The CoRoT Legacy Book

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II.1

The CoRoT observations

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This chapter explains how it has been possible to propose a reasonable mission, taking into account the scientific objectives and the mission constraints.

It shows how the scientific specifications have been translated in the observation programme and its successive runs.

It describes the observations from all aspects: selection criteria (scientific and operational), tools, implementation, global results and specific results.

A particular focus is made on evolution, showing how scientists and engineers in charge of the operations at CNES and in the laboratories have adapted the major principles to the results of the first observations and to the instrument in flight.

The first section deals with science and presents the process to choose the targets and the result of this scientific choice, i.e. the observed targets, individually for the bright stars and statistically for the faint stars.

The following section gathers many operational aspects: the tools used for the operations as well as for the scientific choices, the work flow followed at the beginning of each run, the resulting overall duty cycle.

The last section concerns the runs one by one. A first table indicates the periods of lack of data. Then specific scientific information is given for each run and, in some cases, complementary remarks useful to interpret the data, such as special processing, anomalies, ...

The concept of the instrument and the definition phase were extensively described in Fridlund et al. (2006), called "The CoRoT book".

1. The scientific programme

1.1. General overview

The choice of the fields and the targets to be observed has been driven first by the initial objectives of the Core Programme and its evolution (see Michel et al. 2006). Additional Programmes (AP) are accommodated as much as possible, following the proposals of the GIs.

Calls for AP proposals are sent as soon as the field of a run is approximately chosen. They contain either general scientific studies or specific targets.

The necessity to observe at the same time, for long durations, bright targets devoted to the seismology programme, and faint ones for the exoplanet finding objective have lead to difficult compromises on the instrument, the satellite and the mission profile.

A preliminary proposal for a nominal mission of 2.5 yr was built before the mission, but has been adjusted during the flight before each observing period, taking into account the previous results.

And it was also adapted to the instrumental realisation, and "in flight" performances.

Before the end of the nominal phase (3 yr), a new programme has been proposed for a 3-yr extension, which focussed on the CoRoT "niches", as discovered during the 3 first years.

At the end of this period, as the instrument was still in a good shape, a programme for a second 3-yr extension has been worked out and accepted in October 2012. But unfortunately the instrument stopped sending data a few days later.

1.2. The choice of the fields to be observed

Setting the observational programme consists in defining for each run, successively, a preliminary position of the Field of View (FOV), of the line of sight (LOS), of the roll and a preliminary choice of the targets.

For each run, the process starts by a proposal from the Scientific Committee (SC), based only on the scientific requirements.

The "Core programme" had the highest priority, with an equal weight for seismology and planet hunting.

Additional programmes have been taken into account with a lower priority, essentially in the faint star field.

It starts with a preliminary list of bright targets fulfilling the seismology objectives (as selected in the CoRoTSky database), and the planet hunting requirements on the faint star density, as defined by the Scientific Committee.

Then each proposed pointing is defined by a bright star, the "principal target", with some evaluation of its surrounding in the field of view. The requirement of the exoplanet-hunting programme (a sufficient number of faint dwarf stars) is checked.

Through an iterative process, the best compromise between both programmes optimises the scientific return.

Table II.1.1 summarises the major scientific objectives of each run.

1.3. The scientific selection criteria

* In the Bright Stars Filed (BSF), the order of the priorities was:
  - solar-like stars;
  - A and early F stars to detect/study in more details Delta Scuti and Gamma Doradus variables (already known or suspected);
  - peculiar stars;
  - rare objects

  as extensively described in Michel et al. (2015).

  For each run, the observed targets, classified by the "star type" are listed in Table II.1.2.

  And the total number is given in the last line.
* In the Faint Stars Field (FSF)

  The scientific priority was to detect planets, but the maximum number of windows (5724) is generally larger than the number of good candidates.
* The criteria for planet detection were almost always the same:
  - MV 10-15, Spectral type FGKM, Luminosity class V and IV, contamination <0.2;
  - MV 15-16, Spectral type FGKM, Luminosity class III, contamination <0.2;
  - MV 10-16, Spectral type FGKM, Luminosity class V and IV;
  - MV 10-16, Spectral type OBA, Luminosity class V and IV, contamination <0.2;
  - MV 10-16, contamination <0.3.

  The result of the choice based on these scientific criteria is a collection of thousands stars, with priorities built using CoRoTSky and the EXODAT database. The result of the choice is called the "Exobasket".
* To broaden the scientific objectives, the concept of Additional Programmes (AP) has been created, which can be easily implemented as generally the core programme does not use all the available windows.

After the preliminary choice of the field, a call for proposals was send to the Co-Is and GIs. The requested targets were selected after a review by the Additional Programme Working Group. In a few cases, AP targets are bright stars, but generally they are faint ones; their total number depends of the population of the field, but was limited to 500.

When a specific target is requested by an AP, it can be put in the exobasket with a high priority, to force its selection in EXOWIN.

