



IMC 2018

SLOVAKIA
Pezinok - Modra



ENCONTREITOR

a new approach to meteor shower research software

Leonardo Scanferla Amaral

Lauriston Trindade

Carlos Augusto Di Pietro Bella

Carlos Fernando Jung

bramonmeteor.org



IMC 2018
SLOVAKIA
Pezinok - Modra



How do brazilian guys who don't like football have fun?

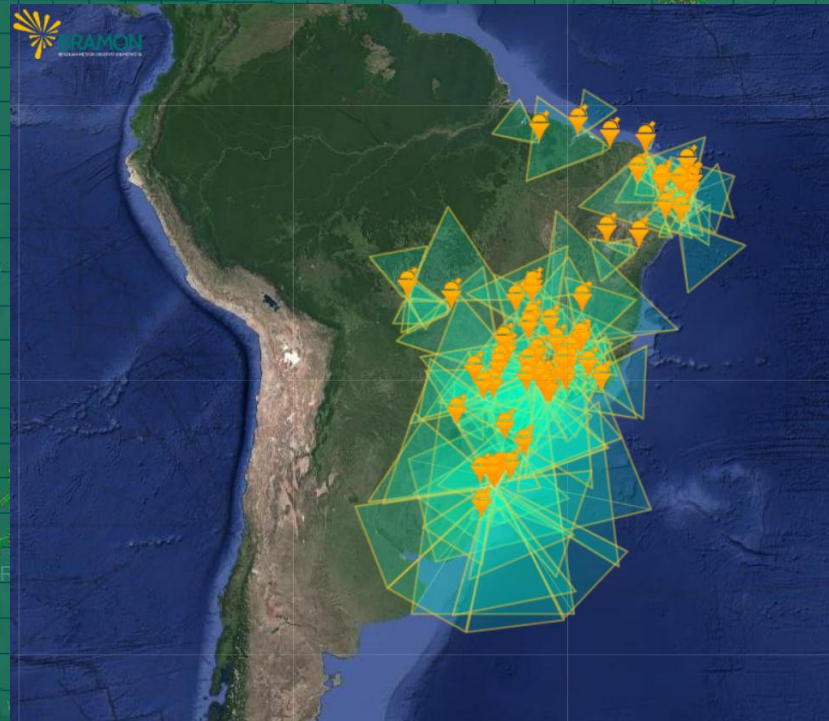


bramonmeteor.org

BRAMON

Brazilian Meteor Observation Network

- Started operating in January 2014
- A collaborative network of amateur astronomers performing a volunteer work: citizen science
- Today BRAMON have 130 cameras and 94 operators covering 20 Brazilian states
- Around of 150.000 orbits collected since 2014
- In 2017, we started searching for new radiants in our database
- So Leonardo Amaral has started development a software to aid this work
- The resulting software was Encontreitor, and it does much more than that...



1. Input data and filters
2. Clustering parameters
3. Tora Pleura parameters
4. DxC Graph parameters
5. Input, output and filters to validations and Paizão
6. IAU list check and Malandrão function
7. Breakpoint and Validator functions
8. Lapideitor (refinement of shower data)

Ben10 Radiant Encontreitor - OCA - BRAMON V2.6

About 1

Input Orbitas: C:\BRAMON\Encontreitor\Dados Filtro Tipo: _spo Read File Open
 RA Máximo: 230 DEC Máximo: 30 Inc. Máxima: 15 Open Nasa Clear
 RA Mínimo: 150 DEC Mínimo: 10 Inc. Mínima: 0 Atalho Clear Lines

D Máximo: 0,05 Gráfico C Clustering D Inicial: 0,04 G DxC 6
 minPoints: 6 2 Print M D Final: 0,1 C SOL RA: DEC: VG E Q W O I UB2/M IAU Num. Load
 Tam. Cluster: 6 %: 1,1 Boundary Passo: 0,01 4 C 18,2 191,9 17,84 17,14 0,67 0,79 341,24 18,18 9,13 Malandrão 1 Validar IAU Drummon

D Máximo: 3 0,04 Tora Pleural Input IAU: C:\BRAMON\Encontreitor\EncontreitorV3.0\Release\s Read D Máximo: 0,15 Comparar Diferença RA/DEC: 15
 Tam. Min. Chuva: 6 Um a Um Salvar em: C:\BRAMON\Encontreitor\EncontreitorV2_5\save.txt Read Imprimir Identificadas 5 Diferença VG: 20
 Tam. Max. Cluster: 35 Tudo Input Nasa: C:\BRAMON\Encontreitor\Dados\Nasa\results.csv Read D Máximo: 0,05 Paizão Diferença SOL: 40

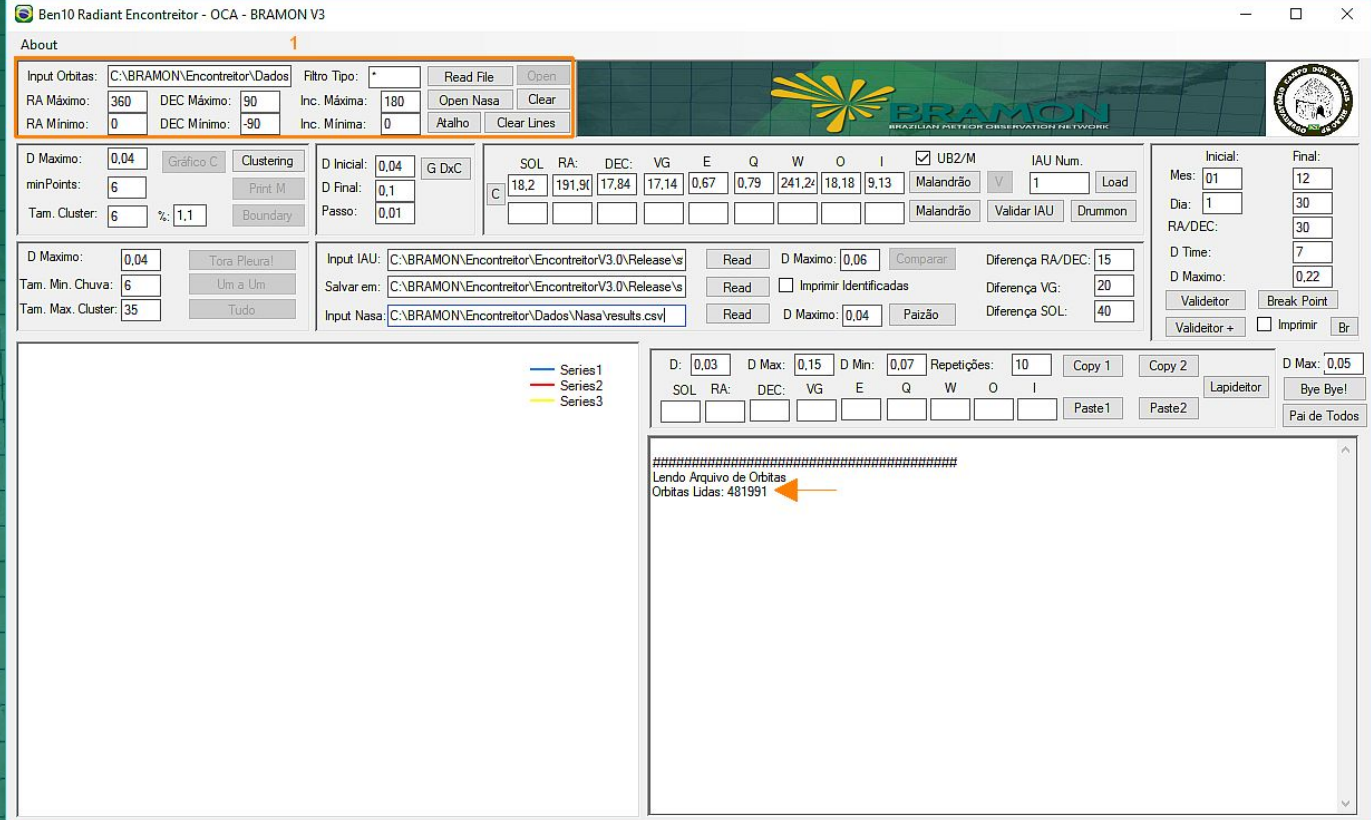
Initial: Final:
 Mes: 1 12
 Dia: 1 31
 RA/DEC: 20
 D Time: 7
 D Máximo: 0,22
 Validador Break Point
 Validador + Imprimir

Series1 Series2 Series3

D: 0,15 D Max: 0,15 D Min: 0,07 Repetições: 10 Copy 1 Copy 2 D Max: 0,05
 SOL RA: DEC: VG E Q W O I Lapideitor Bye Bye!
 262,0 50 50 95,9 0,92 0,72 66,62 262,0 95,9 Paste1 Paste2 8 Pai de Todos

Step 1: Meteor Clustering

- Enter the meteor database (u.csv) to search for clustering
- Define filter for meteor class (generally _spo)
- Define filter for sky area (right ascension and declination limits)
- Define filter for orbit inclination
- And “Read File” to start fun!



