



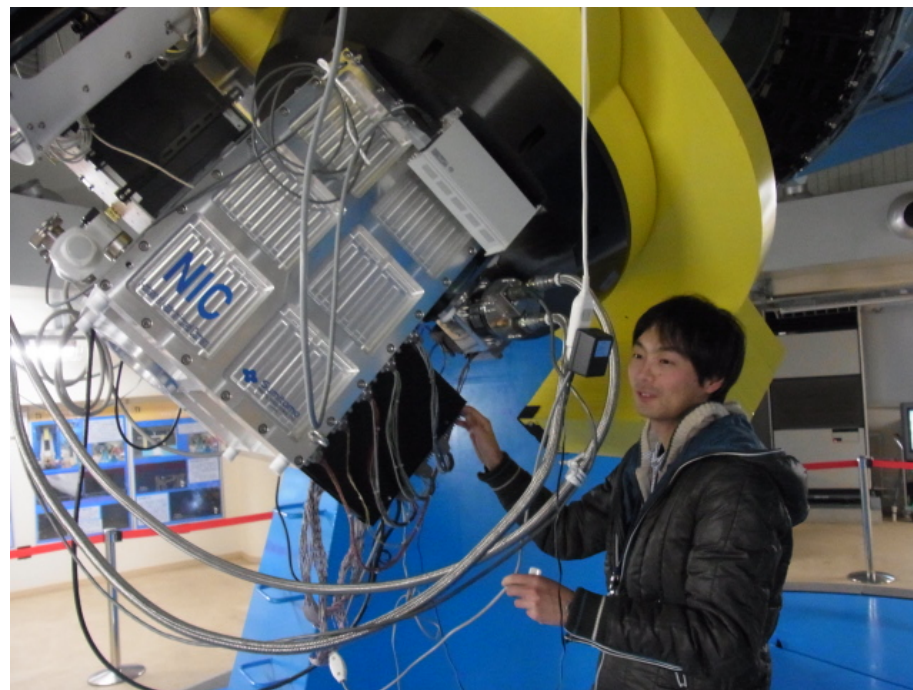
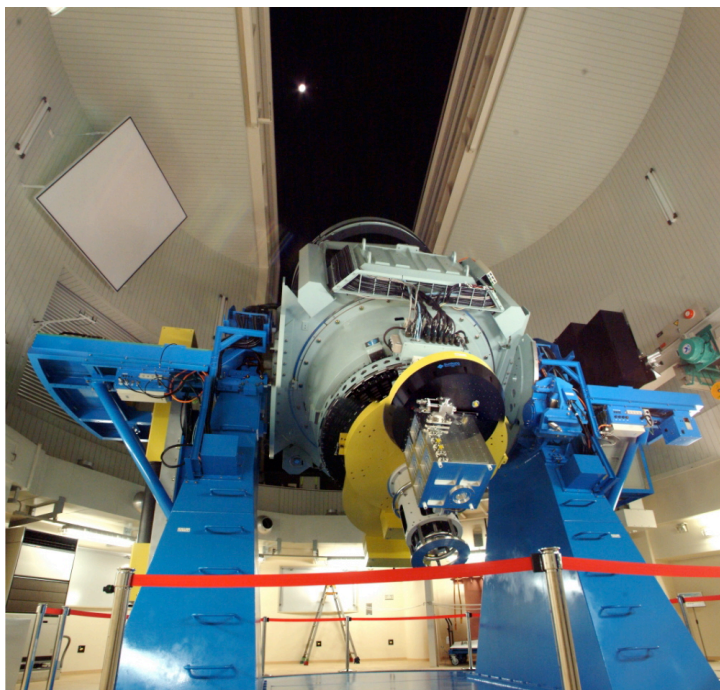
西はりま天文台近赤外線カメラNICによる W UMa型連星系V523 CasのJHKs測光

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永井和男(VSOLJ)





NIC



なゆた (カセグレン F/12) 焦点





スペック

光学系：offner光学系＋ダイクロイックミラー切り分け

検出器：HAWAIIx3 (1024x1024 pixels, HgCdTe)

フィルター：J, H, Ks (3バンド同時、同一視野)

(フィルター交換機能はない)

Pixel Scale: 0.16"/pixel

FOV: 2.7'

限界等級(実測値,SN10) J=16.6, H=16.7, Ks=15.9

(シーイング: J=1.8", H=1.8", Ks=1.6", 120秒露出×10回加算平均)

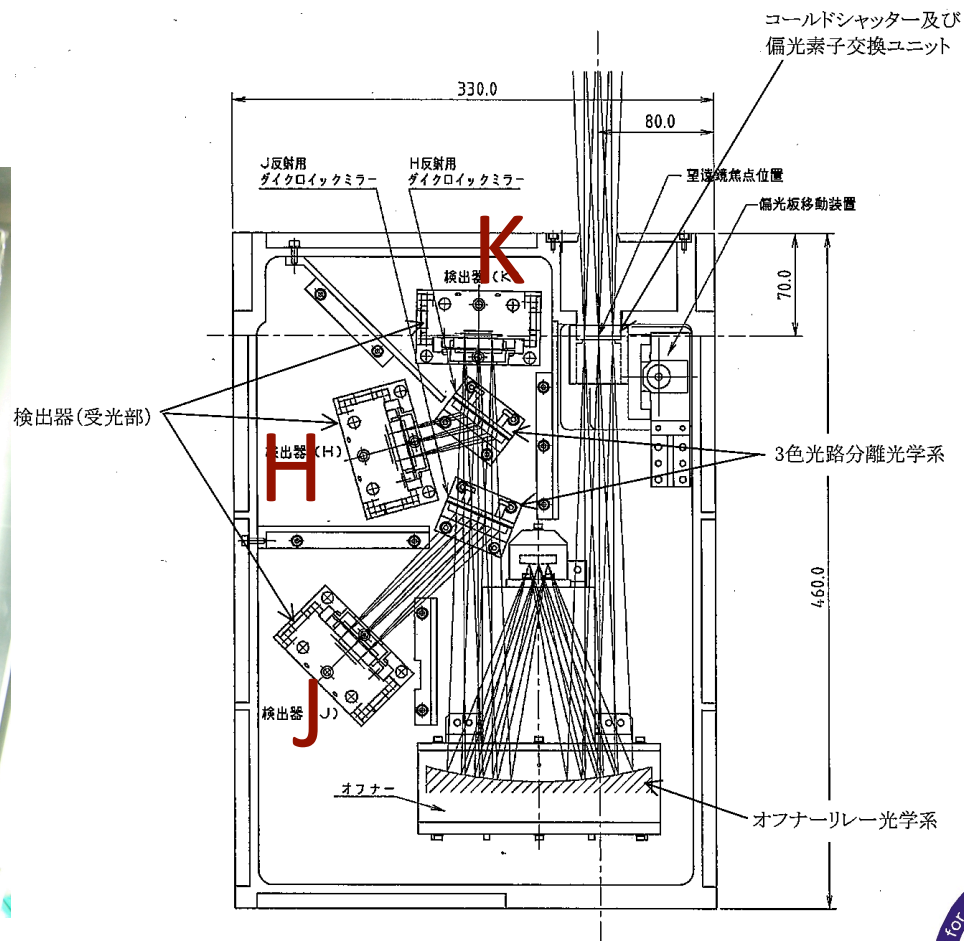
冷却方式：GM冷凍機(He)

冷却温度範囲：80-100K(GM冷凍機)





