HartRAO Absolute Flux Calibration

DARA Dift Scan For VIRGO A

Mini-Project

Pipeline

Technical Report For The Assignment On How To Write Pipeline To Calculate The PSS Values For VIRGO_A_22235 Using Data Of The 26m Antenna From HartRAO.

Student:

Dionísio Cândido Nhadelo

Tutors:

Job Vorster & James Chibueze

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1 Introduction

In assignment 1 we performed a **PSS Single Drift Scan Calculation** by writing a complex Python code that would only allow us to work with one FITS file at time in order to perform flux density calibration for the HartRAO 26m antenna observations. Now the goal is to perform calculations over and over, according to the number of files we will have to work with. To achieve that goal, we are going to modify all the Python code from assignment 1, we must create functions for each part so that the tasks can be done over and over again to the last file, in other words, we are going to automatize the tasks through Python functions, because it would not be practicable for humans to do so file by file when we are going to work with a huge number of files.

The data that we are going to use are stored in FITS file, FITS stands for **Flexible Image Transport System**, they practically do whatever we want it to do. It is mostly but not only used for images, it can be used as a container for anything you want, like image data and binary tables.

As stated in the first report of this mini-project, there are some advantages of using FITS files because they come as raw and uncompressed, unlike .gif, .jpeg or .png files. The FITS files contains information about how and where the images were obtained, they are very informative by their headers. FITS files are divided in chunks, it's basic structure is composed by **Header Data Units** (HDU), so FITS files are composed by the primary HDUs and some extensions.

1.1 Aim

The main aim of this mini-project is to perform calculations of the Point Source Sensitivity (PSS) for as much number of files containing observation data for a given source and range of time. As we are going to work with a huge number of files in this second part of the project, we should optimize the code so that it depends less in human inputs because it would be painful and time consuming to run each file at a time as we did for the single drift scan. In order to optimize the code, we are going to write a pipeline that will do the calculations over and over for the number of files that will be specified. As for this report, I have been assigned to work with observations for the **VIRGO_A_22235**, data obtained from the HartRAO's 26m telescope antenna.

2 Methods

In order to write a pipeline that will do the calculations of the PSS over and over for the specified number of file data, we are going to use the code that was written for assignment 1 to perform calculations for a single drift scan, the point is to take each part of the code and turn them into functions, what will allow the automation of the calculation processes. We are going to use six functions, and each function as it's tasks, below are the brief descriptions of what each part of the code does:

2.1 Plotting the data

As a starting point, we have to open and visualize our data in order to see which corresponds to a bad or good data, this is the first thing we should do as a good practice of data science. We just have to write a basic code to visualize the data so that we can filter those which are good from from those which are not, for this step and the following we must first import some python libraries like numpy for math calculations, matplotlib for data visualization, glob to read all the files at once, astropy to open fits files.

2.2 Noise Diode Calibration

After inspecting the data and filter out those which we consider as bad data we can start to perform the noise diode calibration. For that we are going to write a function that takes as argument the *hdu* variable that will be defined later to store the data of opened file. From this variable we can access the data for *Count1*, *Count2*, *TCAL1*, *TCAL2* and *MJD*. With this function we are going to separate the *on* and *off* counts by using *np.where* and *np.mean* functions. As we have *Count1* and *Count2* we are going to have *on_1*, *off_1*, *on_2* and *off_2*. With this, we find the difference of the mean between the respective *on* and *off*. As last for this function, we find the conversion factor by dividing the calculated difference with the corresponding *TCAL*.

2.3 Gaussian Fitting

The Gaussian function is defined to help find the optimum curve fitting during the pointing correction process, as well as for finding the the optimum curve fiting when we want to find the popt and pcov for the north, centre and south, considering the two polarizations.

2.4 Baseline Correction

With the baseline_correction function we aim to correct the baseline, in other words, the baseline may not be flatten due different reasons. The ideal situation is to have the baseline on zero, but not always we have that situation, so we must perform the baseline correction. This function will separate inds_on from inds_off with help of *np.where* and *np.logical_and* for inds_on and *np.logicar_or* for inds_off where *mjd* is greater or less than the limits that will be defined from the plots.

2.5 Pointing Correction

It is important to perform the pointing correction because it is an important indicator of accuracy detection of ground-based telescope antenna. To perform the pointing correction, the function will depend on the peak of the amplitudes of Gaussian fits and the sigma that corresponds to this amplitude peak as inputs, these values will be used as initial guess, then the pointing_correction will find the optimum curve fit_to the data.

2.6 Plot All

The plot_all function will allow us to visualize the outputs, so that we can evaluate which of them are good or bad plots in each fits files. This function will plot the counts, corrected baseline and the Gaussian fits for the two polarizations in each file. For the Gaussian fitting, we will make usage of the functions that we previously defined.

2.7 Ott

The Ott function is defined so that it can be used to pass the constants a, b and c to the equation of table 5 from the Ott et al paper. This function is then used when we want to compute the flux density, and this takes four arguments, the constants a, b, c and the frequency of observation, the values of the constants can be found in table 5 of the Ott paper.

3 Results

All the process we did go through with this pipeline was to obtain the values of the PSS and their respective errors. They are represented in the plot below:

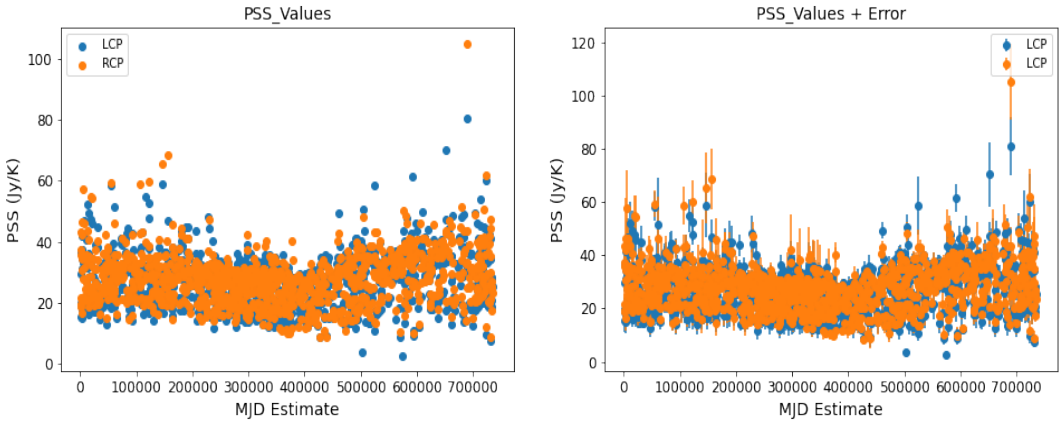

Figure 1: PSS values plotted as function of time.

The Figure 1 shows the plots of the PSS values without and with associated errors for both LCP and RCP. Most of the PSS values are looking constant for both polarizations. We can note that some periods have much more observations than others, few values of the PSS both LCP and RCP tends to be higher, but not that much out of the scale in which the most part of the PSS data tends to remain constant. So there was no a significant change of the PSS values in a significant time.

4 Conclusion

In this project we have been working with a total of 2573 fits files containing data for VIRGO A_22235 observations since 2007 to 2022. Out of the 2573 files, we had 1209 corresponding to good data. With help of statistical analysis we can see that the PSS values for RCP tends to be higher than the the PSS values for the LCP. Based on the mean values we can see that their is small, and this can be supported by the standard deviation values. Verifying the statistical measures of the uncertainties we can see just small differences between the errors of LCP and RCP for the PSS values. For the data we are working with, the maximum value of PSS is 105.29, the minimum is 2.56, regarding to the error values the maximum value is 17.46 and the minimum is 0.19. The statistical values can be seen in Table 3 on the Appendix section. The main sources of uncertainties are the counts, but in general the PSS values does not show a huge difference, they tend to be constant.

Appendix A : PSS values with associated errors

Table 1: Results for the PSS calculations.

Date of observation	PSS Pol 1	PSS Pol 1 Uncertainty	PSS Pol 2	PSS Pol 2 Uncertainty
2007-02-02T05:16:38	30.62	8.13	35.58	11.02
2008-06-02T17:03:44	17.61	4.57	18.60	5.65
2008-06-05T16:50:43	16.96	4.44	19.80	6.07
2008-06-06T16:45:35	14.33	3.72	17.35	5.29
2008-06-08T16:38:54	16.76	4.38	19.37	5.93
2008-06-10T16:31:45	15.76	4.08	17.91	5.44
2008-06-14T16:18:42	17.06	4.42	19.08	5.80
2008-06-16T16:41:14	13.91	3.61	16.00	4.87
2008-06-19T16:03:48	17.65	4.58	21.51	6.55
2008-06-21T16:24:35	14.73	3.82	17.47	5.31
2008-06-27T15:23:47	14.17	3.67	17.51	5.32
2008-06-28T15:23:41	17.02	4.41	20.61	6.27
2008-09-19T09:54:53	15.94	4.14	17.69	5.40
2011-03-02T23:13:21	16.65	4.33	19.51	5.94
2011-03-04T23:04:41	20.33	5.30	27.61	8.46
2011-03-06T22:48:54	14.13	3.66	16.87	5.13
2011-03-08T22:44:09	19.08	4.97	22.38	6.83
2011-03-11T22:31:22	22.57	5.92	31.62	9.72
2011-03-12T22:39:42	19.13	5.02	22.97	7.05
2011-04-08T20:51:31	18.20	4.77	16.52	5.05
2011-04-14T20:25:47	17.17	4.54	24.26	7.50
2011-04-28T19:29:07	11.55	3.01	14.20	4.34
2011-04-29T19:31:45	17.11	4.46	17.63	5.38
2011-05-01T19:10:50	24.05	6.33	29.74	9.23
2011-05-02T19:06:44	18.96	4.96	22.17	6.79
2011-05-08T19:50:47	19.20	4.99	19.62	5.97
2011-05-09T19:41:31	14.10	3.79	19.44	6.09
2011-05-11T18:39:03	16.70	4.34	21.68	6.60
2011-05-13T18:30:08	17.30	4.51	18.48	5.63
2011-05-14T19:06:00	18.35	4.78	19.05	5.80
2011-05-15T18:22:03	17.62	4.59	18.29	5.58
2011-05-16T18:16:33	16.68	4.34	20.38	6.21
2011-05-18T18:09:59	14.52	3.76	19.03	5.79
2011-05-19T17:58:10	18.77	4.90	22.31	6.82
2011-05-25T17:47:30	28.59	7.45	31.56	9.64
2011-05-27T17:32:37	32.06	8.37	29.92	9.12
2011-05-28T17:22:29	35.73	9.42	42.13	12.98
2011-06-02T17:12:59	24.29	6.40	19.99	6.19
2011-06-04T17:03:38	28.12	7.37	30.83	9.45
2011-06-05T17:02:07	29.59	7.85	38.38	11.94
2011-06-13T16:28:23	35.66	9.45	38.77	11.94
2011-06-15T16:13:55	27.77	7.27	28.05	8.57

