



Present and future science with CARMENES (RIA), February 20-21, 2019

CARMENES operation and maintenance at **Calar Alto**

Marco Azzaro CAHA



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 - Vacuum
 - Sensors
 - Ice
- Foreseen interventions
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 - NIR SP
 - Fiber-Sh. Positioning



Access Protocols



- Calibration room
 - Inform M. Azzaro, note down times
- Climatic rooms (VIS + NIR), instructions on doors
 - Inform M. Azzaro who will inform CMT
 - Wait for authorization
 - Wear clean room protections, minimize time inside
 - Note down Name and start-finish Times.
- In case of danger for the instrument
 - If possible, inform M. Azzaro or department head or Pedro Amado.

The LN2 for CARMENES

Mechanics dept.

- VERY IMPORTANT element. 7500 l deposit
 - Dedicated to CARMENES
 - Consumption is 4 times higher, 12000 l/M, 42
 K€/year, extra cost = 32 K€/year
 - Reliable + Available, storage lasts 2 weeks, snow problems last less.
- Re-filling + pressurization (daily cycle), 3 350 l + 2 150 l dewars
 - 350l dewars are re-filled in cycle, pressurized during 24h. Two are always serviced and one in use.
- Vacuum pumping + checks.







Software & computers

Computing dept.



- ICS Tel interface
 - Large program specific to CARMENES
- NIR-VIS reset
 - Soft, hard reset, Reboot.
 - Wolf reset rarely used. Ross needs frequent resets because of Geirs (NIR data management).
- Archive
 - Specific to CARMENES, modification of global archive
 - Disk space had to be increased (+ 30 TB) to fit raw NIR data.
- Health check of the whole system every hour
 - All computers at CAHA are monitored, CARMENES computers part of the checks (space, running programs, services etc.)



Electronics

Electronics dept.



- Parameter checks (SCADA)
 - Vacuum
 - Temperatures
- Rough pumps periodic maintenance
 - Operate Rough Pumps some time to eliminate condensation
- Lamps substitution
- Protocols for various kinds of interventions (Interlocks)
- Fiber-shaker monitoring and maintenance



Climatic system

Maintenance dept.

cormenes

- VIS + NIR rooms at 12 ± 0.1 °C
 - Climatic system checks
 - Oxygen sensors checks
- Ice (carmenes/foto/cooling_sys/....)
 - On-Off valve outlet



Spares



- Two closeby rooms dedicated to spares
- LN2 lines
 - Available for improving the system (less parts like manifolds)
 - Less access to the rooms required
- Electronics
 - On-Off valve
 - Boards + ROE etc.
- Lamps (ThAr, Uar, Une, flats, FP)
- Uar + Une lamps being ordered



Maintenance / checks



- LN2 lines vacuum
- SP regenerations
- Sensors (vacuum, oxigen)
- Ice
 - On-Off valve outlet
- Neon tank checks
 - Pressure
- Fiber-shakers
 - Working







Foreseen interventions



- Normal maintenance (periodic)
 - Lines vacuum, SP regeneration,
- Major (one-time)
 - NIR + VIS LN2 manifolds removal + NIR On-Off relay substitution + make fiber-shakers visible from outside + GPU lines vacuum.
 - NIR SP independization
 - NIR + VIS damping system calibration