光学レイアウト



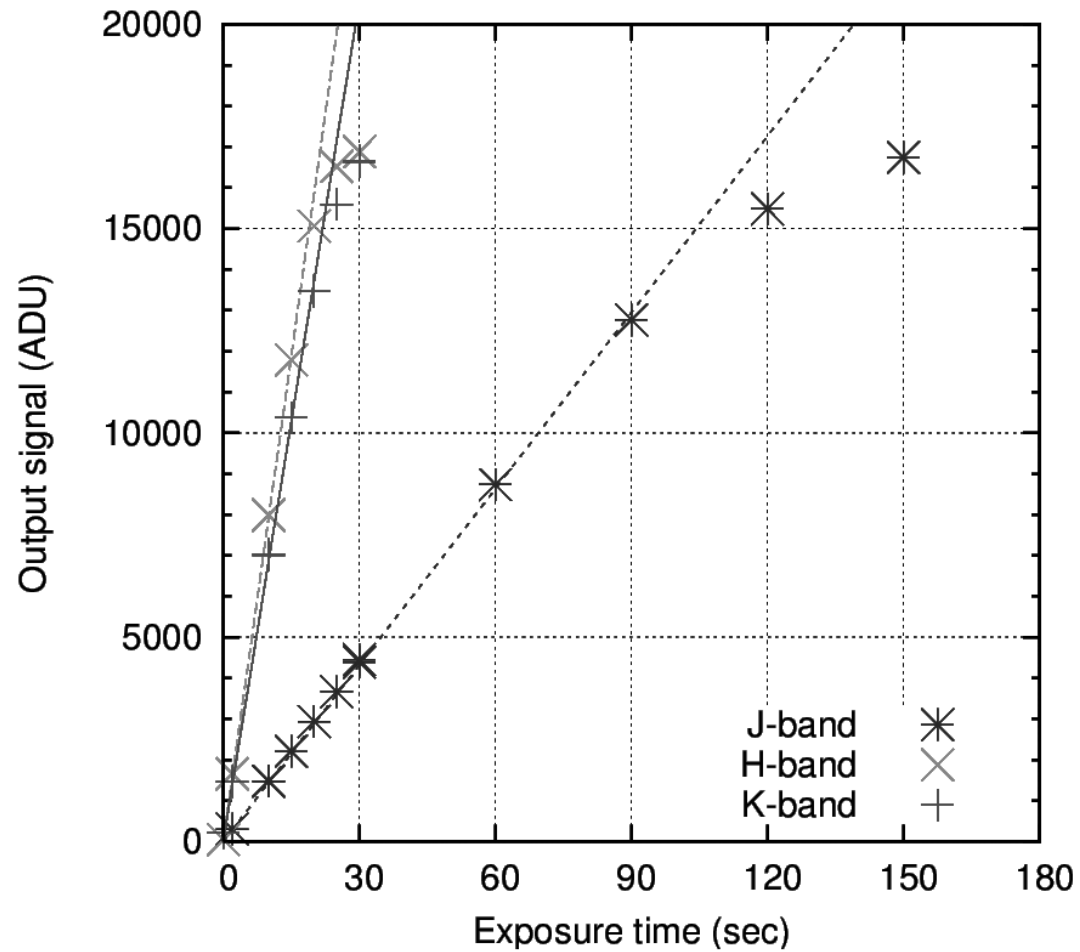
住友取説

図4-1(2/2) クライオスタット(断面図)





linearity

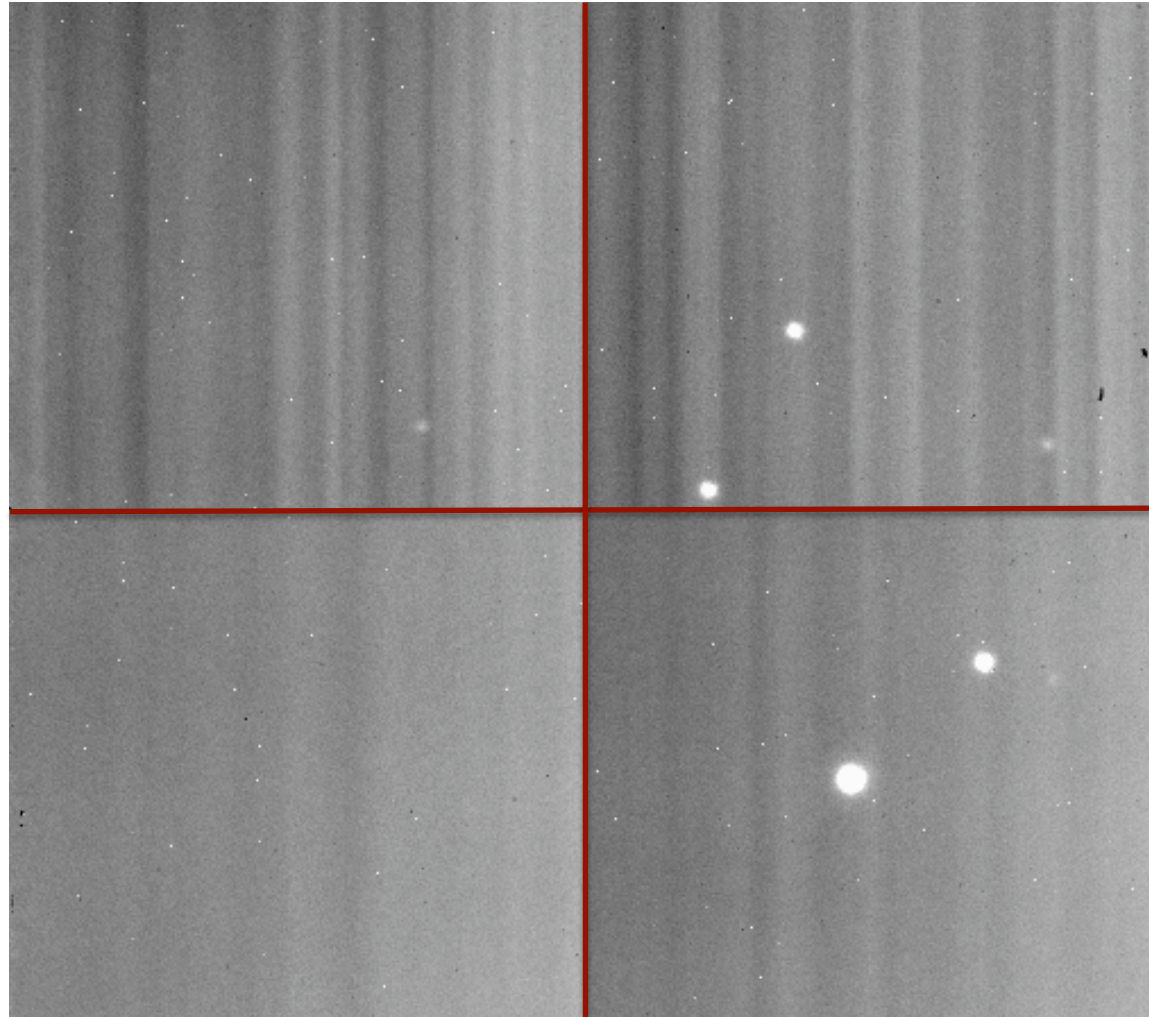


石黒 他 (2011)