1.4. Evolution during the mission

During the six years of the mission, the strategy has been adapted to both the evolution of the instrument and the results already acquired. Let us cite the major ones:

- in the BSF, it appeared that most of the A/early F stellar types, are generally "constant", so their priority has decreased;
- using the light curves already obtained, it has been demonstrated that the optimum duration of a run for planet hunting is slightly smaller than previously said: decreasing the length of the run to 80 to 90 days does not decrease significantly the detection rate, and allows to observe more fields. But the optimum duration for seismology remains as long as possible!

After the loss of chain 1, which reduced the observed area by a factor 2, Daniel Rouan proposed a strategy in which a long period is cut in almost equal parts, of 80 days. Then a rotation of the field allows to keep the same seismology targets and to observe a new region in the FSF. This method has been applied for LRc05/LRc06, LRa04/LRa05 and LRc07/LRc08.

2. The operational phase

2.1. Concept of the operations

The programme of observations is based on a yearly cycle of 4 runs which impulses the rhythms of the operations.

During the "summer period" from October to March, the telescope is pointed towards the "anticentre" of the Milky Way and during the "winter period" from April to September, in the opposite direction.

Two observation runs are achieved during each summer and winter period in general.

Using the CoRoTSky tool and the associated stellar databases (see below), the scientific programme is turned into a precise proposal for the pointing with chosen targets and the technical feasibility is assessed.

In parallel, the evolution of the CCD temperature is evaluated over the whole run; the temperature at the beginning of the run is set in order to minimise the total number of changes.

The operations themselves begin then in close collaboration between the team in charge of the operations at CNES and the science and instrument specialists from the laboratories.

As the bright stars are used for the pointing, they are always observed first. The observation of the faint stars generally begins between 2 and 4 days after the observation of the bright stars.

The successive steps of the procedure are detailed below.

2.2. Tuning of the pointing and setting the parameters

* The full image stage: first, the satellite uses its own pointing mode, often called rough pointing, to record images over 3 orbits (excluding the SAA crossing) to built an image of the sky in the position defined by CoRoTSky.

Table II.1.1. The scientific objectives of the successive runs and their characteristics. Abbreviations of the Star types: SL Solar-like, DS: Delta Scuti, EB: Eclipsing binaries, GD: Gamma Dor, RG: Red giants, OBA: spectral type OBA, LPV: long period variable.

Run	Start time BSF	SAA crossing %	driver	bright stars choice: Principal Target	bright stars choice: Complementary targets	faint star field choice: planet search(ps)	faint star field choice: Additional programmes	Pointing direction in J2000: Alpha (°)	Pointing direction in J2000: Delta (°)	Pointing direction in J2000: Roll (°)
IRa01	31/01/2007 11:06:34	8.73	HD 49933 + ps	HD 49933	1 DS, 1Ap, 2EBs	classical, some overlap with LRa01	8 ASAS variables 1500 BA, 1458 RG	102.60	–1.70	9.60
SRc01	11/04/2007 15:07:52	8.71	seismology core program	2 DS	2 EB, SL 175726	classical USNO cat, field very inhomogenous	no	284.59	3.08	5.48
LRc01	11/05/2007 13:10:19	8.73	HD 181555, HD 180642 + ps	DS, β cep	SL, Be	classical	RRLyr, DS, OAB, 3988 (1400 osc) RG	290.89	0.43	24.24
LRa01	18/10/2007 08:57:24	8.74	HD 49933, HD 49330 +ps	HD 49933	DS, Be, Ap	best field	Bes, Dolitze 25 (56), 1698 (400 osc) RG WD cand (18), EBs, OBA,	101.66	–0.20	1.92
SRa01	05/03/2008 22:34:26	8.75	NGC 2264		GD, Ap		NGC 2264 in faint star field	101.04	9.02	2.32
LRc02	11/04/2008 20:55:29	8.74	GD + ps	GD	DS, SL	classical	22*	279.66	6.40	16.72
SRc02	09/09/2008 23:03:28	8.84	HD 174532, unique DS with very low sinI	l Bootis, HgMn	classical	14*, 1 EB, Var non ident.	284.10	–2.86	–14.64	
SRa02	08/10/2008 22:44:36	8.76	HD 46375 + ps	HD 46375	6 O stars of NGC 2244	simple	16*	97.55	5.66	–25.36
LRa02	13/11/2008 22:49:46	8.72	HD 52265 + ps	HD 52265	3 early B + DS, low Vsini, Ap, Be	classical	Be, EB, 10 BA, 647 OBA	103.52	–4.38	6.00
					stop of chain 1, March 9th 2009					
LRc03	01/04/2009 20:49:11	8.76	planet search		2 L, 2K	optimised for planet	none	277.47	–7.25	16.24
LRc04	04/07/2009 02:58:56	8.73	HD 169689 + ps	HD 169689	EB, 2 SL,	good	10, 49 OAB	277.72	8.02	6.56
LRa03	01/10/2009 20:57:34	8.73	HD 43587 + exo	HD 43587	d scuti, the coolest Be, F2V candidate d scuti	ok, but quite poor	46 NGC2186 members, 1EB,1DS, 1100 OBA	93.75	5.50	–3.84
SRa03	02/03/2010 21:17:26	8.78	SDB in the faint star field		EB, sol-like	classical 2MASS data	7*, 248 A	98.40	0.99	2.16