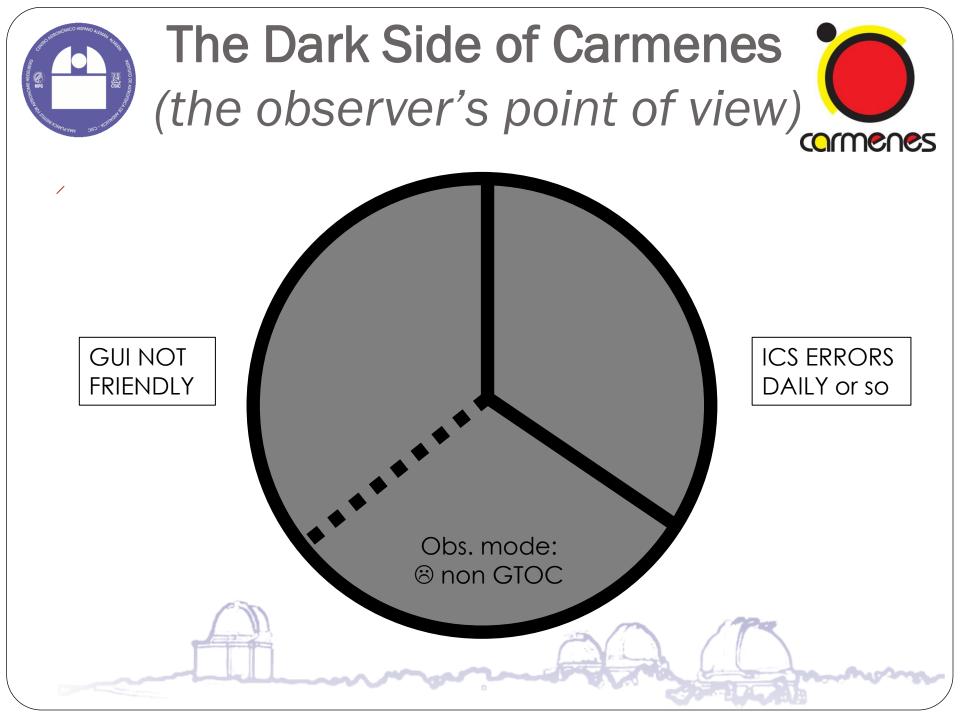
The Dark Side of Carmenes (the observer's point of view)



Rubén Hedrosa & Gilles Bergond

Calar Alto Obs.

with inputs from the whole CAHA Astronomy Department





Night operation of Carmenes

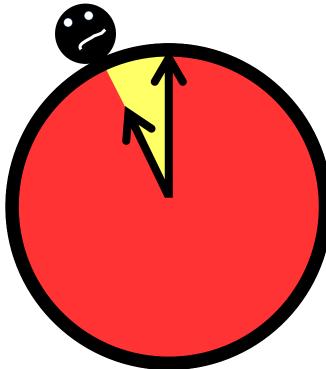


Persistent ICS errors

CARMENES time lost:

2016: 56.3 h in 45 events 2017: 80.5 h in 54 events 2018: 45.3 h in 35 events

1h15 to 1h30 lost/event!



~1 ICS error/night Infamous (end 30' exp.) Ice.ConnectionLost...

• Origin? ("NACK-4" wrong error codes)

Solution? (apart from restarting/ resetting everything,

and SLEEP/wait 5')

□ Script syntax? vis/nir_cal_*



Night operation of Carmenes

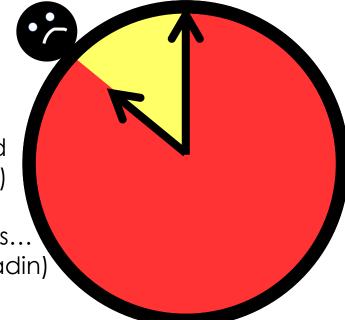


Nice GUI... for GTOC!

Optimized for GTOC:

Scheduler magic wand (but BAD=GOOD night)

Oldie DSS finding charts... (CCOO target list=>Aladin)



