http://www.ivoa.net/pub/VOScienceIAUPrague/programme/index.html

Enrique Solano, LAEFF / SVO

The role of Science

VO is driven by science and it will become a science driver.

Although technology enabled, the Virtual Observatory must not be seen as a technological project only. Its final goal is to produce better, new and more efficient science.

Showing the science community the potential benefits of VO was a major and early task in the VO projects (NVO, AstroGrid, AVO,…).

Creation of Scientific WGs to provide advice to the project.

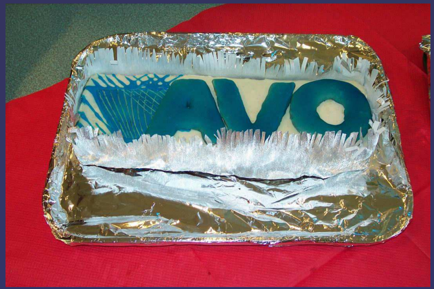
Elaboration of lists of VO use cases with a clear definition of the science requirements.

The AVO Scientific Demonstrations

- Annual scientific demonstrations based on more and more complex demonstrators.

J.Bank03

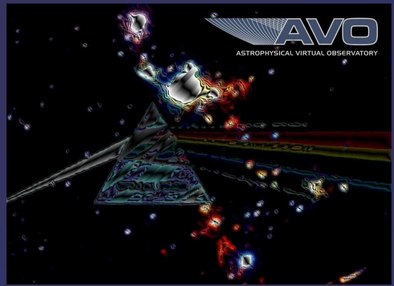
AVO First light



- Multi-waveband analysis of HDF(N)

Garching04

AVO 1st Science



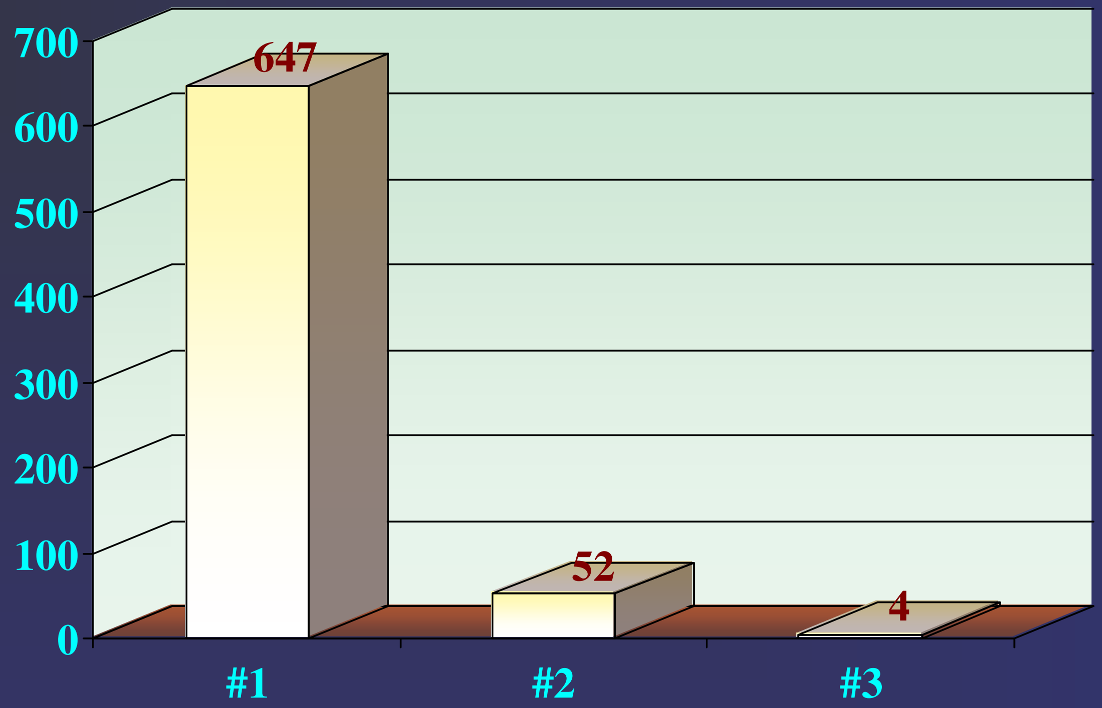
- Obscured quasars
- Star-Forming regions in the Milky Way.

ESAC05

Final Demo.

- AGB-PN transition
- Star formation in galaxies.
- .... and the tool

The VO factory. VO in ADS



#1 : “Virtual Observatory” in abstract from Jan 2000 to Sep 2006. All sources.

#2: “Virtual Observatory” in abstract from Jan 2000 to Sep 2006. Refereed publications.

#3: VO-Science refereed publications.

VO Science

Padovani et al (2004) demonstrates that VO was mature enough to produce cutting-edge science results.

First refereed astronomical paper enabled via end-to-end use of VO tools and systems.

A&A 424, 545–559 (2004)
DOI: 10.1051/0004-6361:20041153

Astronomy & Astrophysics

Discovery of optically faint obscured quasars with Virtual Observatory tools

P. Padovani[1], M. G. Allen[2], P. Rosati[3], and N. A. Walton[4]

Discovering type 2 quasars

- Seyfert 2's high-power counterparts. Characterized by narrow lines and hard X-ray emission ($L_x > 1e44$ erg/s).

- Data: X-ray catalogue for the two GOODS fields (Alexander et al. 2003)

- Filtering: HR ≥ -0.2 for absorbed sources   294 found

  HR=(H-S) / (H+S); H = (2.0 - 8.0 keV), S = (0.5 – 2.0 keV)

- Cross-matching with the GOODS ACS catalogues to get the optical counterparts   168 matches.