Table II.1.1. continued.

					start of the extension					
LRc05	06/04/2010 21:13:38	8.74	HD 170580, DS + ps		DS, Ap	classical	2*, 178 A	279.00	3.66	6.77
LRc06	07/07/2010 01:30:32	8.75			DS, Be	classical	IC4756, 2*, 388 OBA	278.95	4.35	16.85
LRa04	28/09/2010 00:14:23	8.16	HD 42618 +exo	HD 42618	Be + DS + Mvar	2MASS data no selection, field very poor		92.57	6.94	5.87
LRa05	17/12/2010 19:26:25	8.00		HD 42618	d scuti +B	2MASS data no selection, field very poor		91.93	7.95	–23.49
LRc07	06/04/2011 15:57:50	8.01	RG	NGC6633 Red giants		classical	194 OBA,	277.60	6.29	23.97
SRc03	01/07/2011 18:30:50		CoRoT 9 new ecclipse	No bright star		CoRoT 9 new ecclipse		279.86	5.57	2.37
LRc08	06/07/2011 14:59:43	8.01	RG	NGC6633 Red giants		classical	211 A	277.14	5.60	–16.03
SRa04	04/10/2011 19:06:57	7.95	HgMn	HD 45975				96.17	–3.84	1.79
SRa05	29/11/2011 18:14:02	8.02	NGC2264, multi satellite			classical + 11 planet cand	YSOVAR 2 +13 EB = 821 OBA	101.12	10.07	–18.60
LRa06	10/01/2012 18:24:40	7.99	reobs CoRoT 7	HD 49933	SL, Be, BS, Ds	CoRoT 7 + CoRoT 12 and CoRoT 21 + classical	1 Dolitze, 18 WD candidates, 4Be, EB, 171 RG, 1370 OBA	101.55	0.22	16.03
LRc09	10/04/2012 20:47:16	7.77	HD 179079 planet host star	HD 179079	RG puls, 2 early F, B	classical	1700 RG, 558 OBA	288.22	–3.18	–1.15
LRc10	06/07/2012 14:22:07	7.98	sec ecclipse HD 169689	HD169689	RG LP, M LPV	classical	800 RG, 2000 0BA	277.74	7.28	–9.63
LRa07	02/10/2012 19:59:38		O stars	HD 46365+4 O (NGC2244)		classical	1000 RG, 470 OBA	96.87	5.19	15.23
					stop of chain 2, November 2nd 2012					

Table II.1.2. The bright star targets for each run, as a function of their star types.

The "star types" of the bright targets of the successive runns													
RUN	**Duration in the Bright star field in days h:m:s**	**O**	**B**	**Be**	**β cep δ scuti**	**A/ earlyF**	**δ Scut γ Dor**	**late F/G**	**sol-like F/G/K**	**CP**	**giant *puls**	**K/M**	**Multiple**	**Cluster**
IRa01	60 20:5:41.0			50 846		50 844 50 747 50 405 50 170		292 790	49 933	50 773 51 106	50 890		50 846 50 405 50 170	Dolitze 25
SRc01	27 16:5:29.0		174 884	175 869		175 543 174 987 175 542	174 966 174 936		175 726 175 272		*175 679		174 884	
LRc01	156 17:24:42.0		181 440 182 108	181 231	180 642	181 072 181 555 180 973			181 420 181 906		181 907			
LRa01	137 0:52:11.0		50 064	49 330 50 209	50 230	49 808	49 294 49 434		49 385 49 933	49 862				
SRa01	25 9:9:32.0		48 977 49 677 48 752			263 425 49 607	48 784			49 310	48 976 *49 566 49 161	49 429	48 752	NGC2264
LRc02	148 3:4:30.0		172 046 170 935			171 835 171 536 171 834	172 189 171 218		170 987	171 586	171 427		170 987	
SRc02	26 7:39:31.0		174 648			174 990 174 967	174 532 174 589	175 152		175 640 175 445	174 589	174 796 174 323		
SRa02	34 9:43:52.0	46 966 46 150 46 149 46 223 47 129	46 129 46 179		46 202	46 424			46 375		46 612		47 129 46 149 46 202	
LRa02	117 11:41:52.0		51 756	51 193 51 452		52 130 51 332	51 359 50 870 51 722		52 265	51 844			51 756 51 844	

Table II.1.2. continued.

