PLATO Ancillary Data Base

M. Deleuil
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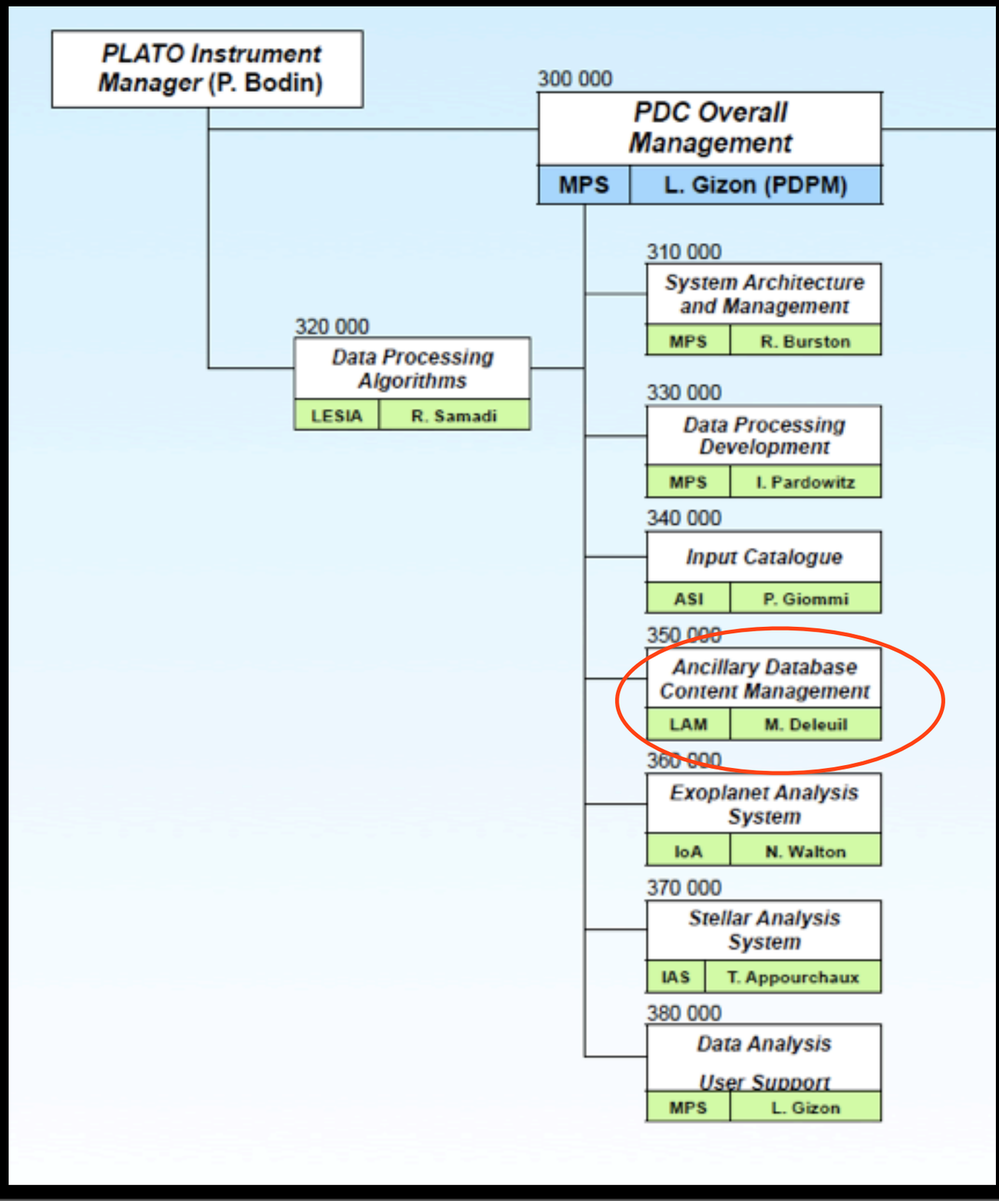

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WP 350 xxx