4象限同時読み出し





V523 Cas

W-type W UMa overcontact system

$P=0.23$ day, $K2-3V$

$J=9.2$, $H=8.6$, $K=8.5$

Period change

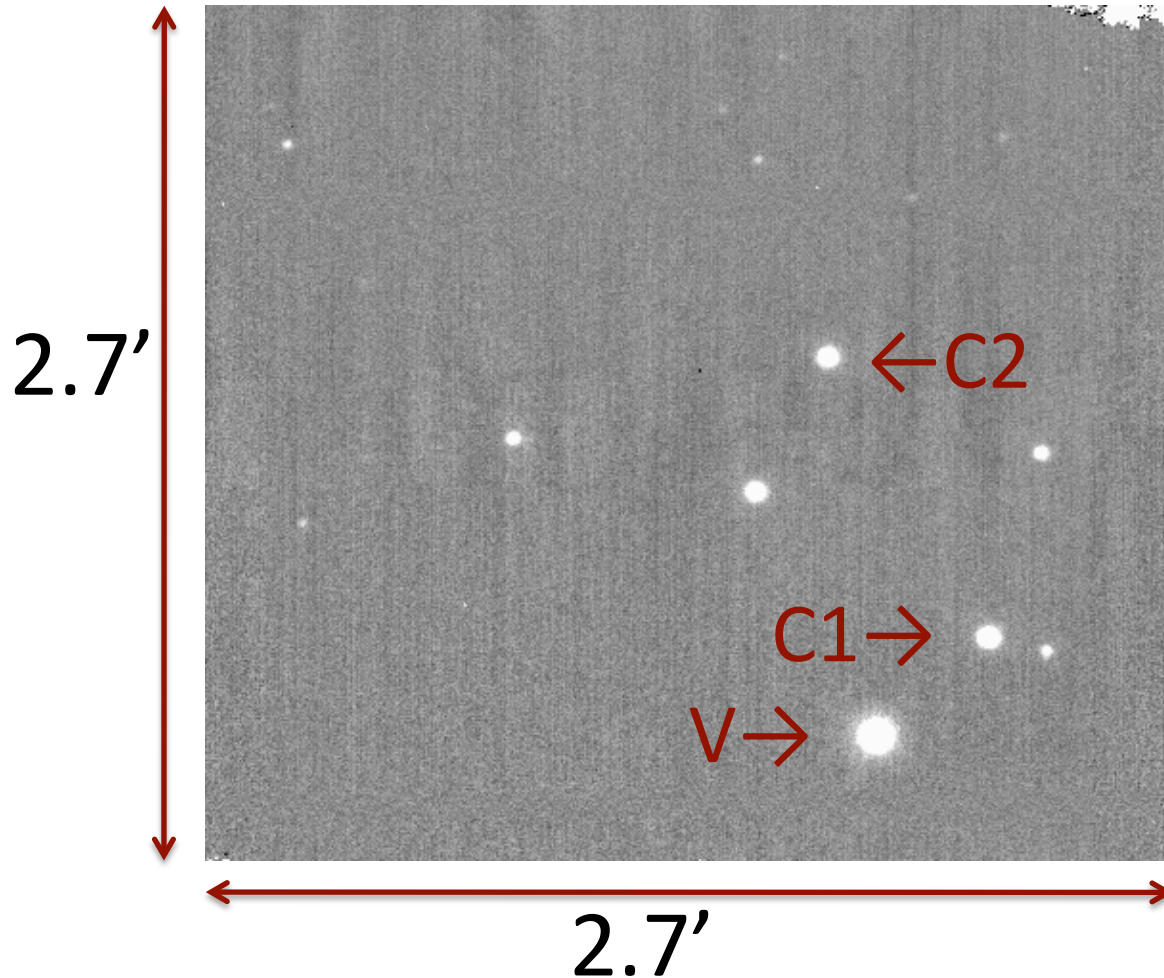
Light curve variation





observations

2012年1月11日～2月12日 9夜



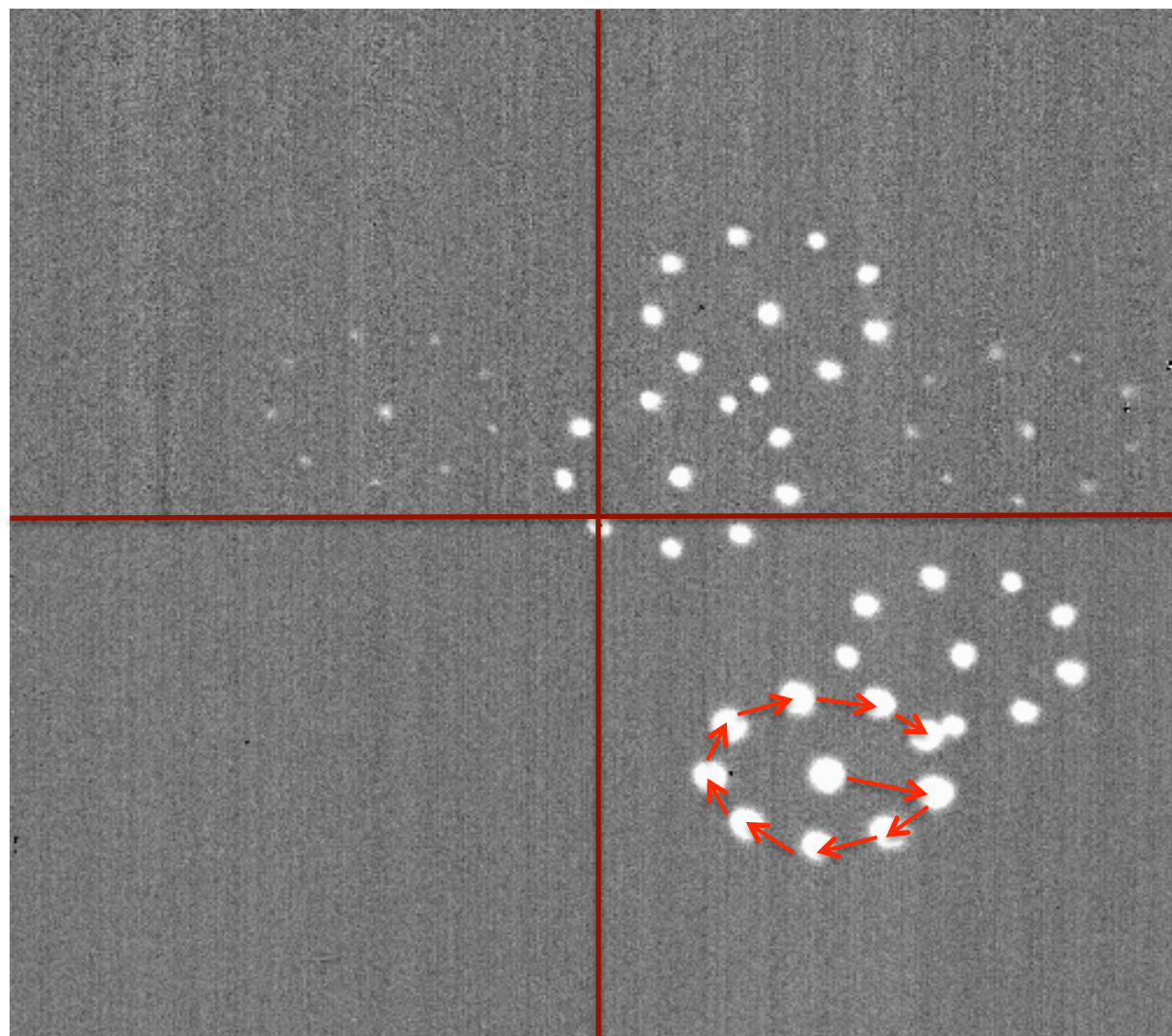
2MASS J00400727+5015178

2MASS J00400429+5014320





自動Dithering・mode 半径10” 10枚設定



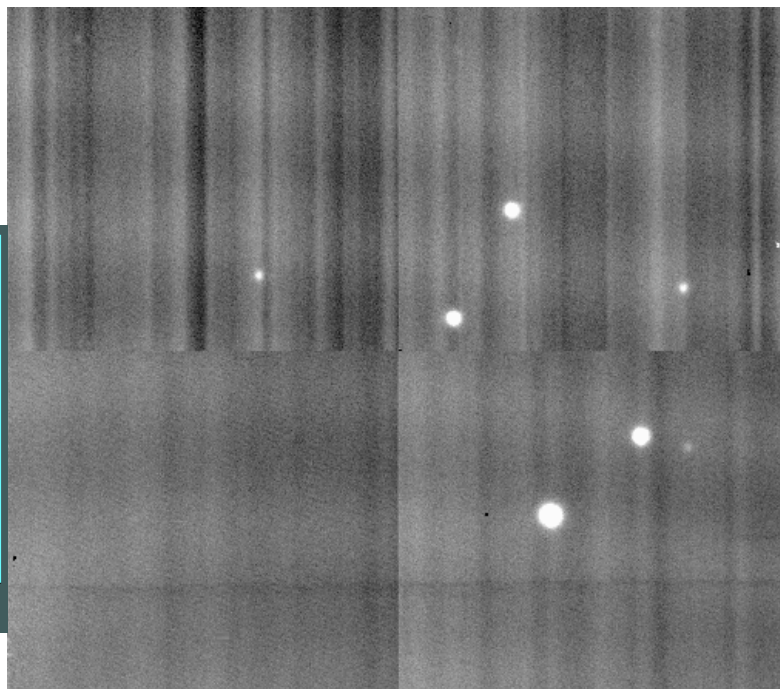
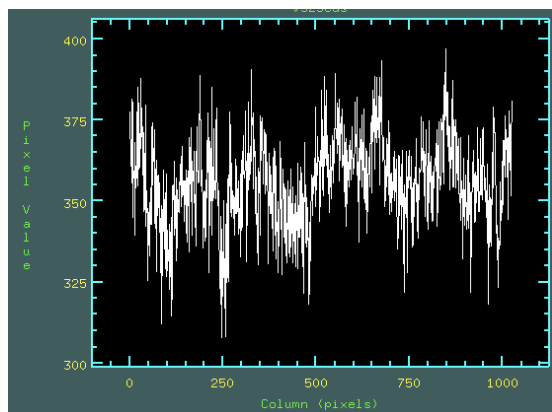
同一象限内回転