stop of chain 1, march 9th 2009														
LRc03	91 7:4:47.0					169 868		169 556	169 392		*169 751 *169 370			NGC 2186
LRc04	87 7:5:0.0		169 689			170 133 170 511		169 822			*169 689 *170 008		169 822 169 689	
LRa03	150 11:39:50.0		43 317	43 913		43 823	44 195		43 587				43 587	
SRa03	26 10:52:29.0		46 769			47 485 46 799		47 530					47 361	
LRc05	89 8:30:50.0				170 580 170 783					170 973	171 264		170 580	
LRc06	79 6:38:21.0			171 219	170 580 170 783		170 699				171 264		170 580	IC 4756
LRa04	79 4:54:49.0			43 285		43 338	TYC144- 3031-1		42 618			42 787		
LRa05	94 12:20:44.0		42 597			42 299	41 641	42 089	42 618					
LRc07	83 3:24:10.0		170 200								*170 053 *170 031 *170 231 *170 174		170 200	NGC 6633
SRc03	3 11:02:58 (Faint star field)													
LRc08	85 15:25:12.0		170 200								*170 053 *170 031 *170 231 *170 174		170 200	NGC 6633
SRa04	54 12:16:15.0		45 418		45 546	45 517				45 975		45 398		NGC2232
SRa05	40 17:41:52.0		48 752 48 977				48 784				49 566	49 429	48 752	NGC2264
LRa06	78 16:29:15.0			49 585	50 230		49 608		49 933 49 385					Dolitze 25
LRc09	85 8:8:17.0		179 192			178 169 178 243			179 079		*178 484			
LRc10	86 17:3:43.0		169 689			170 133		169 822			170 270 *169 689	V 585 Oph	169 689	
LRa07	31 0:19:11.0	46 149 46 223 46 150			46 202				46 375			46 241 (perte pointage)	46 202 46 149	
stop of chain 2 november 2nd 2012														
Total		**5**	**23**	**11**	**7**	**33**	**18**	**7**	**14**	**10**	**21 *11**	**8**	**20**	**3+**

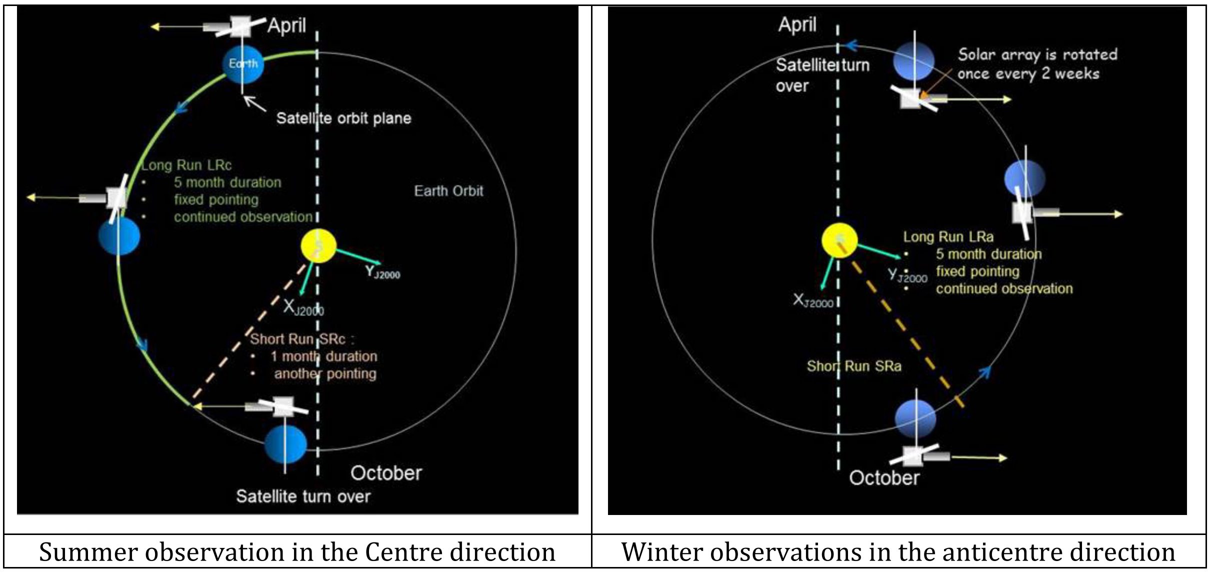

Fig. II.1.1. "The yearly rythm of the pointings: In the outer and inner regions of the Galaxy, and long and short alternate observations", © CNES.