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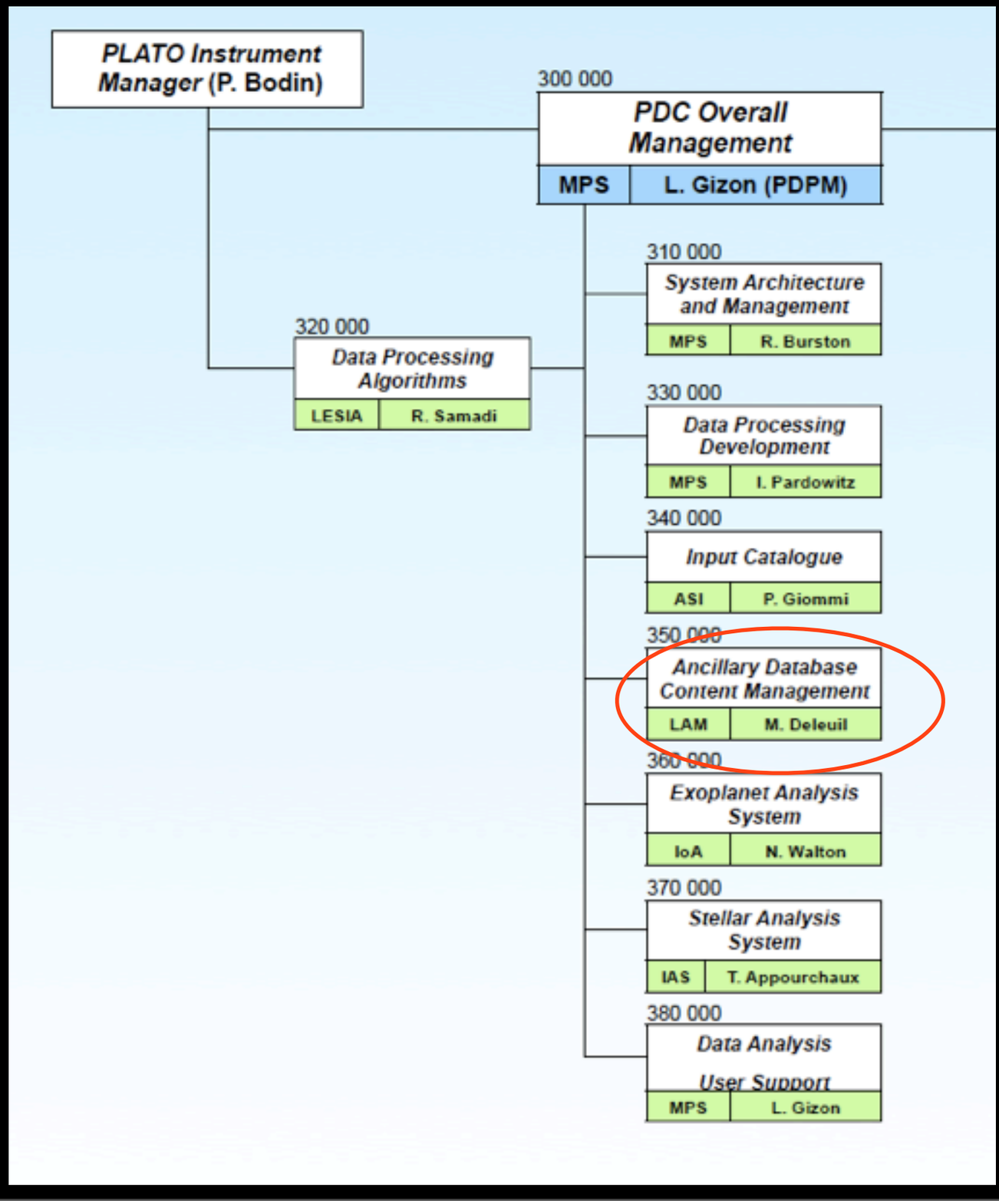
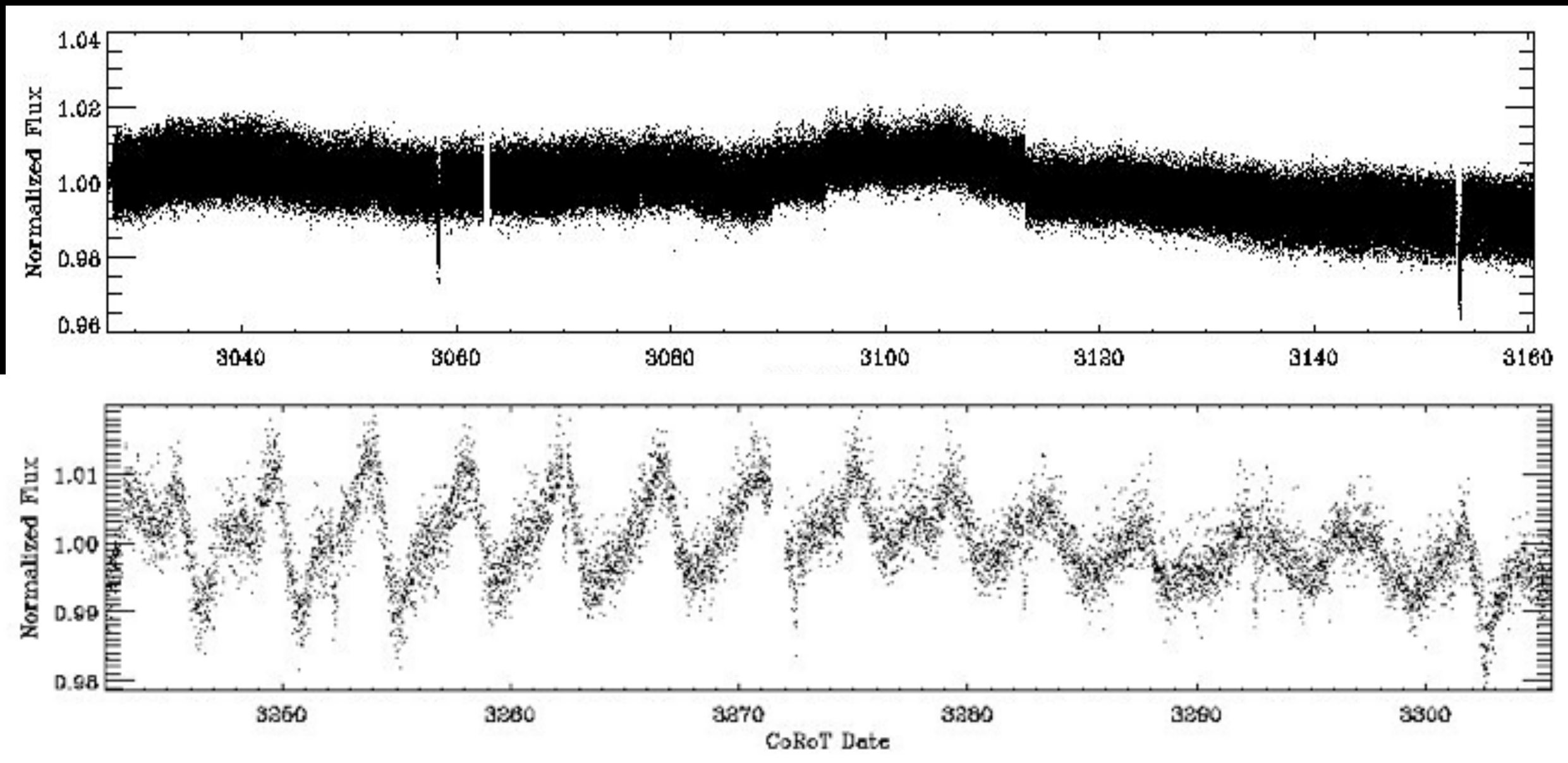


Why a Data Base?

