8896.6 10.6 CMG	
023133 R Tri Mira HIP 8831.5 12.1 FJH 8835.4 11.3 KKP 8843.5 12.0 FJH 8846.5 11.8 BMU 8877.5 11.7 FJH 8889.3 11.1 CMG 8891.5 11.2 FJH	0455-14 R Lep Mira HIP 8896.6 10.0 CMG	054974 V Cam Mira 8766.4 13.0 FJH 8891.3 12.2 CMG	054920A U Ori Mira HIP 8894.5 7.8 CMG	070109 V CMi Mira 8896.6 14.5 CMG	081473 Z Cam UGZ 8744.47 10.8 FJH 8746.38 11.3 FJH 8757.41 13.3 FJH 8760.39 13.4 FJH 8761.42 13.4 FJH 8761.44 13.2 FJH 8762.40 13.3 FJH 8762.44 13.1 BMU 8763.41 13.0 FJH 8763.42 12.8 BMU 8764.42 12.6 BMU 8765.41 12.8 FJH 8765.46 12.5 BMU 8766.42 12.7 FJH 8766.47 12.4 BMU 8767.45 12.5 BMU 8768.41 13.2 FJH 8768.45 12.9 BMU 8769.41 13.1 FJH 8769.45 12.9 BMU 8770.46 13.2 BMU 8771.41 12.7 FJH 8771.44 12.3 BMU 8777.46 10.4 BMU 8779.46 10.6 BMU 8782.51 11.2 BMU 8783.49 11.5 BMU 8784.46 11.6 BMU 8786.46 12.4 BMU 8799.45 11.1 BMU 8800.46 11.6 BMU	
024217 T Ari SRa HIP 8891.5 9.7 CMG	050003A V Ori Mira 8894.5 14.4 CMG	060450 X Aur Mira HIP 8747.4 9.1 BHM 8894.4 9.5 CMG	060246 VY Aur Mira 8746.4 13.3 FJH	070126 WZ Gem Mira 8746.4 11.8 FJH	071713 V Gem Mira HIP 8896.6 14.5 CMG	
			060450 X Aur Mira HIP 8747.4 9.1 BHM 8894.4 9.5 CMG	072141 VX Aur Mira HIP 8746.4 12.5 FJH 8894.5 8.6 CMG	072708 S CMi Mira HIP 8896.6 8.3 CMG	
			060547 SS Aur UGSS 8746.39 14.8 FJH 8831.55 11.1 FJH 8832.51 11.0 FJH 8864.52 10.9 FJH 8865.51 11.7 FJH	072811 T CMi Mira 8896.6 12.8 CMG		

180666 X Dra Mira	181406 AY Oph Mira	182306 T Ser Mira	184134 RY Lyr Mira	185032 RX Lyr Mira	190108 R Aql Mira HIP
8744.5 13.8 FJH	8831.4 14.7 FJH	8747.5 15.1 FJH	8864.4 11.0 FJH	8765.4 :15.6 FJH	8834.4 7.6 BMU
8760.4 13.2 FJH		8771.5 14.7 FJH	8877.4 10.1 FJH	8799.5 14.3 FJH	8839.4 7.6 JCH
8769.4 13.3 FJH	1817-28 N92 Sgr N	8802.5 13.9 FJH	8891.3 9.7 CMG	8806.5 13.8 FJH	8890.3 9.2 CMG
8782.4 12.5 FJH		8811.4 13.8 FJH	8893.3 9.8 FJH	8823.5 12.7 FJH	
8800.5 11.2 FJH	8826.44 9.1 BMU	8831.4 13.2 FJH	8895.5 9.6 BMU	8834.4 12.6 FJH	190317 SV Sge
8812.5 11.2 FJH	8831.43 9.0 BMU	8851.4 12.0 FJH		8841.5 12.7 FJH	RCB
8829.4 11.7 FJH	8833.40 9.4 BMU	8893.3 10.5 FJH	184137 AY Lyr UGSU	8847.4 12.8 FJH	8803.4 11.2 FJH
8833.4 11.8 CMG				8864.3 12.9 FJH	8853.4 11.3 FJH
8842.4 11.8 FJH	181730 TV Lyr Mira	183138 LL Lyr UG	8746.52 :15.5 FJH	8867.4 13.1 FJH	8883.4 11.3 FJH
8853.4 12.7 FJH			8768.45 :15.5 FJH	8883.3 13.5 FJH	8893.3 11.3 FJH
	8747.5 14.9 FJH	8746.52 :15.5 FJH	8769.43 :15.5 FJH	8891.3 13.6 CMG	
181031 TV Her Mira	8763.4 15.0 FJH	8768.45 :15.5 FJH	8771.44 :15.5 FJH	8893.3 13.8 FJH	190333 AB Lyr Mira
8744.5 14.1 FJH	8784.5 14.0 FJH	8769.44 :15.5 FJH	8784.45 13.2 FJH		
8762.4 14.4 FJH	8798.4 12.9 FJH	8771.44 :15.5 FJH	8786.44 :14.6 FJH	185131 SX Lyr Mira	8744.5 11.3 FJH
8771.4 14.5 FJH	8806.5 12.3 FJH	8784.45 :15.5 FJH	8810.44 :15.5 FJH	8744.5 13.0 FJH	8754.4 11.3 FJH
8799.5 14.5 FJH	8825.4 11.8 FJH	8810.44 :15.5 FJH	8811.45 :15.5 FJH	8754.4 12.5 FJH	8762.4 11.4 FJH
8810.4 14.5 FJH	8841.4 11.7 FJH	8811.45 :15.5 FJH	8832.44 :15.5 FJH	8760.4 12.8 FJH	8779.5 11.7 FJH