* The field recognition: one of the images recorded previously is used to recognise the field.
  To do so, this image is compared to a synthetic image obtained using the Tycho catalogue.
* The choice of the bright targets: the procedure checks that targets chosen for observation by the scientific proposal have been well identified, the five targets with higher priority and good feasibility are selected, as well as the two stars used for fine pointing.
* The setting of the photometric mask for the bright targets.
  On the full image, a first mask is designed for each target. The mask is a collection of contiguous pixels for which the photons are collected for a given target; it is adapted to each target by computing recursively the contribution of each pixel to the total flux.
  Then, when the fine pointing is settled, small images called imagettes are recorded and are used to adjust the mask by adding pixels until the S/N ratio decreases. This more precise mask is used during the rest of the run. The discontinuity in the flux implied by the changing of the mask is then corrected in the pipeline (see Part III, Chap. 1 in this book).
* The choice of the faint targets.
  Then, full images of the field in the E1 and E2 CCDs are observed and recorded.
  The targets of the "exobasket" are recognised using the EXOWIN tool (Karioty et al. 2006) software and given a template chosen by EXOWIN in a set of predefined templates, optimising the S/N ratio, as defined in Llebaria & Guterman (2006).
  This set of templates and the position of the associated window on the CCD are uploaded on board at the beginning of the observations, with an associated sampling rate (see Ollivier in this book).
* The choice of the targets observed as imagettes in the faint star field.
  In the faint star field, 40 imagettes can be produced aboard and downloaded. They were first supposed to be used for calibrations. As it appeared rapidly that it was not necessary, a new scientific objective has been given to this possibility: observing the bright targets (magnitude around 9 to 10), which may be saturated, but for which the planet detection could have a better sensitivity.
  So for runs later than LRa02, the 40 imagettes have been put on very bright and saturated stars. The imagettes were used to build light-curves delivered with all other light-curves. They can be found as imagettes in L1 deliveries (see Part II, chap. 4, in this book).

2.3. Continuity of the data

The total duration of the scientific observations is 1981 days (in the bright star field), whereas the total duration of the mission is 2137 days.

In order to devote as much time as possible to the scientific programme, the operations have always minimised the interruptions.

For instance, data acquisition was not stopped, contrary to what had been planned before launch. This minimised the loss of data due to the SAA crossing that depends slightly of the direction of the observation and of the period in the year (Pinheiro da Silva et al. 2008). As shown in Table II.1.1 Col. 3, it is always lower than 8.9% and decreases at the end of the mission.

An unavoidable stop was due to the rotation of the solar panels to optimise the energy supply: it happens every two weeks, lasted 10 to 15 min, usually on Wednesdays between 11:50am and 12:05pm, leading to periodical interruptions corresponding to a loss of approximately 0.07%.

In rare cases, the pointing was lost and it was necessary to start again from the beginning the pointing procedure.

In addition, a few losses of telemetry occurred, but were very seldom, thanks to the efficient network of communication.

The global duty cycle is always higher than 90%.

Missing data are filled by the Inpainting process (Ollivier et al., this book; Pires et al. 2015) and identified with a specific STATUS value. The quality of the filling by Inpainting depends on the duration on which the filling is requested; for SAA crossings, rotation of the solar panels and short interruptions, a limit of 2 hours appears as optimal.

2.4. Tools and databases

Several tools and databases are necessary for the choices at scientific and operational levels.

2.4.1. The CoRoTSky tool

It proposes to place the CCDs on the sky, where targets are presented, using the information (Magnitude, position, spectral type. . .) contained in the databases.

It also takes into account several technical constraints.

It has been developed by CNES based on specifications from the Scientific Committee.

It builds the proposal files, which contain for both fields the list of the requested targets, with priorities.

2.4.2. The CoRoTSky database

It is described in Charpinet et al. (2006).

It has two parts, the bright star base and the faint star base.

* The bright star CoRoTSky base.
  It relies on the extensive programme of ground-based observations, described in Catala et al. (2006).
  All the data (photometric and spectroscopic) are available in the GAUDI archive[1].
* The faint star CoRoTSky base.
  It is composed of extractions of the EXODAT database around the proposed field of view of the faint star field. The EXODAT database was first described in Deleuil et al. (2006) and in Meunier et al. (2009) and in Damiani (Chap. III.5 in this book).

2.4.3. The EXOWIN tool

Developed in the laboratories, it compares the "exobasket" to the true image, identifies stars and transforms the proposal into a list of observable targets, with their associated mask (see Karioty 2006).

During this process, several targets (no more than 10%) are unobservable, either because they have not been found in the field with a correct magnitude and position, or because the shape of their PSF does not allow to fix a template of the set.

This list is send to the instrument through a sequence of commands describing the programming of the 6000 stars; the upload sequence lasts from 12 to 15 min.

As it had been foreseen before launch, the set of templates of the Faint Stars Filed (FSF) has been updated using flight images after the three first runs (IRa01, SRc01 and LRc01). This has no impact on the fluxes because the shape and size of the templates are taken into account in the processing.

[1] http://svo.cab.inta-csic.es/main/index.php

3. Specificities of the runs

This chapter presents useful information concerning the data.

First, it addresses the continuity of the data, giving the date of the main holes or longer than 2 hours.

Then it gives, run by run, every aspect of the observations, from the specific scientific criteria for the selection to operational constraints and anomalies in the resulting data.

And finally, we report the detection of one unknown object: the crossing of the field of view in several runs.

*** *IRa01***

The constraints of the launcher (a maiden flight of Soyuz 2-I-b) have postponed the launch to the end of 2006. This first run (called Initial Run) has been used for both commissioning and scientific observations.

Due to the special interest of this field in the anticentre direction, it has been decided to point it even though the observation could not last more than 2 months.

In the BSF, one star had the highest priority: HD 49933 a "solar analogue" though a little more massive, with a good faint star environment. Following the successful detection of solar-like oscillations during this run, it has been reobserved twice in LRa01 and LRa06.

