

ITC09 Fundamental Data Analysis in Lunar and Planetary Explorations

演習課題7-1

・ WebGeoCalcを用いて、過去の課題で行なった SPICE toolkit の計算・変換などを行い、同じ結果が得られることを確認せよ

- 課題1: 時刻変換

- ・ 二つの画像(ST_2423247750_v.fits, ST_2482160259_v.fits) の撮像時刻をUTCで求める
- ・ ファイル名中の整数値はTI表記での画像の取得時刻

Input Values

Calculation type	Time Conversion
Time system	Spacecraft clock (SCLK=-130)
Time format	Spacecraft clock string
Input time	2423247750
Output time system	UTC

Tabular Results

Click a value to save it for a subsequent calculation.

	SCLK string (ID=-130)	UTC calendar date
1	1/2423247750:000	2005-10-01 09:54:13.549639 UTC

Input Values

Calculation type	Time Conversion
Time system	Spacecraft clock (SCLK=-130)
Time format	Spacecraft clock string
Input time	2482160259
Output time system	UTC

Tabular Results

Click a value to save it for a subsequent calculation.

	SCLK string (ID=-130)	UTC calendar date
1	1/2482160259:000	2005-10-22 17:17:05.592771 UTC

ST_2423247750_v.fits (TI表記で2423247750)

-> 2005年10月1日9時54分13秒549639

ST_2482160259_v.fits (TI表記で2482160259)

-> 2005年10月22日17時17分5秒592771

結果は過去の演習課題のものと概ね一致した

- はやぶさ探査機の小惑星Itokawaへの最初のタッチダウン時刻（UTCでは2005/11/19 22:00）をTI表記で求める

TI表記で 2560119627:170

結果は過去の演習課題のものと概ね一致した

Input Values

Calculation type	Time Conversion
Time system	UTC
Time format	Calendar date and time
Input time	2005-11-19T22:00
Output time system	Spacecraft clock (SCLK=-130)

Tabular Results

Click a value to save it for a subsequent calculation.

	UTC calendar date	SCLK string (ID=-130)
1	2005-11-19 22:00:00.000000 UTC	1/2560119627:170

- 課題3: 小惑星近傍での探査機位置履歴
 - エラー処理方法を変えた場合の動作を確認すること
 - 注: 地球スイングバイと小惑星までの巡航期間中の軌道情報は webGeoCalc 上にはない (PDSアーカイブに含まれていない) ため、課題2, 4, 5に対する計算は行えない

<Error Handling: Stop on error>

CSPICE_N0066: CSPICE.spkeizr: SPICE(SPKINSUFFDATA): [spkeizr_c --> SPKEZR --> SPKGEO] Insufficient ephemeris data has been loaded to compute the state of -130 (HAYABUSA) relative to 2025143 (ITOKAWA) at the ephemeris epoch 2005 NOV 04 07:42:48.849.

CSPICE_N0066: CSPICE.spkeizr: SPICE(SPKINSUFFDATA): [spkeizr_c --> SPKEZR --> SPKEZ --> SPKGEO] Insufficient ephemeris data has been loaded to compute ...