8826.4 14.4 FJH	8847.4 11.8 FJH	8832.44 :15.5 FJH	8837.49 :15.5 FJH	8769.4 12.4 FJH	8798.4 12.7 FJH
8835.4 14.5 FJH	8864.4 12.4 FJH	8837.49 :15.5 FJH	8841.47 13.6 FJH	8779.5 12.3 FJH	8806.4 13.8 FJH
8852.4 13.6 FJH	8877.4 12.6 FJH		8842.43 14.8 FJH	8798.4 12.2 FJH	8826.5 14.7 FJH
8867.4 13.0 FJH	8891.3 14.1 CMG	183149A SV Dra Mira	8843.53 :16.8 FJH	8806.4 12.2 FJH	8834.4 15.3 FJH
8883.3 11.1 FJH	8893.3 13.4 FJH		8882.43 13.5 FJH	8818.5 12.1 FJH	8842.5 :15.5 FJH
8894.3 10.8 CMG		8746.5 14.7 FJH	8883.32 12.6 BMU	8831.4 12.3 FJH	
	182039 TW Lyr Mira	8761.4 14.8 FJH	8883.34 12.9 FJH	8847.4 12.4 FJH	190443 MV Lyr NL
181103 RY Oph Mira HIP		8769.4 14.5 FJH	8891.41 13.2 FJH	8864.4 12.9 FJH	
8889.3 12.7 CMG	8746.5 10.9 FJH	8777.5 14.7 FJH	8893.33 13.4 FJH	8882.4 13.8 FJH	8746.52 12.3 FJ
	8757.4 11.0 FJH	8800.5 13.8 FJH		8893.3 14.0 FJH	8761.44 12.2 FJ
181136 W Lyr Mira HIP	8766.4 11.0 FJH	8812.5 13.3 FJH	1842-05 R Sct RV		8786.44 12.3 FJ
8746.5 12.7 FJH	8782.5 11.5 FJH	8832.4 10.9 FJH	8826.4 5.9 BMU	185132 FF Lyr Mira	8803.47 12.6 FJ
8757.4 12.7 FJH	8798.4 12.2 FJH	8833.4 10.8 CMG	8832.4 5.9 BMU		8818.54 12.6 FJ
8766.4 12.5 FJH	8806.5 12.5 FJH	8853.4 10.0 FJH	8838.4 6.0 BMU	8765.4 :15.0 FJH	8834.43 12.3 FJ
8777.5 11.9 FJH	8823.5 12.2 FJH	8882.4 10.6 FJH	8846.4 5.9 BMU	8831.4 14.4 FJH	8845.40 12.2 FJ
8798.4 9.6 FJH	8834.4 12.9 FJH	8889.5 10.1 CMG	8864.4 5.6 BMU	8841.5 14.7 FJH	8864.41 12.6 FJ
8799.5 9.8 KKP	8841.5 13.4 FJH	8893.3 11.4 FJH	8873.3 5.6 BMU		8877.39 12.2 FJ
8802.5 9.7 KKP	8854.4 13.6 FJH		8889.3 5.9 BMU	185634 Z Lyr Mira	8891.29 12.4 CM
8810.5 8.7 HOL	8867.4 13.8 FJH	183225 RZ Her Mira	8890.3 5.9 CMG		8893.33 12.2 FJ
8811.4 8.9 VDH	8883.4 14.2 FJH			8747.5 11.5 FJH	190527 TY Lyr Mira
8826.4 8.4 VDH	8891.3 14.0 CMG	8744.5 11.8 FJH		8754.4 11.6 FJH	
8826.5 8.5 HOL	8893.3 14.6 FJH	8760.4 10.2 FJH	184243 RW Lyr Mira	8762.4 12.1 FJH	8744.5 10.8 FJH
8832.4 8.1 HOL		8784.4 9.9 FJH		8771.4 12.6 FJH	8757.4 11.3 FJH
8832.4 8.2 FJH	182172 RT Dra Mira	8802.5 10.3 FJH	8811.5 :15.8 FJH	8779.5 13.0 FJH	8765.4 12.1 FJH
8833.4 7.7 JCH		8823.5 11.6 FJH	8842.5 :16.0 FJH	8799.5 13.8 FJH	8779.5 12.2 FJH
8834.5 8.2 BMU	8744.5 12.2 FJH	8835.4 11.8 FJH		8806.5 14.2 FJH	8799.5 12.9 FJH
8840.4 8.3 KKP	8757.4 12.0 FJH	8842.4 12.0 FJH	184826 CY Lyr UGSS	8831.4 14.8 FJH	8806.4 13.4 FJH
8840.5 7.9 JCH	8782.4 11.6 FJH	8852.4 12.5 FJH		8841.5 15.0 FJH	8825.4 14.0 FJH
8840.5 8.2 HOL	8800.5 11.1 FJH	8867.4 13.5 FJH	8744.50 13.1 FJH	8891.3 14.3 CMG	8834.4 14.3 FJH
8841.4 7.9 FJH	8829.4 10.0 FJH	8883.3 14.0 FJH	8746.52 14.2 FJH		8842.4 14.6 FJH
8841.5 8.1 BMU	8841.4 10.0 FJH	8890.3 13.8 CMG	8747.50 14.6 FJH	185737 RT Lyr Mira	8854.4 14.7 FJH
8848.4 7.8 FJH	8848.4 10.0 FJH		8763.43 13.0 FJH		8867.4 :15.0 FJH
8854.4 8.0 HOL	8873.4 11.1 FJH	183308 X Oph Mira	8764.43 13.3 FJH	8746.5 13.5 FJH	190529A V Lyr Mira
8864.4 8.2 HOL	8889.5 11.9 CMG		8765.40 13.7 FJH	8761.4 14.4 FJH	
8871.4 8.1 HOL	8891.4 11.5 FJH	183922 AE Her Mira HIP	8766.44 14.6 FJH	8768.5 14.5 FJH	8746.5 14.8 FJH
8876.4 8.2 FJH			8768.44 15.1 FJH	8779.5 14.8 FJH	8768.5 :14.8 FJH
