# CoRoT DATA
## OBSERVATIONS, PRODUCTION and DISTRIBUTION

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## The phases of the data acquisition process

➤ The process of data acquisition contains several steps :
  ➤ Before the beginning of the run, when the pointing and the stars to be observed are known, the observation is prepared on simulated data :
    ➤ the feasibility of the pointing is checked as well as the windowing of the seismology targets
    ➤ the extraction of EXODAT is checked as well as the feasibility of the exo-planet programming process
  ➤ Programming the on-board acquisition is the first phase of the run :
    ➤ Seismology full images are acquired
    ➤ The seismology stars and background windows are determined according to the wishes of the scientific community (known through the COROTSKY output file)
    ➤ Big imagettes are acquired in order to calculate high resolution PSF
    ➤ Exo-planet full images are acquired
    ➤ The exo-planet stars and background windows are determined according to the COROTSKY output called exobasket.
    ➤ Not all stars proposed in the exobasked are observed. Stars might be rejected because
    ➤ they are not identified
    ➤ they are saturated
    ➤ they are too close to the edges of the CCDs or too close to saturated stars their window overlap.
      ➤ The shape of seismology windows is fitted to the stars according to the high resolution PSF
      ➤ The size of the seismology imagettes is reduced
  ➤ Data are acquired on-board, received through both CNES Icones network antennas and Alcantara antenna, transferred toCNES, Centre Spatial de Toulouse, transferred from TeleMetry format to N0 format, transferred to Meudon (LESIA), transformed to N1, then to N2 format then transferred to IAS to disposal.
  ➤ Note : Data are interrupted about 10 minutes every 14 days for a slight rotation of the solar panels. Until ?July 2. 2008, the duration of the interruption might not have been a multiple of 512 s.

| Run | | | | Data | | | Distribution | | |
|---|---|---|---|---|---|---|---|---|---|
| Code | Number | Begins | Ends | Begins | Ends | Duration | Date | Type | Version |
| IRa01 | 3 | 18/01/07 | 03/04/07 | 31/01/07 | 02/04/07 | 62 days | 10/12/07 | astero | 1.0 |
| | | | | | | | | exo | 1.1 |
| SRc01 | 4 | 03/04/07 | 09/05/07 | 11/04/07 | 09/05/07 | 29 days | 01/04/08 | astero | 1.1 |
| | | | | | | | | exo | 1.2 |
| LRc01 | 5 | 09/05/07 | 15/10/07 | 11/05/07 | 15/10/07 | 158 days | 15/02/08 | astero | 1.2 |
| | | | | | | | | exo | 1.3 |
| LRa01 | 6 | 15/10/07 | 03/03/08 | 18/10/07 | 03/03/08 | 138 days | 24/07/08 | astero | 1.3 |
| | | | | | | | | 29/10/08 | exo | 1.4 |
| SRa01 | 7 | 03/03/08 | 31/03/08 | 04/03/08 | 31/03/08 | 28 days | 06/11/08 | astero | 1.3 |
| | | | | | | | | 04/09/08 | exo | 1.4 |
| LRc02 | 8 | 31/03/08 | 08/09/08 | 11/04/08 | 07/09/08 | 150 days | | planned 10/02/09 | |
| SRc02 | 9 | 08/09/08 | 06/10/08 | 09/09/08 | 06/10/08 | 28 days | | planned 11/05/09 | |
| SRa02 | 10 | 06/10/08 | 12/11/08 | 08/10/08 | 12/11/08 | 36 days | seismo | planned 10/02/09 | |
| | | | | | | | exo | planned 30/04/09 | |
| LRa02 | 11 | 12/11/08 | | 13/11/08 | | | | planned 30/06/09 | |

Depending on the runs , exoplanet data begin 3 to 5 days after the seismology data

In seismo data, the version of the data is given by the last 3 digit of the PIPE_VER row ; for instance, 0.2/1.2 indicates seismo data V1.2

In exo data, the version is given by the row N2_VER, except for IRa01 where N2 version is not indicated in the data.