<Error Handling: Report errors and continue>

Results

Download Results

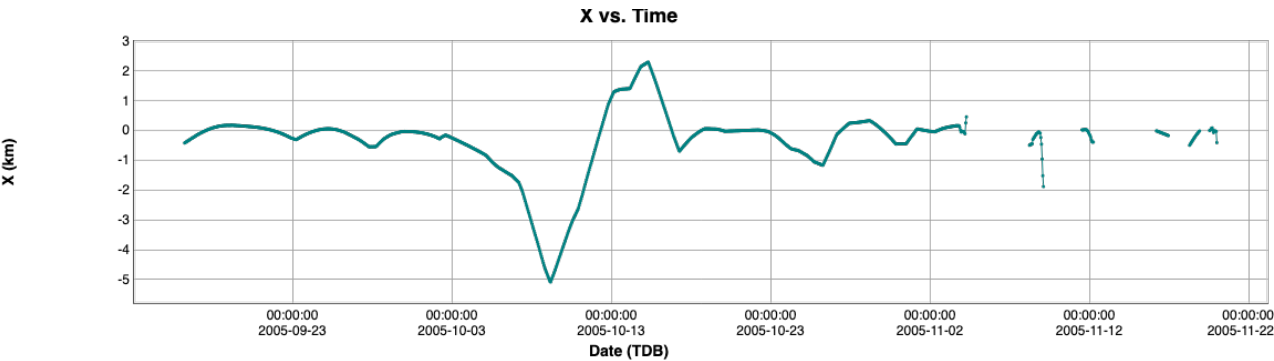
Input Values

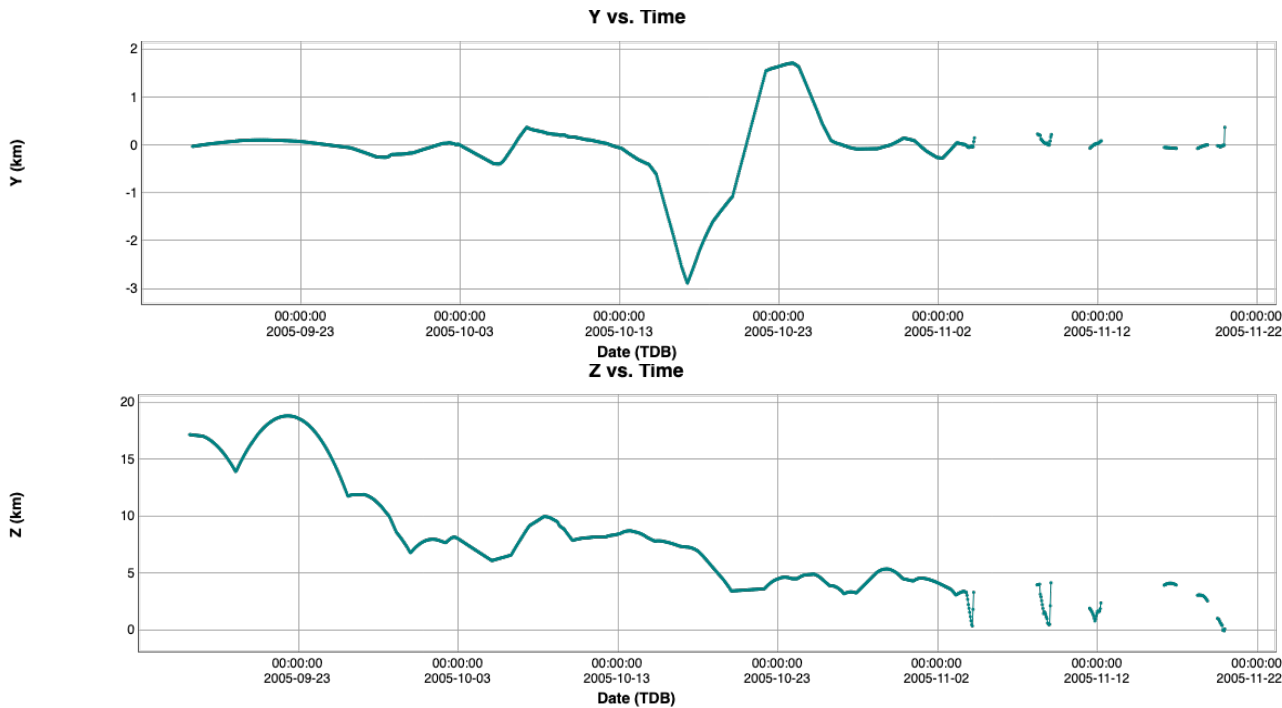
Calculation type	State Vector
Target	HAYABUSA
Observer	ITOKAWA
Reference frame	HAYABUSA_HP
Light propagation	No correction
Time system	TDB
Time format	Calendar date and time
Time range	2005 SEP 16 05:42:48.850 to 2005 NOV 19 23:55:07.665
Step	3600 seconds
State representation	Rectangular

Tabular Results

Click a value to save it for a subsequent calculation.