1 . Support to the light curves analyses



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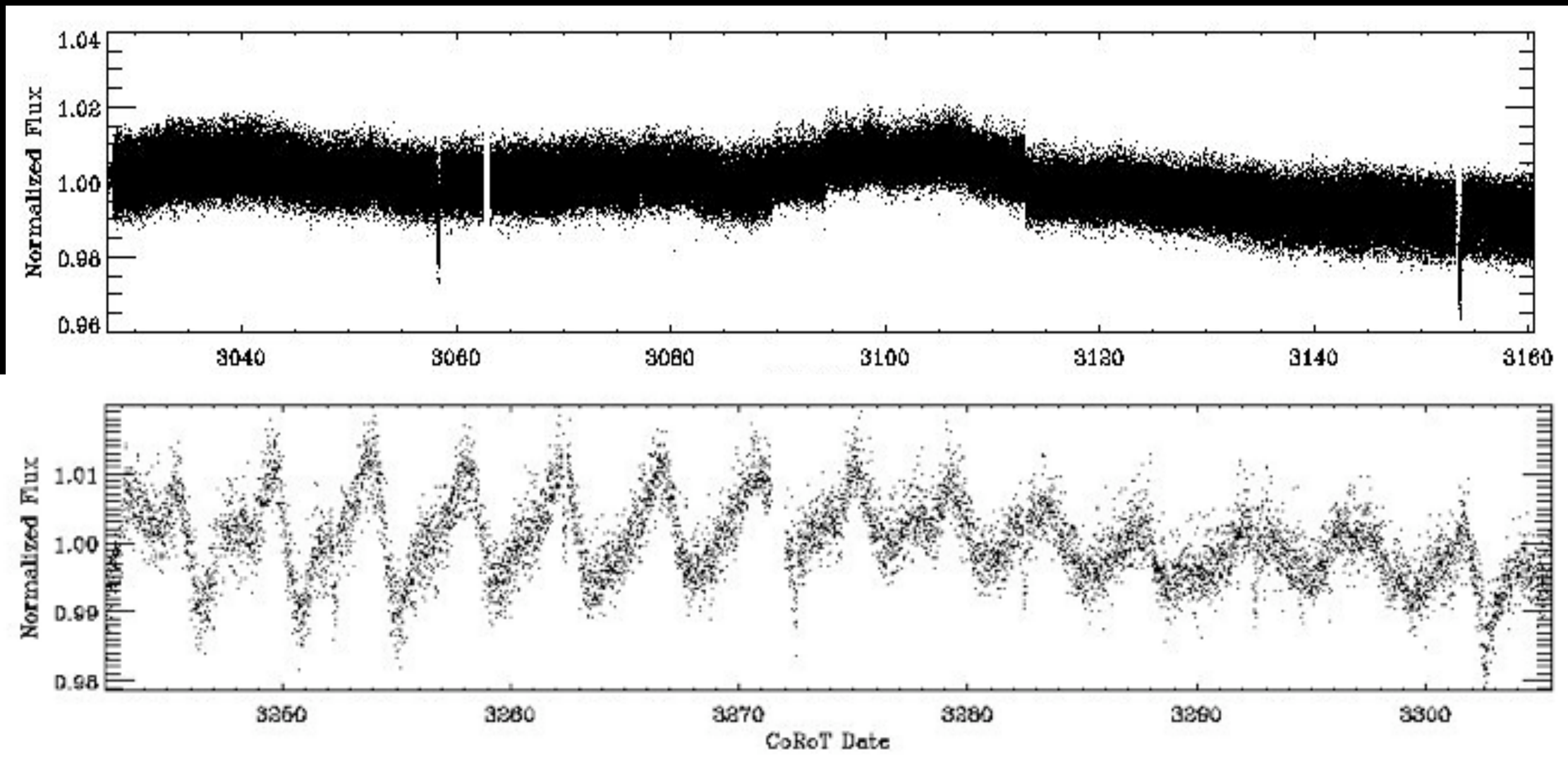
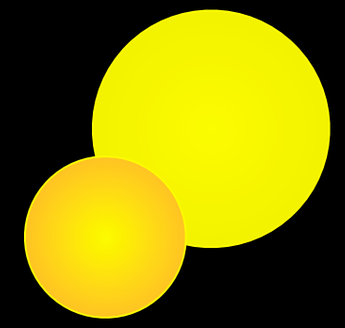


➙ Help assessing the nature of the detected transiting body

Who's that transiting guy ...

Low mass star

Grazing binary



PLATO Input Catalog (PIC) will provide the Target's ID including :

- atmospheric parameters
- fundamental parameters : $M_\star$ & $R_\star$
- others key parameters TBD by PIC

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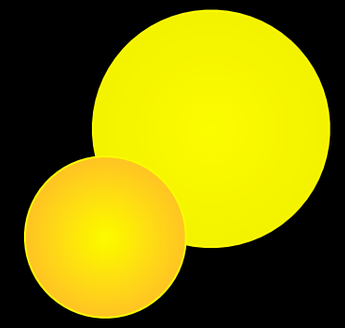

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Role of the Ancillary DB?

Different analyses = different results (most of the time...)

	Line depth ratio	H α wings	Strömgren indices			Evolution tracks & parallax		Spectral synthesis
HD	$T_{\rm eff}$ [K]	$T_{\rm eff}$ [K]	$T_{\rm eff}$ [K]	$\log g$	$[{\rm M/H}]_{\rm phot}$	$M/M_\odot$	$\log g_\pi$	$v \sin i$ [km s^{-1}]
Sun	5770(5)	–	5778[a]	4.44[a]	+0.00[a]	1[a]	4.44[a]	2[b]
43318	6191(17)	6100	6400	4.19	−0.15	1.23(17)	3.96(14)	8
43587	5923(8)	5850	5931	4.31	−0.11	1.02(20)	4.29(15)	2.5[b]
45067	6067(6)	5900	6038	4.03	−0.22	1.08(17)	3.96(15)	<7[b]
49434	–	6950	7304	4.14	−0.01	1.55(14)	4.25(11)	84
49933	–	6400	6576	4.30	−0.45	1.17(18)	4.20(14)	14
55057	–	6750	7274	3.61	+0.10	2.12(22)	3.66(12)	120
57006	6181(7)	6000	6158	3.72	−0.13	1.28(17)	3.58(16)	9
171834	–	6550	6716	4.03	−0.22	1.40(17)	4.13(13)	63
184663	–	6450	6597	4.25	−0.17	1.29(14)	4.19(15)	53
46304	–	7050	7379	3.93	−0.09	1.68(14)	4.18(11)	200
174866	–	7200	7865	3.86	−0.18	1.77(14)	3.86(15)	165

[a] The fundamental parameters for the Sun are also given in the table, although we have not determined its parameters; the exception is our estimate of $T_{\rm eff}$ from line depth ratios.

[b] With the resolution of the ELODIE spectrograph ($R = 45\,000$) it is not possible to measure $v \sin i$ below 7 km s^{-1} directly.

e.g. Bruntt et al., 2002

Role of the Ancillary DB?

Different methods = different results (also…)

HD	$B-V$	P_{rot} (d)[A]	$-log < R'_{HK} >$	t_{chrom}/Myr	t_{iso}/Myr[B]	t_{gyro}/Myr	δt_{gyro}/Myr
160346	0.96	36.4	4.795	2637	.....	3280	490
165341A[K]	0.86	20	4.548	1091	.....	1300	180
166620	0.87	42.4	4.955	4750	>11200	5400	860
178428	0.70	22	5.048	6616	.....	2560	390
185144	0.80	27	4.832	3019	.....	2730	410
187691	0.55	10	5.026	6128	3200	1250	210
190007	1.17	28.95	4.692	1832	<1760	1460	200
190406	0.61	13.94	4.797	2657	3160	1610	250
194012	0.51	7	4.720	2019	.....	900	170
201091	1.18	35.37	4.764	2359	<440	2120	300
201092	1.37	37.84[L]	4.891	3753	<680	1870	260
206860	0.59	4.86	4.416	470	<880	237	33
207978	0.42	3	4.890	3740	.....	1270	810
212754	0.52	12	5.073	7207	.....	2300	440
219834B[M]	0.91	43	4.944	4563	>13200	5040	800
224930	0.67	33	4.875	3538	.....	6330	1080