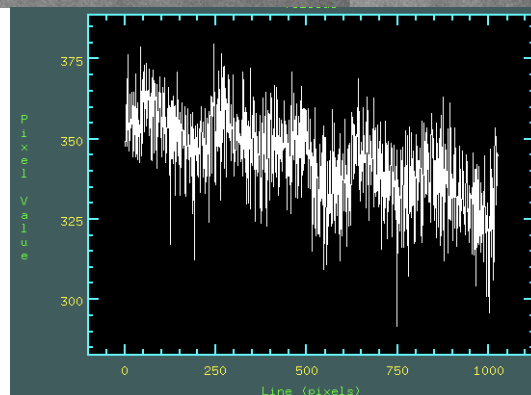
処理

dark, flat (twilight) と bad pixel 除去後イメージ



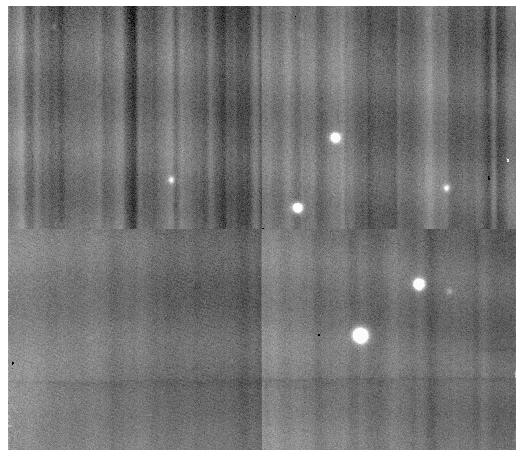
検出器による縦
(読み出し方向) 縞

HAWIIアレイ固有
のパターン
(横波)



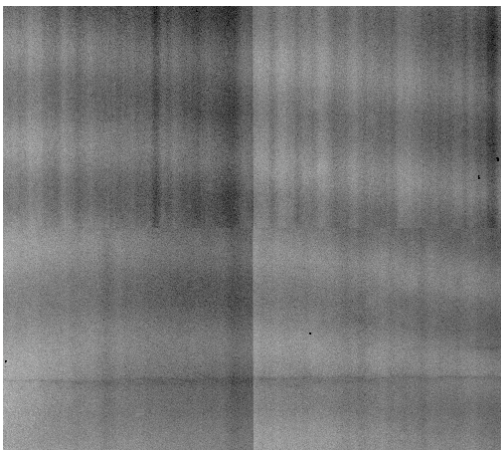


HAWAIIアレイのパターン除去

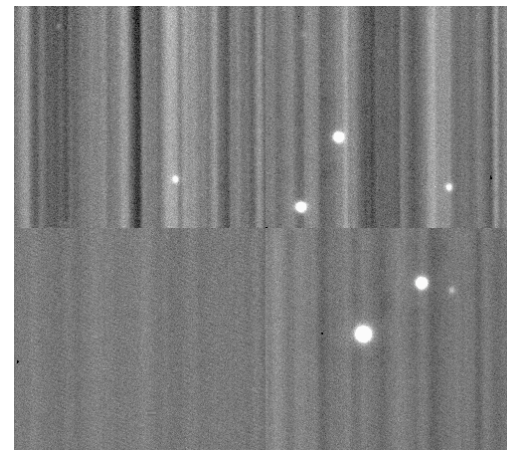


Flat (twilight) 後イメージ

測光精度0.155等
(C1-C2 20点)