8883.3 8.7 HOL	182224 SV Her Mira	8746.5 14.1 FJH	8771.44 :15.6 FJH	8799.5 :15.2 FJH	8799.5 :15.1 FJH
8883.3 8.7 VDH		8768.4 14.1 FJH	8777.45 13.3 FJH	8811.5 :15.3 FJH	8811.5 :15.7 FJH
8891.3 8.8 HOL	8744.5 12.0 FJH	8799.5 12.5 FJH	8784.45 :14.8 FJH	8842.5 15.0 FJH	8891.3 :14.5 CMG
8891.3 9.1 CMG	8754.4 12.3 FJH	8811.4 12.1 FJH	8810.44 13.2 FJH	8867.4 14.7 FJH	
8893.3 9.2 FJH	8764.4 13.3 FJH	8823.5 11.3 FJH	8811.45 13.4 FJH	8883.3 13.8 FJH	190529B VZ Lyr Mira
8895.5 8.9 BMU	8777.5 13.6 FJH	8834.4 9.8 FJH	8812.51 14.3 FJH	8893.3 13.1 FJH	
	8799.5 14.6 FJH	8842.4 9.5 FJH	8823.50 13.3 FJH		8867.4 13.2 FJH
181306 BC Oph Mira HIP	8811.4 14.8 FJH	8850.4 9.5 FJH	8825.43 14.2 FJH	185947 WZ Lyr Mira	8877.4 12.5 FJH
8771.5 9.4 FJH	8826.4 15.2 FJH	8867.3 9.6 FJH	8832.44 :15.6 FJH		8893.3 11.6 FJH
8779.5 9.5 FJH	8835.4 15.3 FJH	8893.3 11.0 FJH	8837.49 13.3 FJH	8746.5 11.0 FJH	
8802.5 10.5 FJH	8842.5 14.9 FJH		8841.47 13.2 FJH	8757.4 10.8 FJH	190627A UV Lyr Mira
8811.4 11.0 FJH	8852.4 14.7 FJH	184134 RY Lyr Mira	8842.43 13.3 FJH	8766.4 11.3 FJH	
8831.4 11.9 FJH	8867.4 14.0 FJH		8843.42 13.2 FJH	8782.4 12.0 FJH	8891.3 11.7 CMG
	8883.3 13.6 FJH	8746.5 14.3 FJH	8845.38 13.8 FJH	8800.5 13.1 FJH	190643 ST Lyr Mira
181406 AY Oph Mira	8890.3 13.6 CMG	8761.4 14.4 FJH	8862.38 14.1 FJH	8812.5 13.4 FJH	
8771.5 10.6 FJH		8777.5 14.2 FJH	8873.38 13.4 FJH	8825.4 13.7 FJH	8746.5 14.4 FJH
8779.5 10.8 FJH		8799.5 13.5 FJH		8834.4 13.9 FJH	8765.4 14.6 FJH
8802.5 12.5 FJH		8806.5 13.3 FJH		8841.5 14.0 FJH	8834.4 14.8 FJH
8811.4 13.4 FJH		8823.5 12.4 FJH		8864.4 14.7 FJH	8891.3 12.7 CMG
		8834.4 12.3 FJH			
		8841.5 11.9 FJH			
		8847.4 11.8 FJH			

201621 PU Vul NL		202752 N92 Cyg N		202752 N92 Cyg N		202817 Z Del Mira		203816 S Del Mira HIP		204318 V Del Mira	
8889.4	11.4	BMU	8750.40	8.3	SAQ	8816.47	8.6	SAQ	8746.5	10.0	FJH
8893.3	11.5	FJH	8750.42	8.0	BHN	8816.48	8.9	BMU	8760.4	10.1	FJH
			8752.48	8.2	BHN	8816.51	8.6	HOL	8771.5	10.6	FJH
			8754.41	8.7	VDH	8818.48	8.6	HOL	8779.5	10.8	FJH
201647 U Cyg Mira HIP			8754.43	8.0	FJH	8820.45	8.9	BMU	8799.5	11.8	FJH
8766.4	8.0	FJH	8754.43	8.3	SAQ	8823.43	8.9	BMU	8810.5	12.2	FJH
8841.4	10.2	FJH	8755.43	8.1	BHN	8825.43	8.8	BMU	8826.4	12.6	FJH
8850.4	10.3	FJH	8756.56	8.2	SAQ	8825.46	8.5	SAQ	8834.4	13.0	FJH
8891.3	10.6	CMG	8757.39	8.1	BHN	8825.56	8.6	HOL	8839.4	13.5	BMU
			8757.45	8.2	BMU	8826.40	8.5	VDH	8841.4	14.0	CMG
202343 V503 Cyg UGSS			8758.43	8.1	FJH	8826.41	8.9	BMU	8841.5	13.7	FJH
8747.51	14.6	FJH	8759.43	8.0	BHN	8826.57	8.7	HOL	8852.4	14.1	FJH
8771.45	15.0	FJH	8760.43	8.3	BMU	8827.43	9.0	BMU	8864.4	14.2	FJH
8784.45	15.0	FJH	8761.43	8.4	BMU	8831.39	8.6	SAQ	8883.4	14.7	FJH
8803.44	13.7	FJH	8761.57	8.1	SAQ	8831.42	9.0	BMU	8889.3	14.4	CMG
8806.46	13.7	FJH	8762.39	8.1	SAQ	8831.53	8.7	HOL	202918 AG Del Mira		
8810.46	14.0	FJH	8762.42	8.3	BMU	8832.42	8.9	FJH	8802.5 15.3 FJH		
8811.45	14.0	FJH	8762.47	8.0	CMG	8832.42	9.0	BMU	202954 ST Cyg Mira		
8812.49	14.3	FJH	8762.57	7.8	BHN	8832.46	8.9	CMG	8842.4 10.7 BMU		