Ben10 Radiant Encontreiro - OCA - BRAMON V3

About 1

Input Orbitas: C:\BRAMON\Encontreiro\Dados Filtro Tipo: * Read File Open

RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180 Open Nasa Clear

RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0 Atalho Clear Lines

D Máximo: 0,04 Gráfico C Clustering

minPoints: 6 Print M

Tam. Cluster: 6 %: 1,1 Boundary

D Inicial: 0,04 G Dxc

D Final: 0,1

Passo: 0,01

SOL	RA	DEC	VG	E	Q	W	O	I	IAU Num.
18,2	191,9	17,84	17,14	0,67	0,79	241,2	18,18	9,13	1

UB2/M Malandrão Validar IAU Drummon

D Máximo: 0,04 Tora Pleural

Tam. Min. Chuva: 6 Um a Um

Tam. Max. Cluster: 35 Tudo

Input IAU: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read D Máximo: 0,06 Comparar

Salvar em: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read Imprimir Identificadas

Input Nasa: C:\BRAMON\Encontreiro\Dados\Nasa\results.csv Read D Máximo: 0,04 Paizão

Diferença RA/DEC: 15

Diferença VG: 20

Diferença SOL: 40

Inicial: Final:

Mes: 01 12

Dia: 1 30

RA/DEC: 30

D Time: 7

D Máximo: 0,22

Validador Break Point

Validador+ Imprimir Br

Series1 Series2 Series3

D: 0,03 D Max: 0,15 D Min: 0,07 Repetições: 10 Copy 1 Copy 2 D Max: 0,05

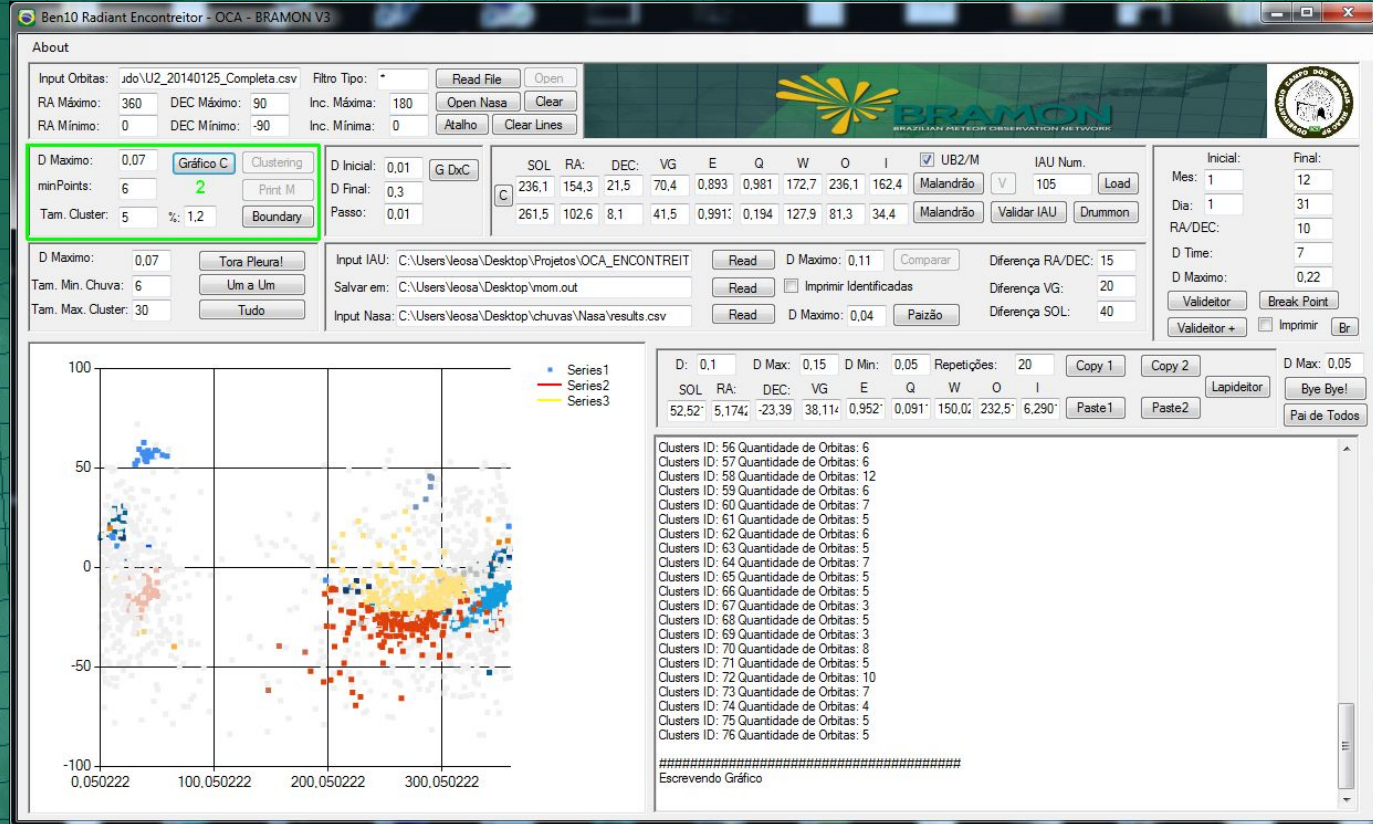
SOL RA: DEC: VG E Q W O I Lapideitor Bye Bye!

Paste1 Paste2 Pai de Todos

```
#####
Lendo Arquivo de Orbitas
Orbitas Lidas: 481991
```

DBSCAN Meteor Clustering

- Encontreitor Uses DBSCAN (Ester et al.) to search for clusters in a meteor database
- DBSCAN search is based in the distance between two points
- In clustering function, the points is the meteors and its distances is the D-criteria between them



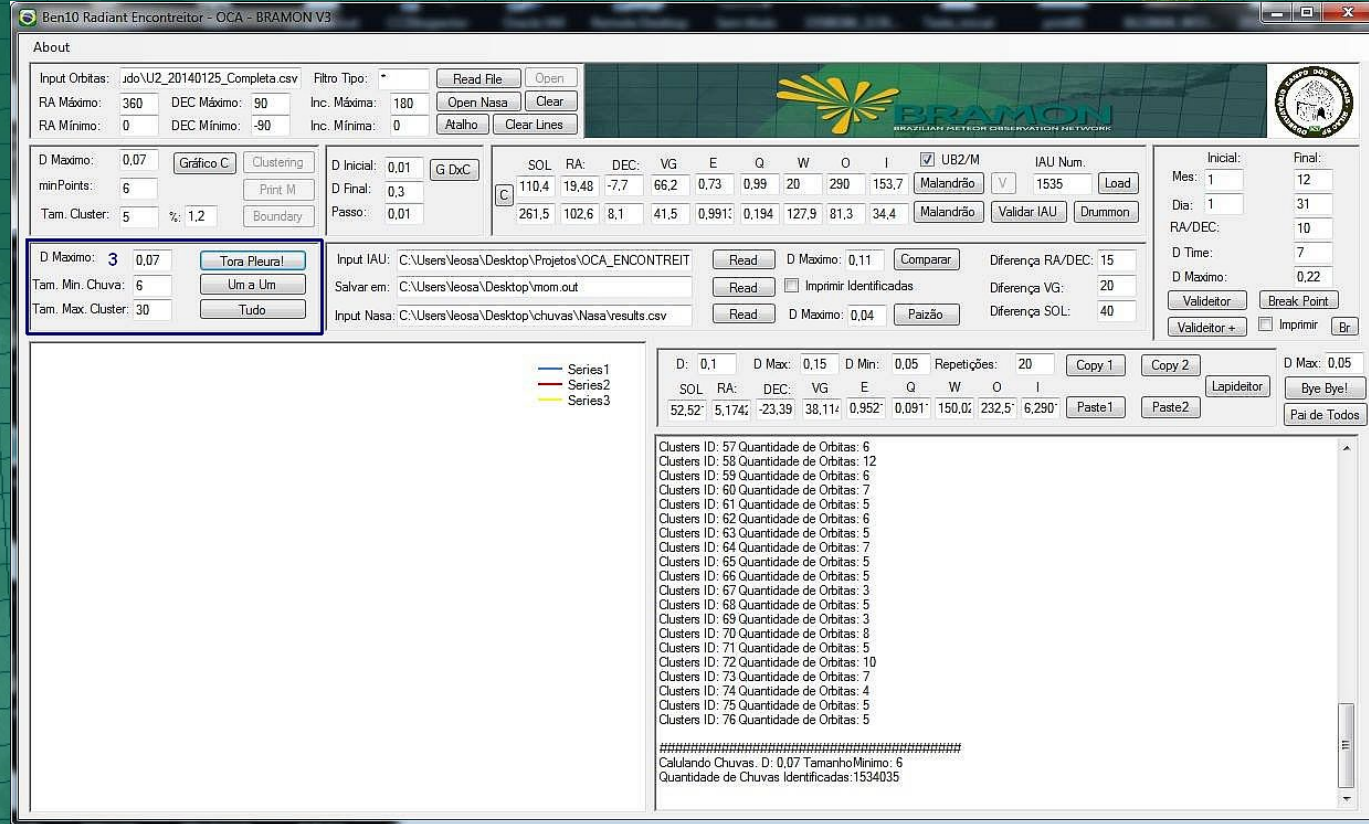
The screenshot shows the 'Ben10 Radiant Encontreitor - OCA - BRAMON V3' software interface. The main window displays a scatter plot of meteor data points clustered into three series (Series 1, Series 2, Series 3) based on DBSCAN clustering. The plot axes are labeled with RA (Right Ascension) and DEC (Declination) values. The interface includes various input fields for orbital parameters (RA, DEC, Inc, etc.), a 'Clustering' button, and a 'Gráfico C' button. The results panel on the right lists 76 clusters, each with a unique ID and the number of orbits it contains. The software also displays a table of orbital parameters for selected clusters.