Barnes, 2007 ApJ

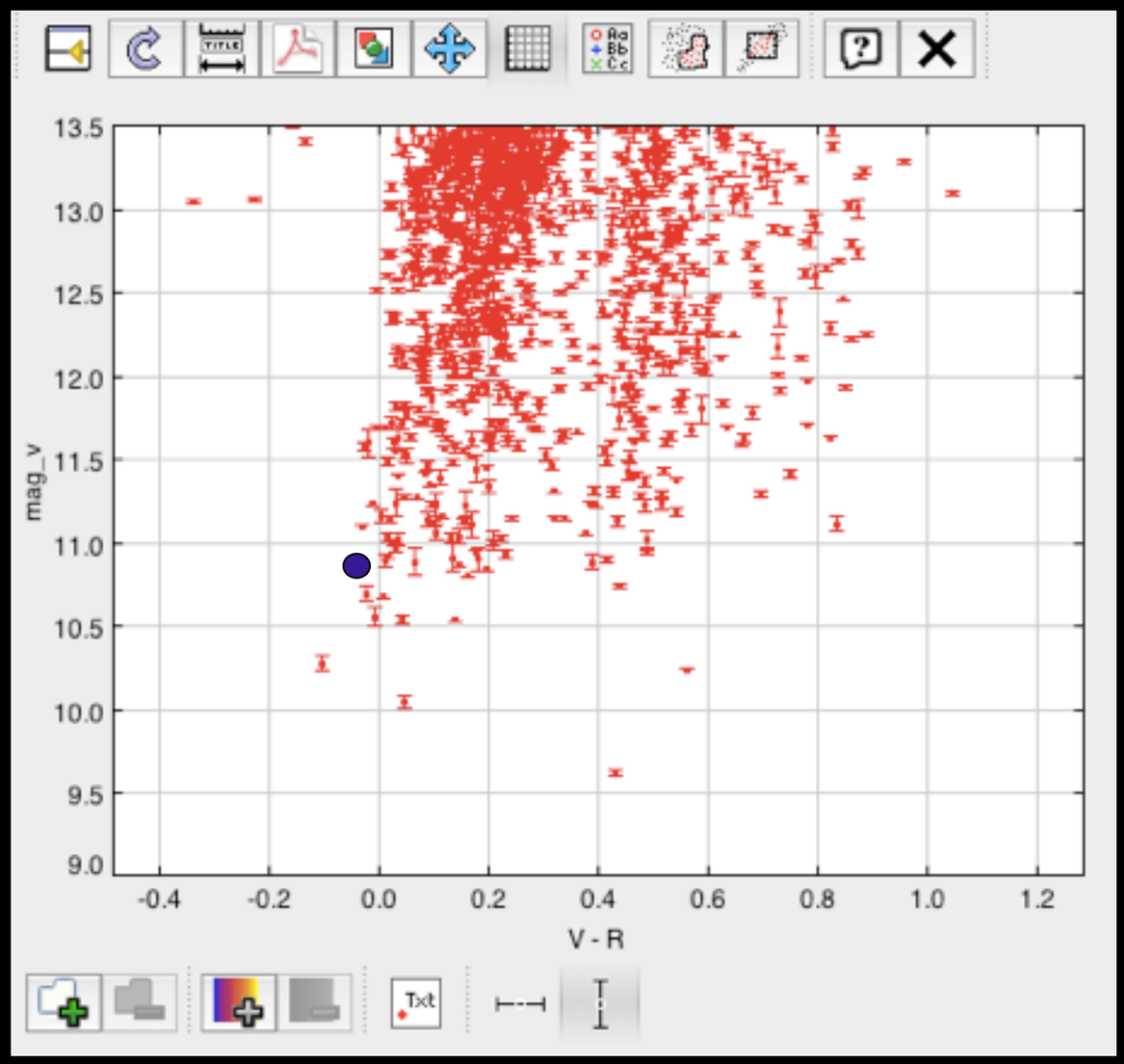
The PIC will do choices and will provide the “best” value for the potential target’s parameters

➙The Ancillary Data Base will ingest the complementary data - when valuable

Content : catalogs

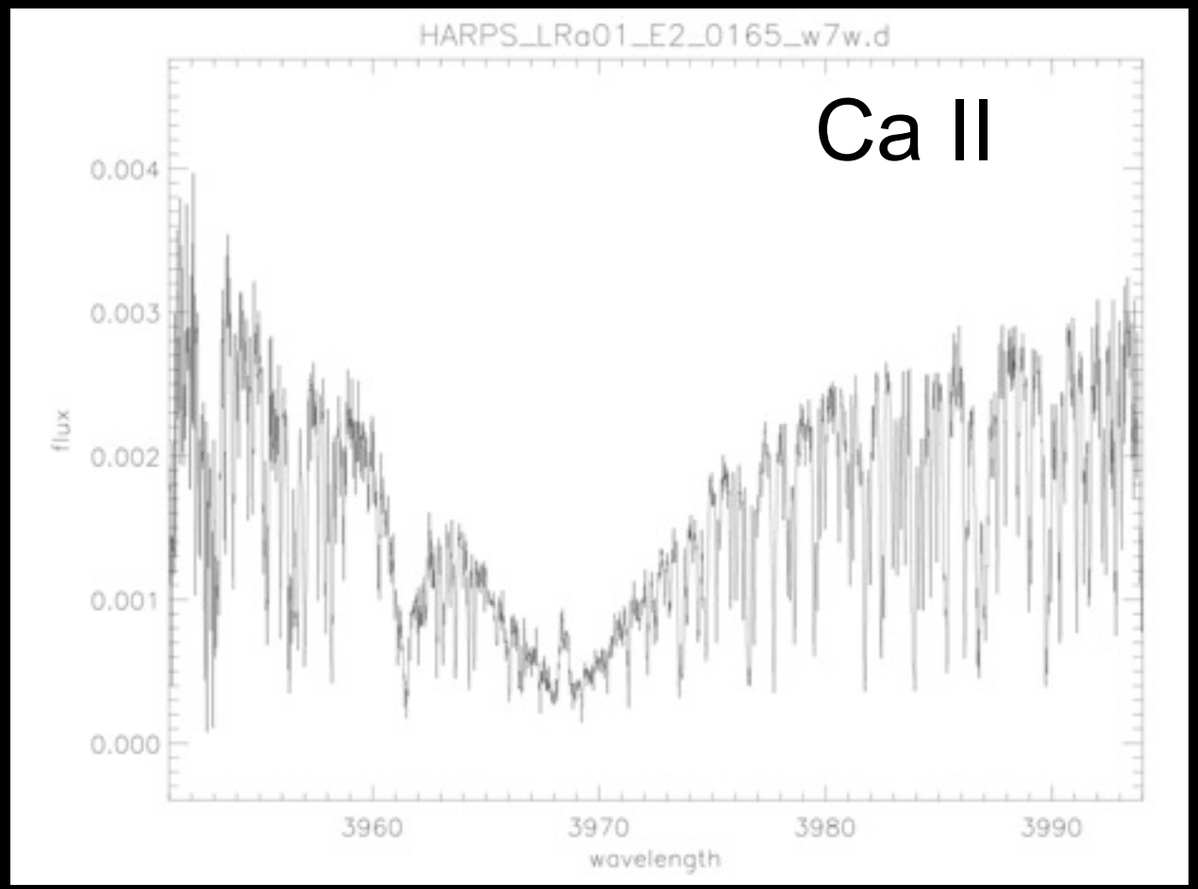
Existing catalogs identified as valuable by the PIC : photometric, astrometric ...