8826.44	14.7	FJH	8763.42	8.2	FJH	8833.41	9.0	BMU	8891.3 11.4 CMG		
8832.45	15.3	FJH	8763.42	8.3	BMU	8833.53	8.6	HOL	202962 BF Cep Mira		
8888.44	13.9	FJH	8763.45	8.2	CMG	8834.41	9.0	BMU	8746.5 14.4 FJH		
8891.41	14.0	FJH	8764.43	8.4	BMU	8834.44	8.9	BMU	8761.4 14.2 FJH		
8893.36	14.0	FJH	8764.46	8.3	CMG	8834.49	8.8	FJH	8812.5 13.5 FJH		
			8765.40	8.1	SAQ	8835.49	8.8	HOL	8843.5 12.8 FJH		
			8765.46	8.3	BMU	8836.41	8.9	BMU	8876.4 12.3 FJH		
202509 RY Del Mira			8765.52	8.1	JDJ	8838.40	8.9	CMG	8894.4 12.3 FJH		
8746.5	13.9	FJH	8766.43	8.2	SAQ	8838.42	8.6	HOL	2039-05 Y Aqr Mira		
8771.5	13.0	FJH	8766.47	8.4	BMU	8838.42	9.0	BMU	8826.5 10.4 FJH		
8779.5	13.0	FJH	8767.46	8.5	BMU	8839.41	9.0	BMU	8839.4 11.2 FJH		
8802.5	13.7	FJH	8768.45	8.6	BMU	8839.49	9.0	HOL	8852.4 11.3 FJH		
8810.5	14.0	FJH	8769.41	8.3	SAQ	8840.41	8.9	CMG	8871.4 11.7 FJH		
8826.4	14.6	FJH	8769.41	8.3	VDH	8840.43	9.0	BMU	8883.4 11.8 FJH		
8834.5	15.0	FJH	8769.45	8.3	FJH	8840.52	9.1	HOL	8890.4 12.0 CMG		
8842.5	15.2	FJH	8769.45	8.6	BMU	8841.43	9.0	BMU	2044-05 T Aqr Mira HIP		
8855.4	15.8	FJH	8770.47	8.5	BMU	8842.44	9.1	BMU	8802.5 7.8 KKP		
			8771.44	8.4	BMU	8843.4	9.1	FJH	8826.5 8.7 FJH		
			8771.48	8.3	SAQ	8844.43	9.0	HOL	8839.4 9.0 FJH		
202512 RX Del Mira			8777.47	8.5	BMU	8845.44	8.9	BMU	8852.4 10.0 FJH		
8746.5	11.2	FJH	8777.48	8.4	FJH	8846.36	8.9	CMG	8871.4 11.5 FJH		
8760.5	10.6	FJH	8779.46	8.5	BMU	8846.44	8.9	BMU	8883.4 12.0 FJH		
8771.5	10.7	FJH	8782.52	8.1	SAQ	8846.47	8.9	FJH	8890.4 12.7 CMG		
8779.5	10.9	FJH	8782.52	8.4	BMU	8850.39	9.1	FJH	204846 RZ Cyg Mira		
8800.5	12.0	FJH	8783.44	8.4	BMU	8850.41	9.0	BMU	8891.3 12.1 CMG		
8811.5	12.6	FJH	8784.40	8.3	BHN	8852.49	9.1	HOL	205017 X Del Mira		
8826.4	14.4	FJH	8784.46	8.5	BMU	8854.41	9.0	FJH	8746.5 14.5 FJH		
8834.5	14.7	FJH	8784.47	8.4	SAQ	8854.43	9.0	HOL	8771.5 13.9 FJH		
8842.5	15.1	FJH	8786.46	8.6	BMU	8854.46	9.0	BMU	8784.5 13.5 FJH		
8854.4	15.0	FJH	8786.54	8.5	FJH	8856.41	9.0	BMU	8800.5 12.9 FJH		
			8788.40	8.5	SAQ	8860.34	9.1	BMU	8811.5 12.7 FJH		
			8788.42	8.5	BHN	8860.34	9.1	FJH	8825.5 11.1 FJH		
202752 N92 Cyg N			8791.44	8.5	BHN	8864.47	9.0	FJH	8746.5 14.6 FJH		
8716.45	7.5	BMU	8791.45	8.5	SAQ	8864.49	8.9	HOL	8771.5 13.1 FJH		
8717.61	7.4	BMU	8792.42	8.7	BMU	8864.58	9.1	BMU	8779.5 12.0 FJH		
8719.57	7.5	BMU	8794.50	8.4	SAQ	8865.57	9.1	BMU	8800.5 9.9 FJH		
8720.59	7.4	BMU	8796.41	8.5	BHN	8866.34	9.0	CMG	8811.5 9.7 FJH		
8721.59	7.3	BMU	8796.51	8.4	SAQ	8871.49	9.2	HOL	8825.5 9.7 FJH		
8722.60	7.5	BMU	8798.47	8.5	SAQ	8871.59	9.0	BMU	8831.4 9.8 KKP		
8729.43	7.6	BMU	8799.45	8.9	BMU	8876.41	9.0	FJH	8839.4 9.8 FJH		
8731.63	7.8	BMU	8799.55	8.6	FJH	8876.44	9.2	HOL	8841.4 10.4 CMG		
8732.43	7.8	BMU	8800.46	8.8	BMU	8883.36	9.2	BMU	8851.4 10.7 FJH		
8733.43	8.0	BMU	8802.46	8.8	BMU	8883.45	9.0	FJH	8864.4 11.4 FJH		
8738.54	8.2	BMU	8803.40	8.5	BHN	8883.47	9.1	HOL	8871.4 11.8 FJH		
8742.38	8.1	SAQ	8803.46	8.9	BMU	8889.41	9.1	BMU	8882.4 12.0 FJH		
8742.53	8.4	BMU	8806.46	8.9	BMU	8891.28	9.2	BMU	8889.3 12.0 CMG		