SOL	RA	DEC	VG	E	Q	W	O	I	UB2/M	IAU Num.
236.1	154.3	21.5	70.4	0.893	0.981	172.7	236.1	162.4	Malandrão	105
261.5	102.6	8.1	41.5	0.991	0.194	127.9	81.3	34.4	Malandrão	Drummon

Clusters ID: 56 Quantidade de Orbits: 6
 Clusters ID: 57 Quantidade de Orbits: 6
 Clusters ID: 58 Quantidade de Orbits: 12
 Clusters ID: 59 Quantidade de Orbits: 6
 Clusters ID: 60 Quantidade de Orbits: 7
 Clusters ID: 61 Quantidade de Orbits: 5
 Clusters ID: 62 Quantidade de Orbits: 6
 Clusters ID: 63 Quantidade de Orbits: 5
 Clusters ID: 64 Quantidade de Orbits: 7
 Clusters ID: 65 Quantidade de Orbits: 5
 Clusters ID: 66 Quantidade de Orbits: 5
 Clusters ID: 67 Quantidade de Orbits: 3
 Clusters ID: 68 Quantidade de Orbits: 5
 Clusters ID: 69 Quantidade de Orbits: 3
 Clusters ID: 70 Quantidade de Orbits: 8
 Clusters ID: 71 Quantidade de Orbits: 5
 Clusters ID: 72 Quantidade de Orbits: 10
 Clusters ID: 73 Quantidade de Orbits: 7
 Clusters ID: 74 Quantidade de Orbits: 4
 Clusters ID: 75 Quantidade de Orbits: 5
 Clusters ID: 76 Quantidade de Orbits: 5

Step 2: Tora Pleura - Combining meteors in clusters

- Algorithm performs a simple combination in each cluster
- Clusters are filtered by size, group min size: 6 meteors
- Every grouping have a mean orbit determined, and every member of the group have their orbital elements confronted against the mean orbit
- If the result of each of the tests are lower than a D min value, this grouping is considered a possible new radiant.



The screenshot shows the 'Ben10 Radiant Encontrador - OCA - BRAMON V3' software interface. The main window displays various input parameters and a table of meteor data. A 'Tora Pleura' button is highlighted in a blue box, indicating the current step in the process.

Input Parameters:

- Input Orbitas: jdo\UJ2_20140125_Completa.csv
- Filtro Tipo: *
- RA Máximo: 360, DEC Máximo: 90, Inc. Máxima: 180
- RA Mínimo: 0, DEC Mínimo: -90, Inc. Mínima: 0
- D Máximo: 0,07, minPoints: 6, Tam. Cluster: 5
- D Inicial: 0,01, D Final: 0,3, Passo: 0,01
- Input IAU: C:\Users\Neosa\Desktop\Projetos\OCA_ENCONTREIT
- Salvar em: C:\Users\Neosa\Desktop\mom.out
- Input Nasa: C:\Users\Neosa\Desktop\chuvas\Nasa\results.csv

Table of Meteor Data:

SOL	RA	DEC	VG	E	Q	W	O	I	UB2/M	IAU Num.
110,4	19,48	-7,7	66,2	0,73	0,99	20	290	153,7	Malandrão	1535
261,5	102,6	8,1	41,5	0,991	0,194	127,9	81,3	34,4	Malandrão	Drummon

Cluster Analysis Results:

- Clusters ID: 57 Quantidade de Orbitas: 6
- Clusters ID: 58 Quantidade de Orbitas: 12
- Clusters ID: 59 Quantidade de Orbitas: 6
- Clusters ID: 60 Quantidade de Orbitas: 7
- Clusters ID: 61 Quantidade de Orbitas: 5
- Clusters ID: 62 Quantidade de Orbitas: 6
- Clusters ID: 63 Quantidade de Orbitas: 5
- Clusters ID: 64 Quantidade de Orbitas: 7
- Clusters ID: 65 Quantidade de Orbitas: 5
- Clusters ID: 66 Quantidade de Orbitas: 5
- Clusters ID: 67 Quantidade de Orbitas: 3
- Clusters ID: 68 Quantidade de Orbitas: 5
- Clusters ID: 69 Quantidade de Orbitas: 3
- Clusters ID: 70 Quantidade de Orbitas: 8
- Clusters ID: 71 Quantidade de Orbitas: 5
- Clusters ID: 72 Quantidade de Orbitas: 10
- Clusters ID: 73 Quantidade de Orbitas: 7
- Clusters ID: 74 Quantidade de Orbitas: 4
- Clusters ID: 75 Quantidade de Orbitas: 5
- Clusters ID: 76 Quantidade de Orbitas: 5

Summary:

- Calculando Chuvas: D: 0,07 TamanhoMínimo: 6
- Quantidade de Chuvas Identificadas: 1534035

Tora Pleura Output



- Groupings output of Tora Pleura combinatory analysis
- The not repeated meteors of each group should be selected which will ultimately constitute a single possible new radiant
- The groups consisting entirely of non-repeated meteors in other groups are discarded

