

Космос и образование

<http://Cosmos2005.ulsu.ru>

Space Physics Practice at Ulyanovsk State University

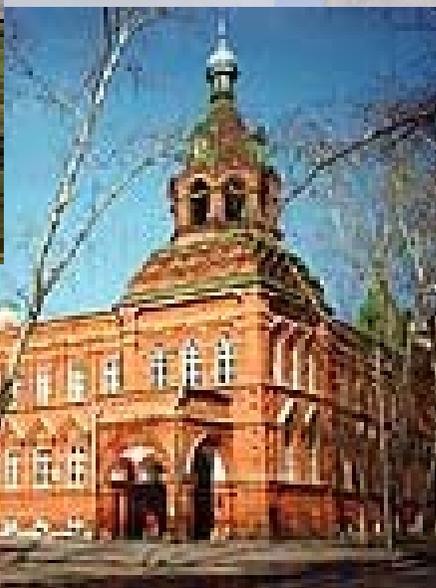
Zhuravlev V.M.

Universat, Moscow, 2006



ULYANOVSK STATE UNIVERSITY

Physics and technic faculty Department of theoretical and mathematical physics



УЛЫАНОВСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

Физико-технический факультет

Кафедра теоретической и математической физики



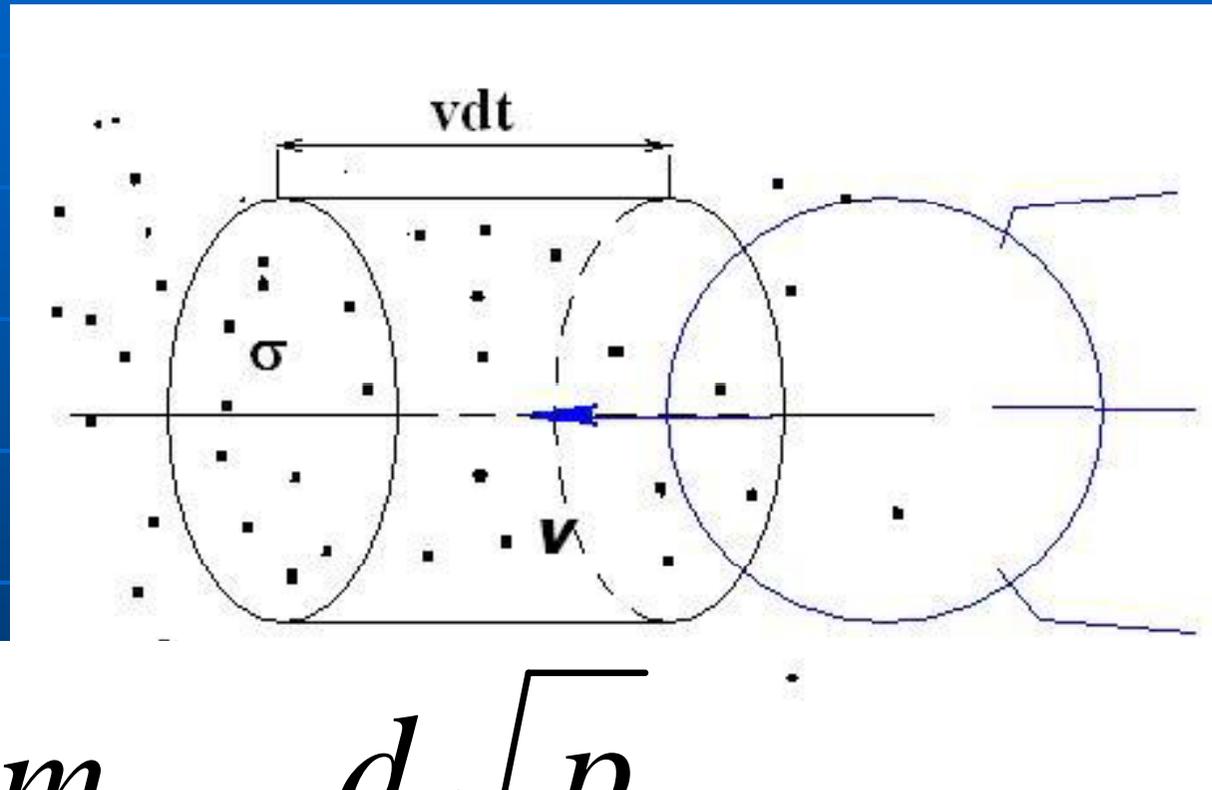
History Information

- Ulyanovsk State University was opened in 1989 as branch of Moscow State University in Ulyanovsk
- Ulyanovsk State University in 1995 became independent university