2011-06-17T16:06:50	35.79	9.51	35.07	10.74
2011-06-18T16:09:59	31.01	8.13	34.70	10.63
2011-06-19T15:59:00	27.97	7.39	29.06	9.01
2011-06-23T16:00:23	25.33	6.61	33.77	10.35
2011-07-01T15:14:17	23.60	6.32	32.29	10.09
2011-07-08T14:52:00	23.92	6.25	27.05	8.29
2011-07-29T14:11:30	18.80	4.97	20.69	6.37
2011-08-27T11:30:23	26.88	7.19	28.34	8.78
2011-08-28T11:33:25	25.34	7.65	26.52	8.97
2011-09-10T10:42:01	13.77	3.57	16.88	5.13
2011-10-07T09:56:48	14.49	3.81	17.21	5.28
2011-10-10T08:34:00	18.21	4.78	21.58	6.63
2011-10-15T08:13:42	13.30	3.48	15.86	4.86
2011-10-26T07:55:33	18.22	4.71	22.61	6.87
2011-11-05T06:51:57	27.46	7.20	29.34	8.99
2011-11-06T06:54:39	18.03	4.66	19.84	6.02
2011-11-13T06:56:35	20.31	5.26	26.48	8.05
2011-11-14T06:46:57	20.58	5.33	24.45	7.44
2011-11-20T05:58:47	17.59	4.54	20.47	6.21
2011-11-24T05:49:04	18.76	4.92	20.79	6.38
2011-11-25T05:35:16	26.81	8.10	29.63	10.03
2011-11-28T05:22:26	17.47	4.53	20.24	6.16
2011-12-03T05:10:42	25.74	6.73	27.99	8.56
2011-12-08T04:57:24	30.87	8.18	32.97	10.14
2011-12-12T04:25:32	17.66	4.56	20.33	6.17
2011-12-16T04:17:51	17.25	4.51	20.43	6.26
2011-12-17T04:08:56	17.74	4.59	20.43	6.20
2011-12-18T04:05:58	20.03	5.18	24.95	7.58
2011-12-19T04:03:59	20.09	5.23	24.00	7.33
2011-12-25T03:45:49	19.81	5.14	23.69	7.21
2011-12-28T03:29:54	20.62	5.36	25.60	7.81
2011-12-30T03:23:03	7.56	2.17	8.65	2.84
2011-12-31T03:15:30	20.85	5.40	25.39	7.73
2012-01-01T03:13:22	18.93	4.92	21.61	6.59
2012-01-02T03:06:14	17.66	4.56	21.01	6.37
2012-01-03T03:11:51	18.87	4.87	21.35	6.47
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2012-01-10T02:40:16	19.63	5.09	24.04	7.32
2012-01-12T02:32:41	17.59	4.54	23.20	7.04
2012-01-13T02:22:11	22.55	5.84	26.45	8.03
2012-01-14T02:30:21	26.42	6.91	31.03	9.51
2012-01-15T02:22:35	17.14	4.51	20.37	6.27
2012-01-20T01:59:43	20.46	5.29	24.91	7.57
2012-01-21T01:59:45	19.62	5.07	23.19	7.04
2012-01-22T01:57:20	22.13	5.73	25.97	7.89
2012-01-23T01:42:03	26.83	6.98	35.09	10.71
2012-01-26T02:16:33	20.39	5.56	21.61	6.78
2012-01-27T01:37:14	23.60	6.13	27.41	8.35

2012-01-28T01:29:16	20.57	5.32	25.13	7.64
2012-01-29T01:29:20	26.03	6.81	29.15	8.89
2012-01-30T01:25:22	18.55	4.79	23.12	7.01
2012-02-05T00:56:36	24.57	6.38	29.21	8.90
2012-02-06T00:52:10	25.38	6.63	27.93	8.52
2012-02-07T00:46:28	24.70	6.42	28.41	8.65
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2012-02-13T00:25:58	18.95	5.09	24.09	7.53
2012-02-17T00:01:20	23.18	6.02	29.67	9.05
2012-02-20T23:55:57	20.54	5.36	21.17	6.47
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2012-03-03T23:02:51	22.59	6.15	28.26	8.90
2012-03-04T22:55:12	21.82	5.72	23.82	7.31
2012-03-06T23:00:53	27.54	7.34	33.50	10.47
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2013-09-13T10:17:33	13.14	3.50	17.46	5.42
2013-09-14T10:16:52	13.14	3.42	15.23	4.65
2013-10-10T08:51:35	8.75	2.31	10.22	3.15
2013-10-14T08:19:10	17.75	4.88	19.90	6.31
2013-10-22T07:47:30	8.97	2.45	9.85	3.11
2013-11-06T06:49:26	20.28	5.25	22.99	6.97
2013-11-08T06:38:02	17.68	4.86	21.75	6.91
2013-11-12T06:21:27	18.88	6.20	22.57	8.19
2013-11-17T06:38:30	22.72	6.16	27.82	8.75
2013-11-18T05:57:01	23.75	6.26	28.85	8.90
2013-11-25T05:29:42	12.82	3.43	15.15	4.72
2013-11-27T05:29:45	21.86	5.78	24.46	7.51
2013-12-04T04:53:16	19.35	5.05	22.10	6.75
2013-12-05T04:48:47	16.01	4.29	18.87	5.86
2013-12-06T04:53:01	13.46	3.49	17.06	5.18
2013-12-09T04:40:13	18.68	4.84	24.87	7.57
2013-12-11T05:42:55	19.83	5.14	25.07	7.64
2013-12-14T04:20:17	12.48	3.23	14.76	4.48
2013-12-16T04:11:11	18.32	4.85	21.55	6.65
2013-12-20T04:04:28	24.43	6.41	31.95	9.84
2013-12-21T04:05:34	19.81	5.12	22.13	6.72
2013-12-22T03:45:52	20.37	5.29	22.57	6.88
2013-12-23T03:45:29	25.44	6.67	28.71	8.79
2013-12-24T03:38:54	20.38	5.32	25.38	7.75
2013-12-25T03:34:00	9.63	2.50	11.89	3.62
2013-12-27T03:25:21	18.80	4.89	20.48	6.24
2014-01-01T03:04:11	15.38	3.97	19.50	5.92

2014-01-02T03:12:32	14.92	3.98	16.63	5.15
2014-01-04T03:03:54	18.34	4.78	21.85	6.68
2014-01-05T02:49:00	19.62	5.13	24.41	7.49
2014-01-07T02:45:00	17.90	4.62	23.57	7.15
2014-01-08T02:42:27	19.26	4.98	20.87	6.33
2014-01-09T02:34:45	22.88	5.96	28.78	8.81
2014-01-10T02:32:40	17.91	4.64	22.37	6.81
2014-01-11T02:27:22	18.99	5.33	25.28	8.24
2014-01-12T03:13:46	16.86	4.38	19.22	5.85
2014-01-13T02:17:18	17.15	4.49	21.96	6.73
2014-01-14T02:16:47	17.28	4.47	20.56	6.25
2014-01-15T02:16:18	18.92	4.93	22.11	6.75
2014-01-16T03:12:38	17.72	4.64	22.29	6.83
2014-01-17T02:01:37	17.37	4.55	20.65	6.33
2014-01-20T02:02:17	18.83	4.88	24.46	7.45
2014-01-23T01:53:39	12.66	3.30	14.91	4.56
2014-01-24T01:39:39	20.25	5.28	23.94	7.31
2014-01-25T01:31:49	21.87	5.66	26.07	7.92
2014-01-27T01:28:14	18.04	4.66	22.80	6.93
2014-01-28T02:13:46	19.98	5.21	22.74	6.94
2014-01-29T01:22:58	19.18	5.00	24.57	7.55
2014-01-30T01:25:28	21.51	5.60	24.27	7.39
2014-02-10T00:58:27	20.68	5.35	24.20	7.35
2014-02-14T00:37:45	17.86	4.67	20.90	6.39
2014-02-15T00:57:29	13.92	3.67	15.52	4.78
2014-02-20T00:24:59	23.34	6.06	28.09	8.58
2014-02-25T23:30:57	15.97	4.13	18.99	5.76
2014-02-27T23:30:58	16.79	4.36	21.01	6.40
2014-03-05T23:01:33	18.57	4.84	18.79	5.72
2014-03-07T22:55:06	22.67	5.90	28.71	8.77
2014-03-11T23:22:47	30.57	7.97	40.87	12.53
2014-03-12T23:16:45	21.17	5.54	23.82	7.29
2014-03-14T22:24:43	20.76	5.37	20.52	6.23
2014-03-15T22:37:07	16.52	4.28	19.53	5.94
2014-03-16T22:27:05	20.63	5.34	25.25	7.68
2014-03-19T22:04:03	19.50	5.06	21.77	6.62
2014-03-20T22:00:00	19.89	5.49	22.33	7.03
2014-03-21T21:55:14	21.77	5.73	26.96	8.29
2014-03-22T21:58:07	18.04	4.67	19.11	5.80
2014-03-23T22:34:24	17.70	4.58	22.87	6.95
2014-04-01T21:10:07	17.49	4.68	20.76	6.46
2014-04-03T22:27:36	19.42	6.21	23.62	8.46
2014-04-15T20:43:01	16.78	4.66	18.51	5.91
2014-04-16T20:18:17	20.34	5.27	21.29	6.47
2014-04-17T20:10:33	16.18	4.30	19.05	5.91
2014-04-19T20:48:16	17.29	5.01	20.48	6.74
2014-04-27T19:53:42	30.42	3.28	28.02	3.03
2014-05-02T20:39:43	31.32	3.46	32.61	3.66

2014-05-03T19:35:23	26.39	3.13	28.40	3.39
2014-05-06T19:00:48	28.35	3.35	27.29	3.28
2014-05-12T18:34:03	29.25	2.62	29.34	2.69
2014-05-27T17:42:58	27.34	2.51	26.31	2.43
2014-05-29T17:33:00	27.73	2.34	22.95	1.97
2014-05-31T17:27:38	28.34	1.96	28.46	2.71
2014-06-01T17:18:37	26.44	1.99	25.90	1.96
2014-06-11T16:28:47	31.32	2.35	30.25	2.27
2014-06-13T16:24:19	27.56	1.13	25.14	1.02
2014-06-14T16:23:52	29.62	1.64	27.68	1.51
2014-06-15T16:14:24	25.22	1.37	24.77	1.31
2014-06-16T16:27:02	28.65	1.68	29.11	1.75
2014-06-18T16:06:00	30.31	1.90	30.16	1.87
2014-06-19T15:58:09	27.82	1.40	28.09	1.39
2014-06-20T15:58:54	27.32	1.10	25.31	0.96
2014-06-21T15:55:05	27.03	0.87	27.58	0.89
2014-06-22T15:53:41	28.43	1.58	27.42	1.50
2014-06-23T15:41:36	28.66	1.33	27.13	1.23
2014-06-24T15:40:24	30.51	1.46	27.73	1.35
2014-06-25T15:33:11	32.41	2.00	30.31	1.83
2014-07-03T15:01:05	29.37	1.68	28.40	1.56
2014-08-17T12:08:01	49.35	3.15	42.91	2.67
2014-08-25T11:32:08	34.69	2.02	36.74	2.18
2014-08-30T11:14:12	30.18	1.18	31.87	1.13
2014-09-07T10:57:47	36.72	2.62	34.71	2.31
2014-09-12T10:22:14	33.13	4.13	35.23	4.33
2014-09-15T10:16:40	33.19	2.52	38.55	2.78
2014-09-16T10:06:46	32.96	2.15	30.02	1.93
2014-09-17T10:05:08	58.61	11.05	43.07	6.55
2014-09-20T10:33:14	29.22	2.12	32.72	2.35
2014-10-10T08:41:38	36.86	2.28	37.96	2.30
2014-10-14T09:01:49	40.23	2.39	37.78	2.21
2014-10-18T08:27:34	34.87	1.80	32.36	1.66
2014-10-19T08:07:08	32.04	1.85	39.32	2.40
2014-10-20T08:05:47	42.83	3.14	38.60	2.71
2014-10-25T07:35:25	43.65	5.13	36.60	3.34
2014-11-22T05:41:17	43.88	6.04	36.86	5.17
2014-12-01T05:59:47	31.60	2.56	28.97	2.31
2014-12-02T05:13:21	41.61	3.25	40.40	3.08
2014-12-04T05:34:16	48.00	3.52	51.51	3.93
2014-12-05T05:27:40	41.38	3.08	36.29	2.54
2014-12-08T05:20:19	80.76	10.89	105.29	14.27
2014-12-15T04:29:26	49.45	6.19	48.83	5.93
2014-12-25T03:36:25	60.22	10.05	61.90	10.27
2015-01-03T03:17:04	42.46	10.35	57.46	14.54
2015-02-06T01:18:13	29.36	2.15	28.68	2.11
2015-02-07T00:42:07	32.79	2.04	31.19	1.95
2015-02-09T00:37:32	40.87	3.61	39.67	2.65