Chuva: 1 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110131_215942	311,523193	145,473557	10,372658	29,509405	0,835203	0,32847	117,696304	131,52356	5,447201	38077		
_20110202_195833	313,468323	148,024231	10,398056	30,423262	0,848644	0,299051	121,15596	133,469452	4,537366	38166		
_20110204_003209	314,675934	151,770004	10,349031	30,173508	0,842868	0,296514	121,920296	134,677963	3,336128	38248		
_20110204_223933	315,611084	150,379211	10,12289	28,087879	0,803158	0,336391	118,622681	135,613144	3,680166	38306		
_20110204_223933	315,611084	150,034683	11,080391	29,863907	0,845365	0,326989	117,316368	135,613861	2,727558	38307		
Chuva: 2 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110131_215942	311,523193	145,473557	10,372658	29,509405	0,835203	0,32847	117,696304	131,52356	5,447201	38077		
_20110202_195833	313,468323	148,024231	10,398056	30,423262	0,848644	0,299051	121,15596	133,469452	4,537366	38166		
_20110204_003209	314,675934	151,770004	10,349031	30,173508	0,842868	0,296514	121,920296	134,677963	3,336128	38248		
_20110204_223933	315,611084	150,034683	11,080391	29,863907	0,845365	0,326989	117,316368	135,613861	2,727558	38307		
_020607PET0006	317,537689	151,123749	11,059768	31,449945	0,879408	0,312155	117,429604	137,541382	2,210033	38442		
Chuva: 3 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110131_215942	311,523193	145,473557	10,372658	29,509405	0,835203	0,32847	117,696304	131,52356	5,447201	38077		
_20110202_195833	313,468323	148,024231	10,398056	30,423262	0,848644	0,299051	121,15596	133,469452	4,537366	38166		
_20110204_223933	315,611084	150,379211	10,12289	28,087879	0,803158	0,336391	118,622681	135,613144	3,680166	38306		
_20110204_223933	315,611084	150,034683	11,080391	29,863907	0,845365	0,326989	117,316368	135,613861	2,727558	38307		
_020607PET0006	317,537689	151,123749	11,059768	31,449945	0,879408	0,312155	117,429604	137,541382	2,210033	38442		
Chuva: 4 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110131_215942	311,523193	145,473557	10,372658	29,509405	0,835203	0,32847	117,696304	131,52356	5,447201	38077		
_20110204_003209	314,675934	151,770004	10,349031	30,173508	0,842868	0,296514	121,920296	134,677963	3,336128	38248		
_20110204_223933	315,611084	150,379211	10,12289	28,087879	0,803158	0,336391	118,622681	135,613144	3,680166	38306		
_20110204_223933	315,611084	150,034683	11,080391	29,863907	0,845365	0,326989	117,316368	135,613861	2,727558	38307		
_020607PET0006	317,537689	151,123749	11,059768	31,449945	0,879408	0,312155	117,429604	137,541382	2,210033	38442		
Chuva: 5 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110202_195833	313,468323	148,024231	10,398056	30,423262	0,848644	0,299051	121,15596	133,469452	4,537366	38166		
_20110204_003209	314,675934	151,770004	10,349031	30,173508	0,842868	0,296514	121,920296	134,677963	3,336128	38248		
_20110204_214120	315,570099	151,519073	9,425589	31,875687	0,875069	0,277842	122,607643	135,571808	4,397001	38302		
_020607PET0006	317,537689	151,123749	11,059768	31,449945	0,879408	0,312155	117,429604	137,541382	2,210033	38442		
_20110206_231321	317,662811	153,967361	11,19232	31,340393	0,870701	0,29698	120,099518	137,670349	1,081675	38463		
Chuva: 6 Quantidade de Orbitas: 6												
_013101HUM0008	311,504272	149,222733	13,413737	28,527868	0,807864	0,299786	123,84449	131,518341	0,135483	38072		
_20110202_195833	313,468323	148,024231	10,398056	30,423262	0,848644	0,299051	121,15596	133,469452	4,537366	38166		
_20110204_003209	314,675934	151,770004	10,349031	30,173508	0,842868	0,296514	121,920296	134,677963	3,336128	38248		
_20110204_223933	315,611084	150,034683	11,080391	29,863907	0,845365	0,326989	117,316368	135,613861	2,727558	38307		
_020607PET0006	317,537689	151,123749	11,059768	31,449945	0,879408	0,312155	117,429604	137,541382	2,210033	38442		
_20110206_231321	317,662811	153,967361	11,19232	31,340393	0,870701	0,29698	120,099518	137,670349	1,081675	38463		

- Specification of the step values to be applied in the Breakpoint and Valideitor tests
- Graph D x C: determination of the optimal cut value of the Drummond Criterion to be applied in the Tora Pleura procedure

Ben10 Radiant Encontrador - OCA - BRAMON V3

About

Input Orbitas: jdo\UJ2_20140125_Completa.csv Filtro Tipo: *
 RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180
 RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0

D Máximo: 0,07
 minPoints: 6
 Tam. Cluster: 5 %: 1,2

D Inicial: 0,01
 D Final: 0,3
 Passo: 0,01

SOL	RA	DEC	VG	E	Q	W	O	I	UB2/M	IAU Num.
110,4	19,48	-7,7	66,2	0,73	0,99	20	290	153,7	<input checked="" type="checkbox"/> Malandrão	1535
261,5	102,6	8,1	41,5	0,991	0,194	127,9	81,3	34,4	<input checked="" type="checkbox"/> Malandrão	

D Máximo: 0,07
 Tam. Min. Chuva: 6
 Tam. Max. Cluster: 30

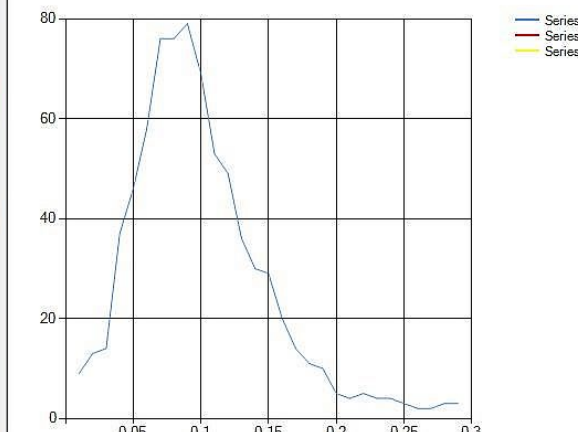
Input IAU: C:\Users\Neosa\Desktop\Projetos\OCA_ENCONTREIT D Máximo: 0,11 Diferença RA/DEC: 15
 Salvar em: C:\Users\Neosa\Desktop\mom.out Imprimir Identificadas Diferença VG: 20
 Input Nasa: C:\Users\Neosa\Desktop\chuvvas\Nasa\results.csv D Máximo: 0,04 Diferença SOL: 40

D: 0,1 D Max: 0,15 D Min: 0,05 Repetições: 20 D Max: 0,05
 SOL RA: DEC: VG E Q W O I
 52,52° 5,174; -23,39 38,11; 0,952° 0,091° 150,0; 232,5° 6,290°

Clusters ID: 1 Quantidade de Orbitas: 6264
 Clusters ID: 2 Quantidade de Orbitas: 10
 D: 0,28
 Iniciando Clustering
 D: 0,28
 MinPoints : 6
 Quantidade de Clusters: 3
 Clustering OK

Clusters encontrados:
 Clusters ID: 1 Quantidade de Orbitas: 6277
 Clusters ID: 2 Quantidade de Orbitas: 10
 Clusters ID: 3 Quantidade de Orbitas: 5
 D: 0,29
 Iniciando Clustering
 D: 0,29
 MinPoints : 6
 Quantidade de Clusters: 3
 Clustering OK

Clusters encontrados:
 Clusters ID: 1 Quantidade de Orbitas: 6293
 Clusters ID: 2 Quantidade de Orbitas: 10
 Clusters ID: 3 Quantidade de Orbitas: 5



- Manual input of mean orbital elements to search for similar meteors in the database.
- The meteors of the output will be those that are below of a maximum D value stipulated in relation to the inserted mean orbital elements
- Validar IAU (Validate against IAU): With this function we can compare the average orbit of a possible new shower against the orbital elements of showers already cataloged in the IAU. In this way we check if it the new shower is not a shower already cataloged

Ben10 Radiant Encontreiro - OCA - BRAMON V3

About

Input Orbitas: C:\BRAMON\Encontreiro\Dados Filtro Tipo: * Read File Open
 RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180 Open Nasa Clear
 RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0 Atalho Clear Lines

D Máximo: 0,05 Gráfico C Clustering D Inicial: 0,02 G Dx C
 minPoints: 6 Print M D Final: 0,06
 Tam. Cluster: 6 %: 1,1 Boundary Passo: 0,01

D Máximo: 0,04 Tora Pleura! Input IAU: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read D Máximo: 0,06 Comparar Diferença RA/DEC: 15
 Tam. Min. Chuva: 6 Um a Um Salvar em: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read Imprimir Identificadas Diferença VG: 20
 Tam. Max. Cluster: 35 Tudo Input Nasa: C:\BRAMON\Encontreiro\Dados\Nasa\results.csv Read D Máximo: 0,08 Paizão Diferença SOL: 40

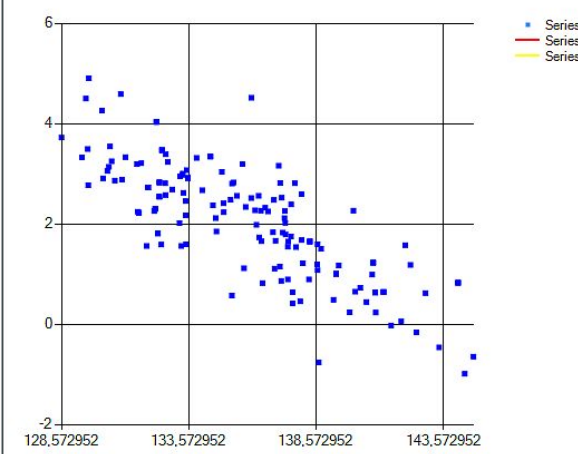
Validador Break Point
 Validador + Imprimir Br