Rem:

- On this first run, observations do not begin on the same day on channel 1 and channel 2;
- Time-frequency analysis shows that CID 123 (HD 50844) and 214 (HD 51106) have a jitter residue;
- In the four first runs, in FSF, the duration of the gaps, including these due to the rotation of the solar panels, are not correctly synchronised on 16*32s tops; as a consequence, all gaps are not filled, regardless of their duration.

*** *SRc01***

This run was dedicated to the seismology core programme, and in particular to Delta Scuti stars, considered as interesting even in a short run, as they have large amplitudes.

The FSF remains very poor, and extremely inhomogeneous, and as they were no specific observations, the USNO catalogue has been used.

Rem:

- In the four first runs, in FSF, the duration of the gaps, including these due to the rotation of the solar panels, are not correctly synchronised on 16*32s tops; as a consequence, all gaps are not filled, regardless of their duration;
- In the four first runs, in FSF, the duration of the gaps, including these due to the rotation of the solar panels, are not correctly synchronised on 16*32s tops; as a consequence, all gaps are not filled, regardless of their duration.

*** *LRc01***

The position of the BSF is strongly constrained by both the need to catch a delta Scuti star and a solar-like target in addition to the principal target, and also instrumental constraint. So strong gradients and inhomogeneities in the FSF were unavoidable.

Table II.1.3. Interruptions longer than 2 hours.

Run	Start of missing data	End of missing data	Duration	
LRc01	20/05/07 05:12	20/05/07 07:44	2:32	
LRa01	19/10/07 20:19	19/10/07 23:37	3:18	
	29/10/07 20:22	30/10/07 00:07	3:45	
	01/11/07 17:33	02/11/07 07:27	13:54	
	19/01/08 22:42	22/01/08 08:02	2 days 9:20	Channel 1 only
LRc02	21/05/08 15:13	21/05/08 17:15	2:02	
	04/06/08 14:13	04/06/08 17:57	3:44	
	19/08/08 17:43	20/08/08 00:45	7:02	
SRc02	28/09/08 09:43	28/09/08 13:16	3:33	
	28/09/08 19:53	29/09/08 00:51	4:58	
	29/09/08 02:47	29/09/08 08:03	5:16	
SRa02	31/10/08 03:11	31/10/08 06:09	2:58	
LRa02	28/01/09 17:05	28/01/09 20:34	3:29	
	20/01/09 09:53	20/01/09 12:07	2:14	
LRc03	16/04/09 14:05	17/04/09 00:36	10:31	
	22/04/09 07:23	22/04/09 10:40	3:17	
	25/04/09 07:31	25/04/09 10:49	3:18	
	25/04/09 18:01	25/04/09 21:35	3:34	
LRc04	27/08/09 23:44	28/08/09 03:11	3:27	
LRa03	27/10/09 17:30	28/10/09 01:01	7:31	
	02/11/09 15:28	03/11/09 02:17	10:49	
	27/01/10 19:09	28/01/10 03:52	8:43	
	02/02/10 23:48	03/02/10 02:17	2:29	
SRa03	19/03/10 21:34	20/03/10 01:08	3:34	
LRc05	05/05/10 16:18	05/05/10 20:21	4:03	
	31/05/10 16:25	31/05/10 19:59	3:34	
LRc06	20/08/10 11:02	20/08/10 13:19	2:17	
LRa04	03/10/10 19:18	03/10/10 23:40	4:22	
	09/10/10 17:04	09/10/10 19:28	2:24	
	20/10/10 01:49	20/10/10 07:56	6:07	
	15/11/10 01:18	15/11/10 08:57	7:39	
	05/12/10 03:27	05/12/10 06:20	2:53	
LRa05	19/01/11 19:48	19/01/11 23:09	3:21	
	05/03/11 17:41	05/03/11 23:37	5:56	
LRc07	08/06/11 03:03	08/06/11 06:06	3:03	
	21/06/11 06:56	21/06/11 09:29	2:33	
LRc08	21/08/11 14:59	21/08/11 18:02	3:03	
Sra04	08/10/11 00:59	08/10/11 02:56	1:57	
Sra05	21/12/11 22:58	22/12/11 17:37	18:39	
LRc09	19/06/12 21:58	20/06/12 00:22	2:24	
LRc10	21/09/12 15:29	21/09/12 20:32	5:03	
LRa07	22/10/12 00:34	25/10/12 17:34	3 days 17:00	

Rem:

- In the FSF, a set of new templates computed from the images of the commissioning was uploaded and tested on board on channel 2 in the last 10 days of the run: these data were used for testing reasons, not for scientific use. Therefore, the scientific observations in channel 2 (end October 5th 2008) are 9 days shorter than in channel 1 (end October 15th 2008);
- In the four first runs, in FSF, the duration of the gaps, including these due to the rotation of the solar panels, are not correctly synchronised on 16*32s tops; as a consequence, all gaps are not filled, regardless of their duration.