Space practicum tasks in a first version

- The estimation of atmosphere density on orbit of satellites (using NORAD data)
- The measurements of amplitude of second spherical harmonic of Earth gravitation field (using NORAD data)
- Simulation of Keplerian orbit in projection on the geographical map

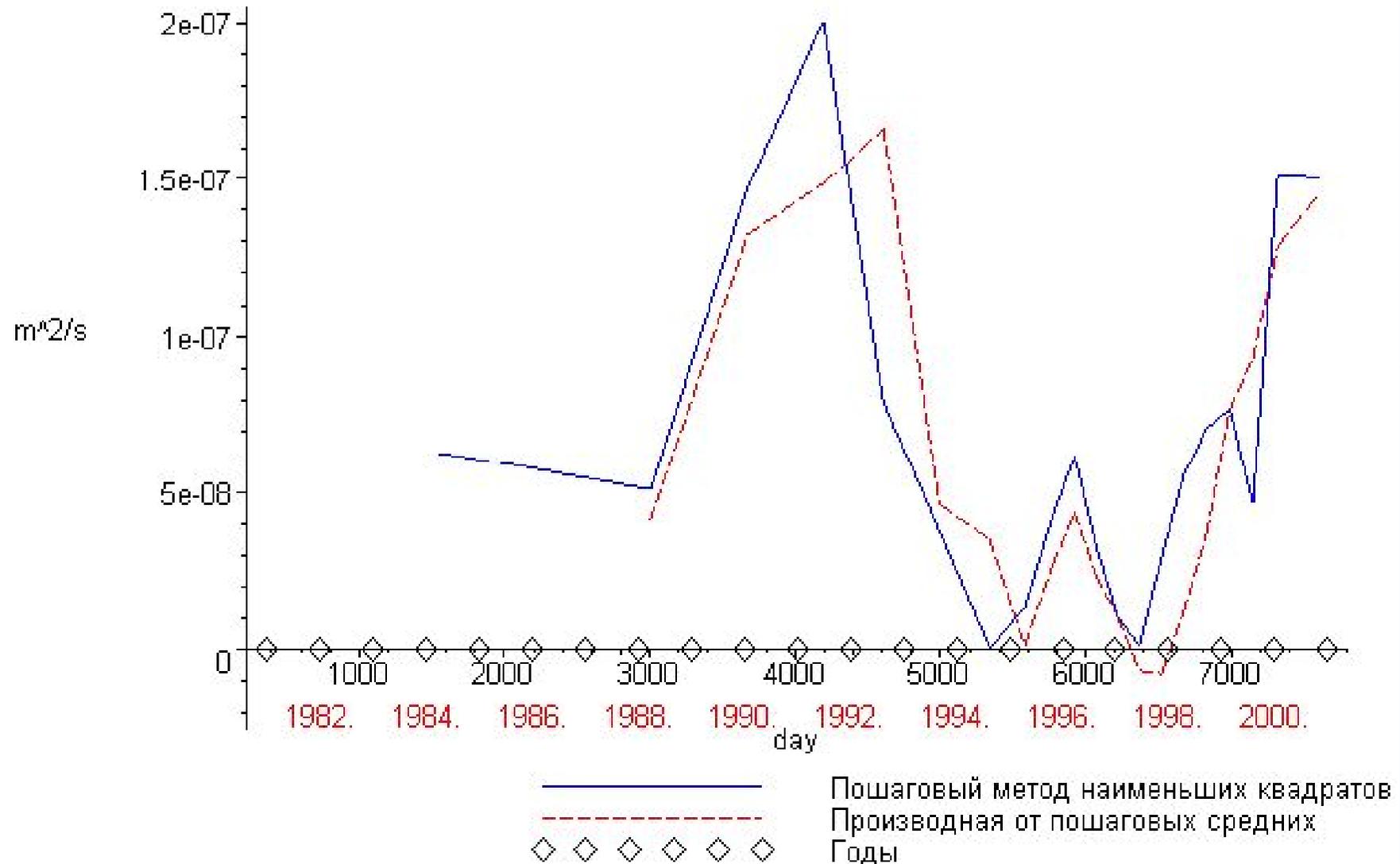
Estimation of atmosphere density (Shlyapin V.S.)