6 SOL RA: DEC: VG E Q W O I U B2/M IAU Num.
 C 260,7 136 1,4 62,5 0,980 0,375 104,7 80,6 142,7 Malandrão 1 Load
 45,75; 246,6; 53,95; 19,60; 0,472; 0,983; 202,2; 45,75; 32,17; Malandrão Validar IAU Drummon

D: 0,15 D Max: 0,15 D Min: 0,07 Repetições: 10 Copy 1 Copy 2 D Max: 0,05
 SOL RA: DEC: VG E Q W O I Lapideitor Bye Bye!
 39,48; 0,080; 53,10; 15,12; 0,599; 0,975; 192,7; 39,49; 19,10; Paste 1 Paste 2 Pai de Todos

0,989931 0,383548 103,098526 85,8461229999999 144,179993 500691 0,040946625392843
 20161218_040119 266,050171 140,828186 1,226931 62,603207 34,657536
 0,989894 0,350608 107,093964 86,0503309999997 143,836945 500795 0,0419231801642493
 20161218_042423 266,066467 141,232666 0,642118 61,921154 9,762635 0,96383
 0,353118 107,83741 86,0666279999999 142,817795 500802 0,0372153916760043
 20161220_041154 268,093201 142,525772 -0,159052 62,261585 19,422152
 0,981703 0,355363 106,827698 88,0932539999997 141,911972 501011 0,0427352536654997
 20161208_004958 255,750595 132,261368 2,298907 62,961449 23,718618
 0,982891 0,405805 100,738647 75,7506640000001 142,546448 520816 0,0429656473844817
 20161208_055801 255,96785 132,362579 1,808531 61,406898 7,009007 0,946108
 0,377728 105,556877 75,9679180000003 139,803421 520946 0,0421138921567093
 20161209_023848 256,842957 132,423264 2,830038 61,785858 10,151362
 0,964907 0,357255 107,325722 76,8430789999999 141,840469 521003 0,0425495149827834
 20161215_023750 262,939697 139,333466 1,650411 61,946503 9,622089 0,96319
 0,35419 107,742462 82,9399410000001 143,259964 522316 0,0320254560254386
 20161217_231218 265,845978 140,909348 0,630802 63,117298 38,092052
 0,989931 0,383548 103,098526 85,8461229999999 144,179993 522849 0,040946625392843
 20161218_040119 266,050171 140,828186 1,226931 62,603207 34,657536
 0,989894 0,350608 107,093964 86,0503309999997 143,836945 522953 0,0419231801642493
 20161218_042423 266,066467 141,232666 0,642118 61,921154 9,762635 0,96383
 0,353118 107,83741 86,0666279999999 142,817795 522970 0,0372153916760043
 20161220_041154 268,093201 142,525772 -0,159052 62,261585 19,422152
 0,981703 0,355363 106,827698 88,0932539999997 141,911972 523179 0,0427352536654997

Quantidade de Orbitas Similares: 149



Universe Sandbox Integration



Orbitator

DATA	SOL	RA	DEC	VG	A	E	Q	W	O	I	LINHA	
<input checked="" type="checkbox"/>	_20080405_024857	15,218296	196,013	17,0600	17,220	2,05118	0,629736	0,759479	247,870316	15,218712	9,236534	275126
<input checked="" type="checkbox"/>	_20090409_032705	18,924726	193,535	12,7188	16,785	2,408183	0,672546	0,788568	241,876129	18,928066	5,703797	296525
<input checked="" type="checkbox"/>	_20100405_225146	15,528642	191,255	18,4303	16,968	1,127956	0,633077	0,780803	244,299271	15,528799	10,121608	322382
<input checked="" type="checkbox"/>	_20100408_013803	17,979357	195,787	19,4845	17,732	2,440867	0,679705	0,781798	242,70903	17,980017	10,1340018	18135
<input checked="" type="checkbox"/>	_20110331_220224	10,68555	184,800	17,7038	17,795	2,476718	0,689043	0,769986	244,026108	10,685518	8,240647	40323
<input checked="" type="checkbox"/>	_20110405_222246	15,261774	189,229	19,0667	16,828	2,267243	0,649865	0,793841	241,586655	15,261972	9,62307	348106
<input checked="" type="checkbox"/>	_20110407_232708	17,650526	189,664	18,24992	15,958	2,27869	0,643744	0,812214	238,782974	17,651327	7,569154	40621
<input checked="" type="checkbox"/>	_20110411_235822	21,22654	200,185	20,1152	17,574	2,281965	0,650059	0,798566	241,024185	21,227509	13,654943	348317
<input checked="" type="checkbox"/>	_20110413_015604	22,655405	195,397	12,10215	16,414	2,27326	0,652474	0,790018	242,405334	22,656245	5,555849	40829
<input checked="" type="checkbox"/>	_20120401_183328	12,262426	185,34433	17,0394	18,490	2,387284	0,688803	0,742919	248,246536	12,264165	6,680168	78425
<input checked="" type="checkbox"/>	_20130331_004524	10,285555	185,54837	12,79651	17,367	2,141926	0,649625	0,750477	248,304293	10,286057	6,389234	110943
<input checked="" type="checkbox"/>	_20130403_230925	13,795387	191,272	15,6923	17,546	2,073471	0,638426	0,749713	249,041534	13,795063	8,999256	398571
<input checked="" type="checkbox"/>	_20130407_224364	17,716127	192,325	18,7963	16,775	2,234929	0,644087	0,795439	241,60817	17,715815	9,936028	398668
<input checked="" type="checkbox"/>	_20130410_224828	21,035698	192,893	16,4730	16,681	2,456317	0,672323	0,80488	239,308365	21,035946	8,121412	111197
<input checked="" type="checkbox"/>	_20130410_224829	21,035698	191,936	16,8365	16,123	2,372186	0,656345	0,815214	238,040817	21,035969	7,772994	111198
<input checked="" type="checkbox"/>	_20130411_232842	21,676669	191,924	17,7289	15,709	2,393852	0,652275	0,832401	235,207977	21,676977	8,3326	398809
<input checked="" type="checkbox"/>	_20130415_202615	25,840332	191,124	18,1736	15,773	2,408891	0,653602	0,834435	234,985733	25,84164	8,838623	111418
<input checked="" type="checkbox"/>	_20130418_002356	27,591524	204,08786	19,2142	17,287	2,387787	0,662736	0,805315	239,764908	27,592649	12,174107	399008
<input checked="" type="checkbox"/>	_20140403_015350	12,673228	186,46524	14,4431	17,099	2,519759	0,688091	0,785935	241,608368	12,675307	6,039321	424906
<input checked="" type="checkbox"/>	_20140408_022734	17,620962	192,670	17,2500	17,161	2,614389	0,694287	0,799254	239,467407	17,623238	8,261148	425098
<input checked="" type="checkbox"/>	_20140409_025434	18,990875	196,670	18,6559	17,912	2,541961	0,692142	0,782562	242,249542	18,992657	10,445728	154686
<input checked="" type="checkbox"/>	_20140417_003709	26,737997	198,163	12,15219	16,949	2,471073	0,679411	0,792199	241,368439	26,738859	6,742683	155081
<input checked="" type="checkbox"/>	_20150328_185945	7,56951	177,722	17,5459	17,620	2,375786	0,678967	0,762705	245,370966	7,571946	7,022351	197152
<input checked="" type="checkbox"/>	_20150331_194843	10,567418	181,667	15,165	18,216	2,529651	0,702073	0,753652	246,132584	10,569446	6,816148	197254
<input checked="" type="checkbox"/>	_20150406_225246	16,605461	190,284	12,6227	18,129	2,461354	0,693772	0,753737	246,583771	16,606988	6,990292	197561
<input checked="" type="checkbox"/>	_20150415_232940	25,463247	195,920	19,0796	16,721	2,670074	0,691144	0,824667	235,651505	25,463566	9,616448	198315
<input checked="" type="checkbox"/>	_20150419_225850	29,355217	197,959	12,9871	16,545	2,528929	0,678391	0,813325	238,049179	29,356644	7,883296	244019
<input checked="" type="checkbox"/>	_20150421_011558	30,425803	200,622	15,8643	16,101	2,57901	0,677965	0,830532	235,193741	30,426708	7,966329	198730
<input checked="" type="checkbox"/>	_20160405_215031	15,944347	190,300	19,00931	17,560	2,338468	0,6662	0,78058	243,2565	15,945259	10,465377	484677
<input checked="" type="checkbox"/>	_20160405_215031	15,944347	190,300	19,00931	17,560	2,338468	0,6662	0,78058	243,2565	15,945259	10,465377	506834