2015-02-10T00:36:17	42.64	5.87	35.12	4.73
2015-02-15T00:45:39	25.89	1.97	27.05	2.03
2015-02-22T23:36:46	24.53	5.21	25.38	5.52
2015-02-24T00:07:21	43.04	4.52	43.34	4.50
2015-02-27T23:17:50	54.94	6.15	39.82	4.10
2015-03-05T00:06:38	33.27	2.54	29.72	2.14
2015-03-16T22:47:53	36.70	2.16	35.12	1.94
2015-03-18T22:06:11	30.51	4.71	40.08	6.22
2015-03-19T22:03:03	46.86	6.69	68.60	11.51
2015-03-23T22:30:35	27.57	4.83	45.84	7.88
2015-03-28T21:23:45	37.17	5.00	37.58	4.90
2015-03-29T21:25:51	32.53	2.10	34.17	2.27
2015-03-30T21:44:24	43.56	6.64	42.49	6.25
2015-04-05T20:51:28	27.01	1.70	25.48	1.57
2015-04-11T20:49:49	26.68	2.48	29.92	2.78
2015-04-13T20:21:20	26.21	2.00	28.54	2.26
2015-04-15T20:46:58	23.28	1.08	24.65	1.13
2015-04-20T19:52:04	27.51	2.81	31.38	3.25
2015-04-21T20:00:22	31.48	2.35	32.03	2.34
2015-04-24T19:39:06	44.48	5.43	47.14	5.22
2015-04-25T20:21:40	26.29	2.01	28.65	2.19
2015-04-26T20:20:19	28.16	1.73	27.76	1.69
2015-04-27T20:14:20	27.43	2.19	27.18	2.13
2015-04-29T19:16:52	35.05	3.72	31.52	3.40
2015-05-01T19:14:01	27.60	1.59	27.51	1.55
2015-05-02T19:46:34	27.96	1.92	28.22	1.93
2015-05-03T19:05:44	28.38	1.67	28.55	1.64
2015-05-04T19:03:30	33.50	1.85	32.11	1.72
2015-05-05T18:53:28	31.35	1.66	29.90	1.52
2015-05-08T18:50:23	32.68	2.81	31.23	2.69
2015-05-09T18:43:14	31.72	2.93	28.70	2.34
2015-05-10T18:37:50	31.33	2.18	34.63	2.45
2015-05-11T18:30:44	31.71	2.60	32.66	2.66
2015-05-13T19:08:18	22.62	0.98	21.25	0.91
2015-05-14T19:10:29	24.10	1.01	25.59	1.07
2015-05-15T18:36:05	24.90	1.18	25.62	1.18
2015-05-16T18:09:29	30.36	1.86	30.52	1.98
2015-05-18T18:02:22	30.93	2.47	28.89	2.27
2015-05-23T17:51:10	28.27	2.42	27.66	2.31
2015-05-24T17:48:59	28.02	2.05	27.42	2.06
2015-05-25T17:44:07	33.41	2.41	29.52	1.80
2015-05-26T17:31:13	27.02	1.49	27.12	1.59
2015-05-27T17:39:54	26.74	1.54	26.57	1.55
2015-05-29T17:23:18	29.15	1.53	29.02	1.57
2015-06-01T17:11:51	32.59	2.29	31.00	2.13
2015-06-07T16:58:12	29.84	2.13	29.36	1.98
2015-06-11T16:39:51	33.42	3.67	31.29	3.21
2015-06-14T17:06:45	25.94	1.45	26.46	1.46

2015-06-17T16:23:38	28.59	2.69	29.31	2.70
2015-06-18T16:03:10	32.46	2.58	33.32	2.60
2015-06-19T16:08:51	28.61	1.75	28.27	1.66
2015-06-21T15:52:45	34.95	2.44	28.57	1.91
2015-07-03T15:52:18	31.58	2.01	29.17	1.84
2015-07-04T15:02:02	28.28	1.58	28.11	1.53
2015-07-05T14:55:39	22.86	0.85	25.64	0.95
2015-07-06T14:50:56	27.99	1.16	27.34	1.11
2015-07-09T14:42:17	22.13	1.11	26.84	1.34
2015-07-12T14:52:03	28.53	2.24	28.83	2.25
2015-07-22T14:29:58	25.90	1.42	28.86	1.57
2015-07-23T13:48:24	29.45	2.71	32.75	3.03
2015-08-01T13:11:34	34.99	2.98	32.73	2.63
2015-08-03T13:21:49	32.18	1.61	34.11	1.73
2015-08-07T12:49:39	33.45	2.20	31.66	2.05
2015-08-08T12:42:14	35.04	2.01	30.21	1.59
2015-08-09T12:36:50	28.11	1.59	30.84	2.01
2015-08-10T12:36:54	27.26	2.52	28.30	2.62
2015-08-15T12:19:54	32.97	1.94	30.04	1.74
2015-08-16T12:13:19	34.72	1.71	40.41	2.25
2015-08-17T12:03:52	28.10	2.82	29.38	2.93
2015-08-18T12:05:19	38.55	2.23	34.41	1.97
2015-08-23T12:01:56	32.91	2.23	30.02	2.02
2015-08-24T12:07:34	27.85	1.88	30.51	2.04
2015-08-25T11:37:12	30.62	2.17	32.82	2.32
2015-08-26T11:35:08	32.11	1.88	32.20	1.88
2015-08-29T11:27:54	38.80	2.56	31.99	2.08
2015-08-31T11:40:01	24.76	2.22	25.90	2.33
2015-09-06T11:36:25	3.69	0.36	21.82	2.11
2015-09-07T10:46:49	34.32	2.27	34.76	2.27
2015-09-09T10:35:29	25.11	2.39	26.21	2.49
2015-09-13T10:28:30	38.31	2.83	38.71	2.87
2015-09-18T10:00:09	29.31	3.43	29.84	3.48
2015-09-19T09:55:22	33.48	2.21	43.00	2.83
2015-09-21T09:50:51	29.22	2.83	38.49	3.77
2015-10-04T08:58:49	31.16	1.31	29.65	1.21
2015-10-05T08:51:30	35.65	2.33	34.55	2.26
2015-10-06T08:55:38	30.03	2.02	28.96	1.94
2015-10-09T08:40:59	37.26	2.12	36.92	2.08
2015-10-13T08:58:50	36.06	2.14	32.63	1.91
2015-10-14T08:22:44	36.66	3.55	36.96	3.57
2015-10-18T08:03:17	37.29	3.52	38.07	3.57
2015-10-19T07:59:54	36.07	3.42	35.62	3.28
2015-10-20T07:54:01	39.41	2.13	40.51	2.13
2015-10-21T07:53:11	37.18	2.86	38.99	3.00
2015-10-23T09:22:04	33.07	2.80	35.22	2.96
2015-10-24T08:44:40	36.81	1.71	36.20	1.60
2015-10-25T08:22:44	37.44	2.72	40.79	2.92

2015-10-28T08:14:02	40.55	2.46	46.27	2.79
2015-10-31T08:06:40	36.38	5.24	33.71	4.85
2015-11-03T07:00:43	29.13	1.28	28.63	1.26
2015-11-04T06:58:59	33.80	2.26	31.58	2.09
2015-11-05T06:54:32	31.11	2.48	32.57	2.60
2015-11-06T06:56:03	36.40	1.59	37.05	1.77
2015-11-07T06:45:45	33.09	2.31	36.56	2.57
2015-11-18T06:13:10	36.90	2.96	35.92	2.85
2015-11-20T05:55:11	47.20	5.09	42.69	4.18
2015-11-23T07:06:28	42.10	2.62	41.91	2.65
2015-11-24T05:42:06	35.44	1.97	45.38	2.83
2015-12-05T04:54:00	48.96	5.06	43.38	4.21
2015-12-19T03:56:29	36.66	2.92	35.81	2.81
2015-12-20T03:56:51	45.36	3.97	41.28	3.41
2015-12-23T03:42:58	44.74	7.51	50.63	8.38
2016-01-01T03:08:21	37.03	1.92	43.31	2.20
2016-01-04T03:44:37	46.91	7.01	46.11	6.68
2016-01-05T02:55:19	31.33	2.16	35.65	2.50
2016-01-06T02:59:15	32.71	2.07	33.41	2.08
2016-01-08T03:12:05	28.66	3.54	34.93	4.31
2016-01-09T03:12:41	47.51	6.66	54.96	7.71
2016-01-10T02:37:11	46.03	7.07	54.21	8.42
2016-01-15T03:24:54	44.83	6.33	40.15	5.33
2016-01-30T01:17:39	33.41	2.43	29.82	2.14
2016-01-31T02:15:14	31.67	2.29	30.67	2.18
2016-02-02T01:16:00	31.39	1.93	32.32	1.96
2016-02-08T00:40:35	29.46	1.76	32.55	1.91
2016-02-13T00:28:56	32.68	1.98	31.50	1.88
2016-02-14T00:13:06	33.26	2.85	35.07	3.07
2016-02-16T00:13:58	29.02	1.87	32.49	2.09
2016-03-01T23:58:31	52.65	7.48	59.86	8.46
2016-03-03T00:12:42	31.61	2.66	32.52	2.73
2016-03-07T00:36:32	30.75	3.46	35.17	3.96
2016-03-07T23:47:16	35.01	3.33	33.82	3.10
2016-03-13T22:31:31	58.87	12.08	65.40	13.36
2016-03-21T23:12:11	25.79	2.06	26.08	2.06
2016-03-22T22:52:01	35.73	1.96	35.66	1.92
2016-03-23T22:51:45	33.43	2.12	30.99	1.90
2016-03-24T21:48:49	36.65	3.68	31.94	3.13
2016-03-30T21:34:35	34.03	2.29	30.20	2.00
2016-03-31T21:32:00	27.36	1.36	29.39	1.44
2016-04-01T21:26:51	30.11	2.30	28.70	2.15
2016-04-02T21:02:31	32.72	2.40	29.37	2.06
2016-04-03T22:22:24	36.43	2.25	33.60	2.01
2016-04-10T20:34:23	32.39	2.56	30.38	2.37
2016-04-11T20:33:43	29.55	2.14	28.61	2.07
2016-04-12T20:27:30	30.65	2.88	29.29	2.72
2016-04-13T20:27:27	26.60	2.46	27.70	2.55

2016-04-14T20:24:12	25.90	1.74	27.76	1.84
2016-04-15T21:14:07	36.06	3.26	31.28	2.77
2016-04-17T20:15:38	29.99	1.85	29.60	1.77
2016-04-22T19:55:36	48.16	6.90	36.85	5.04
2016-04-23T19:46:17	31.70	1.69	29.56	1.54
2016-04-24T20:58:03	32.04	1.94	32.64	1.93
2016-04-26T19:35:41	40.21	3.25	35.62	2.56
2016-04-27T19:21:45	28.01	1.57	25.65	1.42
2016-04-28T19:30:11	23.56	1.83	21.55	1.65
2016-04-29T19:17:23	32.30	1.72	28.02	1.42
2016-04-30T19:18:45	28.01	2.52	29.88	2.69
2016-05-01T19:15:38	29.96	2.08	28.46	1.96
2016-05-02T19:16:00	27.72	2.27	26.18	2.14
2016-05-03T18:57:38	26.05	2.20	26.29	2.20
2016-05-04T18:53:47	21.73	1.60	21.76	1.60
2016-05-05T18:50:19	26.59	1.65	26.87	1.63
2016-05-06T18:47:44	27.68	1.85	26.05	1.69
2016-05-07T18:43:42	28.72	2.36	26.92	2.18
2016-05-09T18:50:39	30.02	2.11	26.31	1.82
2016-05-17T18:08:08	27.15	2.26	28.52	2.36
2016-05-20T18:01:05	29.36	2.60	28.24	2.48
2016-05-21T17:52:30	29.35	1.91	29.41	1.88
2016-05-22T17:54:10	27.87	2.26	27.94	2.27
2016-05-25T17:39:08	33.42	2.34	28.31	1.90
2016-05-26T17:36:55	28.63	1.94	30.60	2.14
2016-05-28T17:20:49	30.29	1.85	29.66	1.80
2016-05-29T17:23:14	26.23	1.45	26.77	1.43
2016-05-31T17:25:09	27.67	1.69	26.45	1.59
2016-06-01T17:07:04	23.81	1.76	26.31	1.94
2016-06-02T17:23:37	28.14	1.91	27.15	1.77
2016-06-04T16:54:10	27.26	1.66	26.84	1.61
2016-06-05T16:57:51	29.41	2.31	27.97	2.16
2016-06-06T16:46:39	29.51	1.68	29.30	1.64
2016-06-07T16:42:35	29.37	1.73	26.79	1.57
2016-06-08T16:46:44	29.24	1.95	26.11	1.69
2016-06-09T16:44:58	26.53	1.34	25.83	1.28
2016-06-10T16:37:16	33.35	2.09	31.27	1.92
2016-06-11T16:35:35	27.05	2.01	27.76	2.06
2016-06-12T16:30:10	35.21	2.91	40.13	3.21
2016-06-13T17:25:49	26.66	3.93	29.63	4.38
2016-06-15T16:23:15	33.29	2.03	27.15	1.42
2016-06-16T16:15:03	30.79	1.70	28.46	1.54
2016-06-17T16:02:09	32.40	2.12	30.04	1.89
2016-06-18T16:02:54	29.82	1.76	29.59	1.73
2016-06-19T16:01:31	32.18	2.04	30.80	1.88
2016-06-20T15:55:22	29.61	1.78	28.16	1.67
2016-06-21T15:55:28	27.68	1.56	26.22	1.45
2016-06-22T15:46:08	29.48	2.61	27.89	2.45