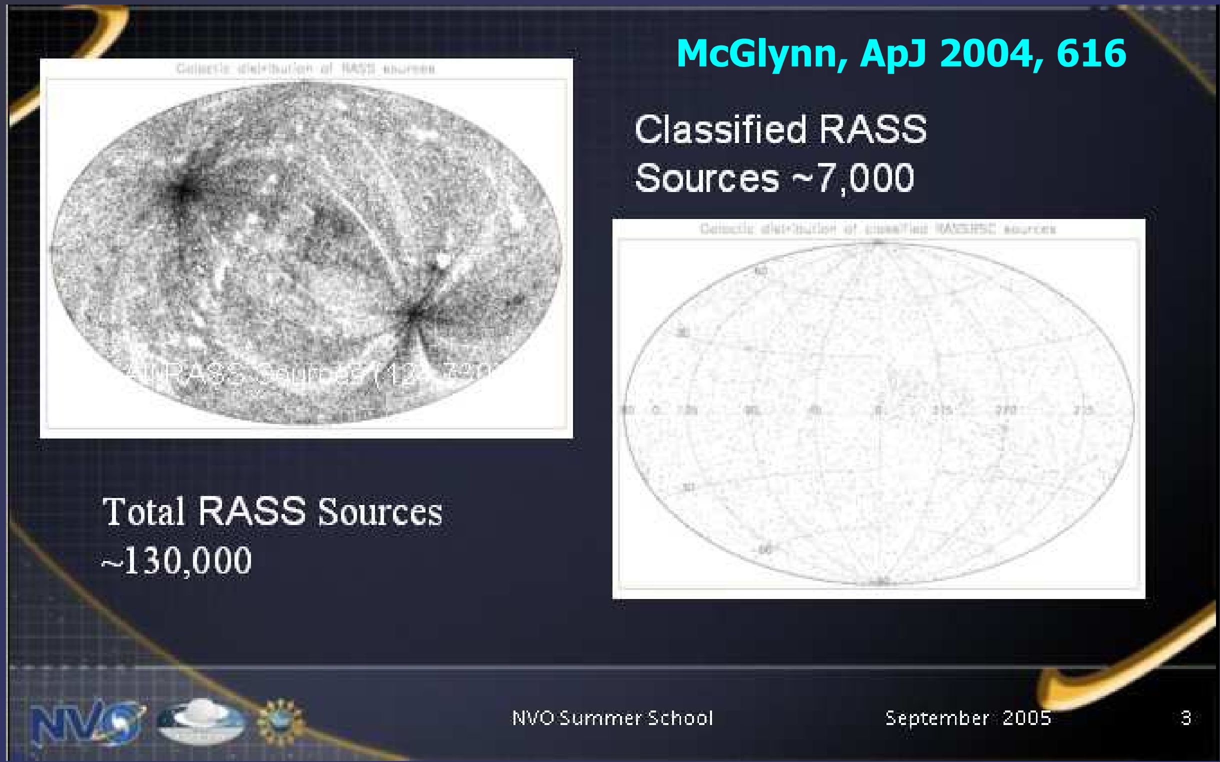
- Data manipulation: Log L (2-10) = log f(2 – 10 keV) / f(R) + 43.05 (Fiore03)

- Results:

- 31 new QSOs 2 (only 9 previously known). QSOs-2 are heavily reddened falling through the "standard" (optical) selection methods.

- 3 mag. fainter than before   New region of redshift-power space.

Data mining and interoperability in action: classification of ROSAT sources



- Find counterparts to ROSAT X-ray sources in optical, IR, radio.
- Train a classifier to use multi-λ information to determine type of objects.
- Classify the sources in ROSAT catalogues in six class categories: stars, WD, X-ray binaries, galaxies, AGNs, and clusters of galaxies.

VO Science (II)

A&A 447, 89–95 (2006)
DOI: 10.1051/0004-6361:20053142

Astronomy & Astrophysics

Luminous AGB stars in nearby galaxies

A study using virtual observatory tools*

P. Tsalmantza[1], E. Kontizas[2], L. Cambrésy[3], F. Genova[3], A. Dapergolas[2], and M. Kontizas[1]

[1] Department of Astrophysics Astronomy & Mechanics, Faculty of Physics, University of Athens, 15783 Athens, Greece
e-mail: vivitsal@phys.uoa.gr
[2] Institute for Astronomy and Astrophysics, National Observatory of Athens, PO Box 20048, 11810 Athens, Greece
[3] Observatoire Astronomique de Strasbourg, 67000 Strasbourg, France

Received 28 March 2005 / Accepted 20 September 2005

- Search of massive carbon stars (dust-enshrouded, not detectable in the optical) making use of 2MASS and appropriate filtering criteria.
- Complements the existing AGB catalogues (most of them in the optical domain).

Are active regions that emerge near existing Active Regions more flare productive than those that emerge isolated?

Solar Active Region emergence and flare productivity

S Dalla[(1)], L Fletcher[(2)] and NA Walton[(3)]

[(1)]School of Physics & Astronomy, Univ of Manchester

[(2)]Dept of Physics & Astronomy, Univ of Glasgow

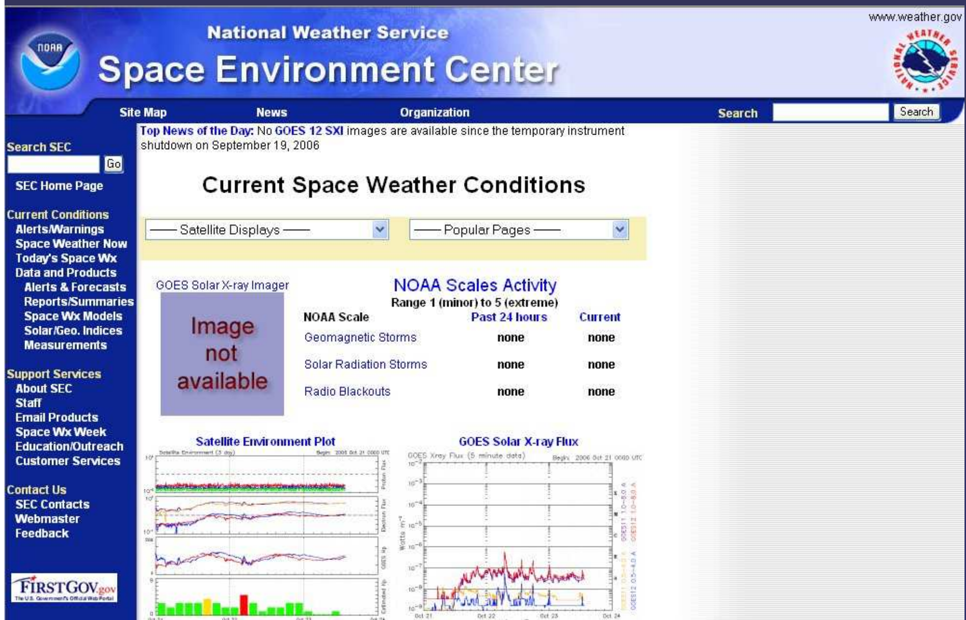
[(3)]Institute of Astronomy, Univ of Cambridge

A PPARC funded project

The workflow

Three steps:

- Identification of new Active Regions
- Study the location of emergence with respect to pre-existing regions.