Dithering 1セットの
Object frame 10枚をmedian
→ (self) sky



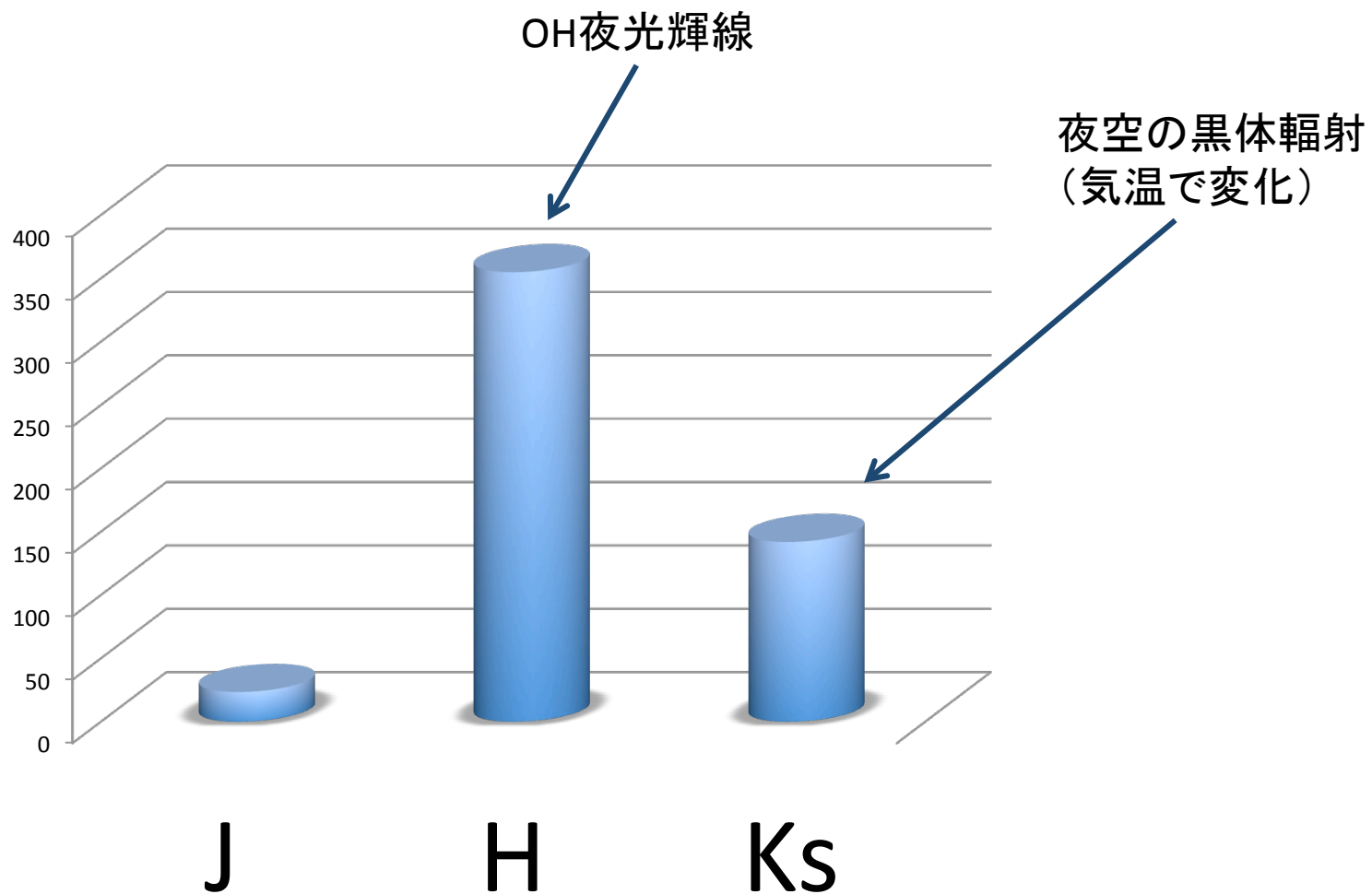
Sky除去後イメージ

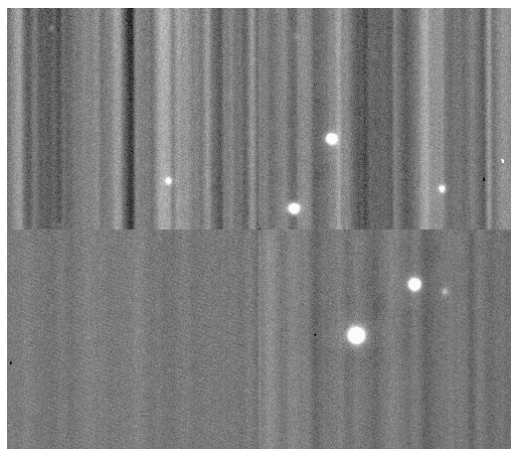
測光精度0.126等





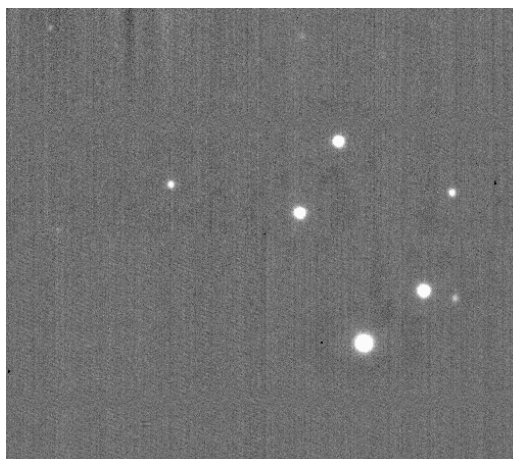
skyの一例





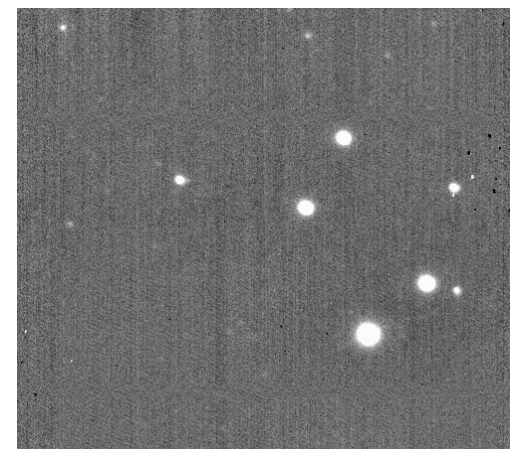
Sky除去後イメージ

測光精度(H)0.126等



縦縞除去後イメージ

測光精度(H)0.027等



ディザリングの1セット
(10枚)加算平均
→ やっと 1点(枚)

測光精度(H)0.006等





測光 Aperture photometry

測光精度

J:	0.019
H:	0.006
Ks:	0.015



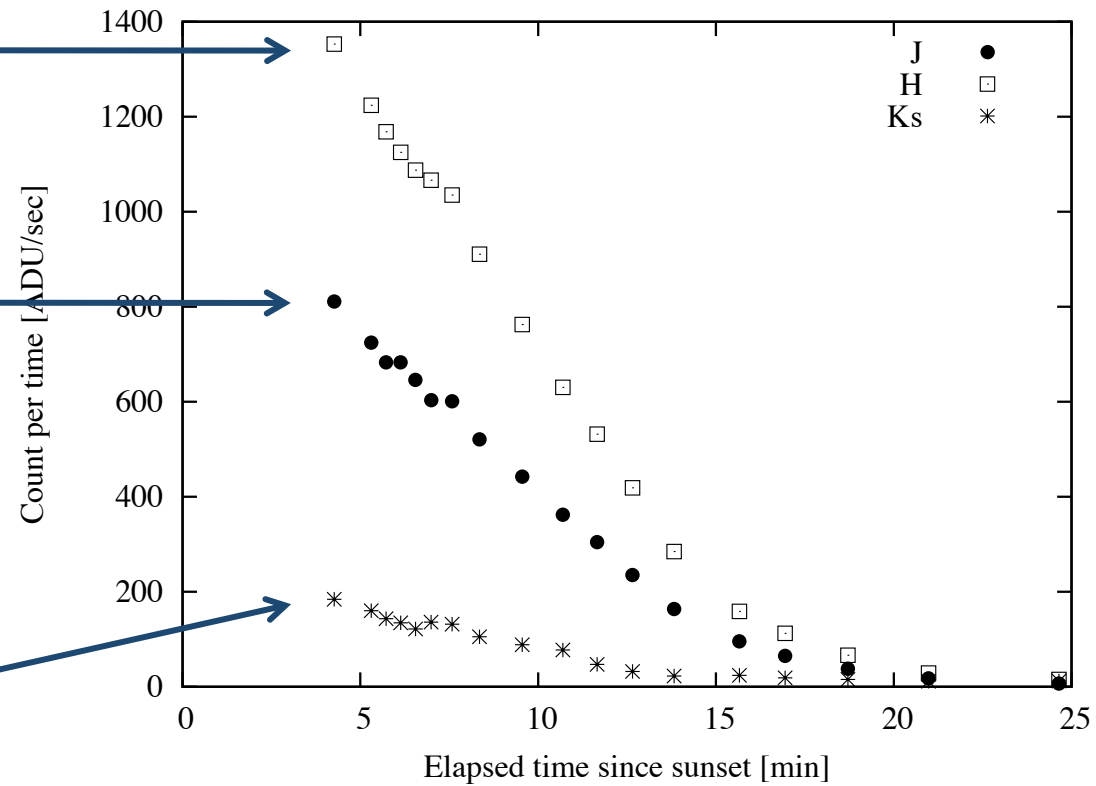


Twilight flat

H-band
OH夜光輝線

J-band

K-band
散乱光弱い

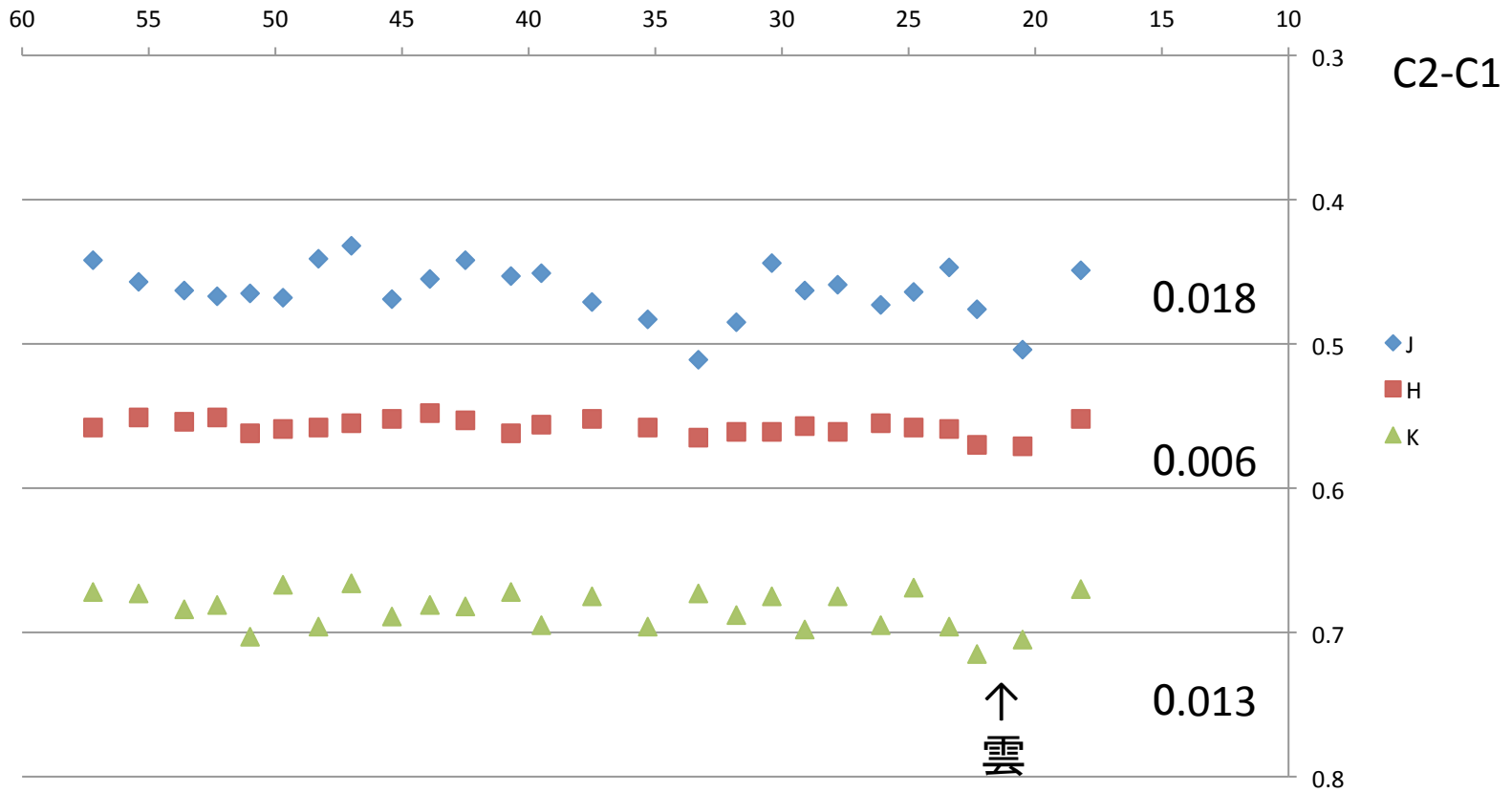


石黒 他 (2011)