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### IRa01 — pointing : RAS : 102.6, Dec : 1.7, Rot: 14.96
Seismology targets

| | HD50474 | HD4993 | HD50844 | HD50773 | HD50846 | HD50170 | HD51106 | HD250890 | HD292790 | HD50405 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 116 | 20 | 123 | 83 | 156 | 223 | 214 | 400 | 263 | 187 |

Targets in the exo field

| Magnitude | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|
| Nb of targets | 2 | 781 | 1568 | 2940 | 4630 |

Changing of the temperature of the CCDs : 01/02/07 12:46 ; 29/03/07 11:30
CorotIDs 102783213, 102784359, 102836234, 102848662, 102854333, 102861526, 102921590, 102766034 and 102782110 were not processed in V1 ; will be processed in V2.
Loss of data : 12:52 to 14:36 on February 4. 2007

### LRa01 — pointing : RAS : 101.66, Dec: -0.20, Rot: 7.28
Seismology targets

| | HD49294 | HD49808 | HD49330 | HD49385 | HD50064 | HD49933 | HD49434 | HD50209 | HD50230 | H49862 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 29 | 1 | 49 | 18 | 14 | 20 | 100 | 26 | 44 | 79 |

Targets in the exo field

| Magnitude | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|
| Nb of targets | 341 | 877 | 1914 | 3430 | 4886 |

First run with the new templates ; these templates will be used for all further runs.
DPU1 was out of order between January 18. 22:41 and January 22. 08:02 2008 : no data was obtained on CCD A1 and E1 during this time
From 11/02/08, the oversampling is synchronized with the beginning of 512s-sampling packets ; before this date, the changing of the sampling could lead to s slight desynchronization between 32s ans 512s points.
Changing orders for the CCDs temperature : 26/10/07 08:55, 30/10/07 09:06, 08/11/07 16:15, 18/12/07 16:20, 22/01/08 16:10, 24/01/08 11:19
Losses of data : 19/10/07 20:19 to 23:37 ; 28/10/07 20:22 to 29/10/07 00:07 ; 01/11 17:33 to 20/11/07 07:26

### SRc01 — pointing : RAS : 284.59, Dec : 3.08, Rot: 0.12
Seismology targets

| | HD1749664 | HD175869 | HD174936 | HD175679 | HD175272 | HD175543 | HD175726 | HD174884 | HD174987 | HD175542 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 7528 | 7636 | 7613 | 7616 | 7548 | 7710 | 7837 | 7758 | 7793 | 7780 |

Targets in the exo field

| Magnitude | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|
| Nb of targets | 104 | 327 | 910 | 1763 | 3911 |

loss of data : 00:34 to 02:10 on 03/20/08

### SRa01 — pointing : RAS: 101.03, Dec: 9.02, Rot: 7.68
Seismology targets

| | HD48784 | HD49566 | HD49310 | HD48976 | HD48752 | HD48977 | HD49161 | HD263425 | HD49429 | HD49677 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 3619 | 3437 | 3905 | 3218 | 3573 | 2820 | 2503 | 2807 | 2983 | 2832 |

Targets in the exo field

| Magnitude | < 11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|---|
| Nb of targets | 38 | 193 | 511 | 1301 | 2066 | 4081 |

loss of data : 20/03/08 00:34 to 02:10

### LRc01 — pointing : RAS : 290.88, Dec: 0.43, Rot: 18.88
Seismology targets

| | HD181907 | HD181440 | HD181420 | HD182198 | HD181231 | HD181906 | HD180973 | HD1811555 | HD180642 | HD181072 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 8774 | 8641 | 8652 | 8872 | 8557 | 8777 | 8481 | 8669 | 8393 | 8527 |

Targets in the exo field

| Magnitude | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|
| Nb of targets | 112 | 753 | 1900 | 3599 | 5084 |

Loss of data : 20/03/08 00:34 to 02:10
Changing of the CCDs temperature : 14/05/07 16:15 ; 05/07/07 15:22
Data on CCD E2 end 10 days before data on CCD E1 in order to test the new templates (bigger templates).
CorotIDs 101430291, 101342375 and 101516387 were not processed in V1 ; they will be processed in V2.

### LRc02 — pointing : RAS: 279.66, Dec: 6.4, Rot: 11.36
Seismology targets

| | HD172046 | HD171586 | HD172189 | HD171835 | HD171538 | HD171427 | HD171834 | HD170987 | HD171218 | HD170935 |
|---|---|---|---|---|---|---|---|---|---|---|
| CorotID | 8310 | 8158 | 8170 | 8394 | 8441 | 8583 | 8567 | 8786 | 8647 | 8928 |

Targets in the exo field

| Magnitude | < 11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 |
|---|---|---|---|---|---|---|
| Nb of targets | 27 | 151 | 673 | 1644 | 3204 | 5749 |

Before the run begins ,a new version of the on-board software is uploaded, which main issue is the elimination on board of the hot pixels in background light curves.
From 02/07/08, the interruption for the rotation of the solar panels is a multiple of 512s
Changing of the temperature of the CCDs : 10/07/08 12:41
Losses of data : 05/05/08 11:53 to 12:11 ; 21/05/08 from 15:13 to 17:15 ; 04/06/08 14:04to 17:58 ; 19/08 17:43 to 20/08/08 00:45
Data processed with the version 2 of the N1 pipe-line