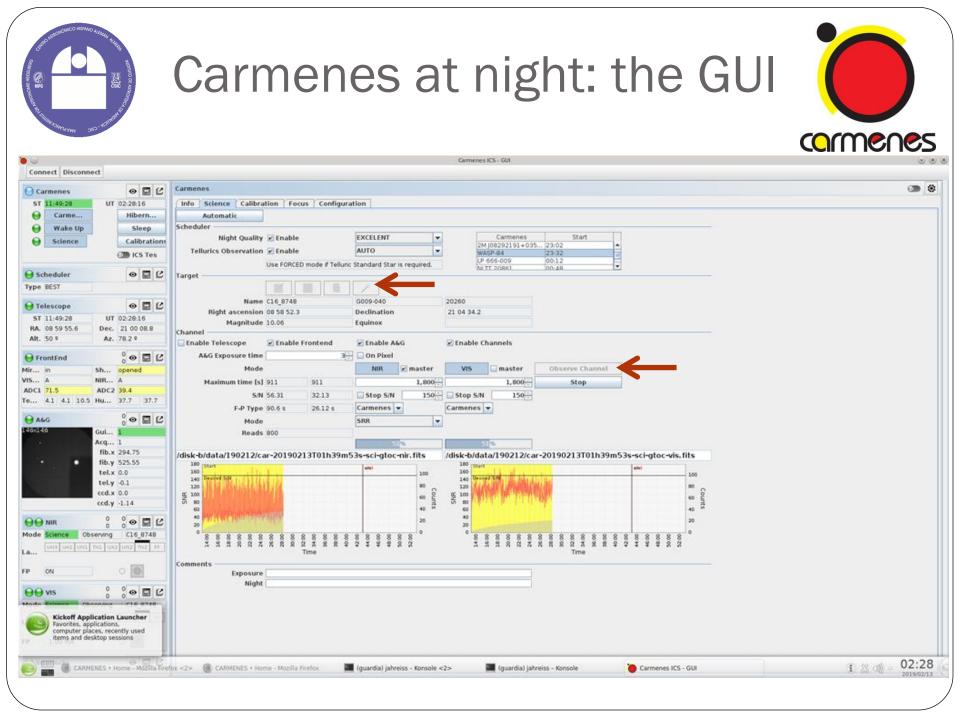
Non GTOC programs

(more every year: 79,7% in 2016 787,5% in 2018)

Longer overheads

Mistakes more likely

Critical for transits
 (ADC update => reacq.;
run VIS & NIR separately)





Night operation of Carmenes



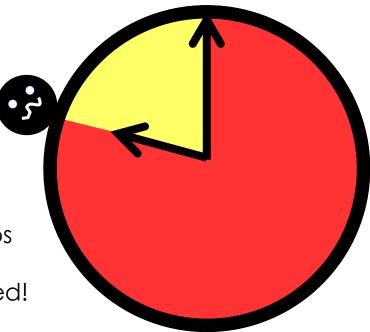
Observation time lost

GUI not friendly:

~260 info. boxes

~190 buttons/menus spread on many tabs

Only ~30 buttons used!