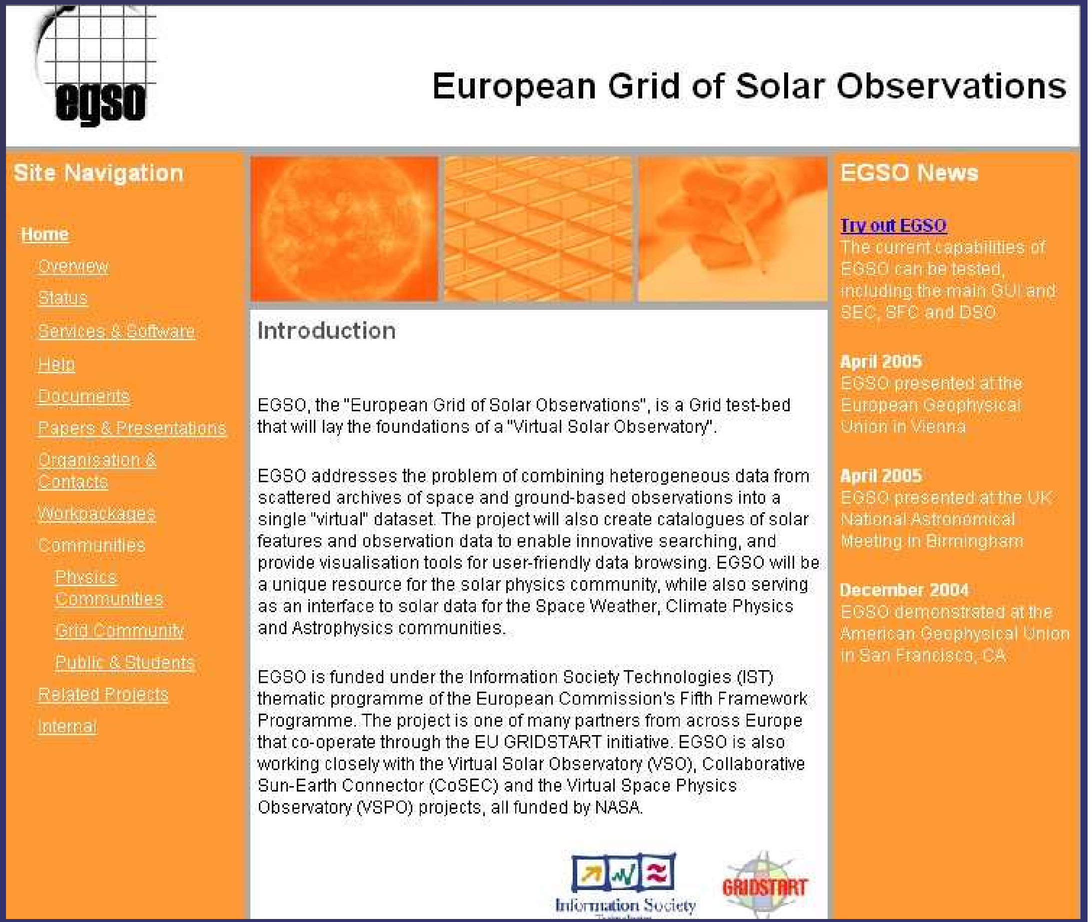

```
====================================================
                         SAMPLE

Product: 1126SRS.txt
:Issued: 2004 Nov 26 0040 UTC
# Prepared jointly by the U.S. Dept. of Commerce, NOAA,
# Space Environment Center and the U.S. Air Force.
#
Joint USAF/NOAA Solar Region Summary
SRS Number 331 Issued at 0030Z on 26 Nov 2004
Report compiled from data received at SWO on 25 Nov
I.  Regions with Sunspots.  Locations Valid at 25/2400Z
Nmbr Location  Lo  Area  Z   LL   NN Mag Type
0704 N13W17   145  0070 Dao  06   06 Beta
0705 S04W95   223  0060 Cao  07   03 Beta
0706 S08E56   072  0070 Dao  07   06 Beta
0707 S15E57   071  0110 Cao  06   06 Beta
IA. H-alpha Plages without Spots.  Locations Valid at 25/2400Z Nov
Nmbr  Location  Lo
0703  N13W44   172
II. Regions Due to Return 26 Nov to 28 Nov
Nmbr Lat    Lo
0696 N08    027

====================================================
```

The workflow

Three steps:

- Identification of new Active Regions
- Study the location of emergence with respect to pre-existing regions.

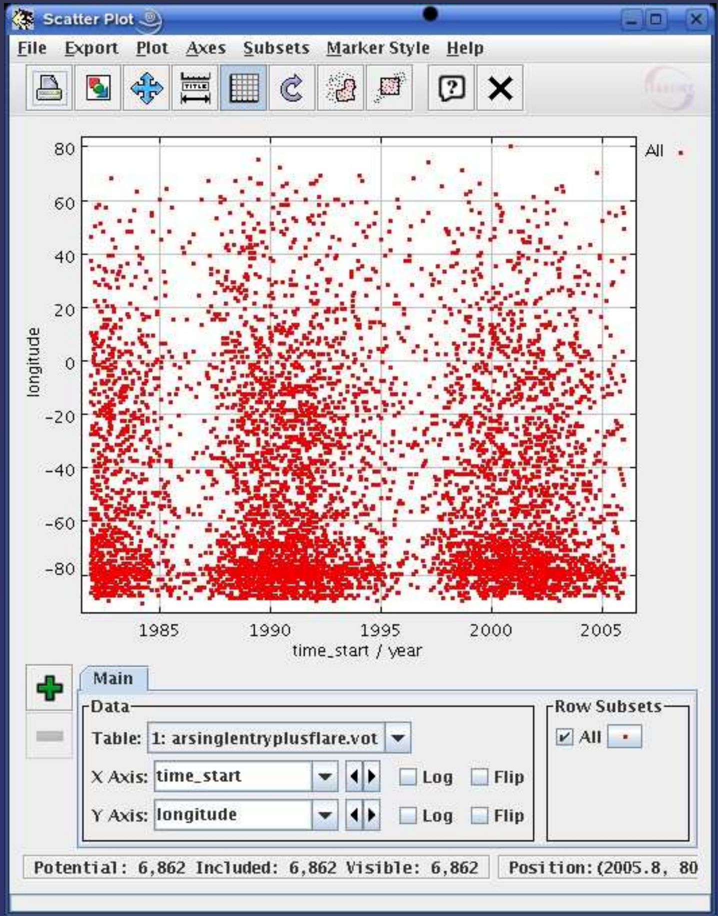
VO compliance by EGSO.