	TDB calendar date	Distance (km)	Speed (km/s)	X (km)	Y (km)	Z (km)	dX/dt (km/s)	dY/dt (km/s)
1	2005-09-16 05:42:48.850000 TDB	17.21015693	4.43654925E-06	-0.40147044	-0.01674617	17.20546548	3.95685948E-06	5.55186146E-07
2	2005-09-16 06:42:48.850000 TDB	17.20308751	4.52081402E-06	-0.38721080	-0.01474368	17.19872293	3.93402699E-06	5.52418478E-07
3	2005-09-16 07:42:48.850000 TDB	17.19601907	4.61481691E-06	-0.37295847	-0.01273945	17.19196939	3.91089149E-06	5.49676790E-07
4	2005-09-16 08:42:48.850000 TDB	17.18895159	4.71797591E-06	-0.35871347	-0.01073348	17.18520487	3.88745290E-06	5.46961056E-07
5	2005-09-16 09:42:48.850000 TDB	17.18188509	4.82970439E-06	-0.34447580	-0.00872577	17.17842937	3.86371119E-06	5.44271252E-07
6	2005-09-16 10:42:48.850000 TDB	17.17481956	4.94942207E-06	-0.33024549	-0.00671633	17.17164290	3.83966629E-06	5.41607353E-07
7	2005-09-16 11:42:48.850000 TDB	17.16775501	5.07656380E-06	-0.31602254	-0.00470515	17.16484546	3.81531817E-06	5.38969334E-07
8	2005-09-16 12:42:48.850000 TDB	17.16069144	5.21058618E-06	-0.30180695	-0.00269225	17.15803706	3.79066675E-06	5.36357172E-07
9	2005-09-16 13:42:48.850000 TDB	17.15362884	5.35097226E-06	-0.28759874	-0.00067761	17.15121771	3.76571200E-06	5.33770840E-07
10	2005-09-16 14:42:48.850000 TDB	17.14656722	5.49723456E-06	-0.27339793	0.00133877	17.14438740	3.74045385E-06	5.31210315E-07
11	2005-09-16 15:42:48.850000 TDB	17.13950658	5.64891667E-06	-0.25920451	0.00335686	17.13754614	3.71489226E-06	5.28675572E-07
12	2005-09-16 16:42:48.850000 TDB	17.13244693	5.80559384E-06	-0.24501851	0.00537669	17.13069393	3.68902718E-06	5.26166586E-07