Copiar Template

Massa (kg):

Densidade:

Cor: Azul
 Amarelo
 Verde
 Vermelho
 Branco

Data:

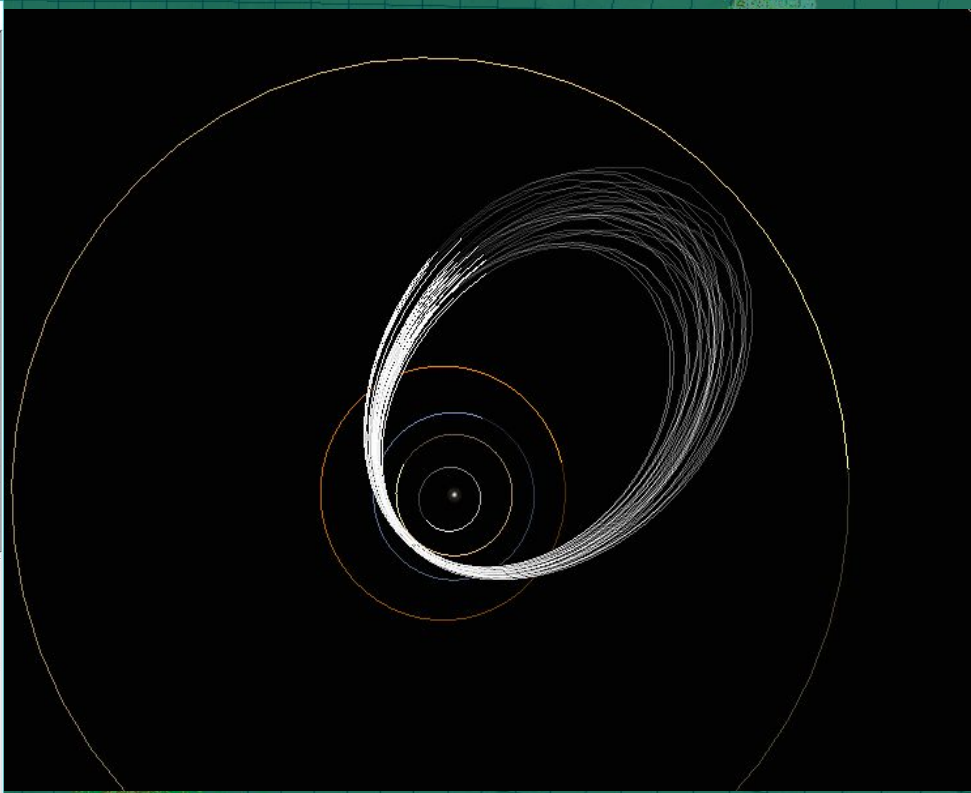
US - Salvar em:

US - Template:

US - Path:

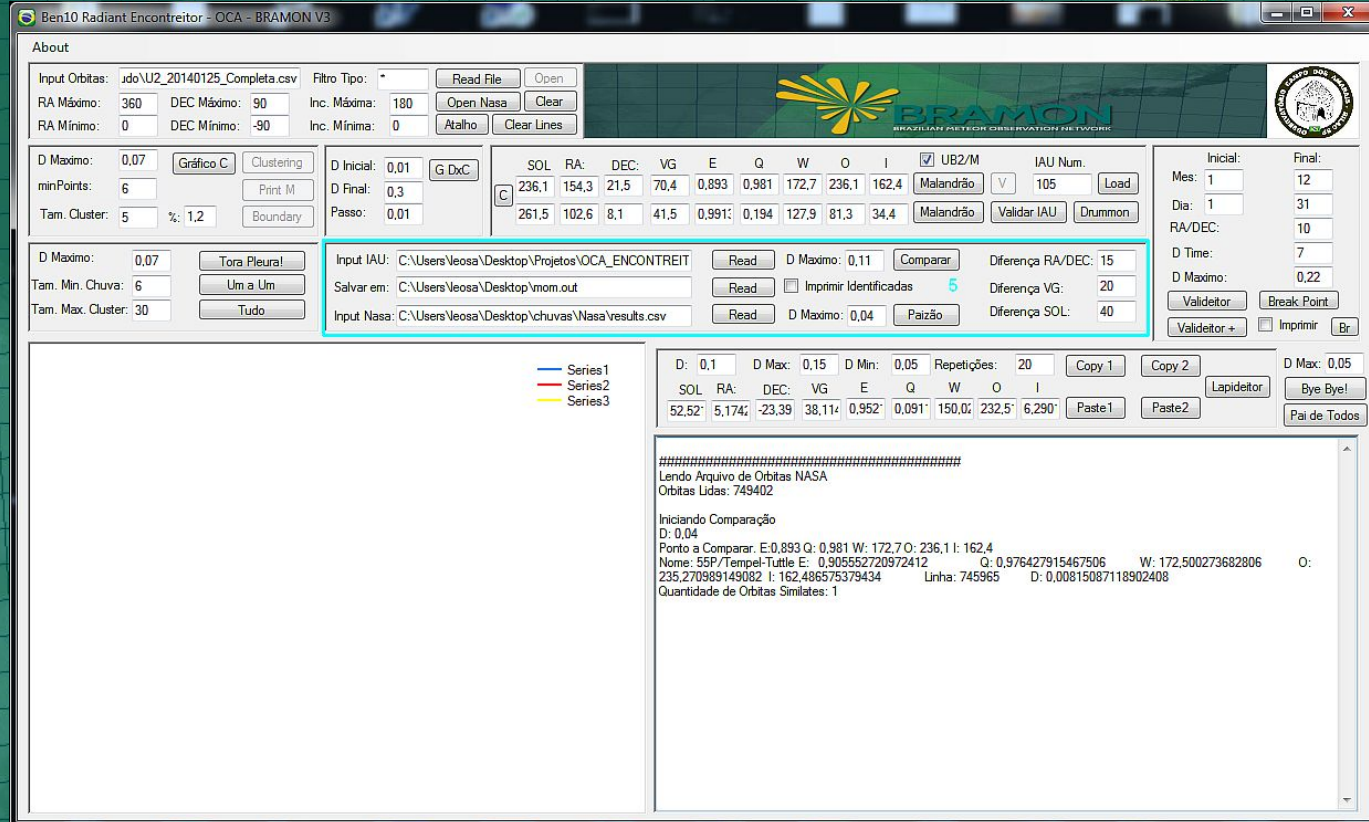
M - Template:

M - Path:



Paizão Function: Search for Parental body

- Paizão (Parental Bodies): with this function we test the mean orbital elements of a new shower against the JPL Small-Body Database to search for parental bodies of the showers



Ben10 Radiant Encontreitor - OCA - BRAMON V3

About

Input Orbitas: jdo\UJ2_20140125_Completa.csv Filtro Tipo: *
 RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180
 RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0

D Máximo: 0,07
 minPoints: 6
 Tam. Cluster: 5 %: 1,2

D Inicial: 0,01
 D Final: 0,3
 Passo: 0,01

SOL	RA	DEC	VG	E	Q	W	O	I	UB2/M	IAU Num.
236,1	154,3	21,5	70,4	0,893	0,981	172,7	236,1	162,4	<input checked="" type="checkbox"/> Malandrão	105
261,5	102,6	8,1	41,5	0,991	0,194	127,9	81,3	34,4	<input type="checkbox"/> Malandrão	<input type="button" value="Validar IAU"/> <input type="button" value="Drummon"/>

D Máximo: 0,07
 Tam. Min. Chuva: 6
 Tam. Max. Cluster: 30

Input IAU: C:\Users\Neosa\Desktop\Projetos\OCA_ENCONTREIT D Máximo: 0,11 Diferença RA/DEC: 15
 Salvar em: C:\Users\Neosa\Desktop\mom.out Imprimir Identificadas 5 Diferença VG: 20
 Input Nasa: C:\Users\Neosa\Desktop\chuvas\Nasa\results.csv D Máximo: 0,04 Diferença SOL: 40

D: 0,1 D Max: 0,15 D Min: 0,05 Repetições: 20 D Max: 0,05
 SOL RA: DEC: VG E Q W O I
 52,52° 5,174; -23,39 38,11; 0,952; 0,091° 150,0; 232,5; 6,290°

```

#####
Lendo Arquivo de Orbitas NASA
Orbitas Lidas: 749402

Iniciando Comparação
D: 0,04
Ponto a Comparar: E:0,893 Q: 0,981 W: 172,7 O: 236,1 I: 162,4
Nome: 55P/Tempel-Tuttle E: 0,905552720972412 Q: 0,976427915467506 W: 172,500273682806 O:
235,270989149082 I: 162,486575379434 Linha: 745965 D: 0,00815087118902408
Quantidade de Orbitas Similares: 1
  