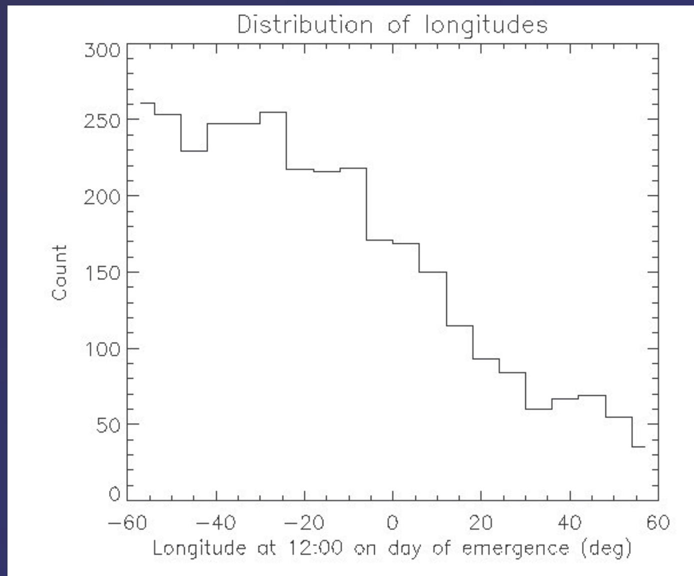


The workflow

Three steps:

- Identification of new Active Regions
- Study the location of emergence with respect to pre-existing regions.





We find a strong asymmetry in the location of emergence of these new regions as viewed from Earth.
Eg: 825 regions in bin E60-E40, 177 in W40-W60 (4.7:1)

The workflow

Three steps:

- Identification of new Active Regions.
- Study the location of emergence with respect to pre-existing regions (paired vs isolated ARs)
- Query catalogues of flares to establish flare productivity.

GOES soft-X ray flare catalogue.

```
#  Prepared by the U.S. Dept. of Commerce, NOAA, Space Environment Center.
#  Please send comments and suggestions to SEC.Webmaster@noaa.gov
#
#               Last 30 Days Daily Solar Data
#
#                        Sunspot       Stanford GOES12
#         Radio   SESC     Area          Solar  X-Ray  ------ Flares ------
#         Flux  Sunspot  10E-6   New     Mean  Bkgd    X-Ray      Optical
#  Date   10.7cm Number  Hemis. Regions Field  Flux   C  M  X  S  1  2  3
#--------------------------------------------------------------------------
2006 09 23   70      13       20      0    -999  A0.0   0  0  0  1  0  0  0
2006 09 24   70      13       30      0    -999  A0.0   0  0  0  1  0  0  0
2006 09 25   70      11       10      0    -999  A0.0   0  0  0  1  0  0  0
2006 09 26   71      13       30      1    -999  A0.0   0  0  0  0  0  0  0
2006 09 27   72      11       20      0    -999  A1.3   0  0  0  0  0  0  0
2006 09 28   73      36      120      3    -999  A1.4   0  0  0  0  0  0  0
```

VO compliance by EGSO

Productivity of paired/isolated

	Paired	Isolated
Regions with flares (%)	16.2±2.0	14.3 ±1.2
Mean flare number	0.35 ±0.03	0.30 ±0.02

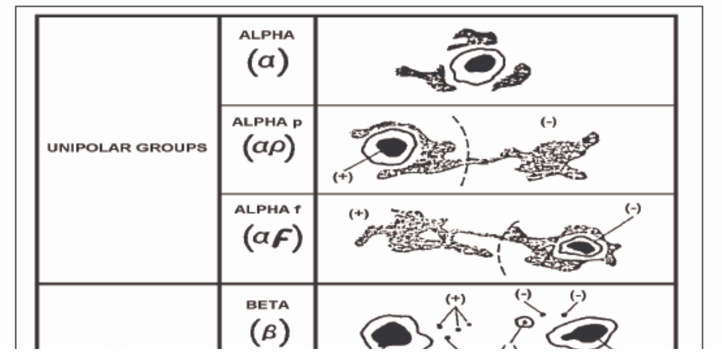
No clear indication that being 'paired' makes a region or its companion more flare productive.

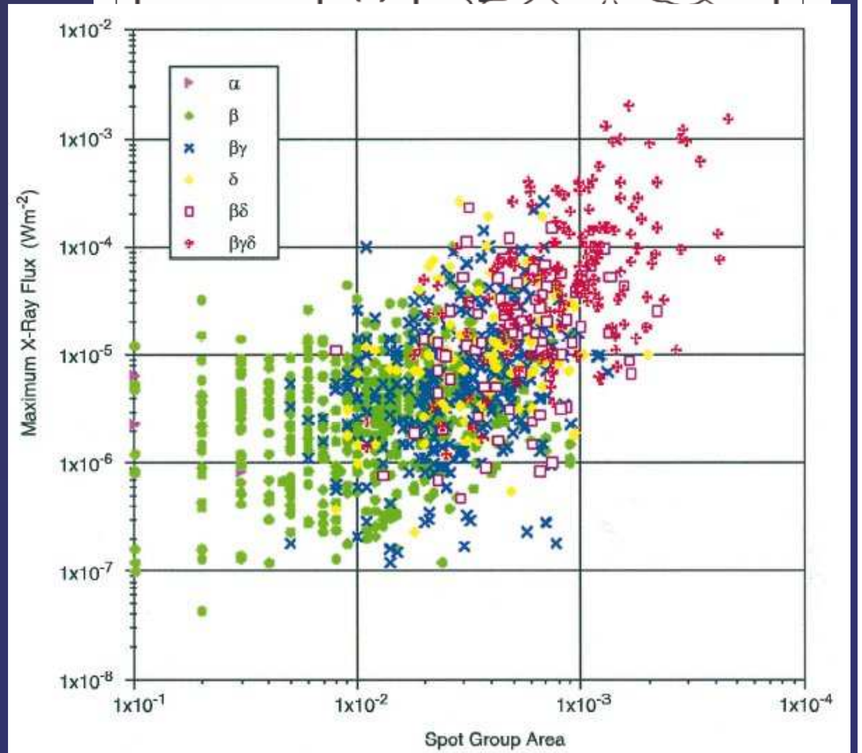
Newly emerged regions have low flare productivity.