高度



C1 ~ 11.5mag.(J), 10.7mag.(H), 10.5mag.(K)

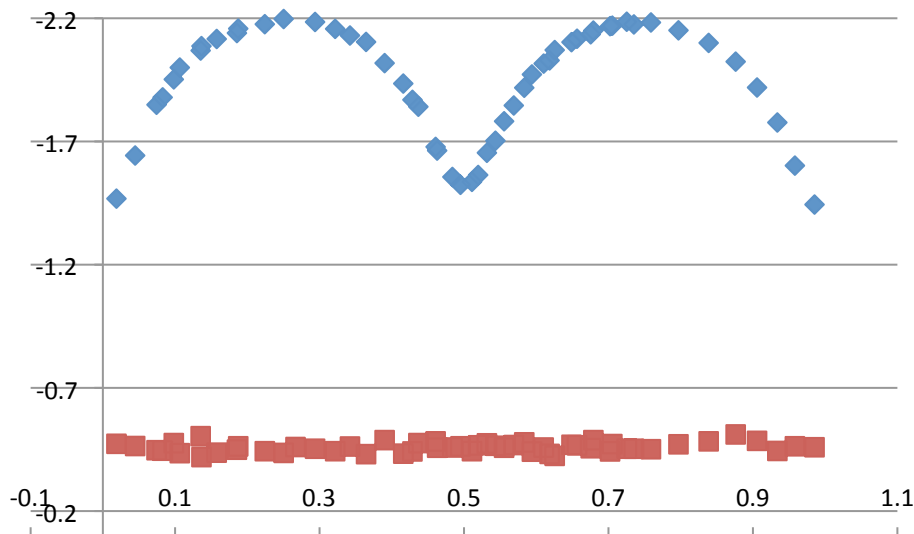
NIC (Jan. 17 2012)



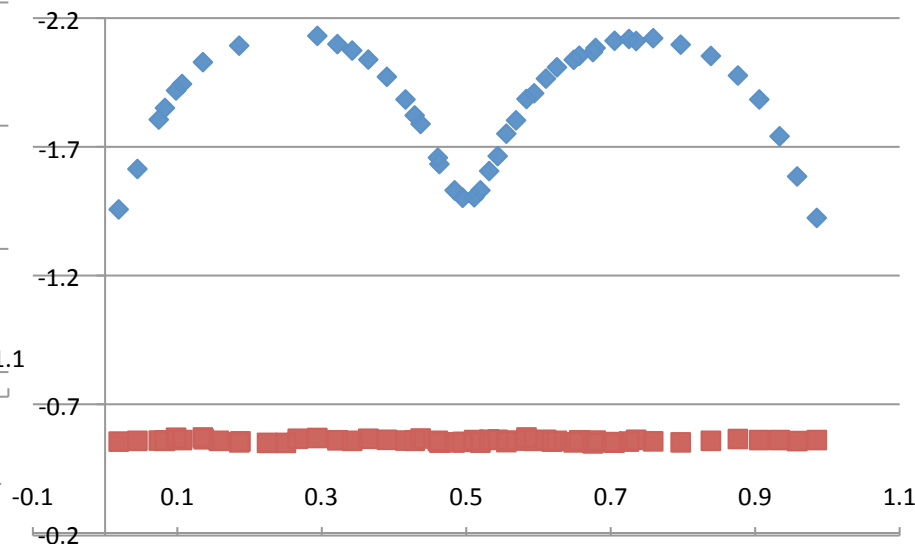


light curves

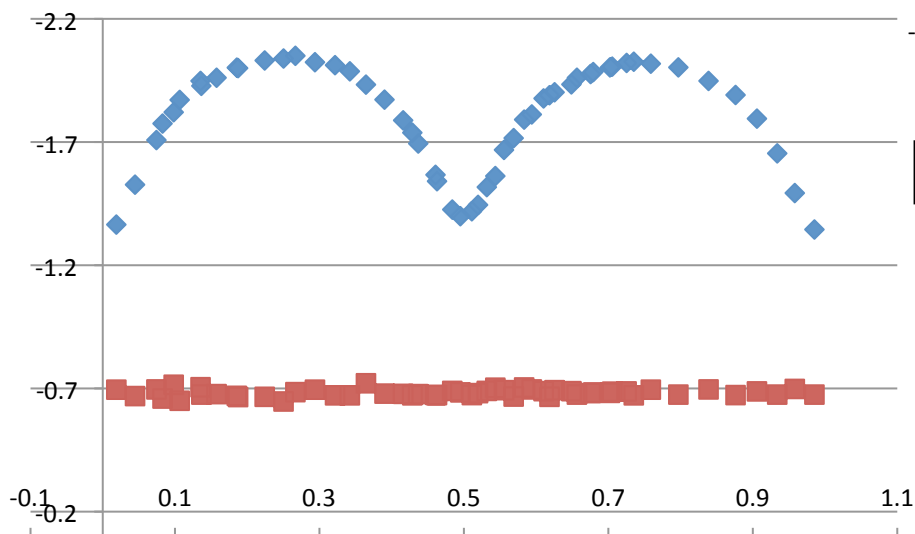
J



H



Ks

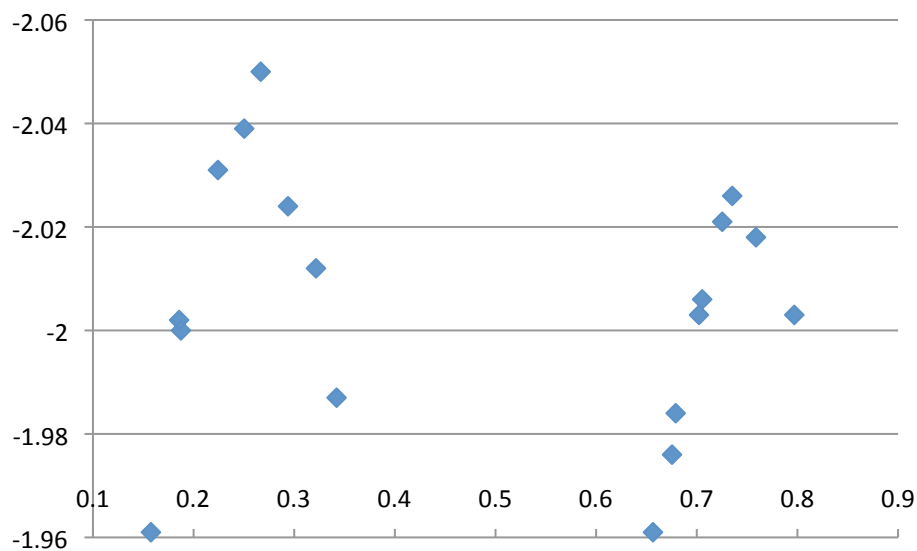
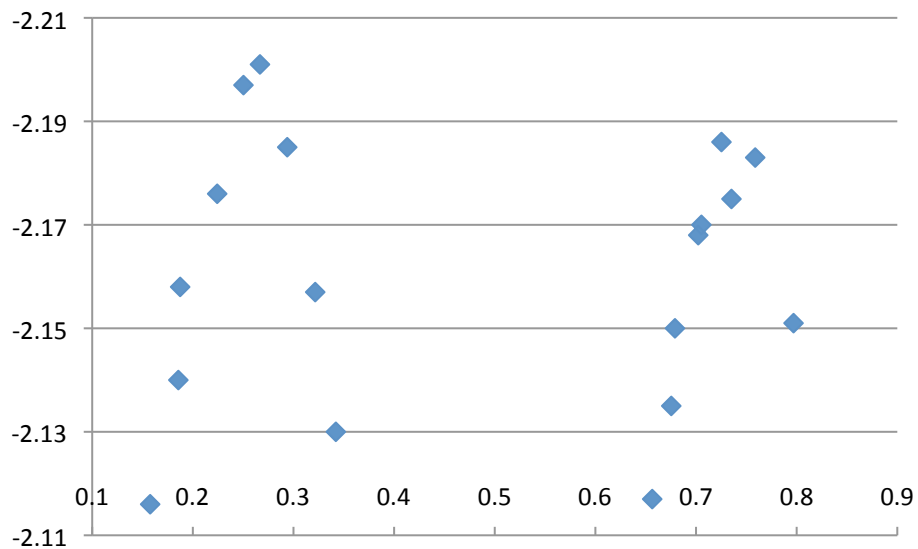