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## Corrections applied at the N0-N1 level

➤ suppression of the aliasing appearing on a CCD when reading another CDD : this is done by using patterns measured in the calibration phase
➤ correction of the time of the exposure and absolute dating
➤ on the seismology field, elimination of the residues of offset and background
➤ on the exo field, subtraction of the offset and of the background obtained as the median of the observed backgrounds in order to eliminate the hot pixels in the background light curves
➤ on the exo chromatic light curves, computation of the white light
➤ jitter corrections using high resolution PSF on the seismo field and medium resolution PSF on the exo field
➤ Detection of energetic particle impacts : a point is considered as an impact when the difference between the signal and the median calculated on a sliding window is higher then 5 σ
➤ Orbit events are indicated taking into account the absolute date of the data : SAA, inbound and outbound Earth eclipses

## The meaning of the « STATUS »

### N2 seismology DATA

| | |
|---|---|
| 0 | The data are valid flux measurement |
| 1 | The data are considered as out of range (e.g. energetic particle impact or glitch). Corresponds to OVER=1 in N1 products |
| 2 | The data is invalid. Either the original value was a spare value (default value) or no images were accumulated (EXPORANK=0). Corresponds to OVER=2 in N1 products |
| 4 | Flux acquired when crossing SAA |
| 8 | Interpolated measurement |
| 16 | Discontinuity detected in the Light Curve |
| 32 | Discontinuity due to change of CCD mask |
| 64 | Flux extracted from imagette |
| 128 | New hot pixel detected |
| 256 | At the time of the data, the satellite was entering earth penombra (orbital event 3 : light to penombra transition). Corresponds to OVER=8 in N1 products |
| 512 | At the time of the data, the satellite was entering light (orbital event 6 : penombra to light transition). Corresponds to OVER=16 in N1 products |
| 1024 | The jitter excursion was greater than the maximum authorized value. The original value is replaced by a calculated value. Corresponds to OVER=32 in N1 products |

### N2 exo-planet DATA

| | |
|---|---|
| 0 | The data are valid flux measurement |
| 1 | Cosmic event detected by the N0-N1 pipeline |
| 2 | Spare value detected by the N0-N1 pipeline |
| 4 | Flux acquired when crossing SAA (N0-N1) |
| 8 | Flux perturbed by Earth eclipse (inbound) |
| 16 | Flux perturbed by Earth eclipse (outbound) |
| 32 | Flux acquired when crossing SAA (N1-N2) |
| 128 | New hot pixel detected |
| 1024 | Flux flagged as an "incorrect value" by theflight s/w (VALIDFLUX=1, when applicable) |
| 2048 | Flux flagged as an "incorrect value" by the flight s/w (VALIDFLUX=2, when applicable) |

The word STATUS is a bit mask, meaning that values can be combined ; for example, STAUUS =5 means energetic particle detected while crossing the SAA.

## V2 improvements

➤ On both seismo and exo fields the jitter corrections were improved :
  ➤ the line of sight is calculated using a single reference computed on the first 5 to 7 days of the run
  ➤ the jitter is corrected when the displacement is less than 1.5 pixels (seismo channel) or 2 pixels (exo channel)
  ➤ when the displacement is larger than these limits, the signal is computed as an interpolation between corrected points.
➤ On exo-planet data, white light line is calculated as the sum of the three colours before the jitter corrections and it is added in the files as a new column
  ➤ PSF are derived from the full image acquired at the beginning of the run
  ➤ they are used to correct the jitter fluctuation separatly on colours and on the white light
➤ Better absolute dating : the absolute date of the first exposure is determined using on board counters.

### Next deliveries : data in version 2

| run | type of processing | date of delivery |
|---|---|---|
| SRa02 sismo | 1st processing | 15/02/09 |
| LRc02 | 1st processing | 10/02/09 |
| LRc01 | reprocessing | 25/02/09 |
| IRa01 | reprocessing | 10/03/09 |
| LRa01 | reprocessing | 01/04/09 |
| SRa01 | reprocessing | 10/04/09 |
| SRc02 | 1st processing | 17/04/09 |
| SRa02 exo | 1st processing | 30/04/09 |
| SRc01 | reprocessing | 11/05/09 |
| LRa02 | 1st processing | 30/06/09 |

Exo light curves from imagettes will be distributed run by run as soon as they will be available beginning in march 2009.

## What remains to be done : using the "imagettes"

➤ the exoplanet targets acquired as "imagettes" will be processed very soon.
➤ the seismology imagettes will be used to compute star light curves : these computed values will replace on-board values when their quality is better.