8744.53	8.4	BMU	8808.47	8.5	SAQ	8891.40	9.2	HOL	8893.3 12.7 FJH		
8745.48	8.2	BHN	8809.58	8.8	HOL	8893.48	8.9	FJH	203718 HR Del Nb		
8746.40	8.2	SAQ	8810.47	8.4	SAQ	8893.50	9.5	HOL	8784.44 12.0 FJH		
8746.42	8.3	VDH	8810.47	9.0	BMU	8894.50	9.3	HOL	8811.46 12.1 FJH		
8746.43	8.1	FJH	8810.51	8.7	HOL	8895.35	9.2	BMU	8839.4 11.9 BMU		
8746.52	8.2	BMU	8811.43	8.5	VDH				8853.4 12.1 FJH		
8747.44	7.9	BHN	8811.46	8.9	BMU				8873.38 12.0 FJH		
8747.57	8.3	SAQ	8812.46	8.9	BMU				2041-04 W Aqr Mira		
			8816.44	8.6	FJH				8832.4 14.6 FJH		
									8842.5 14.8 FJH		

210129 TW Cyg Mira	210868 T Cep Mira HIP	213753 RU Cyg SR	213843 SS Cyg UGSS	213843 SS Cyg UGSS	220133B RZ Peg Mira HIP
8891.3 14.2 CMG	8864.4 7.9 HOL	8826.6 8.8 HOL	8835.44 9.2 FJH	8894.34 11.9 HOL	8760.5 8.9 FJH
	8876.4 7.5 HOL	8834.5 8.8 HOL	8835.46 9.8 HOL	8894.42 11.8 FJH	8770.5 8.8 FJH
210382 X Cep Mira	8883.3 7.5 VDH	8841.5 8.9 HOL	8836.41 8.8 BMU	8895.43 11.9 BMU	8784.5 9.2 FJH
8762.4 11.0 FJH	8883.5 7.5 HOL	8864.4 8.6 HOL	8836.52 9.4 HOL	8896.32 11.1 CMG	8801.5 9.3 FJH
8784.5 12.0 FJH	8889.5 7.4 CMG	8876.4 8.7 HOL	8837.47 8.6 FJH	8896.59 9.4 CMG	8816.4 9.4 FJH
8801.5 12.1 FJH	8891.5 7.2 HOL	8883.4 8.5 HOL	8838.39 8.4 CMG		8827.5 9.4 FJH
8818.5 12.6 FJH	2109-03 RR Aqr	8891.5 8.4 HOL	8838.42 8.3 BMU	214012 TU Peg	8839.4 9.5 FJH
8826.5 12.8 FJH	Mira		8838.43 8.3 HOL	Mira HIP	8852.4 10.5 FJH
8832.5 12.9 FJH	8839.4 9.8 FJH	213843 SS Cyg	8839.37 8.1 FJH	8760.5 10.8 FJH	8873.4 11.1 FJH
8843.5 13.1 FJH	8894.3 11.7 CMG	UGSS	8839.41 8.3 BMU	8770.5 10.9 FJH	8882.4 11.1 FJH
8891.5 14.0 FJH			8839.46 8.3 CMG	8786.5 11.1 FJH	8890.5 10.9 CMG
210405 RR Equ	211614 X Peg	8719.59 8.2 BMU	8839.48 8.0 HOL	8811.5 12.1 FJH	8894.3 11.6 FJH
Mira	Mira	8720.59 8.2 BMU	8840.41 8.3 CMG	8818.5 12.0 FJH	
8802.5 13.5 FJH	8771.5 13.8 FJH	8721.59 8.3 BMU	8840.43 8.2 BMU	8829.4 12.3 FJH	220337 W Lac
8810.5 13.2 FJH	8779.5 14.0 FJH	8738.53 12.1 BMU	8840.53 8.2 HOL	8843.4 12.5 FJH	Mira
8829.4 10.5 FJH	8799.5 13.9 FJH	8744.52 12.1 BMU	8841.36 8.3 FJH	8852.4 13.0 FJH	8890.4 11.7 CMG
8839.4 10.5 FJH	8806.5 13.8 FJH	8746.52 12.1 BMU	8841.42 8.3 CMG	8864.4 13.2 FJH	
8852.4 10.3 FJH	8826.4 12.5 FJH	8757.43 12.1 BMU	8841.43 8.3 BMU	8883.4 13.4 FJH	220412 T Peg
8864.5 11.1 FJH	8834.5 12.2 FJH	8760.43 12.0 BMU	8841.54 8.3 HOL	8890.5 13.7 CMG	Mira
8871.5 11.6 FJH	8839.4 12.2 FJH	8760.53 11.8 FJH	8842.36 8.2 FJH	8891.4 13.2 FJH	8771.5 14.0 FJH
8871.5 11.6 FJH	8852.4 11.2 FJH	8761.43 12.1 BMU	8842.44 8.3 BMU		8799.5 12.6 FJH
8882.4 11.9 FJH	8871.5 9.6 FJH	8762.42 12.2 BMU	8842.49 8.4 HOL	214024 RR Peg	8810.5 12.6 FJH
8890.4 12.5 CMG	8890.5 9.6 CMG	8763.42 12.1 BMU	8843.36 8.2 FJH	Mira	8826.5 12.5 FJH
	8894.3 9.9 FJH	8764.42 12.2 BMU	8843.43 8.4 CMG	8720.6 11.5 BMU	8838.5 12.2 BMU
210612 AN Peg	211800 RW Aqr	8765.46 12.1 BMU	8844.41 8.4 CMG	8760.5 10.3 FJH	8839.4 12.4 FJH
Mira	Mira	8765.49 11.7 FJH	8844.43 8.3 HOL	8770.5 10.5 FJH	8852.5 12.0 FJH
8771.5 11.9 FJH	8890.4 13.6 CMG	8766.47 12.2 BMU	8845.37 8.4 CMG	8784.4 11.1 FJH	8871.5 11.5