* ***LRa01***

As we now know that we are able to detect solar-like oscillations in stars, in a sufficiently long run, it has been decided to have LRa01 before the short run of the same season SRa01. But the total time available (less that 160 days) lead to stop LRa01 after 134 days and leave 26 days for SRa01.

The field of LRa01 is considered as the best field for exoplanet hunting. It contains also an open cluster, Dolitze 25, and many red giants.

More precise ground based observations are available in the EXODAT database.

Re-observation of HD 49933 is considered as a very high priority. It implies some overlap of the fields with IRa01.

Rem:

- Due to a breakdown of channel 1 between 19/01/2008 22:50 and 22/01 08:02 no data were received from this channel. Bright stars and faint stars are concerned. Gap is not filled in the FSF;
- Time-frequency analysis shows that the CID 100 (HD 49434) has a jitter residue,
- In the four first runs, in FSF, the duration of the gaps, including these due to the rotation of the solar panels, are not correctly synchronised on 16*32s tops; as a consequence, all gaps are not filled, regardless of their duration;
- Six changes of the temperature of the CCDs: not easy to handle!
  For the later runs, the thermal analysis of the whole run was performed at the beginning of the run in order to minimise the numbers of changes of the set point inside the run.

*** *SRa01***

The Scientific Committee decided to devote some short runs to additional programmes; and SRa01 was the first one.

Three proposals were selected after a phase A. And the observation of the open cluster NGC2264 in the FSF won! A very long preparation, with ground based observations, has been necessary to select the targets, as contamination was quite strong.

The run has been very successful, and triggered a new observation of this cluster in a multi-satellite campaign (SRa05).

Rem:

- CID 2503 (HD 49161): because of very high flux, the precision on the wings of the PSF is lower than usual, leading to a rougher correction from satellite jitter and to a significant jitter residue;
- in the BSF, poor correction of the jumps due to the change of the photometric mask.

*** *LRc02***

The position was difficult to accommodate, as the proposed roll to observe some major targets was not compliant with the constraints on the thermal equilibrium of the satellite, but finally accepted!

*** *SRc01***

It was devoted to the seismology exploratory core programme, and was driven by the observation of HD 174532, a unique Delta Scuti star with a very low rotation.

Rem:

- Ad-hoc elimination of the aliasing applied to CID 7519, positioned on the first rows of the CCD;
- The CID 7524 (HD 174967) and 7663 (HD 174589) have a jitter residue.

*** *SRa02***

It was devoted to the second priority of the phase A study for Aps.

The main target was HD 46375, a solar-like star with a non-transiting planet, with the hope to detect both oscillations and reflected light on the planet.

Fortunately, six O stars belonging to the cluster NGC2244 have been observed as secondary targets.

*** *LRa02***

Due to the run was devoted to the core programme, but the choice of the field has been extremely difficult, as there were conflicts with scientific priorities and instrumental constraints.

Rem:

- The CID 579 (HD 51756) has a jitter residue;
- In the FSF, the CIDs 30000315, 110741824 and 300003271 are observed as imagettes and contain the star and one or two contaminant (this can be seen in the corresponding EN2_WINDESCRIPTOR files);
- Addition of one second on December 31st 2008: 3 points are withdrawn: (2 points at 23:59:58 and the point at 23:59:59).

*** *LRc03***

It was decided to devote it to the exoplanet programme, which has chosen the field independently of any bright star constraint. Unfortunately the loss of chain 1 reduced the field.

The position has been fixed in maximising the density of bright stars. The BSF field is quite poor.

*** *LRc04***

The choice of the field was partly driven by the interest of an eclipsing binary HD 169689 in which pulsations in the red giant as well as binary modelling have been successful, but the field is tuned to optimise the dwarfs density and is quite good.

Rem:

- The CID 9861 (HD 170008) has a jitter residue.

*** *LRa03***

Dedicated to HD 43587. The FSF is poor, but there is an open cluster NGC 2186.

Rem:

- CID 3093(HD 43823) is positioned on a dead column, which produces a jitter residue;
- CID 3412 (HD 43317) and 3474 (HD 43587) also have some jitter residue.

*** *SRa03***

The run is dedicated to the observation of an SdB in the faint star field, as the third priority of the AP phase A Study.

A very wide spectrum of oscillations has been found.

But the field has not been observed from the ground and relies only on 2MASS data.

In the BSF there are some interesting targets.

Rem:

- CID 374 (HD 47361) is positioned on a dead column as can be seen in the AN2_WINDESCRIPTOR; it produces a jitter residue.

*** *LRc05/LRc06***

The DR method has been used, which couples LRc05 and LRc06.

Rem:

- In LRc06, CID 8167 (HD 171264), CID 8303 (HD 170783) and 8385 (HD 171219) have a jitter residue.

*** *LRa04/LRa05***

These runs use also the DR method.

Rem:

- In LRa04, CID 4243 (HD 43338) and 4910 (HD 42618) have a jitter residue.
- CID 4910 (HD 42618) is observed in both LRa04 & LRa05. Strangely, the flux is not stable at the beginning of each run, it increases during 5 to 6 days before stabilisation; no valid explanation was found for this phenomenon. Ad-hoc elimination of the aliasing has been applied to this target in both runs.