2016-06-23T15:46:44	29.36	2.33	29.31	2.28
2016-06-25T15:37:07	31.09	1.84	30.31	1.75
2016-06-30T16:52:09	26.10	1.30	27.22	1.34
2016-07-01T15:09:03	31.18	2.30	29.86	2.11
2016-07-02T16:02:56	28.28	2.51	26.16	2.31
2016-07-03T15:08:57	25.90	1.92	28.06	2.12
2016-07-08T14:41:22	28.14	1.42	28.17	1.40
2016-07-09T14:47:21	25.84	1.07	27.55	1.16
2016-07-10T14:35:34	28.47	1.22	27.26	1.10
2016-07-11T14:33:11	28.58	1.36	28.45	1.29
2016-07-12T14:34:15	29.47	1.33	28.02	1.16
2016-07-13T14:28:56	25.69	1.27	24.19	1.07
2016-07-14T14:19:03	26.89	1.45	25.45	1.12
2016-07-15T15:01:20	25.45	1.17	27.07	1.24
2016-07-16T14:34:11	28.18	1.34	24.45	1.04
2016-07-17T14:53:45	26.08	1.13	25.15	1.04
2016-07-22T13:51:41	24.93	1.96	29.93	2.18
2016-07-27T13:36:36	28.29	1.39	26.98	1.29
2016-08-05T13:15:18	24.66	1.24	22.77	1.16
2016-08-11T12:26:29	29.07	1.49	28.31	1.50
2016-08-12T12:26:39	28.28	1.97	27.53	1.85
2016-08-15T12:17:14	31.41	1.85	31.39	1.79
2016-08-22T12:40:41	20.25	1.31	22.55	1.42
2016-08-24T11:45:22	36.18	3.00	35.01	3.14
2016-08-27T11:31:21	34.47	1.44	33.48	1.37
2016-08-28T11:31:06	25.34	1.46	28.19	1.63
2016-08-31T11:45:11	40.39	1.74	37.95	1.60
2016-09-01T11:02:06	28.39	1.24	28.33	1.29
2016-09-02T11:00:15	34.15	2.06	35.06	2.11
2016-09-03T11:08:05	29.76	1.55	26.14	1.36
2016-09-04T10:53:15	40.38	2.19	38.15	3.05
2016-09-05T10:46:58	38.59	2.90	37.56	2.65
2016-09-07T10:38:26	43.74	3.25	35.42	2.21
2016-09-11T10:30:40	22.46	3.32	25.15	3.70
2016-09-12T10:25:54	24.21	3.27	33.86	4.56
2016-09-16T10:10:49	31.36	3.07	28.55	2.73
2016-09-23T10:23:29	28.73	2.56	26.48	2.35
2016-09-25T09:50:43	29.68	1.45	30.32	1.49
2016-09-27T09:24:14	34.54	3.73	33.56	3.61
2016-09-30T09:14:12	37.32	3.74	37.53	3.73
2016-10-01T09:07:08	35.54	2.62	35.34	2.55
2016-10-02T09:06:26	31.68	2.52	33.52	2.66
2016-10-03T08:57:22	29.71	2.18	31.03	2.20
2016-10-08T08:40:19	27.97	2.00	30.70	2.18
2016-10-10T08:48:38	31.08	2.58	29.60	2.44
2016-10-13T10:05:40	36.47	2.92	39.56	3.13
2016-10-20T07:51:12	26.50	6.19	31.12	7.31
2016-10-31T07:11:38	41.49	3.68	41.27	3.66

2016-11-04T07:00:28	32.31	5.02	34.28	5.28
2016-11-11T06:26:52	14.94	2.59	17.79	3.09
2016-11-13T06:16:09	35.81	8.43	36.01	8.34
2016-11-14T06:15:10	35.31	2.15	34.72	2.05
2016-11-19T06:07:11	33.60	4.14	36.59	4.39
2016-11-21T06:27:08	44.36	9.76	46.74	10.27
2016-12-04T04:54:24	33.24	5.40	36.52	5.87
2016-12-05T05:11:23	38.02	6.66	37.33	6.39
2016-12-07T04:44:12	38.51	6.20	43.58	7.21
2016-12-09T04:33:40	35.93	4.58	39.04	4.89
2016-12-11T05:23:22	36.15	3.39	31.32	2.87
2016-12-12T04:24:18	29.04	5.78	29.81	5.91
2016-12-16T04:06:51	45.98	5.93	39.64	4.90
2016-12-17T04:03:15	41.24	3.44	35.10	2.66
2016-12-19T03:57:43	27.49	2.79	29.15	3.13
2016-12-23T03:42:58	38.38	4.34	35.79	3.96
2016-12-28T03:35:48	40.92	6.18	47.18	7.01
2017-01-02T03:05:28	37.38	3.89	36.01	3.56
2017-01-06T02:45:36	52.19	8.03	43.52	5.51
2017-01-21T01:52:48	27.22	3.09	24.53	2.79
2017-01-22T01:42:04	33.78	3.81	42.35	4.79
2017-01-23T01:37:26	29.16	2.33	30.40	2.38
2017-01-24T01:38:54	34.97	3.53	38.09	3.76
2017-01-27T01:23:06	58.37	5.30	59.27	5.04
2017-01-29T01:27:01	28.00	3.29	28.43	3.26
2017-01-30T01:11:23	34.90	4.69	35.77	4.75
2017-02-05T00:47:59	39.62	3.97	32.82	3.14
2017-02-06T00:43:08	39.03	6.00	41.18	5.90
2017-02-12T00:22:15	15.13	3.29	14.64	3.20
2017-03-04T23:01:21	19.42	3.97	28.43	5.81
2017-03-05T23:11:33	21.68	4.15	27.59	5.28
2017-03-13T22:24:29	21.45	2.47	19.34	2.17
2017-03-16T23:14:40	30.30	6.90	26.94	6.07
2017-03-19T22:04:34	23.61	2.22	22.86	2.14
2017-03-20T21:58:09	21.18	3.39	22.61	3.61
2017-03-21T21:51:24	19.57	1.95	20.83	2.06
2017-03-22T21:57:33	21.66	2.67	21.82	2.65
2017-03-23T21:46:25	25.20	4.78	28.17	5.37
2017-03-28T21:25:51	21.60	2.90	19.56	2.60
2017-04-01T21:07:13	27.53	2.76	25.13	2.32
2017-04-02T21:38:39	22.21	4.04	23.49	4.27
2017-04-03T22:32:58	19.25	4.28	19.83	4.63
2017-04-14T20:19:18	28.22	4.09	26.61	3.84
2017-04-15T20:14:43	20.09	1.92	20.08	1.90
2017-04-16T20:10:22	24.37	2.94	26.56	3.28
2017-04-17T20:05:42	18.79	2.22	20.52	2.41
2017-04-21T19:49:16	17.35	1.77	18.31	1.84
2017-04-22T19:49:15	23.10	1.91	19.85	1.60

2017-04-27T19:31:16	22.20	2.14	20.75	1.98
2017-04-28T19:29:46	24.50	2.51	23.01	2.31
2017-04-29T19:20:02	23.97	2.48	21.47	2.18
2017-04-30T19:19:34	25.22	2.20	22.78	1.91
2017-05-04T19:07:16	19.52	1.97	20.88	2.06
2017-05-05T18:51:54	20.49	1.95	20.27	1.86
2017-05-06T18:53:21	22.31	2.81	18.99	2.32
2017-05-07T18:45:16	22.70	2.30	21.50	2.15
2017-05-10T18:36:02	17.91	1.79	20.61	2.04
2017-05-11T18:27:21	19.17	1.84	21.34	2.02
2017-05-16T18:19:04	19.28	1.53	18.71	1.47
2017-05-19T18:02:34	23.38	2.61	21.73	2.40
2017-05-20T18:03:12	21.02	1.63	21.37	1.62
2017-05-22T17:43:56	18.47	1.52	19.13	1.56
2017-05-25T17:34:13	18.68	1.37	19.51	1.43
2017-05-27T17:26:38	21.92	1.32	22.36	1.31
2017-05-28T17:43:29	20.79	1.76	18.33	1.51
2017-05-31T17:12:19	35.94	4.03	31.21	3.27
2017-06-02T17:04:15	34.37	2.16	29.19	1.77
2017-06-03T17:16:07	24.79	2.25	28.94	2.62
2017-06-04T16:57:23	27.93	2.46	32.73	2.87
2017-06-05T16:57:12	33.55	2.66	29.73	2.21
2017-06-06T17:03:20	20.46	1.75	19.86	1.65
2017-06-09T16:44:24	31.42	2.08	28.76	1.86
2017-06-10T16:32:35	23.11	2.30	22.92	2.23
2017-06-11T16:37:26	21.04	1.75	18.38	1.52
2017-06-13T16:22:34	22.10	1.47	21.52	1.39
2017-06-14T16:16:30	23.01	1.44	20.72	1.20
2017-06-21T15:59:19	20.59	3.08	20.49	3.05
2017-06-23T15:38:55	27.66	1.87	27.80	1.86
2017-06-24T15:34:24	24.09	2.28	23.04	2.06
2017-06-25T15:38:44	24.07	1.90	20.70	1.61
2017-06-30T15:15:10	19.77	1.94	19.24	1.88
2017-07-01T15:08:51	26.04	2.42	23.28	1.98
2017-07-02T15:02:49	23.75	1.80	22.83	1.75
2017-07-03T15:08:50	23.19	1.45	22.60	1.42
2017-07-05T14:53:39	24.10	1.97	21.74	1.63
2017-07-06T14:58:42	21.52	1.18	21.05	1.12
2017-07-15T14:21:41	25.59	1.88	22.41	1.56
2017-07-21T14:24:23	19.69	1.16	19.47	1.15
2017-07-22T13:45:39	24.79	1.31	26.51	1.39
2017-07-23T13:46:54	21.24	1.22	23.45	1.36
2017-07-25T13:49:38	22.27	1.18	23.07	1.17
2017-07-28T13:55:28	24.08	1.19	22.40	1.07
2017-07-29T13:28:35	20.13	1.11	20.23	1.11
2017-07-30T13:14:29	21.81	1.28	21.75	1.29
2017-08-03T14:31:46	25.04	1.44	23.41	1.33
2017-08-07T12:41:57	21.21	1.32	20.43	1.24