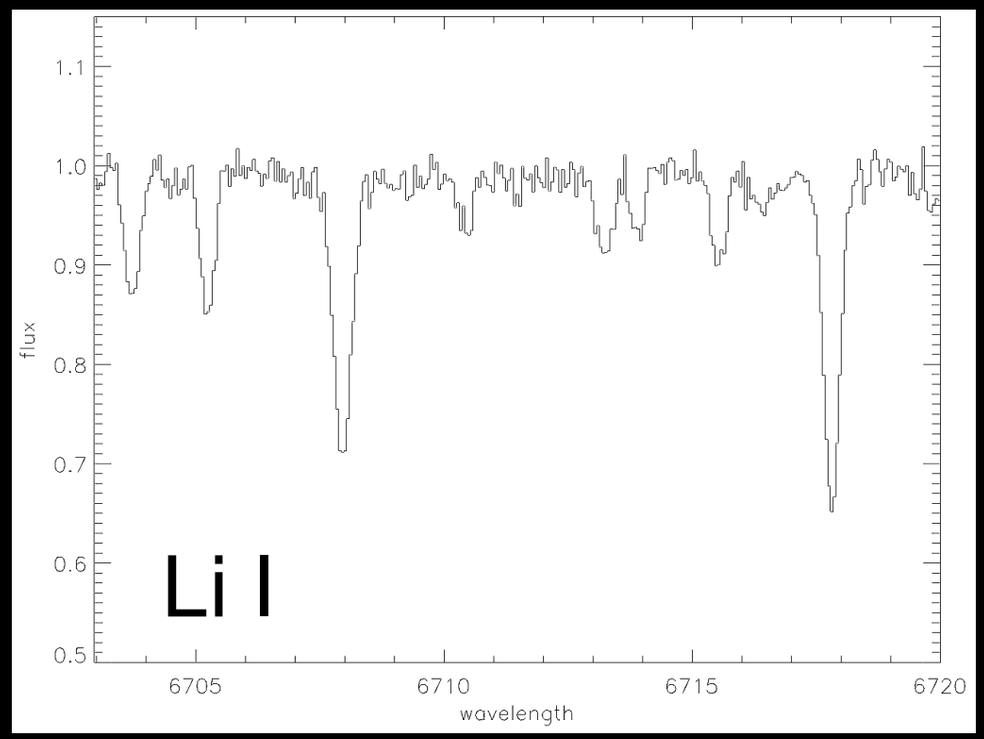
➙ support to build the Input Catalog
➙ support to light curve analysis - additional verifications on the target's properties