8786.5 12.4 FJH		8767.46 12.1 BMU	8845.39 8.3 FJH	8799.5 11.8 FJH	8882.4 11.3 FJH
8802.5 12.9 FJH	212216 TV Peg	8768.45 12.1 BMU	8845.44 8.4 BMU	8806.5 12.2 FJH	8890.5 10.9 CMG
8810.5 13.3 FJH	Mira	8769.45 12.1 BMU	8846.36 8.4 CMG	8826.4 13.3 FJH	
8834.5 14.8 FJH	8760.5 12.2 FJH	8770.47 12.0 BMU	8846.43 8.4 FJH	8834.5 13.3 FJH	220613 Y Peg
8842.5 14.9 FJH	8771.5 13.1 FJH	8771.44 12.1 BMU	8846.44 8.5 BMU	8841.5 13.8 FJH	Mira
8855.4 15.2 FJH	8786.5 13.8 FJH	8777.47 11.4 BMU	8847.41 8.7 FJH	8852.5 14.2 FJH	8799.5 13.3 FJH
8890.5 14.4 CMG	8799.5 14.7 FJH	8779.46 10.8 BMU	8848.41 9.0 FJH	8864.4 14.6 FJH	8810.5 11.8 FJH
210812 R Equ	8810.5 15.2 FJH	8782.45 8.3 FJH	8850.35 10.3 CMG	8871.4 14.7 FJH	8826.5 10.9 FJH
Mira	8826.4 15.0 FJH	8782.51 8.4 BMU	8850.38 10.2 HOL	8883.4 14.9 FJH	8839.4 10.6 FJH
8746.5 13.8 FJH	8842.5 15.5 FJH	8783.44 8.3 BMU	8850.41 10.1 BMU	8890.5 14.8 CMG	8852.4 11.0 FJH
8771.5 14.3 FJH	8855.4 15.3 FJH	8784.43 8.3 FJH	8851.37 10.5 FJH	8891.4 15.0 FJH	8864.4 11.3 FJH
8779.5 14.2 FJH	8871.5 14.9 FJH	8784.46 8.4 BMU	8852.37 10.8 FJH		8871.5 11.8 FJH
8799.5 14.3 FJH	8883.4 13.9 FJH	8786.46 8.7 BMU	8852.50 10.8 HOL	214445 WY Cyg	8882.4 12.4 FJH
8810.5 14.2 FJH		8788.46 9.5 FJH	8853.37 10.9 FJH	Mira	8890.5 13.4 CMG
8826.4 13.6 FJH	212610 UU Peg	8792.42 12.0 BMU	8854.37 11.1 FJH	8766.4 9.5 FJH	8891.4 13.4 FJH
8833.4 12.8 CMG	Mira	8799.45 12.1 BMU	8854.46 11.4 BMU	8788.5 9.4 FJH	
8834.5 12.6 FJH	8771.5 10.9 FJH	8800.46 12.2 BMU	8855.42 11.5 FJH	8801.5 9.6 FJH	220714 RS Peg
8839.4 12.7 FJH	8779.5 10.6 FJH	8801.46 11.8 FJH	8856.41 11.8 BMU	8842.4 10.8 FJH	Mira HIP
8852.4 12.5 FJH	8786.5 10.8 FJH	8802.46 12.1 BMU	8860.34 11.9 BMU	8851.4 11.0 FJH	8771.5 14.4 FJH
8864.5 12.0 FJH	8802.5 11.0 FJH	8803.46 12.1 BMU	8860.34 11.8 FJH	8865.4 12.2 FJH	8799.5 13.8 FJH
8871.5 11.3 FJH	8811.5 11.1 FJH	8806.46 12.0 BMU	8861.53 11.8 FJH	8883.4 13.2 FJH	8810.5 13.8 FJH
8882.4 9.8 FJH	8826.5 11.5 FJH	8810.46 12.0 BMU	8864.34 11.8 FJH	8891.3 13.3 CMG	8826.5 13.6 FJH
8890.4 9.6 CMG	8834.5 11.7 FJH	8811.46 11.9 BMU	8864.40 11.9 BMU		8834.5 13.6 FJH
210818 AS Peg	8839.4 11.2 FJH	8812.46 12.0 BMU	8864.47 11.7 HOL	215605 V Peg	8841.5 13.6 FJH
Mira	8852.4 12.1 FJH	8812.48 12.1 FJH	8865.43 11.9 FJH	Mira	8852.4 13.5 FJH
8799.5 14.9 FJH	8864.4 12.2 FJH	8816.49 12.0 BMU	8865.57 11.9 BMU	8802.5 10.7 FJH	8864.4 13.6 FJH
8826.4 15.3 FJH	8871.5 12.3 FJH	8818.49 12.1 FJH	8871.35 11.8 FJH	8811.5 11.0 FJH	8871.5 13.4 FJH
8835.5 15.5 FJH	8882.4 12.4 FJH	8823.43 12.1 BMU	8871.59 12.0 BMU	8826.5 11.8 FJH	8882.4 13.1 FJH
8841.5 15.5 FJH	8891.4 12.4 FJH	8825.42 12.0 BMU	8873.33 11.8 FJH	8834.5 12.2 FJH	8890.5 12.4 CMG
8855.4 15.3 FJH		8826.41 11.9 BMU	8876.39 11.8 FJH	8841.5 12.6 FJH	8891.4 12.7 FJH
8871.5 15.4 FJH	213678 S Cep	8826.50 11.9 HOL	8882.42 11.7 FJH	8852.4 12.9 FJH	
8891.4 14.7 FJH	Mira HIP	8827.43 12.0 BMU	8882.42 11.7 FJH	8864.4 13.0 FJH	220912 RU Peg
	8766.4 9.2 FJH	8829.41 12.1 FJH	8883.29 12.1 BMU	8871.5 13.4 FJH	UGSS
210836 DU Cyg	8788.4 9.5 FJH	8831.42 11.7 BMU	8883.32 11.9 HOL	8883.4 13.7 FJH	8771.52 11.7 FJH