Current ICS frozen

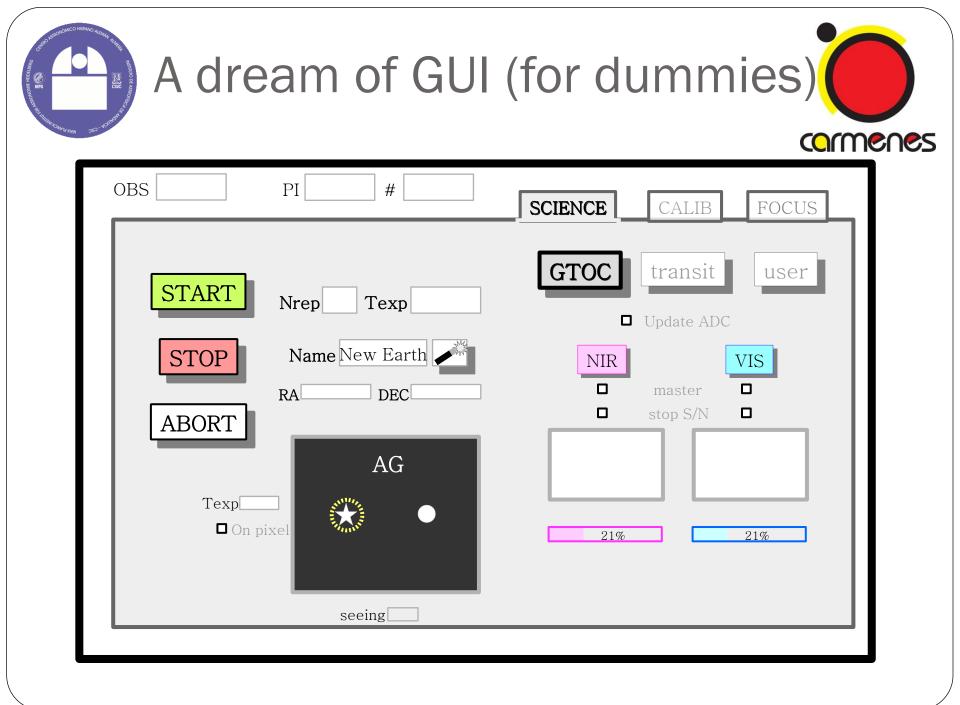
GUI inherited from engineering version

Simpler/more robust ICS & GUI for **visitors**

Carmenes at night: current GU

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On behalf of the past/present/future CARMENES service mode observers:

<u>(99% of a1001+ nights tale)</u> Belén Arroyo Florian Bauer Gilles Bergond Alba Fernández Eulalia Gallego Ana Guijarro Rubén Hedrosa Israel Hermelo Pablo Martín Manuel Moreno Ester Ramos



¡MUCHAS GRACIAS! for including us as co-authors in the discovery papers



Calibration: the daily scripts

Unknown syntax! Must be named vis/nir_cal_*.txt

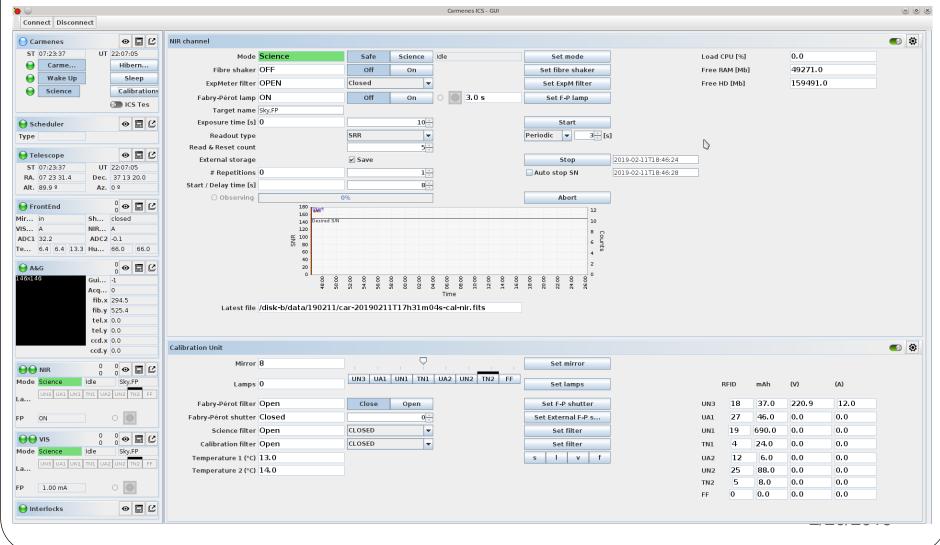


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ICS: individual channel mode VIS + NIR + AG by hand for transits (repeated exp.)