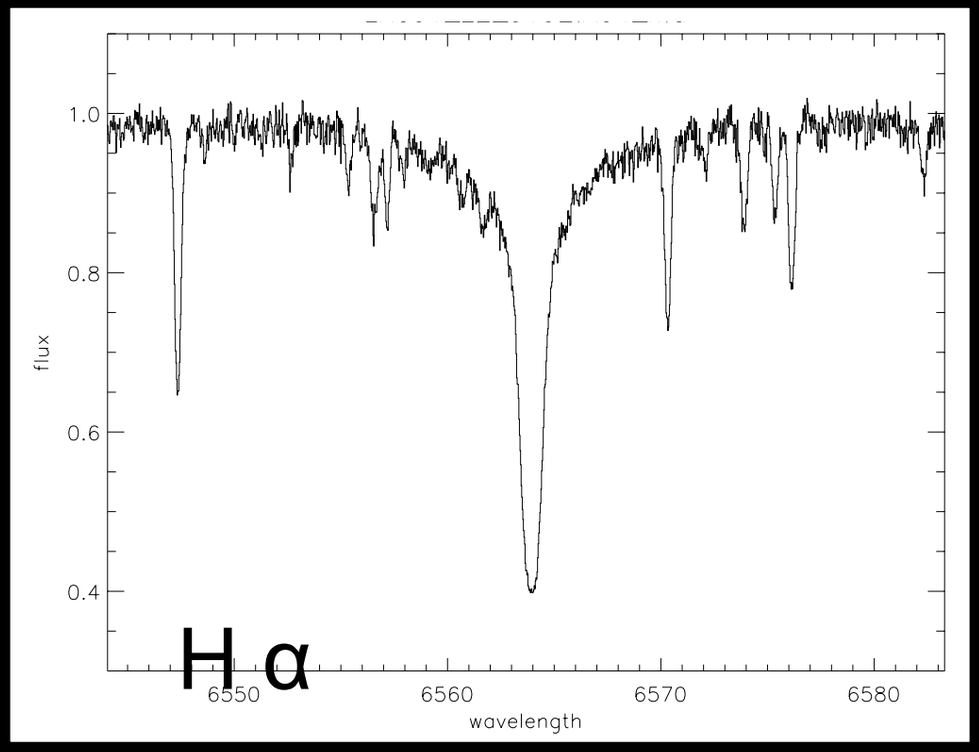


Content : spectra

- spectra - when available to allow additional verifications - if wished

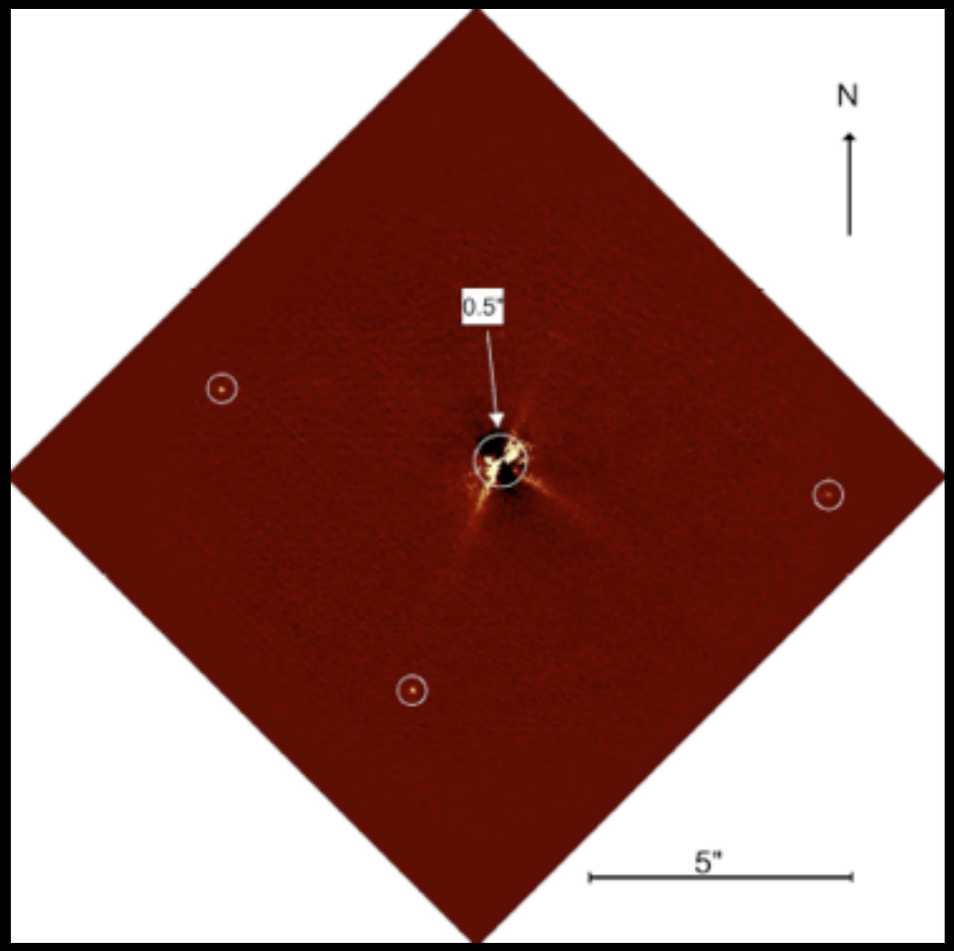


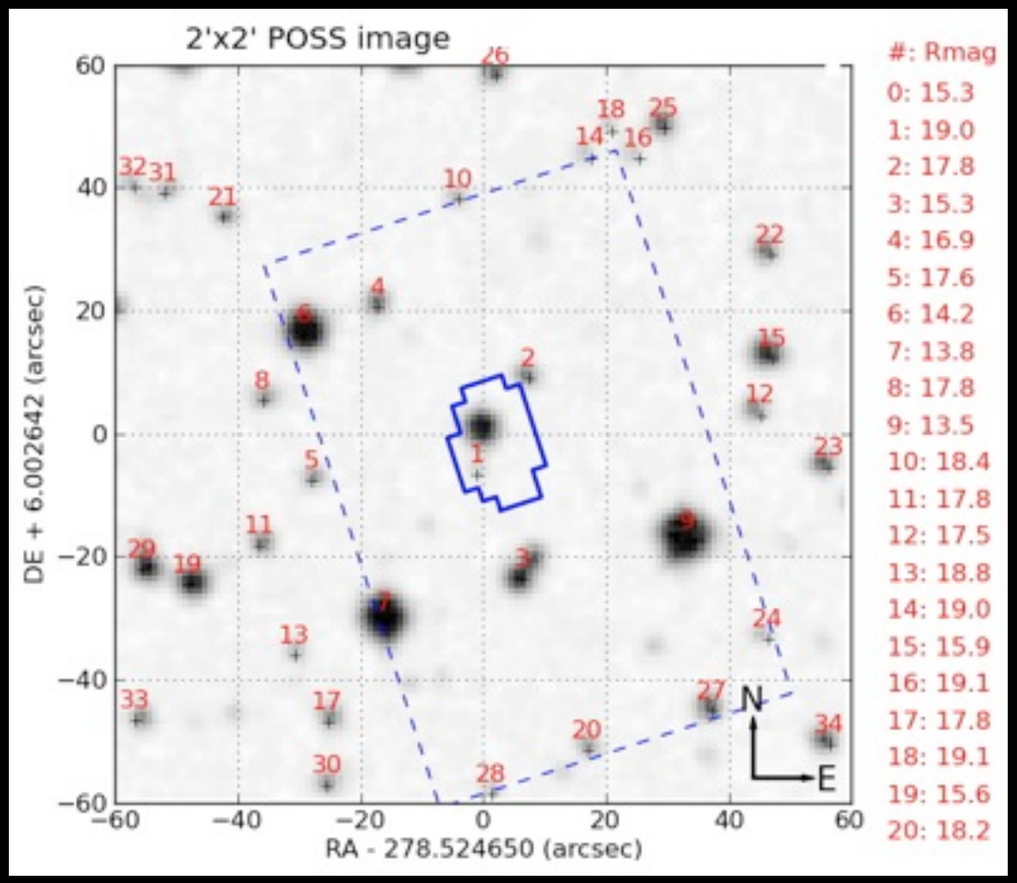




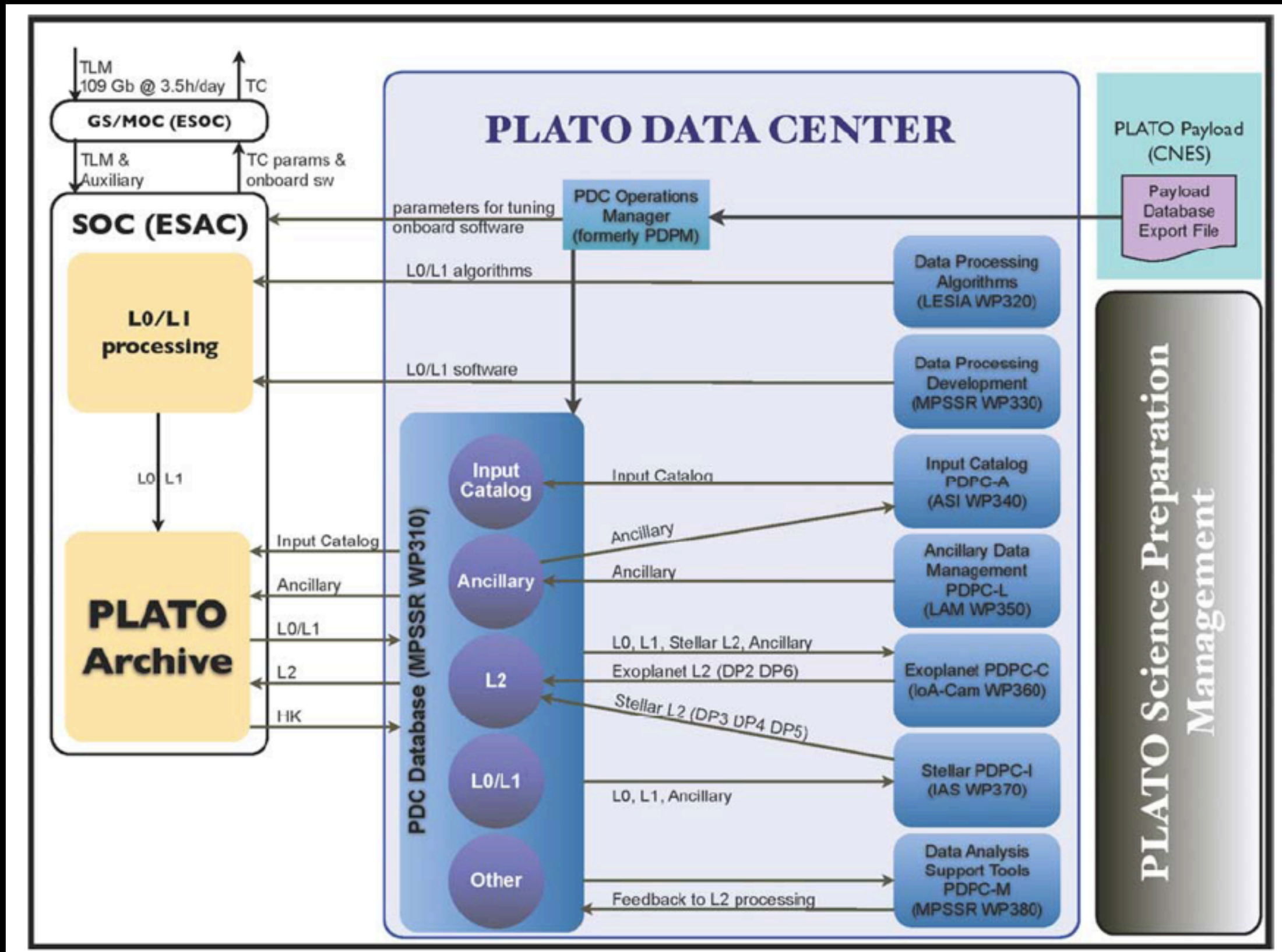
Content : images

Images to help probing the target's environment & contaminants position + properties (magnitudes, variability ....)