```

- Breakpoint Method (Welch, 2001), test of the mean orbital elements of a candidate new shower against a continuum meteor background

Ben10 Radiant Encontreiro - OCA - BRAMON V3

About

Input Orbitas: C:\BRAMON\Encontreiro\Dados Filtro Tipo: * Read File Open
 RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180 Open Nasa Clear
 RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0 Atalho Clear Lines

D Máximo: 0,04 Gráfico C Clustering
 minPoints: 6 Print M
 Tam. Cluster: 6 %: 1,1 Boundary

D Inicial: 0,008 G DxC
 D Final: 0,5
 Passo: 0,01

SOL RA: DEC: VG E Q W O I U2B/M IAU Num.
 126,8 340,2 -16,3 40,6 0,968 0,077 151,7 306,8 28 Malandrão 1 Load
 Malandrão Validar IAU Drummon

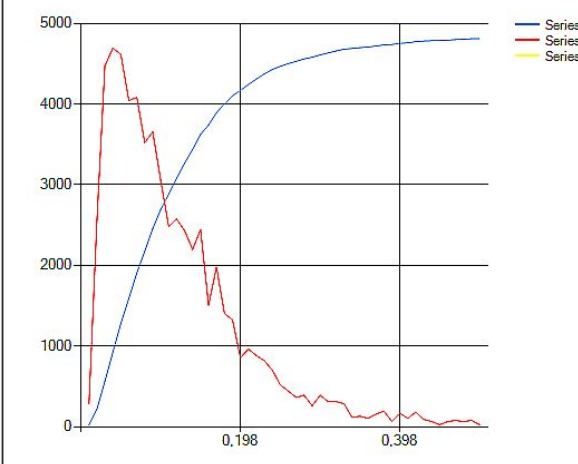
D Máximo: 0,04 Tora Pleural
 Tam. Min. Chuva: 6 Um a Um
 Tam. Max. Cluster: 35 Tudo

Input IAU: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read D Máximo: 0,06 Comparar Diferença RA/DEC: 15
 Salvar em: C:\BRAMON\Encontreiro\EncontreiroV3.0\Release\vs Read Imprimir Identificadas Diferença VG: 20
 Input Nasa: C:\BRAMON\Encontreiro\Dados\Nasa\results.csv Read D Máximo: 0,08 Paizão Diferença SOL: 40

Inicial: Final:
 Mes: 01 12
 Dia: 1 30
 RA/DEC: 7 5
 D Time: 7
 D Máximo: 0,22
 Validador Break Point
 Validador + Imprimir Br

D: 0,15 D Max: 0,15 D Min: 0,07 Repetições: 10 Copy 1 Copy 2 D Max: 0,05
 SOL RA: DEC: VG E Q W O I Lapideitor Bye Bye!
 39,48 0,0807 53,10 15,12 0,599 0,975 192,74 39,49 19,10 Paste1 Paste2 Pai de Todos

0,268	364
0,278	390
0,288	260
0,298	390
0,308	312
0,318	312
0,328	286
0,338	117
0,348	130
0,358	104
0,368	156
0,378	195
0,388	65
0,398	169
0,408	104
0,418	182
0,428	91
0,438	65
0,448	26
0,458	65
0,468	78
0,478	65
0,488	78
0,498	26



Valideitor: Search for increase of shower activity

- The Valideitor analyzes over time (day by day) the amount of orbits that belong to a given radiant. To determine if an orbit belongs to a radiant, the Drummond test is applied between an individual meteor orbit in database and the shower orbital parameters. If the result is less than a given maximum D (we usually use the value of 0.21), the orbits are considered to belong to the radiant.
- Over time, the number of orbits that fit in the radiant tends to increase, so you can see the formation of a peak in the graph.

Ben10 Radiant Encontrator - OCA - BRAMON V3

About

Input Orbitas: C:\BRAMON\Encontrator\Dados Filtro Tipo: * Read File Open
 RA Máximo: 360 DEC Máximo: 90 Inc. Máxima: 180 Open Nasa Clear
 RA Mínimo: 0 DEC Mínimo: -90 Inc. Mínima: 0 Atalho Clear Lines

D Máximo: 0,04 Gráfico C Clustering
 minPoints: 6 Print M
 Tam. Cluster: 6 %: 1,1 Boundary

D Inicial: 0,2 G DxC
 D Final: 0,8
 Passo: 0,01

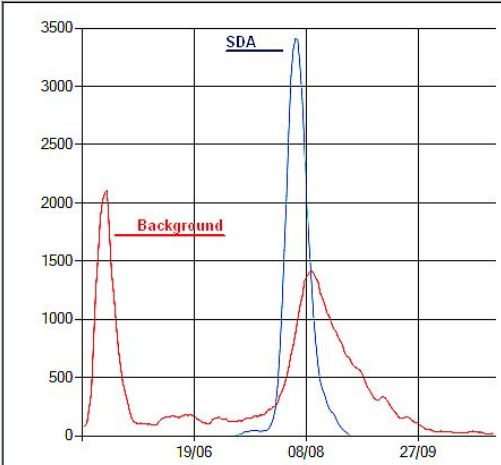
SOL RA: DEC: VG E Q W O I UB2/M IAU Num.
 126,8 340,2 -16,3 40,6 0,968 0,077 151,7 306,8 28 Malandrão V 1 Load
 Malandrão Validar IAU Drummon

D Máximo: 0,04 Tora Pleural
 Tam. Min. Chuva: 6 Um a Um
 Tam. Max. Cluster: 35 Tudo

Input IAU: C:\BRAMON\Encontrator\EncontratorV3.0\Release's Read D Máximo: 0,06 Comparar Diferença RA/DEC: 15
 Salvar em: C:\BRAMON\Encontrator\EncontratorV3.0\Release's Read Imprimir Identificadas Diferença VG: 20
 Input Nasa: C:\BRAMON\Encontrator\Dados\Nasa\results.csv Read D Máximo: 0,08 Paizão Diferença SOL: 40

Initial: Final:
 Mes: 05 10
 Dia: 1 30
 RA/DEC: 20
 D Time: 7
 D Máximo: 0,22
 Validator Break Point
 Validator+ Imprimir Br

D: 0,15 D Max: 0,15 D Min: 0,07 Repetições: 10 Copy 1 Copy 2 D Max: 0,05
 SOL RA: DEC: VG E Q W O I Lapidator Bye Bye!
 39,48 0,0807 53,10 15,12 0,599 0,975 192,7 39,49 19,10 Paste1 Paste2 Pai de Todos



Date	Count
19/10	33
20/10	0
20/10	38
21/10	0
21/10	41
22/10	0
22/10	38
23/10	0
23/10	34
24/10	0
24/10	31
25/10	0
25/10	31
26/10	0
26/10	25
27/10	0
27/10	16
28/10	0
28/10	17
29/10	0
29/10	20
30/10	0
30/10	22
30/10	22
Fim	

Ben 10 isn't dead!