2017-08-10T12:40:25	22.03	1.79	22.73	1.79
2017-08-12T12:56:39	18.72	1.05	17.42	0.95
2017-08-25T11:37:19	19.34	1.28	19.60	1.30
2017-08-27T11:26:04	17.79	3.76	19.48	4.01
2017-08-31T12:06:50	20.86	1.67	21.18	1.60
2017-09-01T11:03:11	16.25	1.88	17.72	2.08
2017-09-02T11:09:39	16.99	1.51	16.43	1.46
2017-09-03T11:07:31	19.03	1.71	17.79	1.59
2017-09-04T10:57:31	18.70	1.03	19.07	1.03
2017-09-06T10:45:28	20.38	2.69	21.13	2.80
2017-09-09T10:35:42	20.15	1.67	21.50	1.79
2017-09-10T10:37:12	19.66	1.54	19.82	1.54
2017-09-12T10:30:50	19.55	1.57	18.54	1.48
2017-09-15T10:09:37	21.45	1.55	20.08	1.44
2017-09-17T10:24:16	30.17	3.27	28.82	3.04
2017-09-23T09:37:38	21.86	1.63	21.90	1.62
2017-09-26T09:30:00	29.46	3.27	26.49	2.86
2017-10-14T08:19:22	26.30	9.68	23.74	8.74
2017-10-16T08:10:35	21.10	2.40	22.35	2.55
2017-10-17T08:05:34	20.36	2.02	18.22	1.82
2017-10-18T08:06:16	23.82	1.65	22.58	1.53
2017-10-25T07:40:02	26.34	4.88	25.41	4.68
2017-10-31T07:19:50	28.20	3.26	27.06	3.09
2017-11-04T07:03:48	29.30	4.10	27.22	3.79
2017-11-05T07:12:40	17.80	2.07	18.74	2.16
2017-11-06T07:00:08	29.28	2.32	31.18	2.55
2017-11-08T06:48:13	20.86	1.68	22.44	1.83
2017-12-17T04:10:04	24.09	2.38	21.42	2.11
2017-12-18T04:08:15	18.48	1.32	20.51	1.44
2017-12-28T03:26:18	22.53	2.72	20.03	2.41
2017-12-29T03:22:42	23.79	2.92	21.25	2.59
2017-12-30T03:36:31	18.79	2.34	17.31	2.14
2017-12-31T03:06:43	25.41	2.92	23.36	2.65
2018-01-01T03:07:09	19.67	1.80	18.64	1.69
2018-01-02T03:00:07	18.63	1.47	20.28	1.60
2018-01-03T03:02:46	19.24	1.71	20.95	1.86
2018-01-06T02:51:31	19.64	1.68	21.09	1.79
2018-01-07T02:41:51	15.99	1.62	18.60	1.88
2018-01-08T02:39:11	18.72	1.74	21.18	1.97
2018-01-13T02:22:30	21.64	2.00	21.13	1.94
2018-01-14T02:22:33	19.49	2.00	21.14	2.17
2018-01-16T02:09:14	24.28	3.93	25.27	4.09
2018-01-19T02:21:35	21.70	1.83	23.28	1.94
2018-01-30T01:21:32	23.79	2.53	21.21	2.23
2018-02-01T01:00:56	22.42	2.51	20.15	2.25
2018-02-06T00:54:34	25.16	3.27	21.32	2.72
2018-02-10T00:25:49	24.07	2.47	19.97	1.98
2018-02-11T00:24:14	21.85	2.64	21.40	2.56

2018-02-12T00:27:20	20.44	4.77	21.83	5.16
2018-02-13T00:22:20	21.54	1.68	21.81	1.70
2018-02-14T00:16:10	20.68	1.91	20.61	1.91
2018-02-16T01:51:11	25.53	2.57	25.45	2.55
2018-02-17T00:04:51	22.08	1.84	21.98	1.82
2018-02-18T00:04:50	20.62	2.07	20.91	2.09
2018-02-19T23:47:57	22.38	2.80	20.47	2.55
2018-02-22T23:54:15	22.60	2.69	58.75	7.02
2018-02-27T23:14:47	22.78	4.54	20.47	4.07
2018-03-03T23:11:55	24.28	1.99	21.53	1.75
2018-03-05T22:51:56	22.86	2.84	22.81	2.83
2018-03-13T22:28:29	24.62	3.25	22.63	2.98
2018-03-17T22:10:14	20.64	4.01	18.85	3.64
2018-03-19T21:59:41	19.03	2.06	21.67	2.34
2018-03-23T21:47:26	22.07	2.26	20.79	2.07
2018-04-06T20:53:58	18.01	1.75	18.57	1.81
2018-04-13T20:21:27	14.11	2.26	19.57	3.14
2018-04-14T20:18:00	22.22	2.61	19.09	2.23
2018-04-15T20:14:20	16.34	1.94	15.36	1.82
2018-04-20T20:02:16	20.40	1.95	20.25	1.93
2018-04-21T19:56:33	15.89	1.80	15.21	1.72
2018-04-22T19:54:47	17.46	1.90	17.13	1.85
2018-04-25T19:32:10	15.45	1.34	16.23	1.40
2018-04-28T19:28:49	16.81	1.47	17.18	1.49
2018-04-29T19:22:39	15.30	1.16	16.24	1.23
2018-04-30T19:17:25	23.55	2.34	25.02	2.59
2018-05-01T19:21:28	17.81	1.98	17.80	1.96
2018-05-02T19:22:28	22.61	1.87	22.42	1.83
2018-05-03T19:00:50	15.44	1.13	16.06	1.17
2018-05-06T18:55:34	15.87	2.08	15.67	2.04
2018-05-11T18:29:34	17.42	1.47	16.28	1.36
2018-05-12T18:34:54	18.74	2.28	19.23	2.33
2018-05-17T18:13:24	15.53	1.37	13.71	1.20
2018-05-18T18:11:36	15.46	1.46	15.89	1.50
2018-05-21T17:53:38	19.23	1.74	17.97	1.62
2018-05-22T17:49:19	18.58	1.54	18.66	1.54
2018-05-24T17:45:45	21.59	2.06	20.19	1.90
2018-05-27T17:36:22	14.14	1.42	15.35	1.53
2018-06-06T16:58:48	14.65	0.94	15.50	0.99
2018-06-07T16:44:33	16.06	1.65	15.67	1.61
2018-06-10T16:31:30	15.50	1.82	15.94	1.87
2018-06-12T16:29:10	16.56	1.61	16.55	1.60
2018-06-13T16:24:30	17.94	1.22	16.04	1.08
2018-06-15T16:19:54	17.86	2.23	16.46	2.05
2018-06-16T16:14:14	16.53	1.68	15.42	1.56
2018-06-17T16:03:55	17.27	1.36	17.29	1.35
2018-06-18T16:08:28	17.95	1.77	17.26	1.69
2018-06-19T16:04:53	17.51	1.62	18.21	1.68

2018-06-22T15:52:02	16.89	1.75	18.77	1.94
2018-06-23T15:44:34	19.07	1.67	18.78	1.62
2018-06-24T15:45:08	17.74	1.76	17.48	1.74
2018-06-25T15:37:32	18.05	2.03	16.43	1.83
2018-06-29T15:29:51	16.88	1.89	16.47	1.83
2018-06-30T15:24:11	16.43	1.43	17.73	1.54
2018-07-01T15:19:41	16.71	1.67	16.60	1.66
2018-07-03T16:47:27	18.48	1.90	17.63	1.80
2018-07-04T15:00:23	15.26	1.50	15.89	1.55
2018-07-16T14:17:27	18.03	1.62	19.16	1.52
2018-07-17T14:05:13	22.49	1.83	21.84	1.76
2018-07-21T14:01:36	14.85	1.98	16.31	2.17
2018-07-23T13:51:35	16.45	2.49	18.06	2.73
2018-07-24T13:47:06	17.62	1.60	17.37	1.57
2018-07-25T13:33:56	21.26	1.67	20.63	1.57
2018-07-26T13:39:49	17.40	1.81	16.20	1.68
2018-07-28T13:23:53	18.69	1.79	20.25	1.95
2018-07-29T13:27:56	12.30	1.21	12.71	1.25
2018-07-30T13:14:13	24.26	2.95	25.30	3.09
2018-08-04T13:05:01	15.04	2.94	15.35	2.99
2018-08-07T12:48:10	14.75	3.59	15.51	3.77
2018-08-11T12:37:12	14.82	0.89	16.24	0.96
2018-08-12T12:33:38	16.38	2.14	14.88	1.95
2018-08-19T11:59:23	18.55	2.00	17.48	1.87
2018-08-20T11:54:18	19.99	1.87	22.64	2.14
2018-08-21T12:27:13	12.94	3.38	13.91	3.63
2018-08-24T11:42:38	20.30	2.13	21.66	2.28
2018-08-27T11:32:23	13.27	0.95	13.99	1.00
2018-08-28T11:51:24	18.95	1.18	20.17	1.25
2018-08-29T12:20:55	22.95	3.43	21.13	3.15
2018-08-30T11:21:19	19.64	2.12	17.48	1.87
2018-09-01T11:12:23	18.07	1.41	18.35	1.43
2018-09-02T11:02:51	25.83	2.28	26.97	2.38
2018-09-03T11:28:16	26.39	1.23	26.57	1.23
2018-09-04T10:55:21	23.96	1.10	25.60	1.16
2018-09-07T12:22:01	50.58	4.65	48.34	4.14
2018-09-16T10:04:41	24.01	2.93	24.69	3.01
2018-09-19T09:55:03	31.01	1.72	30.00	1.59
2018-09-21T09:49:16	27.07	1.39	30.18	1.56
2018-09-22T09:50:39	40.04	3.48	40.13	3.37
2018-09-23T09:41:38	24.16	1.48	29.11	1.76
2018-09-24T09:41:29	32.41	2.29	36.82	2.61
2018-09-25T09:31:36	29.93	3.00	32.48	3.24
2018-09-28T09:29:39	30.54	4.77	27.90	4.35
2018-10-02T09:10:29	26.67	1.03	26.29	1.00
2018-10-03T09:05:11	26.80	1.92	29.43	2.09
2018-10-05T09:01:51	32.09	2.46	32.94	2.50
2018-10-07T08:41:53	35.89	3.78	34.01	3.54

2018-10-08T08:43:05	32.57	2.44	34.34	2.56
2018-10-09T08:45:39	32.50	2.57	35.24	2.75
2018-10-10T08:37:01	29.53	2.61	32.18	3.07
2018-10-12T08:25:17	27.19	2.72	30.10	3.02
2018-10-22T08:38:10	29.19	2.81	26.53	2.52
2018-10-29T07:23:23	49.75	4.93	40.96	3.51
2018-10-30T07:16:56	40.22	3.79	34.68	3.07
2018-11-05T07:43:41	32.14	2.06	33.08	2.07
2018-11-06T06:55:30	32.57	2.79	30.14	2.49
2018-11-16T07:53:43	34.88	3.65	40.07	4.19
2018-11-25T05:36:35	28.63	1.89	33.09	2.17
2018-11-26T05:33:24	20.29	3.16	19.30	3.00
2018-12-03T05:03:44	38.62	2.75	33.85	2.18
2018-12-04T05:04:58	28.81	2.15	29.98	2.24
2018-12-10T04:30:48	30.32	2.37	28.11	2.18
2018-12-11T04:53:36	25.78	1.84	25.88	1.87
2018-12-12T04:23:31	29.06	2.06	30.27	2.15
2018-12-16T04:21:20	31.13	2.11	28.37	1.89
2018-12-17T04:12:14	35.31	2.36	32.14	2.08
2018-12-19T04:04:21	40.70	3.20	38.58	2.92
2018-12-20T04:01:39	36.51	2.78	33.55	2.50
2018-12-21T03:55:22	29.08	2.98	28.62	2.92
2018-12-22T03:50:46	31.22	3.61	27.75	3.15
2018-12-23T03:47:48	33.85	2.38	38.83	2.70
2018-12-24T03:43:41	44.28	3.92	40.11	3.52
2018-12-25T03:36:57	26.25	2.06	28.71	2.27
2019-01-02T03:06:29	34.55	3.14	42.20	3.94
2019-01-03T03:06:43	33.21	3.61	27.95	3.01
2019-01-05T02:55:09	40.49	3.30	34.11	2.65
2019-01-06T02:50:10	33.00	3.18	34.59	3.33
2019-01-07T02:42:06	22.46	2.63	20.15	2.37
2019-01-11T02:28:36	28.68	3.38	34.61	4.08
2019-01-12T02:27:13	27.63	2.66	31.06	2.98
2019-01-13T02:19:52	39.09	5.39	37.39	5.14
2019-01-21T01:53:44	29.76	1.88	27.96	1.75
2019-01-22T01:54:19	24.16	2.43	23.08	2.31
2019-01-24T01:43:45	28.64	2.50	37.47	3.23
2019-01-25T01:40:12	33.04	2.16	33.62	2.16
2019-01-26T01:27:19	34.00	2.43	31.12	2.16
2019-01-27T01:31:02	28.05	2.68	30.18	2.87
2019-01-28T01:25:29	31.86	2.44	31.14	2.33
2019-01-29T01:17:22	30.38	2.17	30.86	2.20
2019-02-01T01:02:05	14.95	2.91	16.18	3.15
2019-02-05T00:57:25	41.01	3.61	31.42	2.52
2019-02-06T00:48:01	31.65	3.15	31.27	3.13
2019-02-09T00:33:51	36.35	4.06	33.29	3.69
2019-02-10T00:33:38	41.83	4.20	36.10	3.46
2019-02-11T00:23:43	30.44	3.39	33.78	3.78