The CARACAL IDL pipeline Quick/nice but a "black box" for casual user



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/disk-b/data/CARM_N /disk-b/data/CARM_N	NIK/raw/190218/car=20190218T1 NIR/raw/190218/car=20190218T1	L5h53m54s-cal-nir.expm /disk-b/data/CARH_NIR/raw/1 L6h00m07s-cal-nir.expm /disk-b/data/CARH_NIR/raw/1	90218/car=20190218115h55m52s=cal=ni 90218/car=20190218T16h03m04s=cal=ni	r.expm r.expm		End of CARACAL		E						
/disk-b/data/CARM_)	NIR/raw/190218/car-2019021811	.6h06n04s-cal-nir.expm		+ovbu		[[2019-Feb-18 17:01	:22] 3 waiti	-5e+06						
	obs35 : bash - Kon							5000						
			- 1	Gnuplot wi	indow 0 <@lalande	.caha.es>	\odot	\otimes						
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Hand-written nightlogs!

to complete the automatic logs in the wiki



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	~	utua Astronómica LE		Alexandra d				HIGH			
-		ntro Astronómico Hi									
	Observer: Guijo	WTO - GTOC	00%	Weather	HN7E+	3		Date BIZIZO19 BACKGROUND			
	d	, w/ NEU	1.4-1	ESS TAR	SET GH	0-62 N	03				
comenes	s Notes:g]	oc (#100) +)	neze	(# 019	5			Page of 7			
Time (UT)	File(s)	Object.	AM	NIRtexp	QUD	MCtore		Commente			
15.22	100	t. txt	7411	Nincoop	SNR	VIStexp	SNR	Comments			
17:00	Vit - cal - Trew]-	and wight byt						in"ICSTes" mode			
		-						in ICI 100 made			
Clou	idy + CALIM							Sky 14, hum 2 44% [=0.24c Wind-24/			
23:45	FOCO = 33.0	467	1133			15					
23:57	Ad STAR	26 Uma	1.037	69-+55	200	69+67	271	77=2.3°2 seeing ~ 1.5° Ext-0.46 mag/Am			
00:02	Wdg294	J06548+332		272 -> 536	197	272 - 546	123				
00:15	Calande 21185	J11 033 + 359		47-> 81	202	47→93	148	NIGHT QUALITY = GOOD			
00:20		541 511 +352		363->674	201	363-2683	140				
00:37 -		541110+304		426-772	198	426->781	151	CCOO ~> ICE, Greation Lost por NCV			
1:01	WASP-84 HD 238090	WASP-84 J12123 + 5445		1800 553 -> 857	77 199	1800	98 156	FORCED HERRERO'S PROGRAM			
1:57	BD+11 2576	J13799+102		225-3410	203	225 - 421	126	SKY~3			
2:07	DATTI AJTO	542312 + @86		508 = 791	200	508-801	116	SAYAS			
2:23		312479+ 097.	1.142	743 -1200		743-1205	119				
2:45		J14257+236W		502 -> 968	201	502 3978	157				
3:07		J14257+236E		560-21112	188	560->1121	140				
3:29		514307-086		436->860	110	436-3873	79	and the second se			
3:46		544 342 - 125		534->1060	155	534-1069	83				
4:10	OTSel	345248+209	1,107	100 -0	202	433-844	139	St. a man			
4:27	1	515194 - 077 516303-126		473 ⇒ 938 236 → 464	186	473 ⇒ 814 236 → 474	114	Sky 28 Carrow Carlos			
4:57	Barnards	J17578 + 046	1 751	123 - 238	58	123-248	201	FORCED Jus T. CICUIDS			
5:06	A& STAR	109Viz	1.237		118	29->	178 •	to the to cloubs			
5:08	~> 'CLOSED]	VE TO LLOUDS	5	-		-	~				
1 5:13	cal_end_nic	3MA	-					AI			
	Astronight = $19:20 - 5:27$ -0' = 18:01 - 6:47 -18:45 - 6:00 = 11,25h -10' = 18:01 - 6:47 -18:45 - 6:00 = 11,25h -10' = 18:01 - 6:47 -10' = 18										
	-0	- = 18:01 - 6:	47 T	Ch: 210	- 6:00) = 11,c	511 4	23:45-5:15 =5.5h = dk			
								\$ 5:15 - 6:00 = 0.75 = closed			

2/20/2019