5/9夜





O'Connell effect (?)





Period study

主極小中央時刻

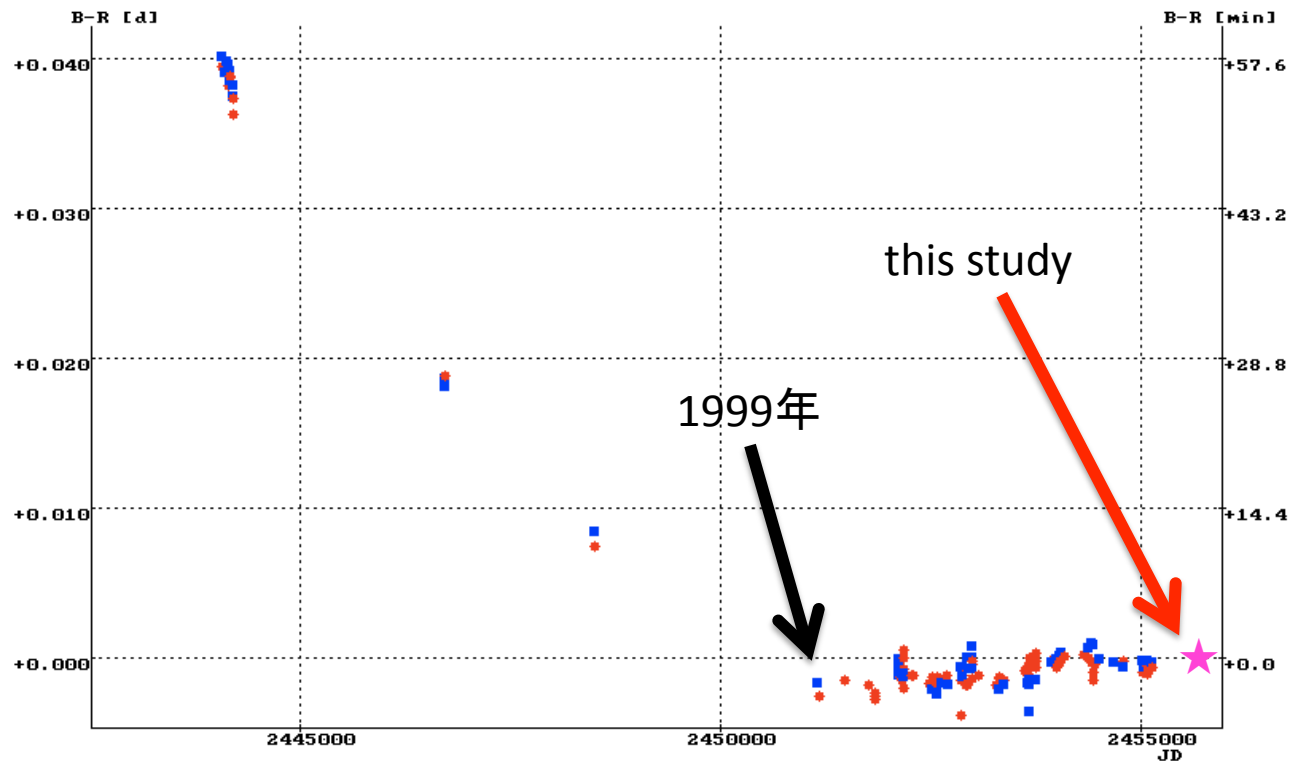
Bi-section法 (3色平均)

→ HJD 2455994.0775±0.0005





O-C diagram



Primary minimum (circle) red: CCD, green: visual
Secondary minimum (square) blue: CCD, yellow: visual

Min I = HJD 2452500.1397+0.23369329 E (Kreiner 2004)

Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V.(BAV) + this study

世紀末に何か起きた?





Light curve analysis (preliminary result)

WD-code

H-bandのみ

ベース Latkovic et al. (2009)の解

フリーパラメータ $T_s(h)$ と spot



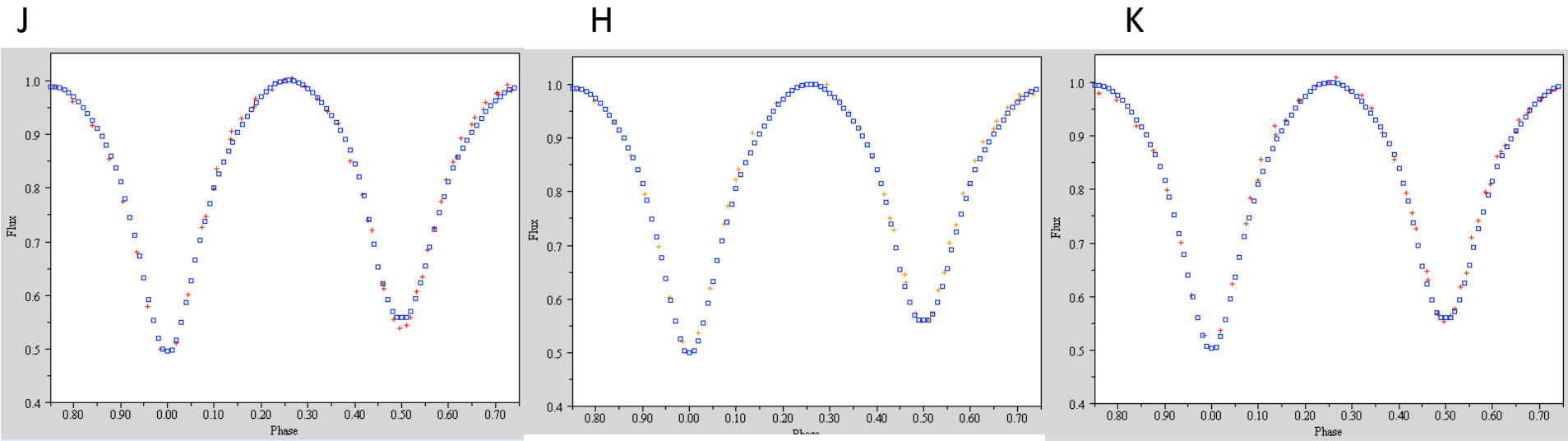


- $q=0.52$
- $T_s(h)=5000\text{K}$ (-176K)
- $T_p(c)=4762\text{K}$
- $i=84.8\text{deg}$
- $\text{fill out}=0.2$
- $g=0.08, A=0.5, u=0.5$

Spot Parameters

Star	Co-Latitude	Longitude	Spot Radius	Temp. Factor
s	90	80	40*2	1.05
p	90	30	10	2.00