2019-02-16T23:59:20	29.20	6.57	24.45	5.67
2019-02-18T00:00:11	30.22	1.97	31.12	2.04
2019-02-20T23:52:22	26.43	2.31	27.43	2.38
2019-02-24T23:49:12	27.15	2.98	26.74	2.91
2019-02-27T00:19:53	31.96	2.92	29.12	2.58
2019-02-27T23:23:45	30.24	2.61	27.94	2.36
2019-03-02T00:49:50	34.50	4.08	34.86	4.11
2019-03-02T23:16:59	37.61	3.88	34.34	3.54
2019-03-03T23:25:42	26.61	2.58	29.15	2.88
2019-03-09T22:46:27	35.41	3.26	32.14	2.95
2019-03-11T22:41:12	38.35	4.59	35.42	4.23
2019-03-12T22:30:28	28.53	2.73	32.00	3.10
2019-03-13T22:34:18	26.31	1.80	26.74	1.82
2019-03-14T22:35:33	31.00	3.14	28.81	2.89
2019-03-16T22:22:45	30.08	2.29	27.70	2.09
2019-03-17T22:14:06	28.10	2.27	30.31	2.42
2019-03-18T22:15:25	33.56	3.32	29.34	2.86
2019-03-21T22:00:01	28.75	2.60	28.73	2.59
2019-03-22T21:55:32	38.05	3.68	38.12	3.74
2019-03-23T21:48:39	31.68	3.23	26.63	2.66
2019-03-24T21:49:59	35.44	2.67	31.46	2.31
2019-03-26T21:40:08	34.50	3.24	32.01	3.03
2019-03-31T21:29:34	38.45	4.48	30.76	3.41
2019-04-05T21:09:20	44.75	6.47	36.49	5.06
2019-04-06T21:02:42	34.49	3.08	30.26	2.65
2019-04-07T21:01:32	31.24	3.45	29.84	3.29
2019-04-12T20:40:45	43.75	3.89	33.62	2.73
2019-04-13T20:31:44	30.47	2.12	30.99	2.14
2019-04-14T20:35:26	26.29	2.27	26.71	2.30
2019-04-16T20:34:26	25.56	1.61	24.17	1.50
2019-04-17T20:23:59	32.28	2.40	30.31	2.12
2019-04-18T20:16:50	28.47	2.10	28.23	2.01
2019-04-19T20:11:27	27.99	2.08	30.09	2.22
2019-04-20T20:10:34	31.95	2.52	31.06	2.40
2019-04-21T20:04:48	28.38	1.68	28.64	1.70
2019-04-27T19:33:05	28.27	1.70	26.02	1.52
2019-04-28T19:29:15	26.58	1.33	28.03	1.40
2019-05-03T19:09:31	28.22	2.15	29.22	2.21
2019-05-04T19:12:59	25.37	2.17	26.01	2.20
2019-05-10T18:41:58	33.72	2.45	30.31	2.13
2019-05-11T18:38:13	33.07	1.72	29.20	1.47
2019-05-12T18:34:22	26.10	1.61	26.34	1.59
2019-05-17T18:14:34	29.49	1.86	27.70	1.72
2019-05-18T18:10:32	23.98	1.85	28.31	2.20
2019-05-19T18:06:46	32.82	2.67	27.19	2.16
2019-05-21T17:58:48	34.32	2.62	26.26	1.89
2019-05-22T17:54:53	30.49	1.79	27.85	1.59
2019-05-23T17:50:57	29.45	2.95	28.41	2.78

2019-05-26T17:45:16	29.55	2.23	27.42	2.01
2019-05-27T17:35:38	28.75	1.76	27.35	1.65
2019-05-30T17:23:30	27.35	2.37	27.18	2.37
2019-05-31T17:14:44	25.56	2.14	25.53	2.15
2019-06-01T17:11:04	29.70	2.63	27.29	2.40
2019-06-02T17:06:49	28.57	2.47	27.47	2.37
2019-06-03T17:29:31	30.31	2.78	28.73	2.65
2019-06-06T17:13:38	24.03	1.83	24.41	1.86
2019-06-08T16:43:23	26.84	2.00	26.80	2.00
2019-06-09T16:39:24	24.65	1.53	23.88	1.46
2019-06-10T16:43:48	29.40	1.95	27.12	1.75
2019-06-11T16:31:27	27.00	1.85	25.61	1.73
2019-06-12T16:43:55	26.29	1.83	25.11	1.74
2019-06-13T16:23:34	25.28	2.16	25.47	2.19
2019-06-14T16:19:40	29.47	1.59	27.43	1.44
2019-06-15T16:16:23	28.37	2.22	27.22	2.08
2019-06-16T16:13:15	25.53	2.57	26.20	2.67
2019-06-18T17:47:13	24.37	1.74	24.60	1.75
2019-06-21T15:52:01	27.35	1.94	26.22	1.79
2019-06-22T15:48:12	30.20	2.45	28.18	2.20
2019-06-28T15:27:00	35.51	3.02	33.01	2.78
2019-06-29T15:20:42	28.38	2.28	27.60	2.21
2019-06-30T15:16:43	29.43	1.93	27.60	1.75
2019-07-02T15:08:55	24.78	1.50	25.53	1.56
2019-07-06T14:53:18	27.21	1.86	40.11	2.76
2019-07-07T14:49:09	18.97	1.84	19.12	1.85
2019-07-13T14:25:35	20.22	0.81	20.64	0.82
2019-07-14T14:21:37	24.23	1.18	24.10	1.17
2019-07-18T14:05:56	29.45	2.42	27.35	2.15
2019-07-19T14:02:33	25.23	5.66	25.28	5.64
2019-07-22T14:46:03	25.20	1.69	25.03	1.67
2019-07-26T13:35:02	30.87	3.89	28.37	3.58
2019-07-27T13:31:36	27.35	1.51	28.00	1.57
2019-07-29T13:22:46	18.54	1.18	16.64	1.04
2019-07-30T13:19:22	32.21	3.09	30.44	2.88
2019-08-04T12:59:05	35.85	4.39	32.52	3.94
2019-08-06T12:51:19	31.85	2.57	31.72	2.66
2019-08-14T12:19:58	29.91	1.76	27.41	1.60
2019-08-16T12:11:56	23.24	1.13	25.82	1.24
2019-08-17T12:08:03	30.96	2.74	31.26	2.76
2019-08-20T11:56:12	31.76	2.09	30.97	2.04
2019-08-22T11:48:12	36.00	3.44	32.05	3.10
2019-08-23T11:44:17	26.63	2.06	28.89	2.26
2019-08-24T11:40:31	30.50	1.61	30.74	1.59
2019-08-25T11:36:39	27.88	1.50	30.05	1.33
2019-08-31T11:12:57	33.44	2.45	35.40	2.61
2019-09-01T11:08:59	41.17	2.96	39.94	2.88
2019-09-08T10:41:32	33.13	3.66	32.69	3.56

2019-09-09T10:37:34	30.30	2.43	32.37	2.78
2019-09-10T10:33:41	24.46	1.41	25.40	1.40
2019-09-13T10:17:03	24.88	2.07	24.50	2.02
2019-09-15T10:13:53	34.90	2.20	34.85	2.17
2019-09-18T11:28:37	32.81	7.20	33.74	7.40
2019-09-23T09:42:26	23.35	3.24	31.14	4.36
2019-09-25T09:34:28	26.51	4.79	30.32	5.56
2019-09-27T09:26:46	32.40	1.50	29.68	1.34
2019-09-29T09:18:53	20.05	1.66	22.08	1.82
2019-10-03T09:03:17	32.20	2.60	30.01	2.41
2019-10-04T08:59:47	35.84	3.46	33.51	3.20
2019-10-05T08:55:14	36.55	3.70	33.08	3.03
2019-10-06T08:51:25	36.88	3.10	35.58	2.93
2019-10-11T08:31:36	2.56	0.20	30.42	2.23
2019-10-12T08:28:05	43.38	4.87	50.39	6.64
2019-10-14T08:19:52	37.30	4.99	48.36	6.70
2019-10-15T08:16:11	47.77	5.40	46.00	5.06
2019-10-16T08:12:05	36.07	3.82	34.20	3.56
2019-10-17T08:08:12	38.36	3.65	41.02	3.92
2019-10-18T08:06:18	37.82	4.49	39.15	4.66
2019-10-19T08:00:15	37.10	3.19	33.81	2.89
2019-10-26T09:15:20	12.17	1.20	12.69	1.26
2019-10-27T08:31:59	34.98	2.65	31.59	2.31
2019-10-29T07:22:28	35.38	1.79	31.66	1.54
2019-10-31T07:13:10	28.94	4.24	26.77	3.91
2019-11-05T06:56:07	29.40	4.98	33.66	5.72
2019-11-06T07:12:58	36.20	3.56	34.76	3.10
2019-11-08T06:41:37	40.53	6.00	45.84	6.71
2019-11-09T06:37:51	32.21	2.65	39.37	3.51
2019-11-10T06:33:47	38.41	4.51	37.23	4.36
2019-11-11T06:29:57	39.60	2.84	34.79	2.27
2019-11-13T07:46:13	28.15	4.59	22.66	3.69
2019-11-15T06:14:14	40.67	4.98	37.33	4.43
2019-11-16T06:10:03	32.62	2.30	30.38	2.11
2019-11-17T06:06:16	35.04	4.01	37.49	4.33
2019-11-18T06:02:23	33.11	4.72	38.42	5.73
2019-11-19T05:58:18	70.30	12.15	43.71	5.63
2019-11-24T05:39:04	35.30	2.54	39.99	2.92
2019-12-08T04:43:47	31.82	4.55	33.06	4.70
2019-12-11T04:32:02	35.48	3.49	30.92	3.02
2019-12-16T04:12:20	24.66	1.10	23.95	1.07
2019-12-18T04:04:23	29.91	3.20	31.16	3.36
2019-12-19T04:00:39	53.92	10.60	39.84	7.79
2019-12-25T03:36:46	33.33	3.48	29.42	3.03
2019-12-26T03:33:00	43.61	5.66	39.15	4.99
2019-12-27T03:29:04	42.28	4.87	41.78	4.85
2020-01-01T03:09:32	29.55	3.35	37.19	4.38
2020-01-02T03:05:29	31.16	3.24	30.68	3.21