<Error Handling: Silently omit errors>

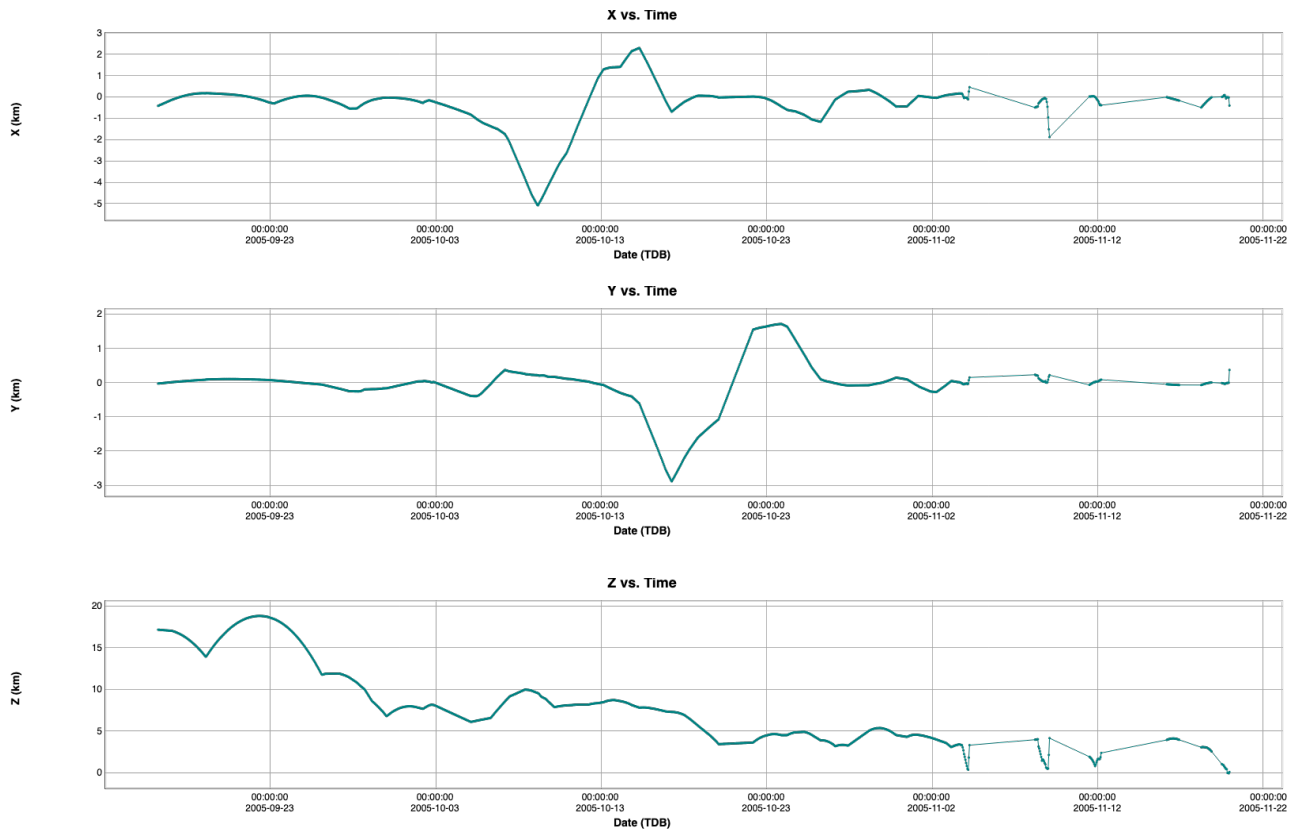
Input Values

Calculation type	State Vector
Target	HAYABUSA
Observer	ITOKAWA
Reference frame	HAYABUSA_HP
Light propagation	No correction
Time system	TDB
Time format	Calendar date and time
Time range	2005 SEP 16 05:42:48.850 to 2005 NOV 19 23:55:07.665
Step	3600 seconds
State representation	Rectangular

Tabular Results

Click a value to save it for a subsequent calculation.

	TDB calendar date	Distance (km)	Speed (km/s)	X (km)	Y (km)	Z (km)	dX/dt (km/s)	dY/dt (km/s)	dZ/dt (km/s)	Time at Target	Light Time (s)
1	2005-09-16 06:42:48.850000 TDB	17.20308751	4.52081402E-06	-0.38721080	-0.01474368	17.19872293	3.93402699E-06	5.52418478E-07	-2.15778240E-06	2005-09-16 06:42:48.850000 TDB	5.73833232E-05
2	2005-09-16 06:42:48.850000 TDB	17.20308751	4.52081402E-06	-0.38721080	-0.01474368	17.19872293	3.93402699E-06	5.52418478E-07	-2.15778240E-06	2005-09-16 06:42:48.850000 TDB	5.73833232E-05
3	2005-09-16 07:42:48.850000 TDB	17.19601907	4.61481691E-06	-0.37295847	-0.01273945	17.19196939	3.91089149E-06	5.49676790E-07	-2.38732452E-06	2005-09-16 07:42:48.850000 TDB	5.73597454E-05
4	2005-09-16 08:42:48.850000 TDB	17.18895159	4.71797591E-06	-0.35871347	-0.01073348	17.18520487	3.88745290E-06	5.46961056E-07	-2.61683784E-06	2005-09-16 08:42:48.850000 TDB	5.73361709E-05
5	2005-09-16 09:42:48.850000 TDB	17.18188509	4.82970439E-06	-0.34447580	-0.00872577	17.17842937	3.86371119E-06	5.44271252E-07	-2.84632204E-06	2005-09-16 09:42:48.850000 TDB	5.73125995E-05
6	2005-09-16 10:42:48.850000 TDB	17.17481956	4.94942207E-06	-0.33024549	-0.00671633	17.17164290	3.83966629E-06	5.41607353E-07	-3.07577682E-06	2005-09-16 10:42:48.850000 TDB	5.72890315E-05
7	2005-09-16 11:42:48.850000 TDB	17.16775501	5.07656380E-06	-0.31602254	-0.00470515	17.16484546	3.81531817E-06	5.38969334E-07	-3.30520186E-06	2005-09-16 11:42:48.850000 TDB	5.72654667E-05
8	2005-09-16 12:42:48.850000 TDB	17.16069144	5.21058618E-06	-0.30180695	-0.00269225	17.15803706	3.79066675E-06	5.36357172E-07	-3.53459685E-06	2005-09-16 12:42:48.850000 TDB	5.72419051E-05
9	2005-09-16 13:42:48.850000 TDB	17.15362884	5.35097226E-06	-0.28759874	-0.00067761	17.15121771	3.76571200E-06	5.33770840E-07	-3.76396148E-06	2005-09-16 13:42:48.850000 TDB	5.72183468E-05
10	2005-09-16 14:42:48.850000 TDB	17.14656722	5.49723456E-06	-0.27339793	0.00133877	17.14438740	3.74045385E-06	5.31210315E-07	-3.99329543E-06	2005-09-16 14:42:48.850000 TDB	5.71947918E-05
11	2005-09-16 15:42:48.850000 TDB	17.13950658	5.64891667E-06	-0.25920451	0.00335686	17.13754614	3.71489226E-06	5.28675572E-07	-4.22259839E-06	2005-09-16 15:42:48.850000 TDB	5.71712401E-05
12	2005-09-16 16:42:48.850000 TDB	17.13244693	5.80559384E-06	-0.24501851	0.00537669	17.13069393	3.68902718E-06	5.26166586E-07	-4.45187005E-06	2005-09-16 16:42:48.850000 TDB	5.71476916E-05
13	2005-09-16 17:42:48.850000 TDB	17.12538825	5.96687261E-06	-0.23083992	0.00739825	17.12383079	3.66285855E-06	5.23683333E-07	-4.68111010E-06	2005-09-16 17:42:48.850000 TDB	5.71241464E-05