Technical aspects ...



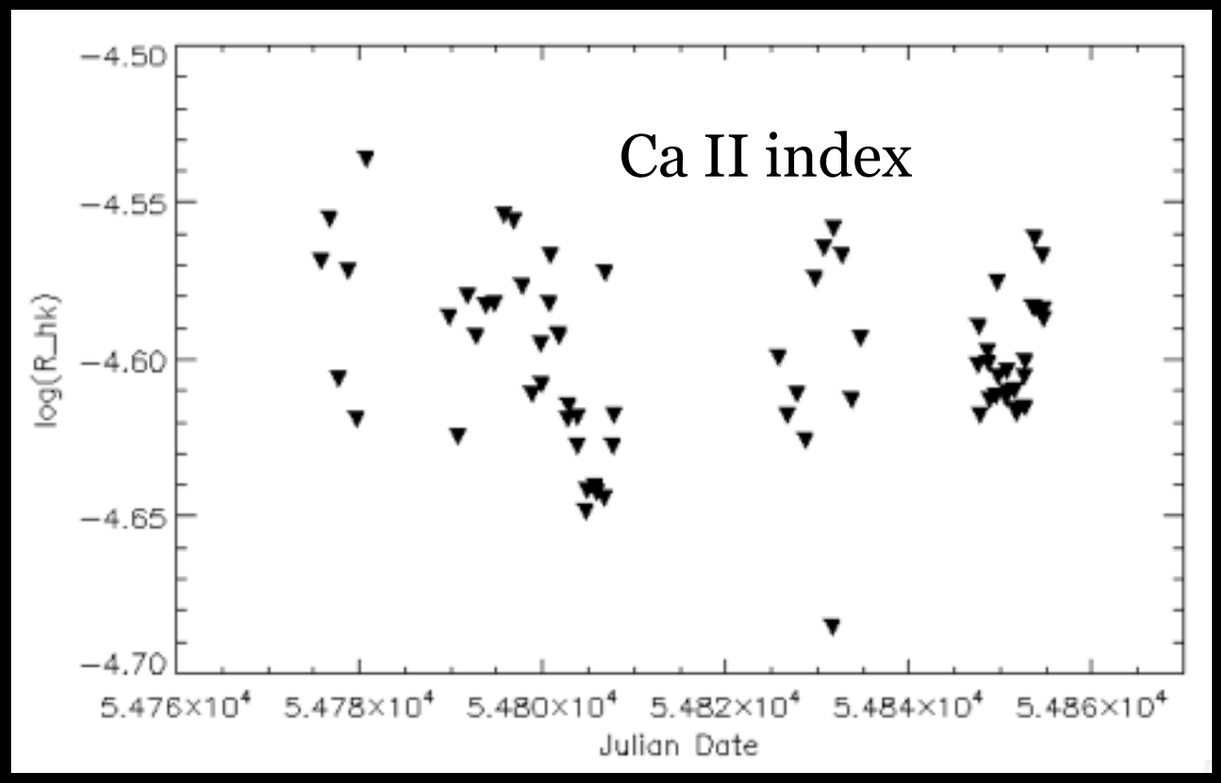
Role of the Ancillary DB II

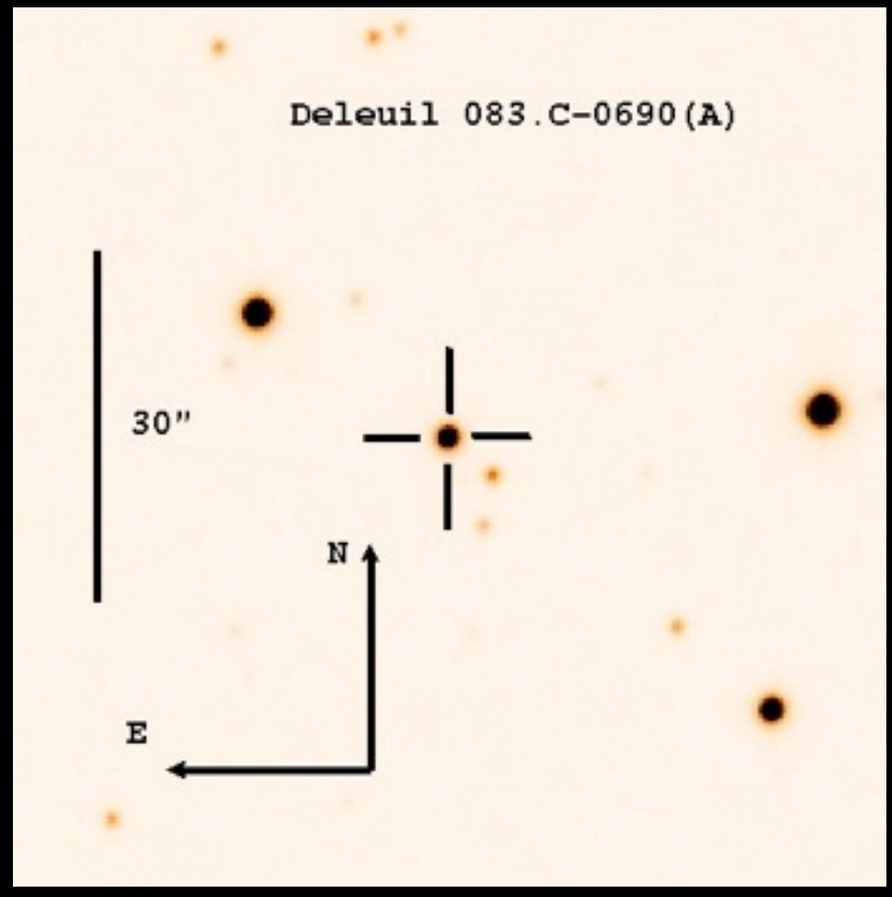
2. Support of the follow-up observations

FUp observations will need input from

- the detection : transits parameters + ephemerides ...
- the input catalog : target coordinates, magnitude ...
- the Ancillary DB : contaminants, finding charts, Ca II index series ...