2020-01-04T02:58:50	35.81	3.57	31.58	3.11
2020-01-06T02:50:04	31.54	3.10	28.06	2.74
2020-01-15T02:14:23	38.29	4.33	33.97	3.80
2020-01-19T01:59:14	31.74	3.08	28.94	2.83
2020-01-20T01:54:26	32.11	3.66	35.97	4.28
2020-01-22T01:47:07	28.83	2.80	32.22	3.17
2020-01-23T01:42:57	22.86	2.27	25.01	2.48
2020-01-26T01:31:11	36.49	3.65	31.66	2.99
2020-01-27T01:22:15	36.92	3.33	31.02	2.60
2020-01-28T01:18:28	27.92	1.68	27.92	1.70
2020-01-29T01:14:40	29.65	2.38	31.90	2.60
2020-01-30T01:10:33	36.22	3.80	32.55	3.34
2020-02-01T01:07:35	30.33	2.59	27.85	2.24
2020-02-02T01:03:34	28.14	2.03	29.69	2.16
2020-02-03T00:59:36	29.49	2.38	32.42	2.58
2020-02-09T00:35:58	36.05	3.28	35.17	3.20
2020-02-11T00:28:16	44.39	4.53	35.24	3.39
2020-02-15T00:12:25	42.75	3.43	42.31	3.36
2020-02-16T00:09:04	37.13	3.14	34.39	2.76
2020-02-17T00:06:14	25.27	1.62	31.06	1.99
2020-02-22T23:40:55	36.91	4.27	42.91	4.82
2020-02-23T23:36:54	31.68	2.21	33.35	2.31
2020-03-01T23:09:35	47.77	3.63	38.47	2.69
2020-03-06T22:49:50	29.65	1.35	29.06	1.28
2020-03-07T22:46:03	27.28	1.34	26.60	1.27
2020-03-08T22:41:56	31.93	2.20	29.24	1.93
2020-03-14T22:18:54	31.03	2.05	31.77	2.07
2020-03-19T21:58:43	25.46	3.39	32.59	4.34
2020-03-22T21:46:56	36.56	3.40	35.95	3.15
2020-03-26T21:31:08	32.44	1.90	27.82	1.53
2020-03-28T21:23:27	38.27	2.70	32.84	2.07
2020-03-29T21:19:33	40.10	4.00	44.40	4.42
2020-04-02T21:03:36	44.81	8.19	41.18	7.48
2020-04-04T20:55:58	41.22	3.69	41.11	3.32
2020-04-05T20:51:56	27.47	1.60	27.44	1.57
2020-04-06T20:48:04	26.79	1.69	25.77	1.61
2020-04-10T20:32:54	32.19	2.58	32.39	2.56
2020-04-11T20:28:22	32.24	2.14	32.40	2.03
2020-04-12T20:24:13	33.06	2.16	30.41	1.82
2020-04-13T20:20:32	34.29	2.74	32.84	2.57
2020-04-18T20:01:02	29.00	2.07	30.81	2.24
2020-04-22T19:45:08	32.23	2.00	32.34	1.86
2020-04-23T19:41:15	30.33	1.97	28.67	1.83
2020-04-24T19:37:10	30.02	1.79	28.80	1.65
2020-04-26T19:29:25	28.86	2.94	31.63	3.21
2020-04-28T19:21:36	34.03	2.89	33.35	2.73
2020-04-29T19:17:31	28.96	1.49	30.51	1.62
2020-04-30T19:13:51	27.59	1.25	28.85	1.36

2020-05-01T19:09:39	28.86	1.31	26.78	1.15
2020-05-02T19:05:37	26.38	1.31	26.06	1.28
2020-05-03T19:01:55	27.04	1.97	26.22	1.87
2020-05-04T19:23:06	28.82	1.38	29.26	1.38
2020-05-08T18:42:16	28.04	1.21	28.21	1.23
2020-05-09T18:38:14	29.82	1.86	29.04	1.77
2020-05-11T18:30:36	28.48	1.33	26.77	1.19
2020-05-13T18:22:31	29.18	2.49	30.83	2.61
2020-05-15T18:14:46	27.03	1.26	24.89	1.03
2020-05-16T18:10:45	28.91	1.89	28.99	1.83
2020-05-17T18:06:47	28.31	1.12	27.74	1.01
2020-05-18T18:02:56	27.98	1.66	29.69	1.80
2020-05-21T17:51:34	26.23	1.16	26.88	1.16
2020-05-22T17:46:59	25.77	1.61	25.02	1.56
2020-05-24T17:39:27	29.72	1.46	26.91	1.28
2020-05-25T17:35:31	26.83	1.65	24.78	1.47
2020-05-26T17:31:27	38.83	3.84	37.53	3.46
2020-05-29T17:19:39	31.00	1.69	28.81	1.55
2020-05-30T17:15:45	25.26	1.62	27.63	1.78
2020-05-31T17:11:40	28.46	1.63	26.57	1.47
2020-06-02T17:03:41	28.05	1.67	26.85	1.57
2020-06-04T16:55:58	30.72	2.03	30.08	1.97
2020-06-05T16:52:48	29.09	1.50	27.45	1.38
2020-06-06T16:48:11	30.54	1.69	27.10	1.37
2020-06-07T16:44:19	25.99	1.38	25.66	1.35
2020-06-08T16:40:20	31.42	1.75	28.01	1.44
2020-06-09T17:05:25	23.38	1.41	23.86	1.43
2020-06-12T16:24:37	22.30	1.65	22.63	1.68
2020-06-13T16:20:40	25.03	1.83	25.10	1.83
2020-06-14T16:16:49	25.20	1.76	24.90	1.73
2020-06-26T15:29:41	32.93	2.57	29.64	2.06
2020-06-29T15:17:50	26.20	1.70	24.35	1.60
2020-07-02T15:05:56	29.74	2.20	25.64	1.86
2020-07-04T14:58:01	23.67	1.53	23.31	1.52
2020-07-05T14:54:13	25.45	1.29	24.33	1.21
2020-07-06T14:50:15	26.44	1.56	24.39	1.36
2020-07-15T14:15:23	28.22	1.95	26.28	1.84
2020-07-20T13:55:12	29.79	1.52	25.72	1.30
2020-07-29T13:20:14	27.47	1.49	25.22	1.31
2020-07-30T13:15:47	22.25	0.93	20.13	0.83
2020-07-31T13:12:00	27.76	1.42	26.47	1.36
2020-08-01T13:08:01	28.41	1.59	28.75	1.48
2020-08-02T13:04:41	27.95	1.38	26.32	1.36
2020-08-03T13:00:11	27.27	1.29	26.21	1.06
2020-08-09T12:36:31	26.00	1.49	22.90	1.28
2020-08-10T12:32:40	27.81	2.16	22.19	1.31
2020-08-12T12:32:12	28.19	3.34	25.22	2.98
2020-08-14T12:16:57	27.49	2.06	26.83	2.01

2020-08-17T12:05:07	33.21	2.03	34.76	2.41
2020-08-30T11:14:03	41.07	2.57	34.80	1.93
2020-09-03T10:58:14	32.25	1.93	29.40	1.75
2020-09-04T10:54:19	36.43	2.42	31.22	2.02
2020-09-05T10:50:28	32.06	1.75	29.19	1.57
2020-09-06T10:46:26	28.07	1.84	31.13	1.97
2020-09-11T10:27:16	37.76	2.73	34.24	2.57
2020-09-16T11:53:13	36.70	3.57	35.30	3.33
2020-09-19T09:55:21	29.85	1.80	27.58	1.64
2020-09-22T09:43:32	29.91	2.28	29.88	2.25
2020-09-24T09:35:42	33.78	1.66	33.41	1.56
2020-09-25T09:32:04	35.69	3.49	33.81	3.28
2020-09-26T09:27:43	29.02	1.76	28.16	1.69
2020-10-09T08:36:41	31.57	3.12	34.19	3.32
2020-10-15T08:13:05	34.24	1.94	37.53	2.15
2020-10-27T07:25:44	38.69	2.62	35.89	2.30
2020-11-02T07:04:36	43.80	2.85	39.63	2.50
2020-12-05T04:52:33	14.08	2.73	14.15	2.68
2020-12-20T03:54:13	29.80	2.20	26.48	1.95
2020-12-21T03:49:57	33.85	2.54	41.58	2.97
2020-12-27T03:26:22	34.56	3.23	35.14	3.14
2021-01-19T01:55:53	32.04	2.55	31.18	2.60
2021-03-01T23:16:38	31.42	2.93	31.93	2.98
2021-03-16T22:11:45	36.39	3.17	35.80	3.11
2021-03-27T21:28:35	29.79	2.00	29.17	1.93
2021-04-01T21:08:56	31.58	1.92	29.56	1.74
2021-04-06T20:49:06	28.85	7.40	35.32	9.07
2021-04-10T20:33:32	30.50	1.83	31.13	1.83
2021-04-11T20:29:27	28.85	1.72	31.20	1.77
2021-04-12T20:45:15	36.09	2.38	26.69	1.71
2021-04-18T20:02:02	28.62	1.81	26.97	1.67
2021-04-22T19:46:20	28.97	2.82	30.32	2.84
2021-04-23T19:52:30	25.86	1.93	25.71	1.87
2021-04-25T19:35:17	26.86	1.59	27.25	1.60
2021-05-02T19:06:55	31.64	1.43	28.43	1.23
2021-05-10T18:35:42	29.91	3.30	28.44	3.09
2021-05-11T18:31:35	26.10	2.62	25.51	2.54
2021-05-14T18:19:51	26.68	2.99	26.12	2.93
2021-05-18T18:04:00	36.23	4.10	30.55	3.39
2021-05-21T17:52:18	21.41	2.90	19.90	2.67
2021-05-28T17:24:45	16.12	2.44	14.33	2.15
2021-06-10T16:33:34	12.96	1.48	12.82	1.43
2021-06-15T16:14:46	12.17	3.09	12.41	3.16
2021-06-25T15:34:35	13.96	4.02	11.67	3.36
2021-06-27T15:26:44	11.45	1.96	10.53	1.81
2021-07-01T15:10:58	12.63	2.83	10.96	2.46
2021-07-02T15:07:04	10.65	1.39	10.07	1.32
2021-07-04T14:59:23	10.90	1.48	9.86	1.34

2021-07-06T14:51:20	13.30	1.84	11.75	1.60
2021-07-12T14:27:50	14.08	2.28	11.91	1.92
2021-07-14T14:19:57	16.81	1.72	14.66	1.49
2021-07-17T14:08:59	13.64	3.21	11.71	2.75
2021-07-18T14:04:10	16.51	3.50	14.50	3.05
2021-07-19T14:00:16	11.95	1.26	11.98	1.27
2021-07-20T13:56:52	13.52	2.28	13.62	2.29
2021-07-21T13:52:16	15.03	5.96	17.73	7.02
2021-07-24T13:40:37	13.75	1.48	14.32	1.54
2021-07-25T13:36:48	14.43	2.76	13.43	2.58
2021-07-26T13:32:47	16.36	2.22	15.05	2.03
2021-07-30T13:17:00	8.70	2.19	8.58	2.16
2021-08-03T13:01:15	17.15	4.44	10.82	2.77
2021-08-05T12:53:43	9.15	3.70	8.60	3.74
2021-08-11T12:29:49	17.96	2.41	17.01	2.22
2021-08-12T12:25:48	15.96	5.06	14.87	4.68
2021-08-16T12:10:06	17.76	2.53	17.03	2.42
2021-08-17T12:06:39	14.78	3.13	16.31	3.45
2021-08-18T12:02:14	14.43	2.82	13.46	2.57
2021-08-21T11:50:23	14.24	2.60	13.64	2.46
2021-08-22T13:28:39	12.21	3.91	10.62	3.41
2021-08-24T11:38:47	13.33	4.67	16.17	5.98
2021-08-28T11:23:05	16.59	2.44	14.13	2.06
2021-09-17T10:27:24	10.93	3.06	13.80	3.85
2021-09-18T10:00:16	17.45	3.18	13.41	2.41
2021-10-16T08:10:29	29.47	2.39	27.26	2.18
2021-10-17T08:16:38	39.38	3.90	36.72	3.58
2021-10-20T07:54:46	35.35	3.37	27.07	2.45
2021-10-20T08:05:24	61.32	5.26	33.14	2.79
2021-10-21T07:50:47	37.85	5.00	38.60	5.11
2021-10-21T08:00:33	10.84	1.56	34.38	4.24
2021-10-23T07:42:48	46.16	4.69	34.63	3.55
2021-10-26T07:30:53	21.92	2.90	20.54	2.75
2021-11-14T06:16:13	32.39	3.17	39.97	4.02
2021-11-22T05:44:35	35.87	3.95	35.12	3.77
2021-11-24T05:36:49	48.61	4.48	40.17	3.42
2021-11-27T05:36:01	32.67	3.86	21.56	2.58
2021-12-26T03:30:59	40.82	5.29	36.60	4.61
2021-12-28T03:23:06	25.17	2.77	29.77	3.36
2021-12-29T03:19:06	28.04	1.62	24.50	1.37
2021-12-29T03:23:50	28.24	2.07	26.94	1.93
2022-01-01T03:07:30	36.52	3.50	35.81	3.33
2022-01-02T04:46:52	41.79	4.97	34.24	4.00
2022-01-05T02:51:42	21.83	2.03	20.65	1.90
2022-01-05T03:01:08	27.10	2.95	26.47	2.90
2022-01-07T02:43:59	49.31	7.59	40.71	6.01
2022-01-07T02:48:40	36.05	3.99	35.15	3.87
2022-01-09T02:35:59	32.35	3.19	32.24	3.17