Magnetic complexity of new/old regions

Subset	number of ARs	α (%)	β (%)	$\beta\gamma$ (%)	$\beta\delta$ (%)	$\beta\gamma\delta$ (%)
All	2880	10	73	11	0.8	5.2
old regions	1003	8	61	18	1.6	11
NE regions	1496	10	82	6	0.3	1.7
companions (α=12)	468	6	72	13	0.6	7

Figure 3.4. Mount Wilson Magnetic Classification System.





Newly emerged region are considerably simpler than older regions.

In agreement with Sammis et al. (2000) who pointed out a strong dependence of flare productivity and magnetic complexity.

First step to

Massive physical and dynamical characterization of asteroids

W. Thuillot[1], J. Berthier[1], A. Sarkissian[2], A. Mickaelian[3], L. Sargsyan[3], J. Iglesias[1], V. Lainey[1], M. Birlan[1], G. Simon[4]

[1] Institut de mécanique céleste et de calcul des éphémérides (IMCCE), Paris Observatory, France

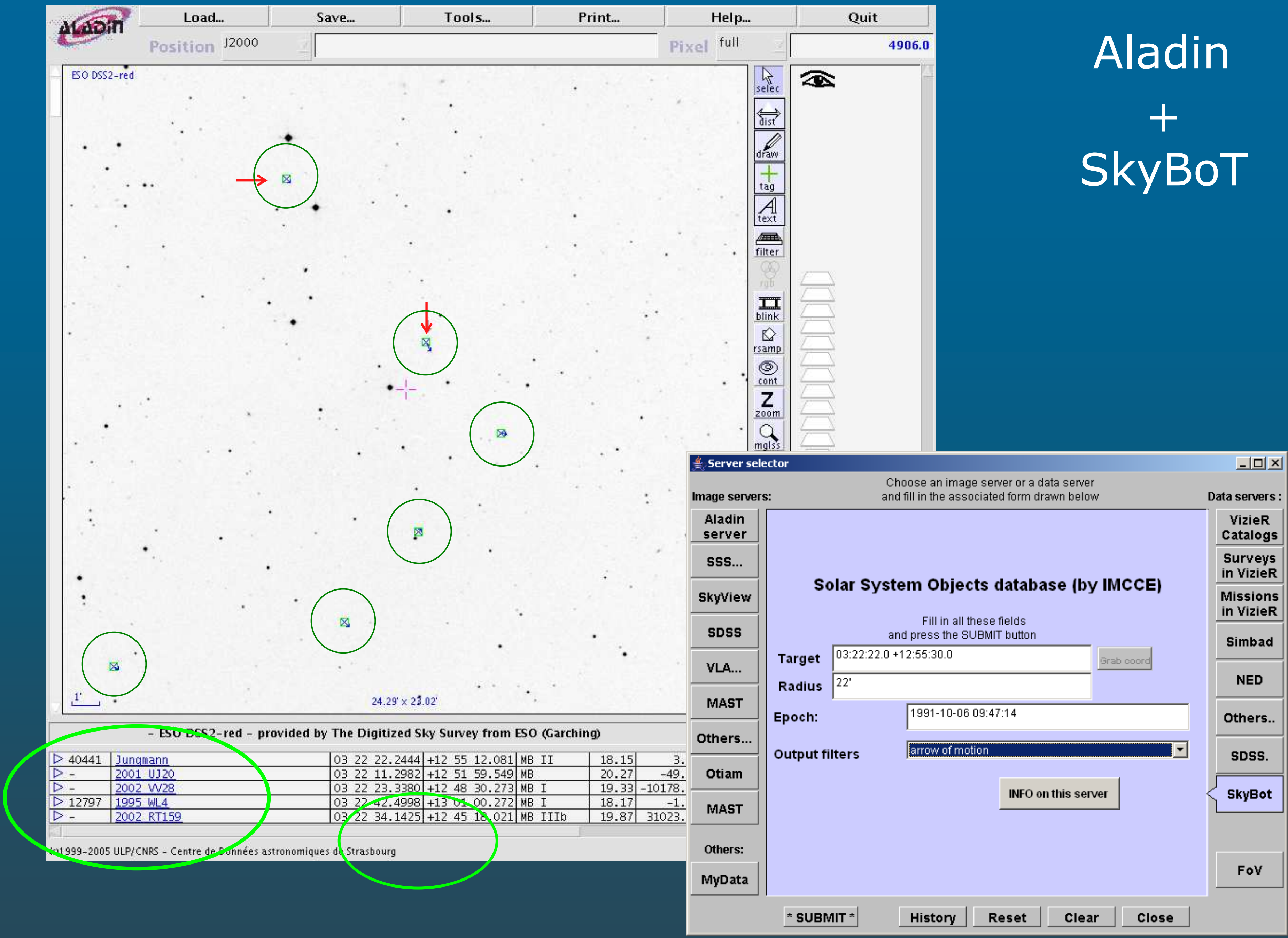
[2] Service d'Aéronomie, Institut Pierre Simon Laplace, France

[3] Byurakan Astrophysical Observatory, Armenia

[4] GEPI, Paris Observatory, France

IAU UAI PRAGUE 2006
26th General Assembly

Aladin + SkyBoT



Asteroids in DENIS

IR classification of asteroids may contribute significantly to the mineralogical knowledge of their surface.

Goal (I): Performing of a complete study of the solar system bodies in DENIS.

Procedure:

Identification of asteroids in DENIS plates using SKYBOT

Color confirmation: (previous work by Baudrand 2001,2004)

$$0 < (V-I) < 1.5$$

$$0.5 < (V-J) < 2$$

$$1 < (V-K) < 3$$

Goal (II): Spectroscopic characterization of these objects using FBS.