Mira	8832.4 10.0 FJH	8831.51 11.7 HOL	8883.43 11.8 FJH	8890.5 14.1 CMG	8779.50 10.9 FJH
8891.3 12.1 CMG	8841.5 10.0 FJH	8832.42 10.7 BMU	8888.43 11.8 FJH	8891.4 13.9 FJH	8784.48 11.3 FJH
	8876.4 10.0 FJH	8832.43 10.7 FJH	8889.32 11.8 BMU		8786.48 11.5 FJH
210868 T Cep	8883.5 10.1 HOL	8832.45 11.7 CMG	8890.41 12.0 BMU	215934 RT Peg	8799.51 12.4 FJH
Mira HIP	8889.5 10.5 CMG	8832.45 9.8 HOL	8891.28 11.7 BMU	Mira	8810.46 12.2 FJH
8756.4 10.2 FJH	8892.5 10.1 HOL	8833.40 10.2 FJH	8891.33 12.0 CMG	8760.5 13.6 FJH	8811.51 12.3 FJH
8763.4 9.9 FJH	8894.5 10.3 FJH	8833.40 10.3 CMG	8891.40 11.9 HOL	8786.5 11.0 FJH	8829.42 12.1 FJH
8765.6 10.0 JOJ		8833.41 10.3 BMU	8891.40 11.9 HOL	8833.5 10.7 FJH	8831.48 12.3 FJH
8826.6 8.2 HOL		8833.45 9.8 HOL	8892.32 11.9 HOL	8843.4 10.7 FJH	8832.46 12.2 FJH
8838.4 8.2 HOL		8834.41 10.1 BMU	8893.31 12.0 CMG	8854.5 11.5 FJH	8834.45 12.3 BMU
8843.4 8.0 FJH		8834.43 9.9 BMU		8866.3 11.5 CMG	8834.46 12.3 FJH
8851.4 8.0 FJH		8834.47 10.4 HOL		8871.5 13.6 FJH	8835.45 12.3 FJH
8856.4 8.0 BMU		8834.49 10.2 FJH		8890.5 14.2 CMG	8837.49 12.4 FJH
					8838.45 12.3 BMU
					8839.46 12.4 CMG
					8841.46 12.4 CMG

220912 RU Peg UGSS	224517 SX Peg Mira HIP	231508 S Peg Mira HIP	2338-15 R Aqr Mira HIP	2357-15 W Cet Mira
8841.50 12.4 FJH	8803.5 11.3 FJH	8847.4 8.3 FJH	8890.6 10.1 CMG	8890.6 13.6 CMG
8843.43 12.6 FJH	8890.5 9.3 CMG	8890.5 9.5 CMG		
8845.44 12.7 FJH		8893.5 9.8 FJH	233956 Z Cas Mira	235855A Y Cas Mira
8852.51 12.8 FJH	225542 SZ And Mira	231817 IP Peg UGSS+E	8799.5 14.0 FJH	8786.5 :14.6 FJH
8853.44 12.7 FJH	8786.5 13.5 FJH	8832.46 ;15.0 FJH	8810.5 14.3 FJH	8802.5 14.8 FJH
8854.49 12.7 FJH	8799.5 13.8 FJH	8834.46 ;15.0 FJH	8831.4 13.7 FJH	8831.4 15.2 FJH
8855.44 12.7 FJH	8806.5 13.9 FJH	8835.46 ;15.0 FJH	8833.4 14.0 CMG	8842.5 :15.3 FJH
8864.39 12.6 FJH	8831.4 14.0 FJH	8837.49 ;15.0 FJH	8842.5 13.2 FJH	8893.4 14.6 FJH
8866.35 12.3 CMG	8841.5 14.1 FJH	8842.53 15.2 FJH	8852.5 12.3 FJH	
8867.40 12.6 FJH	225914 RW Peg Mira	8871.40 12.5 FJH	8867.4 11.0 FJH	235939 SV And Mira HIP
8871.40 12.5 FJH	8779.5 12.7 FJH	8873.36 12.7 FJH	8889.3 10.8 CMG	8786.5 12.7 FJH
8882.44 11.7 FJH	8786.5 12.1 FJH		8893.5 11.0 FJH	8801.5 11.2 FJH
8883.31 11.2 BMU	8802.5 10.6 FJH	231839 BU And Mira		8812.5 9.6 FJH
8883.37 11.8 FJH	8818.5 10.1 FJH	8771.5 12.8 FJH	235053 RR Cas Mira	8827.5 9.5 FJH
8888.43 12.1 FJH	8827.5 10.1 FJH	8786.5 12.9 FJH	8799.5 13.0 FJH	8832.4 9.5 FJH
8890.45 12.3 CMG	8838.4 10.3 BMU	8803.5 13.7 FJH	8812.5 12.4 FJH	8841.4 9.6 FJH
8891.43 12.3 FJH	8839.4 10.3 FJH	8810.5 13.9 FJH	8843.4 11.6 FJH	8848.4 9.6 FJH
8893.43 12.3 FJH	8847.4 10.3 FJH	8831.5 14.1 FJH	8854.4 11.6 FJH	8864.5 10.2 FJH
8894.31 12.3 CMG	8861.5 10.7 FJH	8841.5 14.2 FJH	8865.4 11.4 FJH	8890.5 11.5 CMG
8894.42 12.5 FJH	8882.4 12.3 FJH	8855.4 14.2 FJH	8889.3 11.3 CMG	8891.5 11.9 FJH
8896.31 12.4 CMG	8890.5 12.4 CMG	8864.5 14.1 FJH	8893.5 11.0 FJH	
	8891.4 12.7 FJH	8871.5 14.1 FJH		
222129 RV Peg Mira	230110 R Peg Mira HIP	8893.4 14.1 FJH	2352-09 V Cet Mira	