2022-01-16T02:08:25	21.21	4.59	19.39	4.22
2022-01-17T02:04:29	14.63	2.20	16.34	2.46
2022-01-22T01:44:52	22.60	1.47	23.82	1.54
2022-01-22T01:54:14	29.48	2.41	26.13	2.15
2022-01-23T01:50:25	27.06	2.87	24.00	2.55
2022-01-24T01:36:57	23.64	1.54	20.97	1.37
2022-01-29T01:17:13	39.42	5.27	33.21	4.47
2022-01-30T01:13:15	51.52	17.46	46.26	15.56
2022-02-01T01:05:26	29.20	2.82	29.86	2.94
2022-02-01T01:14:50	29.37	2.53	26.95	2.32
2022-02-07T00:41:56	31.81	2.78	28.67	2.45
2022-02-11T00:26:14	34.46	3.56	34.47	3.70
2022-02-20T23:47:22	28.57	2.26	32.65	2.61
2022-02-22T23:39:01	31.82	2.55	26.37	2.07
2022-02-23T23:34:58	38.28	3.08	36.21	2.86

Appendix B : Code

B.1 : Noise Diode Calibration

```
def noise_diode_calibration(hdu):
    noise_counts1 = hdu[2].data['Count1']
    noise_counts2 = hdu[2].data['Count2']
    noise_mjd = hdu[2].data['MJD']
    tcal1 = hdu[2].header['TCAL1']
    tcal2 = hdu[2].header['TCAL2']
    tcalsig1 = hdu[2].header['TCALSIG1']
    tcalsig2 = hdu[2].header['TCALSIG2']

    on1 = np.where(noise_counts1 > np.mean(noise_counts1))[0]
    off1 = np.where(noise_counts1 < np.mean(noise_counts1))[0]
    on_sig1 = np.std(noise_counts1[on1])
    off_sig1 = np.std(noise_counts1[off1])

    #Difference between the "on" and "off" in counts.
    diff1 = np.mean(noise_counts1[on1])-np.mean(noise_counts1[off1])
    diffsig1 = np.sqrt(on_sig1**2 + off_sig1**2)
    conv1 = diff1/tcal1
    convsig1 = conv1 * np.sqrt((diffsig1/diff1)**2 + (tcalsig1/tcal1)**2)

    on2 = np.where(noise_counts2 > np.mean(noise_counts2))[0]
    off2 = np.where(noise_counts2 < np.mean(noise_counts2))[0]
    on_sig2 = np.std(noise_counts1[on2])
    off_sig2 = np.std(noise_counts1[off2])

    #Difference between the "on" and "off" in counts.
    diff2 = np.mean(noise_counts1[on2])-np.mean(noise_counts1[off2])
    diffsig2 = np.sqrt(on_sig2**2 + off_sig2**2)
    conv2 = diff2/tcal2
    convsig2 = conv2 * np.sqrt((diffsig2/diff2)**2 + (tcalsig2/tcal2)**2)

    return conv1,convsig1,conv2,convsig2
```

B.2 : Baseline Correction

```
def baseline_correction(mjd,counts,limits):
    inds_on = np.where(np.logical_and(mjd > limits[0],mjd<limits[1]))[0]
    inds_off = np.where(np.logical_or(mjd < limits[0],mjd>limits[1]))[0]
    p = np.polyfit(mjd[inds_off],counts[inds_off],3)
    p1 = np.poly1d(p)
    return counts-p1(mjd) #Counts after polynomial subtraction.
```

B.3 : Gaussian Fit

```
def gaussian(x,A,centre,sigma):
    return A*np.exp(-(x-centre)**2/(2*sigma**2))
```

B.4 : Pointing Correction

```
#Inputs - Amplitudes of gaussian

def pointing_correction(north,centre,south): fits.
    x=  [0,1,2]
    ydata = [north,centre,south]
    p0 = [max(ydata),x[np.argmax(ydata)],1]
    popt_pointing,pcov_pointing = optim.curve_fit(gaussian,xdata=x,
    ydata=[north,centre,south],p0=p0, maxfev=500000000)
    return popt_pointing[0]/centre
```

B.5 : Plotting the Data

```
def plot_all(hdu,conv1,conv2,j,north_limits,centre_limits,south_limits):
    plt.figure(figsize=(16,4))
    name_arr = ['Noise diode','North scan','Centre scan','South Scan']
    for i in [1,2,3,4]:
        plt.subplot(1,4,i)
        #Convert MJD to seconds.
        mjd = (hdu[i+1].data['MJD']- min(hdu[i+1].data['MJD']))*24*3600
        if i in [2,3,4]: #Drift scans.
            count_1 = hdu[i+1].data['Count1']/conv1
            count_2 = hdu[i+1].data['Count2']/conv2
        else: #Noise diode
            count_1 = hdu[i+1].data['Count1']/conv1-np.mean(hdu[i+1]\
            .data['Count1']/conv1)
            count_2 = hdu[i+1].data['Count2']/conv2-np.mean(hdu[i+1]\
            .data['Count2']/conv2)
        if i == 2:
            count1_corrected = baseline_correction(mjd,count_1,\
            north_limits[j])
            count2_corrected = baseline_correction(mjd,count_2,\
            north_limits[j])
            #[A guess, centre guess, sigma guess]
            p0 = [max(count1_corrected),mjd[np.argmax(count1_corrected)],\
            (max(mjd)-min(mjd))/4.]
            popt_north1,pcov_north1 = optim.curve_fit(gaussian,xdata = mjd,\
            ydata=count1_corrected,p0 = p0, maxfev=500000000)
```

```
        #[A guess, centre guess, sigma guess]
        p0 = [max(count2_corrected),mjd[np.argmax(count2_corrected)],\
        (max(mjd)-min(mjd))/4.]
        popt_north2,pcov_north2 = optim.curve_fit(gaussian,xdata = mjd,\
        ydata=count2_corrected,p0 = p0, maxfev=500000000)

        x = np.arange(min(mjd),max(mjd),0.01)

        plt.plot(x,gaussian(x,*popt_north1),color='red',\
        label='count1_fit')
        plt.plot(x,gaussian(x,*popt_north2),color='blue',\
        label='count2_fit')

        plt.scatter(mjd,count1_corrected,color = 'red',\
        label = 'count1',s= 1) #s in scatter is the dot size.
        plt.scatter(mjd,count2_corrected,color = 'blue',\
        label = 'count2',s=1)
    elif i == 3:
        count1_corrected = baseline_correction(mjd,count_1,\
        centre_limits[j])
        count2_corrected = baseline_correction(mjd,count_2,\
        centre_limits[j])


        #[A guess, centre guess, sigma guess]
        p0 = [max(count1_corrected),mjd[np.argmax(count1_corrected)],\
        (max(mjd)-min(mjd))/4.]
        popt_centre1,pcov_centre1 = optim.curve_fit(gaussian,xdata = mjd,\
        ydata=count1_corrected,p0 = p0, maxfev=500000000)

        p0 = [max(count2_corrected),mjd[np.argmax(count2_corrected)],\
        (max(mjd)-min(mjd))/4.] #[A guess, centre guess, sigma guess]
        popt_centre2,pcov_centre2 = optim.curve_fit(gaussian,xdata = mjd,\
        ydata=count2_corrected,p0 = p0, maxfev=500000000)

        x = np.arange(min(mjd),max(mjd),0.01)

        plt.plot(x,gaussian(x,*popt_centre1),color='red',\
        label='count1_fit')
        plt.plot(x,gaussian(x,*popt_centre2),color='blue',\
        label='count2_fit')


        plt.scatter(mjd,count1_corrected,color = 'red',\
        label = 'count1',s=1)
        plt.scatter(mjd,count2_corrected,color = 'blue',\
```

```
            label = 'count2',s=1)
        elif i == 4:
            count1_corrected = baseline_correction(mjd,count_1,\
            south_limits[j])
            count2_corrected = baseline_correction(mjd,count_2,\
            south_limits[j])


            #[A guess, centre guess, sigma guess]
            p0 = [max(count1_corrected),mjd[np.argmax(count1_corrected)],\
            (max(mjd)-min(mjd))/4.]
            popt_south1,pcov_south1 = optim.curve_fit(gaussian,xdata = mjd,\
            ydata=count1_corrected,p0 = p0, maxfev=500000000)

            p0 = [max(count2_corrected),mjd[np.argmax(count2_corrected)],\
            (max(mjd)-min(mjd))/4.] #[A guess, centre guess, sigma guess]
            popt_south2,pcov_south2 = optim.curve_fit(gaussian,xdata = mjd,\
            ydata=count2_corrected,p0 = p0, maxfev=500000000)

            x = np.arange(min(mjd),max(mjd),0.01)

            plt.plot(x,gaussian(x,*popt_south1),color='red',\
            label='count1_fit')
            plt.plot(x,gaussian(x,*popt_south2),color='blue',\
            label='count2_fit')


            plt.scatter(mjd,count1_corrected,color = 'red',\
            label = 'count1',s=1)
            plt.scatter(mjd,count2_corrected,color = 'blue',\
            label = 'count2',s=1)
        else:
            plt.plot(mjd,count_1,color = 'red',label = 'count1')
            plt.plot(mjd,count_2,color = 'blue',label = 'count2')
        plt.title(name_arr[i-1])
        if i == 2:
            plt.vlines(x = north_limits[j][0],ymin = min(count1_corrected),
            ymax = max(count1_corrected),color='black')
            plt.vlines(x = north_limits[j][1],ymin = min(count1_corrected),\
            ymax = max(count1_corrected),color='black')
        plt.legend()
    try:

        pointing1 = pointing_correction(popt_north1[0],popt_centre1[0],\
        popt_south1[0])
        pointing2 = pointing_correction(popt_north2[0],popt_centre2[0],\
        popt_south2[0])
```

```
        print('The Date of creation of this file was {}'\
        .format(hdu[0].header['DATE']))
        print('The pointing correction for this scan: Pol1 %.3f -- \
        Pol2 %.3f'%(pointing1,pointing2))
        print('The peak antenna temperature is: Pol1 %.3f K-- Pol2 %.3f K'
          %(popt_centre1[0]*pointing1,popt_centre2[0]*pointing2))
        plt.suptitle('Plot index - %d'%(j))
        plt.show()
        plt.close()
        return [popt_centre1[0]*pointing1,np.sqrt(np.diag(pcov_centre1))[0]/\
        popt_centre1[0],popt_centre2[0]*pointing2,\
        np.sqrt(np.diag(pcov_centre2))[0]/popt_centre2[0]]
    except:

        print('Pointing correction could not be calculated. \
        Please check the data.')
        plt.suptitle('Plot index - %d'%(j))
        plt.show()
        plt.close()
    return [[],[],[],[]]
```

B.6 : Constants for VIRGO A_22235 from Ott paper

```
def ott(nu,a,b,c):
    return 10**(a+b*np.log10(nu)+c*np.log10(nu)**2)
```

Appendix C : Statistical information of the PSS values

Table 3: Statistics

	PSS1	Unc1	PSS2	Unc2
max	80.75	17.46	105.29	15.55
min	2.56	0.19	8.58	0.82
mean	26.86	3.28	27.43	3.70
std	8.63	1.86	8.10	2.56

Appendix D Uncertainties Propagation

For the uncertainties propagation we are supposed to compute the errors for the counts, which are the bigger source of the uncertainties, and compute the errors for the pointing correction. First we need to compute the error of the conversion factor, for that we need to obtain the *TCALSIG* for the both polarization, then we compute the standard deviation for the on and off counts, what will allow us to have the difference between them compute the error of the conversion factor (convsig) for each polarization. See the equation below:

$$convsig_i = \frac{diff_i}{tcal_i}\sqrt{\left(\frac{diffsig_i}{diff_i}\right)^2 + \left(\frac{tcalsig_i}{tcal_i}\right)^2} \tag{1}$$

Now we need to compute the error propagation for the pointing. For that we need the fraction of the peak and the fraction of the noise diode, having that we can compute the fraction of the error for the PSS values for LCP and RCP using the equation 2:

$$frac_i = \sqrt{noise\_diode\_frac_i^2 + frac\_peak_i^2} \tag{2}$$

Where:

$$noise\_diode\_frac_i = \frac{convsig_i}{conv_i} \tag{3}$$