*** *LRc07/LRc08***

These runs use also the DR method.

Rem:

- In LRc07, CID 8943 (HD 170174) has a jitter residue;
- In LRc08, all 5 stars in the BSF have a jitter residue: CID 8831 (HD 170200), 8852 (HD 170031), 8943 (HD 170174), 9044 (HD 170231), and 9109 (HD 170053);
- Ad-hoc elimination of the aliasing has been applied to CID 9109.

*** *SRc03***

Observation of CoRoT 9 for 5 days, in order to follow the predicted transit.

Rem:

- No specific choice of the targets as the duration is too short;
- Bright stars have not been processed;
- No worry about the dates of the full image associated with this run: the image is correct even if the dates are in April.

*** *SRa04***

This run of intermediate length (53 days) is dedicated to the observation of a chemically peculiar star. The chosen target is a member of the young cluster NGC 2232 and 4 other members are also observed.

Rem:

- The star HD 45965 (CID1824) is quite near contaminating star, as it can be seen in the corresponding AN2_WINDESCROPTOR. It is recommended to look at the imagette (AN1_IMAGETTE, available in N1 archives) if some new evaluation of the photometry is needed;
- In Sra04, all 5 stars in the BSF have a jitter residue: CID 1824 (HD 45965), 2031 (HD 45418), 2069 (HD 45398), 2070 (HD 45546), and 2153 (HD 45517);
- Ad-hoc elimination of the aliasing was applied to CID 1824.

*** *SRa05***

This run was dedicated to the multi-satellite campaign on NGC 2264, which gave strong constraints on the date and the duration of the observation.

Rem:

- During the shutdown of the instrument between December 21st to 22nd 2011, the synchronisation of the aboard clock was lost, which prevents from a strict resynchronisation of the data after the recovery of the observations;
- CID 2983 (HD 49429) and 3573 (HD 48752) have a jitter residue;
- Ad-hoc elimination of the aliasing was applied to CID 2983;
- One outlier (value about 2E9) is quite visible on December 1st 2011 at 15:56:56 on all five targets (CIDs 2820, 2983, 3437, 3573 and 3619); no explanation could be found for this phenomenon. The following value at 15:15:57 is correct;
- Due to the renumbering inside EXODAT, the CID 400007811 might be incorrectly identified as well as CID 616780499.

*** *LRa06***

Dedicated to the re-observation of CoRoT 7; it has been decided to use an imagette to increase the photometric accuracy. The field allows also the reobservation of CoRoT 12.

In the BSF, HD 49933 has been reobserved for the third time, with a coordinated ground based campaign to try to detect its magnetic field.

Rem:

- The standard pointing correction limits the excursion of the jitter at 1.5 pixel, which has been sufficient for the whole mission except for a few days in this run:
  - from January 20th to 23rd 2012, the maximal excursion (MAX_JIT) was limited to 1.7 pixel;
  - from March 26th to March 29th 2012, MAX_JIT = 1.8 is needed.

*** *LRc09***

LRc09 is dedicated to the exoplanet programme in the BSF: the observation for 85 days of HD 179070, a star hosting planet, to try to detect inner transiting planets, if they exist.

Rem:

- Addition of a supplementary second on July 1st 2012 at 1h 59min 60s; the doubled second is withdrawn in the CoRoT data;
- The CID 8111 (HD 179079) has a jitter residue;
- Ad-hoc elimination of the aliasing was applied to CorotID 7981 (HD 178169) because the standard correction leaves a too important residue.

*** *LRc10***

LRc10 was driven by the re-observation of the Eclipsing binary HD 169689 for which the primary eclipse was observed incompletely in LRc04.

Rem:

- Ad-hoc elimination of the aliasing had to be applied to CorotID 9540 (HD 169689) and CorotID 9775 (HD 169822).
- CID 9368 (HD 170270) and 9540 (HD 169689) have a jitter residue.
- In September 26th 2012, the changing of the temperature set point took place at the time of the rotation of the solar panels (from 11h56:23 to 12h03:20); therefore, for some light-curves, the correction is not as good as usual.

*** *LRc09***

This run was devoted to O stars, which were observed only in SRa02, with great success. Once more the region of NGC 2232 has been chosen.

Rem: It has encountered several perturbations:

- After 20 days the pointing was lost (on October 22nd 2012) and restarted 3 days later;
- After 7 more days later, on November 2nd 2012, chain 2 stopped definitively.

*** *Unknown object?***

One object crossing the field of view has been detected in several runs: the object is seen generally 4–5 min in one orbit, and in 6 to 10 contiguous orbits (one orbit lasts about 1h40min).

It has been identified in:

LRa01: 2007/11/20
LRa06: 2012/01/22; 2012/02/15; 2012/03/07
LRc09: 2012/06/17

but it might be present elsewhere.

Some residue of the object is detectable in the stars light-curves.

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