BRAMON Members

ADRIANO AUBERT SILVA BARROS
ALCIONE DA ANUNCIACÃO CAETANO
ALEX CAMBOIM DANTAS
ALEX PEREIRA SANTOS
ALEXANDRE HEINZ
ALEXANDRE PEREIRA DA SILVA
ALEXSANDRO MOTA
ALFREDO DAL'AVA JÚNIOR
ALYSSON WANDERLEY TEIXEIRA SILVA
ANDREI LIMA
ANDREY ALESSANDRO SILVA MACHADO
ANTONIO CARLOS DUARTE
BRUNO FERNANDES BONICONTRO
BRUNO GUIITI
BRUNO MOREIRA FORTI
CARLOS AUGUSTO DI PIETRO
CARLOS FERNANDO JUNG
CLAUDIO MAX MORAES PAIVA
CLELISON MARCOS DA SILVA
CRISTIAN REIS WESTPHAL
CRISTIANE ROMERO POLTRONIERI

CRISTOVÃO JACQUES
DANIEL LEAL MATEUS
DANIEL SCHEK BORTOLINI
DANIELA CARDOZO MOURÃO
DENIS ARAUJO
DIEGO ALENCAR
DIEGO RHAMON
EDGAR MENDES MERIZIO
EDUARDO COELHO
ERICK COUTO
ERIKSON PIETRZACK DE OLIVEIRA
FRANCESCO ROSSI LENA
GABRIEL DOS SANTOS ZAPAROLLI
GUSTAVO BOLSON MAIA
HELDER CRISTIANO SILVEIRA
HERITON ROCHA
IVAN DONIZETE SOARES
IZAAC SILVA LEITE
JENIVALDO LISBOA DE ARAÚJO
JOÃO AMÂNCIO
JOCIMAR JUSTINO DE SOUZA

JULIANO CEZAR VIEIRA ZAIKIEVICZ
KALINE DE ARAÚJO LIMA
LAURA NEVES DO AMARAL
LAURISTON TRINDADE
LEANDRO DE CARVALHO P. MACHADO
LEONARDO SCANFERLA AMARAL
LEONARDO TAVARES DE OLIVEIRA
LUCAS JARDEL ALVES DA SILVA
LUCAS TRANQUILINO DA SILVA
MARCELO DOMINGUES
MARCELO ZURITA
MARCO ANTÔNIO VIEIRA
MARCO AURELIO HAUCK SALGADO
MARCOS ANTUNES
MARCOS JERÔNIMO
MAYLER MARTINS
NEFTALI DIAS CAVALCANTE JUNIOR
NEWTON CESAR FLORENCIO
PAULO HERCIDIO DE SOUZA
PLANETÁRIO DE SANTO ANDRÉ
RAFAEL BERNARDINO

RAFAEL H. QUARESMA
RAFAEL LUCIO
RAFAEL NARDE DE REZENDE
RAFAEL SILVEIRA COMPASSI
RENATO C. POLTRONIERI
RENATO FERNANDES BANDEIRA
RENATO RIBEIRO
RICARDO CAVALLINI
RICARDO SALES
ROMUALDO ARTHUR ALENCAR CALDAS
RUBENS DAMIGLÊ ALVES MARREIRA
SÉRGIO MARQUES
SYDNEY VIANNA PINTO JÚNIOR
TESSO MARTINS COSTA
UBIRATAN DA NÓBREGA BORGES
VANDSON GUEDES
WELLINGTON ALBERTINI
WELTER MESQUITA
WENDEL GONÇALVES
WENDELL DOS SANTOS MONTEIRO
WILLIAM SIQUEIRA



BRAMON in IMC 2018 Supporters

ALCIENE SEVERO DE OLIVEIRA
ALEXANDRE ALVES NETO
ALEXANDRE VIEIRA PIECZUR
ALEXANDRE ZABOT
ALFREDO DAL AVA JUNIOR
ALMIR AMORIM ANDRADE
ALUISIO AMORIM ANDRADE
ANA RAMALHO ALKIMIM
ANDERSON SANTIAGO DA SILVA
ANDRÉ A C R COUTO
ANDRÉ LUIZ ZANI
ANDRÉ MOUTINHO
ANDRÉ O ZANI NAS ALTURAS
ANDRÉ PEIXOTO
ANTONIO CARLOS DUARTE
ANTONIO CARLOS S. WIEDERMANN
ANTONIO RAFAEL DA SILVA SOUSA
ARTHUR SVIDZINSKI
AUGUSTO DE ORNELLAS ABREU
BONIFACIO DE OLIVEIRA
BRUNO BONICONTRIO
BRUNO FORTI
CAMILA RENATA DE TOLEDO
CARLOS DI PIETRO
CARLOS FERNANDO JUNG
CARLOS KIKO FAIRBAIRN
CARLOS PALHARES
CHRISTINE LEÃO
CLAUDIO MAX
CLÁUDIO QUEIROZ

CRIS RIBEIRO
CRISTOVAO JACQUES
DANIEL FREIRE ALMEIDA
DANIELA CARDOZO MOURÃO
DAVI SOUZA
DAVID MARQUES
DENIS AUGUSTO DE ARAUJO
DIEGO ALENCAR
EDNEY SARI
EDUARDO ALDAVIS PARLAMENTO
EDUARDO COELHO
EDUARDO FERNANDO BECKER
EDUARDO MAIDA
EDVALDO TREVISAN
EFRAIM MELO DOS SANTOS
ERICK DE BRITO COUTO
EWERTON LIMA SALAZAR
FELIPE HIME
FELIPE SÉRVULO
FERNANDO MARTINS DE PAIVA
FERNANDO SCHIMIDT
FRANCISCO DANIEL
FRANCISCO DE ASSIS R. DA SILVA
GABRIEL CARNEIRO DE PAIVA
GABRIEL G
GEOVANDRO ANDREA
GRECYA
GUIDO GARCIA D ANGELO
GUNTER MORAES

HELDER ASSIS RAASCH
HELIOMÁRZIO R. MOREIRA
HERACLIDES JOSE CORDEIRO
HERITON ROCHA
HILBERNON ALMEIDA FILHO
HUMBERTO ORCY DA SILVA
ISAAC SILVA
ISABEL ALVES
ISABEL CHRISTINA S. AGUIAR
IVAN DONIZETE SOARES
IZAAC DA SILVA LEITE
JEFFERSON L. DO NASCIMENTO
JESSICA
JOÃO ANTONIO MATTEI
JOÃO FIDÉLIS SALLES
JOCIMAR JUSTINO SOUZA
JONATAS FONTELE DOURADO
JONATHAN DE ALMEIDA VIEIRA
JONATHAN PEREIRA DE PAULA
JONATHAN TITTON
JOSE HENRIQUE ROSSI OLIVIERI
JOSÉ PAULO DE CARVALHO
JOSÉ ROBSON LEITE NOGUEIRA
JOSE SERRANO AGUSTONI
JOVEM EXPLORADOR / M. PACOTI
JULIANO ZAIKIEVICZ
JULIO BESSA
KLEPER CARVALHO DE F. LEITÃO
LEONARDO SCANFERLA AMARAL

LILIAN MARIN
LUCAS DE MORAIS TEIXEIRA
LUCIMEIA IVIZI
MACIEL SPARRENBERGER
MAICON GERMINIANI
MARCELO MEDEIROS SANCHEZ
MARCELO W. SILVA DOMINGUES
MARCELO ZURITA
MARCO DOMENEGHETTI
MARCOS JERÔNIMO R. BARRETO
MARIA DAS GRAÇAS SILVA
MARINA DUTRA
MARIO FELISBINO DA SILVA
MARLENE JOAQUIM DE SOUZA
MICHEL LOPES GRANJEIRO
MICHEL TORRES
MICHELE COSTA
MIGUEL BORGES
MÔNICA ÂNGELA MAZZONI
MUCIO MACEDO
NATÁLIA PALIVANAS
NEFTALI JUNIOR
PAULO CARLOS SALDANHA FILHO
PAULO GUYLHERME M. ANDRADE
PAULO HERCIDIO DE SOUZA
PAULO LEME
PAULO VITOR DE SOUSA LUCENA
PEDRO JOSE DE SOUZA MATTOS
RAFAEL NARDE DE REZENDE

RAFAEL VENÂNCIO L. SANTOS
RAFAELA DE MARSILLAC
REGIANE SOUZA
REGINALDO DE SOUZA SILVA
RENATO CASSIO POLTRONIERI
RENATO RIBEIRO
RICARDO JOSÉ CAVALLINI
ROBERTO G. DE OLIVEIRA
ROBERTO SOUZA
ROBSON DA SILVA SIQUEIRA
RODRIGO NÓBREGA R. XAVIER
ROMUALDO ARTHUR A. CALDAS
RONALDO DE SOUZA
RUBENS DAMIGLE A. MARREIRA
RUBENS FRAGA JUNIOR
RUBENS GHIGONETTO
SAMARA DA SILVEIRA LOURENÇO
SANDRO ROSA
SCHWARZA
SERGIO LARRUSCAIM MATHIAS
SÉRGIO LUIZ
SÉRGIO SACANI
SOCORRO AÍLA COSTA
VÂNIA DE GODOY
VIVIENE MELO
WENDEL GONÇALVES COSTA
WENDELL DOS SANTOS
MONTEIRO
WILSON BONFIM ABREU FILHO
WILTON FERREIRA DA COSTA

Very thanks to...

Jakub Algot Koukal

- Supports BRAMON since it was created
- He taught us a lot about meteors
- He gave us some lashes
- And was our babysiter too





IMC 2018

SLOVAKIA
Pezinok - Modra



THE END

Lauriston Trindade

lauriston.lauriston@gmail.com

bramonmeteor.org