演習課題7-2

- ・ WebGeoCalc の Geometric Event Finder を用いて、はやぶさのランデブー期間中の以下のイベント時刻・期間を求めよ
 - AMICAの視野内に小惑星イトカワが入っている期間
 - ・ Target in Field of View Finder を用いる
 - 位相角が1度以下になっている期間
 - ・ Phase Angle Finder を用いる
- ・ ランデブー期間は課題3で用いたものを使ってよい

<AMICAの視野内に小惑星イトカワが入っている期間>

Input Values

Calculation type	Target in Field of View Event Finder
Instrument	HAYABUSA_AMICA
Target	ITOKAWA
Target shape	Point
Observer	HAYABUSA
Light propagation	No correction
Time system	TDB
Time format	Calendar date and time
Time range	2005 SEP 16 05:42:48.850 to 2005 NOV 04 06:42:48.850
Step	3600 seconds
Output time unit	hours
Complement result window	no
Result interval adjustment	No adjustment
Result interval filtering	No filtering

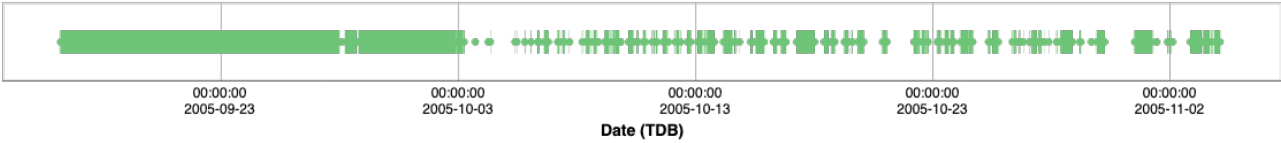
Tabular Results

Click a value to save it for a subsequent calculation.

Save All Intervals

	Start Time	Stop Time	Duration (hrs)
1	2005-09-16 05:42:48.850000 TDB	2005-09-28 00:19:42.372596 TDB	282.61486739
2	2005-09-28 01:42:44.576922 TDB	2005-09-28 01:44:55.655220 TDB	0.03641064
3	2005-09-28 05:35:50.992880 TDB	2005-09-28 17:21:36.156852 TDB	11.76254555
4	2005-09-28 19:11:34.091763 TDB	2005-10-02 21:39:39.857603 TDB	98.46826829
5	2005-10-02 22:01:09.298041 TDB	2005-10-03 04:34:27.121015 TDB	6.55495083
6	2005-10-03 04:51:49.503961 TDB	2005-10-03 06:30:36.664403 TDB	1.64643346
7	2005-10-03 17:32:17.885093 TDB	2005-10-03 17:44:37.980604 TDB	0.20558209
8	2005-10-04 06:40:52.959887 TDB	2005-10-04 06:44:31.590496 TDB	0.06073072
9	2005-10-04 08:38:50.837625 TDB	2005-10-04 08:49:19.662887 TDB	0.17467368
10	2005-10-05 09:24:41.949744 TDB	2005-10-05 09:44:26.808120 TDB	0.32912733
11	2005-10-05 11:30:52.212248 TDB	2005-10-05 11:57:42.463741 TDB	0.44729208
12	2005-10-05 19:32:25.605284 TDB	2005-10-05 19:54:06.750115 TDB	0.36142912

Target in Field of View Finder Time Interval Plot



<位相角が1度以下になっている期間>

2005-10-13 02:38:38.025300 TDB - 2005-10-13 12:43:48.947313 TDB

Input Values

Calculation type	Phase Angle Event Finder
Target	ITOKAWA
Observer	HAYABUSA
Illuminator	SUN
Light propagation	No correction
Time system	TDB
Time format	Calendar date and time
Time range	2005 SEP 16 05:42:48.850 to 2005 NOV 04 06:42:48.850
Step	3600 seconds
Event condition	is less than 1
Output time unit	seconds
Complement result window	no
Result interval adjustment	No adjustment
Result interval filtering	No filtering

Tabular Results

Click a value to save it for a subsequent calculation.

Save All Intervals

	Start Time	Stop Time	Duration (secs)
1	2005-10-13 02:38:38.025300 TDB	2005-10-13 12:43:48.947313 TDB	36310.92201245

Phase Angle Finder Time Interval Plot