8786.5 13.4 FJH	8802.5 8.3 KKP		8890.6 13.9 CMG	
8799.5 13.6 FJH	8803.5 8.2 FJH	232144 AL And Mira		
8810.5 13.9 FJH	8812.5 8.3 FJH	8810.5 :15.0 FJH	235255 WY Cas Mira	
8831.5 14.7 FJH	8827.5 8.5 FJH	8831.5 13.8 FJH	8765.4 12.4 FJH	
8835.5 14.8 FJH	8832.5 8.6 FJH	8841.5 12.6 FJH	8786.5 12.8 FJH	
8842.5 14.8 FJH	8838.4 8.7 BMU	8848.5 12.3 FJH	8799.5 13.3 FJH	
8866.4 14.6 CMG	8839.4 9.0 FJH	8867.5 11.9 FJH	8810.5 13.4 FJH	
8871.5 :15.3 FJH	8847.4 8.9 FJH	8873.4 11.9 FJH	8831.4 13.9 FJH	
	8890.5 10.0 CMG	8888.5 11.2 FJH	8842.5 14.1 FJH	
222439 S Lac Mira HIP	8893.5 10.0 FJH		8852.5 14.3 FJH	
8770.5 11.9 FJH	230759 V. Cas Mira HIP	232543 DX And UGSS	8894.3 14.6 CMG	
8779.5 11.8 FJH	8747.4 :10.3 KKP	8810.49 14.5 FJH		
8801.5 10.3 FJH	8786.5 12.0 FJH	8831.46 14.4 FJH	235350 R Cas Mira HIP	
8818.5 9.6 FJH	8801.5 12.6 FJH	8841.56 14.4 FJH	8744.5 9.1 BMU	
8832.4 8.7 FJH	8812.5 12.3 FJH	8852.49 14.4 FJH	8757.4 7.9 BMU	
8841.4 8.3 FJH	8832.5 11.5 FJH	8864.42 14.4 FJH	8764.4 7.6 BMU	
8848.4 8.4 FJH	8841.5 11.1 FJH	8871.51 14.3 FJH	8799.5 13.3 FJH	
8876.4 9.4 FJH	8842.5 11.1 BMU	8883.44 14.3 FJH	8810.5 13.4 FJH	
8890.4 10.6 CMG	8851.4 10.8 FJH	8893.43 14.3 FJH	8831.4 13.9 FJH	
8894.5 10.7 FJH	8867.5 10.0 HOL		8842.5 14.1 FJH	
	8889.3 8.9 CMG	232642 BG And Mira	8852.5 14.3 FJH	
222924 SS Peg Mira HIP	8891.5 9.1 HOL	8771.5 9.9 FJH	8894.3 14.6 CMG	
8771.5 13.2 FJH	231425 W Peg Mira HIP	8786.5 9.9 FJH		
8786.5 13.7 FJH	8721.6 8.7 BMU	8801.5 10.3 FJH	235350 R Cas Mira HIP	
8802.5 13.8 FJH	8771.6 9.8 FJH	8812.5 10.6 FJH	8744.5 9.1 BMU	
8810.5 14.6 FJH	8803.5 11.3 FJH	8842.4 10.9 FJH	8757.4 7.9 BMU	
8831.5 14.4 FJH	8811.5 11.9 FJH	8854.4 10.9 FJH	8764.4 7.6 BMU	
8835.5 14.6 FJH	8831.5 12.3 FJH	8876.4 11.0 FJH	8771.5 7.2 BMU	
8842.5 14.4 FJH	8838.5 11.8 BMU	8893.4 11.9 FJH	8779.5 6.9 BMU	
8854.4 14.2 FJH	8839.4 12.3 FJH		8800.5 6.3 BMU	
8864.4 14.2 FJH	8847.4 12.6 FJH	232642 BG And Mira	8803.5 6.4 FJH	
8871.5 13.5 FJH	8864.5 12.6 FJH	8771.5 9.9 FJH	8810.5 6.5 BMU	
8882.4 12.9 FJH	8871.4 12.6 FJH	8786.5 9.9 FJH	8816.4 6.8 FJH	
8890.5 13.2 CMG	8882.4 12.2 FJH	8801.5 10.3 FJH	8826.4 6.5 BMU	
	8883.5 11.5 HOL	8812.5 10.6 FJH	8833.4 7.0 BMU	
223841 R Lac Mira	8890.5 12.3 CMG	8842.4 10.9 FJH	8841.4 7.3 FJH	
8770.5 9.2 FJH	8891.4 11.8 HOL	8854.4 10.9 FJH	8842.5 7.1 BMU	
8801.5 8.8 FJH	8894.3 12.3 FJH	8876.4 11.0 FJH	8848.4 7.3 FJH	
8818.5 9.3 FJH		8893.4 11.9 FJH	8889.3 9.0 CMG	
8832.4 9.3 FJH	231508 S Peg Mira HIP		8891.5 8.5 HOL	
8841.4 9.8 FJH	8802.5 9.8 FJH	232648 Z And Z And		
8848.4 10.3 FJH	8832.5 8.7 FJH	8841.4 11.0 FJH	235525 Z Peg Mira HIP	
8873.4 12.0 FJH	8838.4 8.3 BMU	8854.4 11.0 FJH	8786.5 9.4 FJH	
8882.4 12.8 FJH	8839.4 8.6 FJH	8876.4 11.0 FJH	8802.5 10.2 FJH	
8890.4 13.1 CMG		8890.5 10.6 CMG	8818.5 10.8 FJH	
8893.4 13.2 FJH			8826.5 10.9 FJH	
		233109 FF Peg Mira	8838.5 11.7 BMU	
		8890.5 12.6 CMG	8839.4 11.7 FJH	
			8847.4 11.8 FJH	
			8864.4 12.7 FJH	
			8871.4 12.8 FJH	
			8883.4 13.0 FJH	
			8890.5 13.1 CMG	
			8891.4 12.9 FJH	