Asteroids in DENIS/FBS

1965 – 1980 Byurakan Observatory (Armenia)

1m Schmidt telescope + objective prism

Sky coverage: DEC>-15°, all RA (except the Milky Way)

Total area: 17 000 deg^2

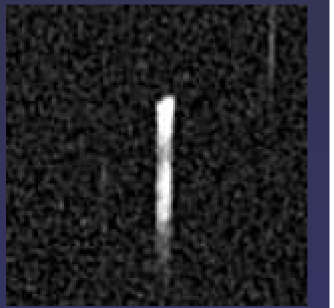
20 000 000 objects (spectra)

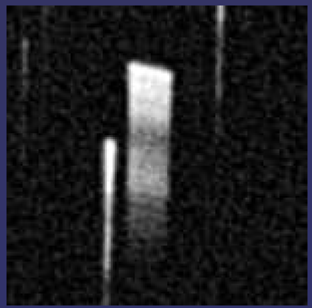
Limiting magnitude: 17.5 in V

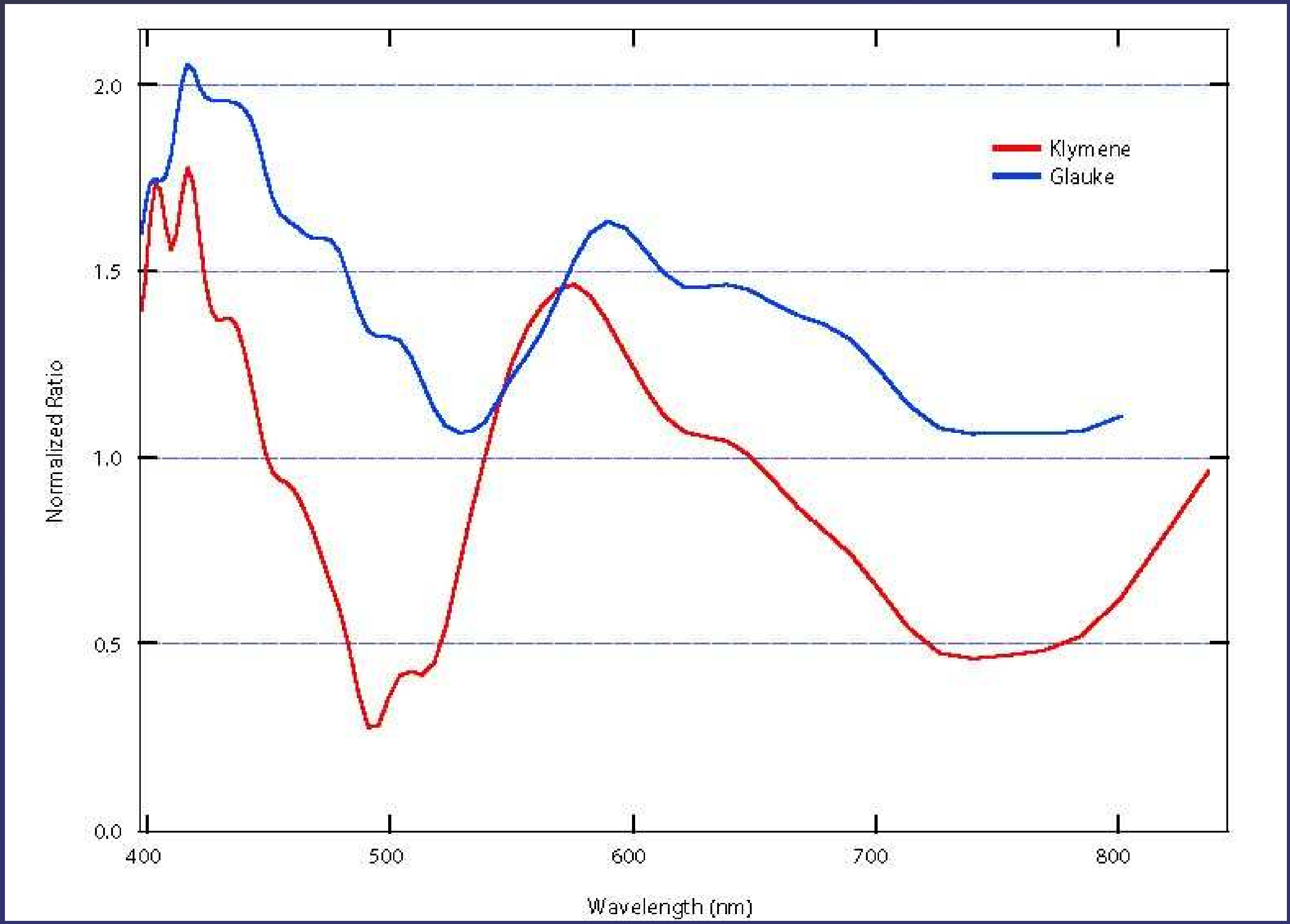
Spectral range: 3400 – 6900 A, resol. 50A

VO-compliant (ArVO)

Asteroids in DENIS/FBS







Large surveys and determination of interstellar extinction

Oleg Malkov (*Institute of Astronomy, Moscow)*
Erken Karimov *(Moscow State University)*

Prague, IAU GA XXVI, SPS3, Aug 17-22, 2006

The method

• Three-dimensional models (Av = f [l,b,d]) on photometric stellar data.

• Assumption: Uniform interstellar extinction law (Rieke & Lebofsky 1985)

λ	B	V	R	I	J	H	K
$E(B-\lambda)/ E(B-V) = k_\lambda$	0.	1.	1.78	2.60	3.22	3.55	3.74

• For every λ available in photometric survey:

calculate $(B-\lambda)$

$E(B-\lambda) = (B-\lambda) - (B-\lambda)_0$ Intrinsic color. Depends on sp. typ.

$E(B-V)_\lambda = E(B-\lambda) / k_\lambda$ Tabulated. Extinction law

• Assuming that a star satisfies the interstellar extinction law, we can expect $E(B-V)_\lambda$ be identical for every λ.

• Mean $E(B-V)_\lambda$ calculation, $E = n^{-1}\Sigma E(B-V)_\lambda$

• Minimization of $\Delta E^2 = \Sigma(E(B-V)_\lambda - E)^2$

$$A_V = 3.1 \cdot E(B-V)$$

$$\log r = 0.2 \cdot (B - M_B + 5 - A_B)$$

Pros and cons

- Advantages:

  Densification
  - 2′ test area: l=323, b=+6 (Lupus)

    - B(USNO-B), J(DENIS, 2MASS), H(2MASS), K(DENIS, 2MASS), available for 36 objects.
    - 0.0007 objects (on average) used in previous works.