→ help the observations scheduling

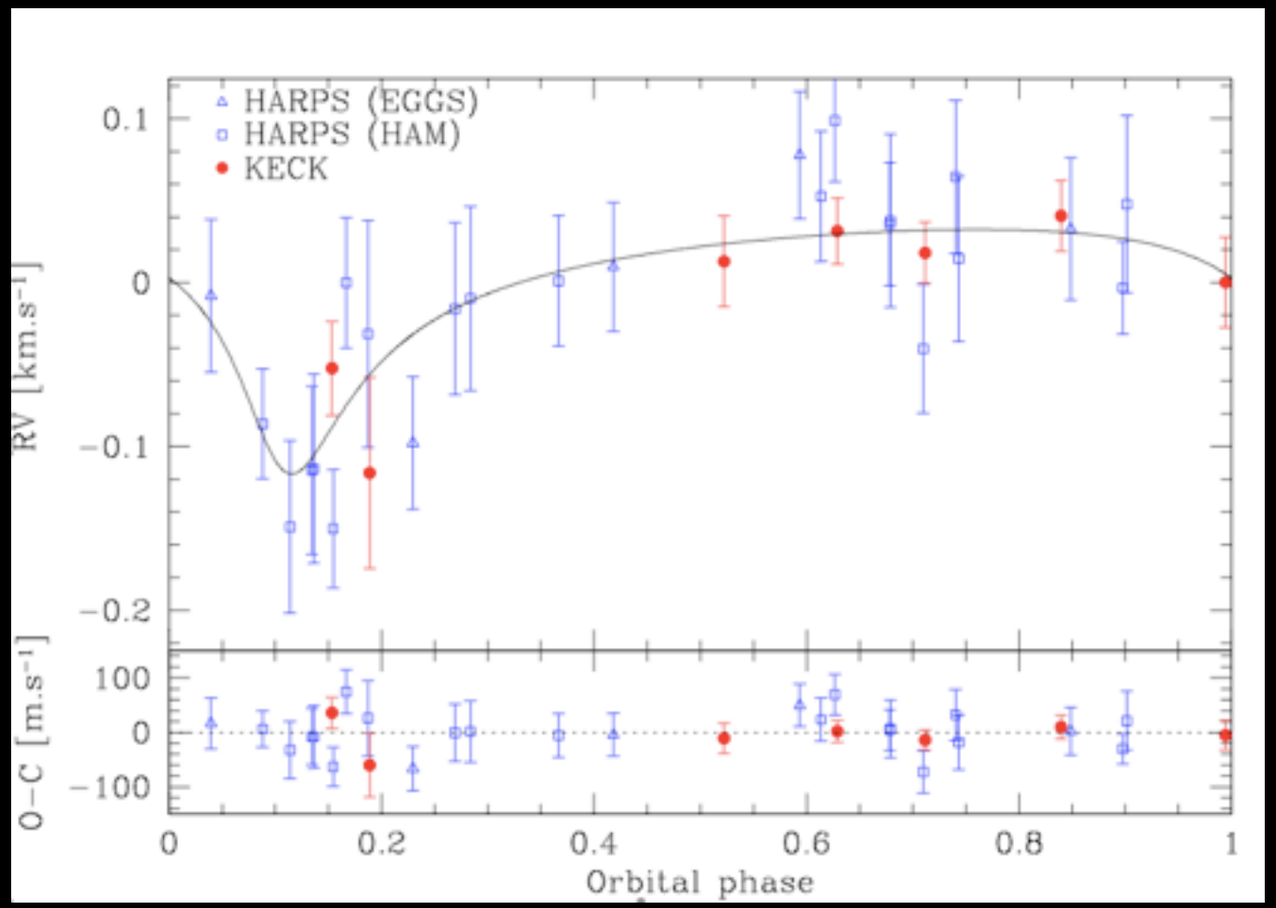




Role of the Ancillary DB II

2. Support of the follow-up observations

➛ regular updates during the mission life time :
+ general *data (series of spectra, spectral range, S/N ...)*
+ *parameters derived from analysis e.g. K(m/s), eccentricity ...*



BJD[a] −2 400 000	RV (km s^{-1})	1-σ error (km s^{-1})	exp. time (s)	S/N p. pix. (at 550 nm)
		SOPHIE		
54314.40776	−37.6060	0.0490	3600	12.15
54318.41015	−37.5454	0.0184	3600	17.00
		HARPS		
54675.69652	−37.5050	0.0151	2700	9.20
54678.66557	−37.4427	0.0101	2700	12.20
54679.73180	−37.4751	0.0407	2700	4.60
54682.68436	−37.4830	0.0112	2700	11.20
54700.57459	−37.4756	0.0140	2700	8.90
54703.59565	−37.4611	0.0169	2700	8.40
54732.56202	−37.4687	0.0080	3600	14.50
54733.58576	−37.4508	0.0077	3600	14.80
54737.58497	−37.4955	0.0134	3600	10.30
54987.78368	−37.4550	0.0237	3600	7.82
54988.84456	−37.4482	0.0146	3600	10.92
54989.83528	−37.4540	0.0098	3600	14.77
54991.85115	−37.4979	0.0157	3600	10.74
54992.80807	−37.4839	0.0106	3600	13.68
54993.87346	−37.4610	0.0113	3600	13.30
54998.85102	−37.5006	0.0106	3600	12.20
55021.82951	−37.4656	0.0102	3600	14.22
55045.74089	−37.4139	0.0148	3600	10.95
55046.73467	−37.4888	0.0179	3600	9.47

Ancillary Data Content

- **Catalogues & Archives**
  - GAIA catalogues
  - Photometric catalogues
  - Archives spectra
  - High contrast imaging
- **Stellar parameters**
  - Atmospheric parameters
  - Fundamental parameters
  - Proper motions
  - Star's peculiarities
  - Stellar companion
  - Known planetary companion
- **Radial Velocity data**
  - Spectra
  - Radial velocity parameters
  - Stellar parameters
- **High contrast imaging**
  - Adaptative Optics
  - Time series photometric observations
- **Complementary observations for planet characterization**
  - Space-based observations
  - Ground-based observations

Ancillary DB - summary

Content of the DB will be defined in the forthcoming years

Could be anything you can dream of to support the PLATO data analysis… as long as valuable and sufficient in quality

Main contributors to the content definition :
- **PLATO Input Catalog**,
- **Science Management**
- **Follow-up observations**

Critical points :
- Interfaces are important
- Validation of the data to be ingested

Contributions/collaborations are welcome!

During PLATO observations : will gather results from FUp observations regular updates with observations & results

Long term : basis for statistical studies of planetary systems properties