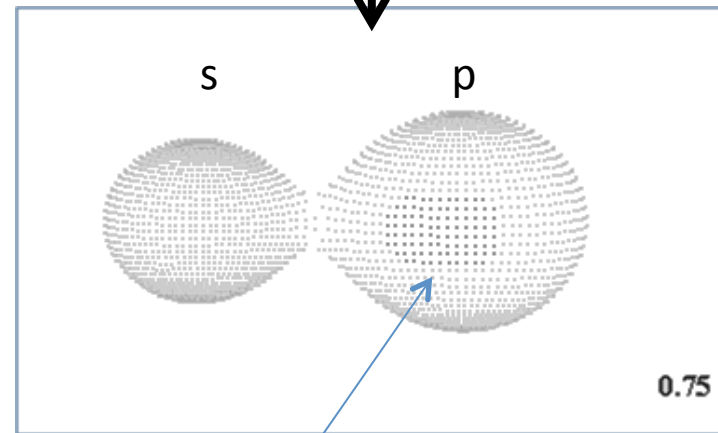
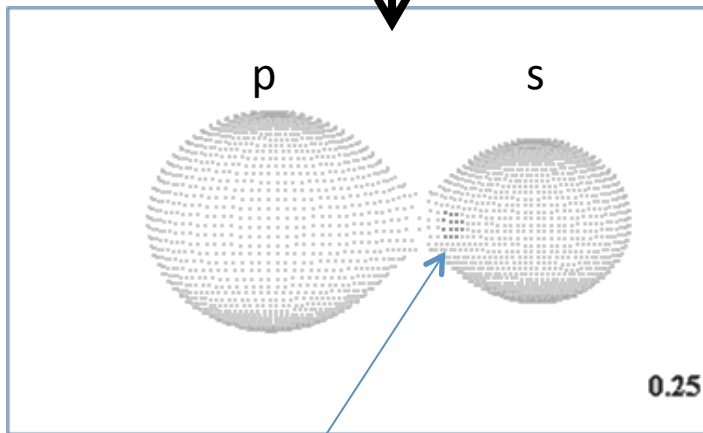
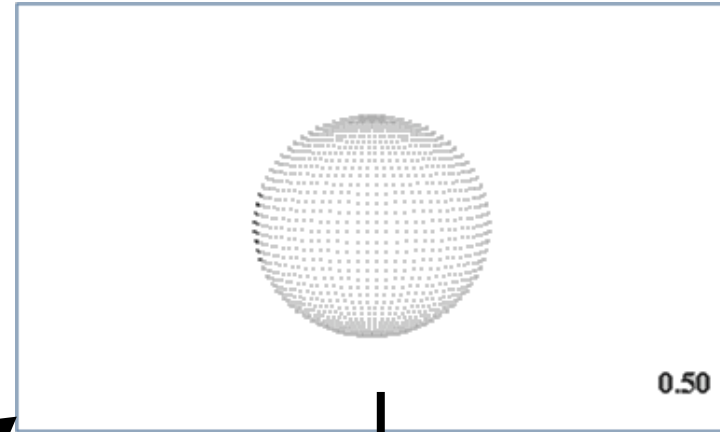
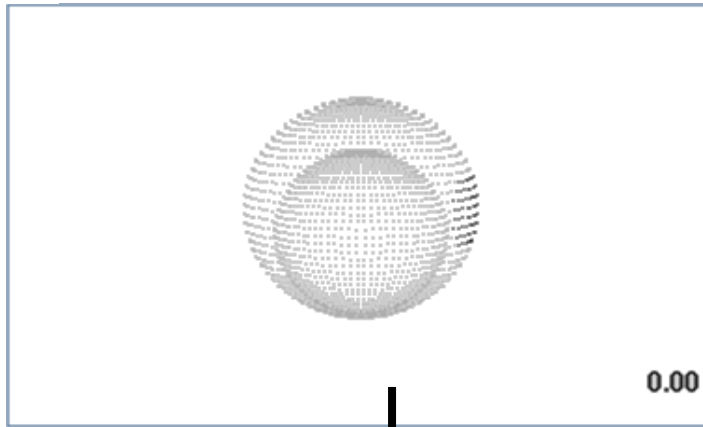




+ observations

□ model





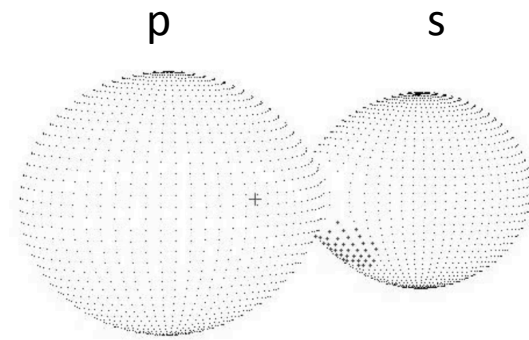
Hot spot
Radius=10
Temp. factor=2.00

楕円のHot spot
Radius=40*2
Temp. factor=1.05





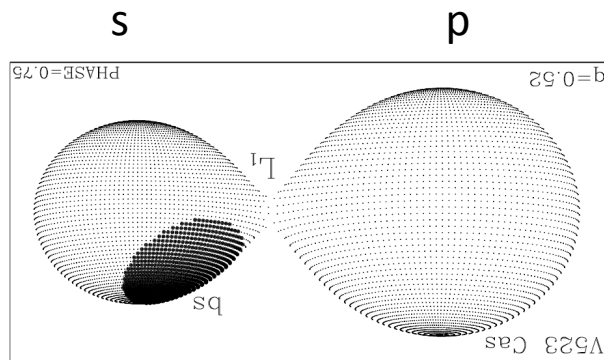
hot spotの変化



← Sep. 1998

Phase 0.35

Samec et al. 2004

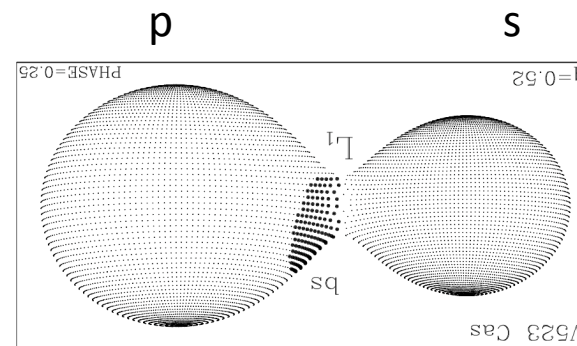


← 2005/2006

Zboril & Djurasevic 2006

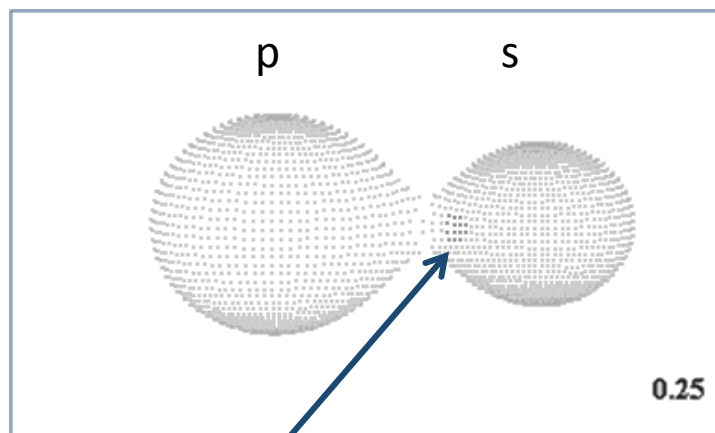
Sep. 2006 →

Latkovic et al. 2009

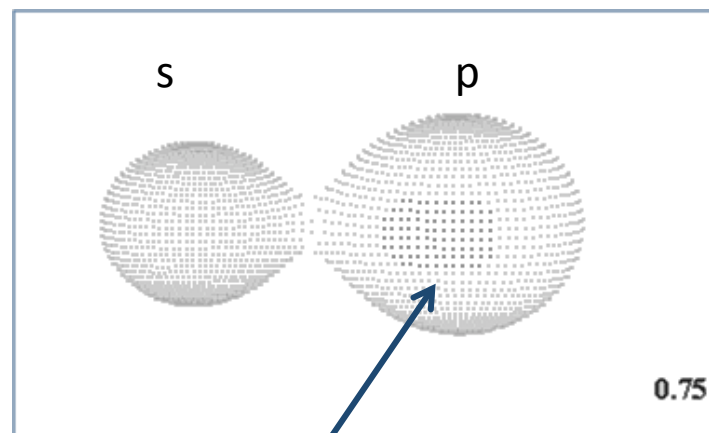




V523 Casの両成分星に同時にspotを検出したのは世界初(?)



Hot spot



楯円のHot spot





謝辞

石黒正晃 氏
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