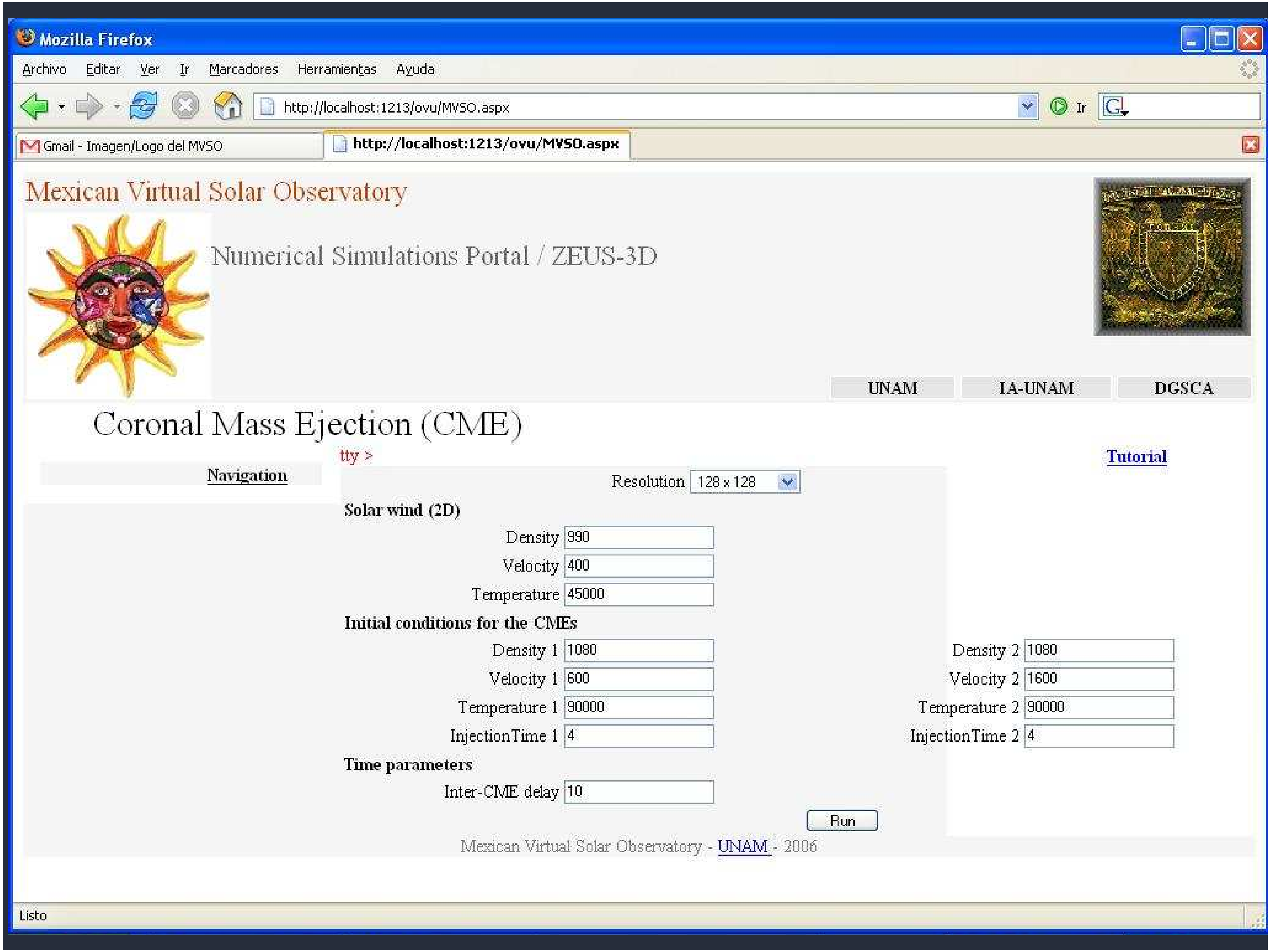
  Depth   Arenou: < 2 kpc. Malkov: < 10 kpc

  Other (including future) multi-wavelength surveys like DPOSS (3 bands), SDSS (5 bands), UKIDSS (3 bands), … can be incorporated using VO techniques.

- Limitations:

  Uniform interstellar extinction law. Local variations of the interstellar extinction are not taken into account.

  Variable stars (eclipsing binaries, pulsating stars,…) must be discarded.


Mozilla Firefox
Archivo Editar Ver Ir Marcadores Herramientas Ayuda
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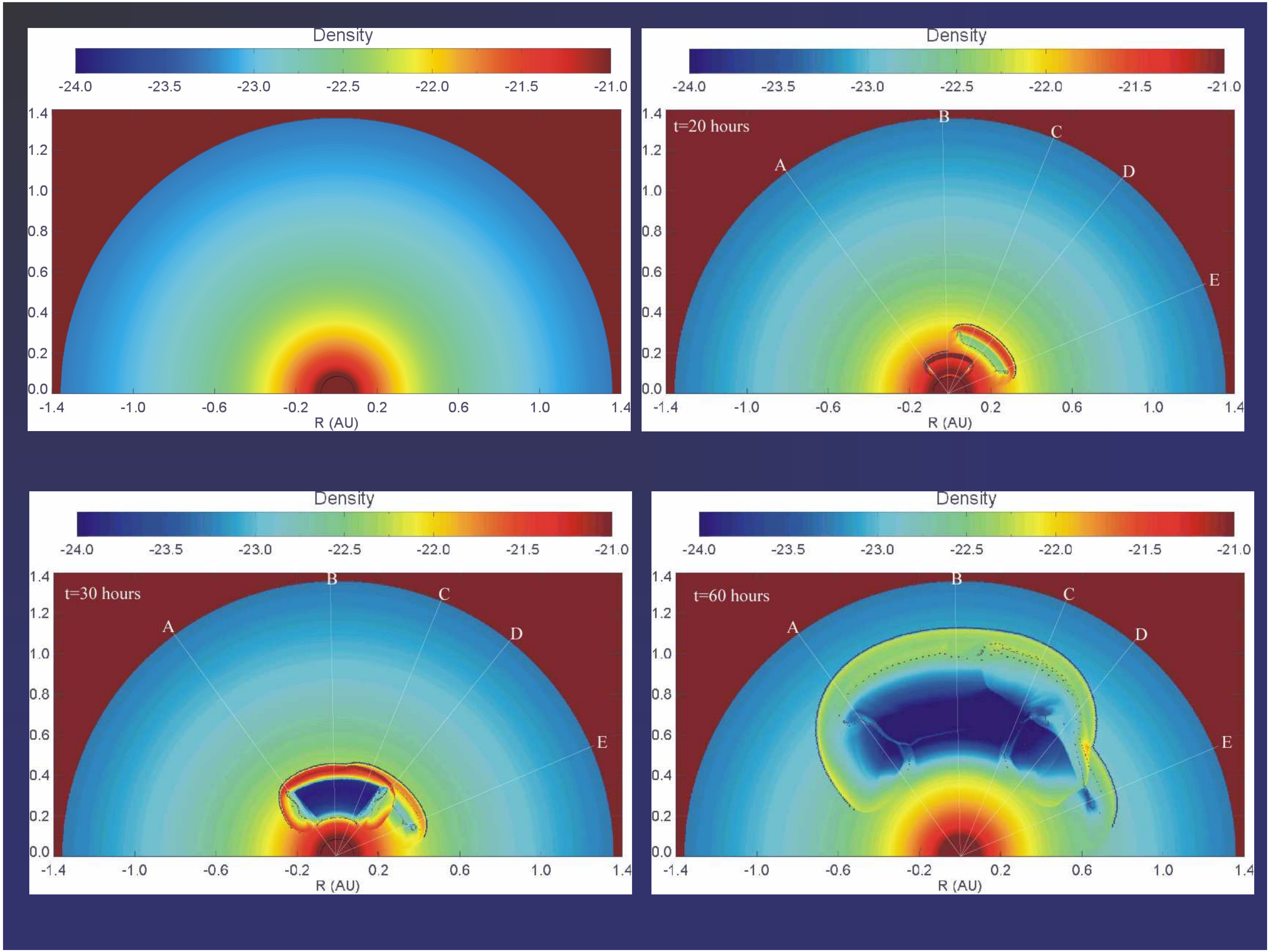
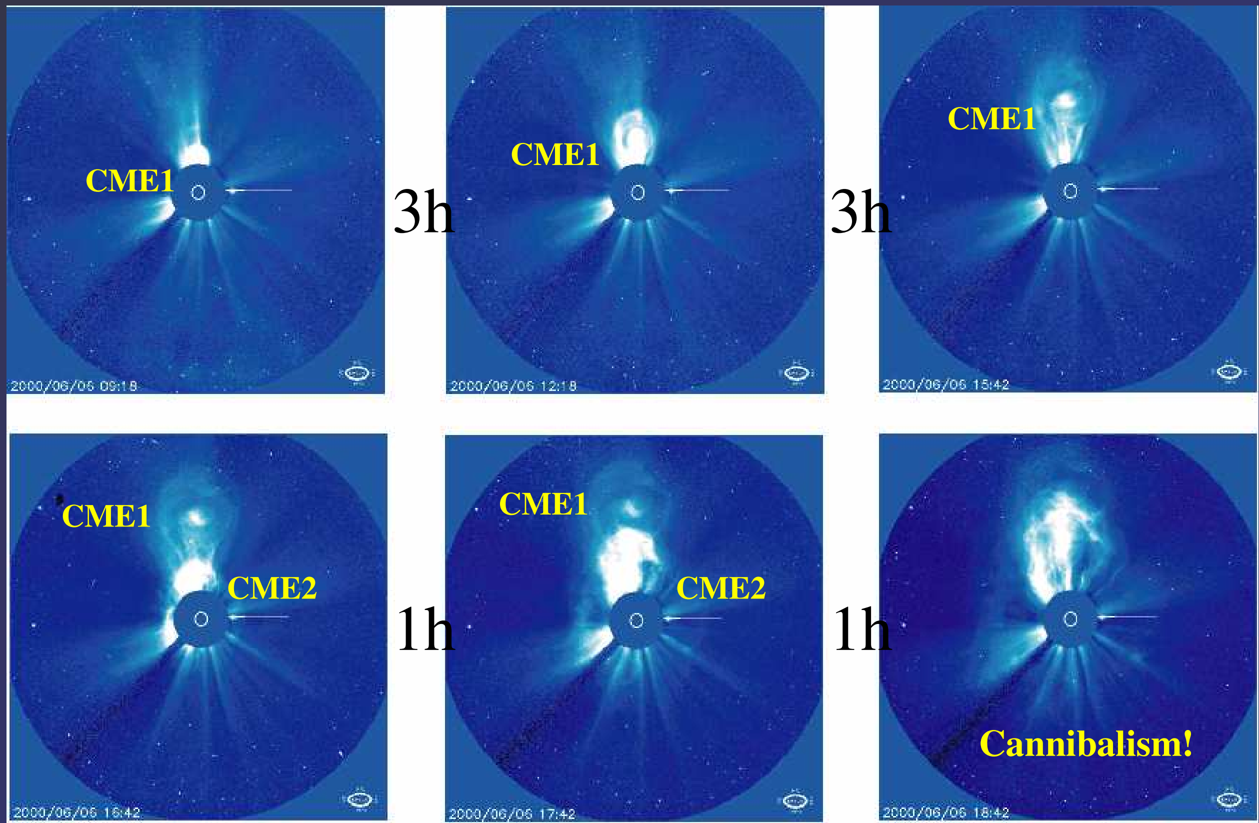
Ir
Gmail - Imagen/Logo del MVSO
http://localhost:1213/ovu/MVSO.aspx
Mexican Virtual Solar Observatory
Numerical Simulations Portal / ZEUS-3D
UNAM
IA-UNAM
DGSCA
Coronal Mass Ejection (CME)
tty >
Tutorial
Navigation
Resolution 128 x 128
Solar wind (2D)
Density 990
Velocity 400
Temperature 45000
Initial conditions for the CMEs
Density 1 1080
Velocity 1 600
Temperature 1 90000
InjectionTime 1 4
Density 2 1080
Velocity 2 1600
Temperature 2 90000
InjectionTime 2 4
Time parameters
Inter-CME delay 10
Run
Mexican Virtual Solar Observatory - UNAM - 2006
Listo


Density
-24.0
-23.5
-23.0
-22.5
-22.0
-21.5
-21.0
R (AU)
t=20 hours
t=30 hours
t=60 hours
A
B
C
D
E

Theory in the Virtual Observatory

Cannibal Coronal Mass Ejections



June 2000

- Fast-moving solar erruptions overtaking their slower-moving kin.
- These collisions change the speed of the eruption, which is important for space weather prediction.
- 21 cannibalistic ejections have been identified since April 1997.