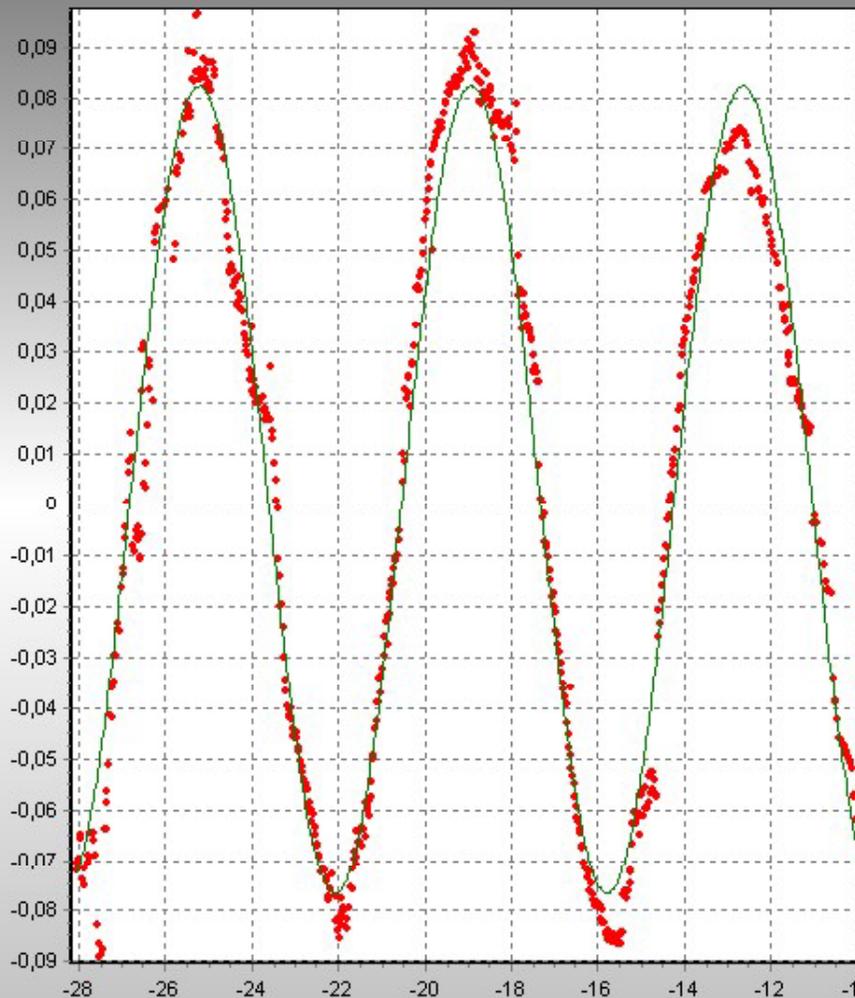
$$\rho = \frac{m}{\sigma \sqrt{MG}} \frac{d\sqrt{p}}{dt}$$

Estimation of atmosphere density

Удельный коэффициент сопротивления (METEOR2-06)



Estimation of amplitude of second harmonics of Earth gravitation field (Fundaev S.V.)



Результаты

По данным средней аномалии

Линейная аппроксимация: $M = At+B$

A: ±

B: ±

Задача 4:

J2:

dJ2:

Гармоническая аппроксимация: $M = A\cos(wt)+B\sin(wt)+C$

A: ±

B: ±

C: ±

Период: суток

J2:

dJ2:

По данным аргумента перигея

Линейная аппроксимация: $W = At+B$

A: ±

B: ±

Задача 3:

J2:

dJ2:

Гармоническая аппроксимация: $W = A\cos(wt)+B\sin(wt)+C$

A: ±

B: ±

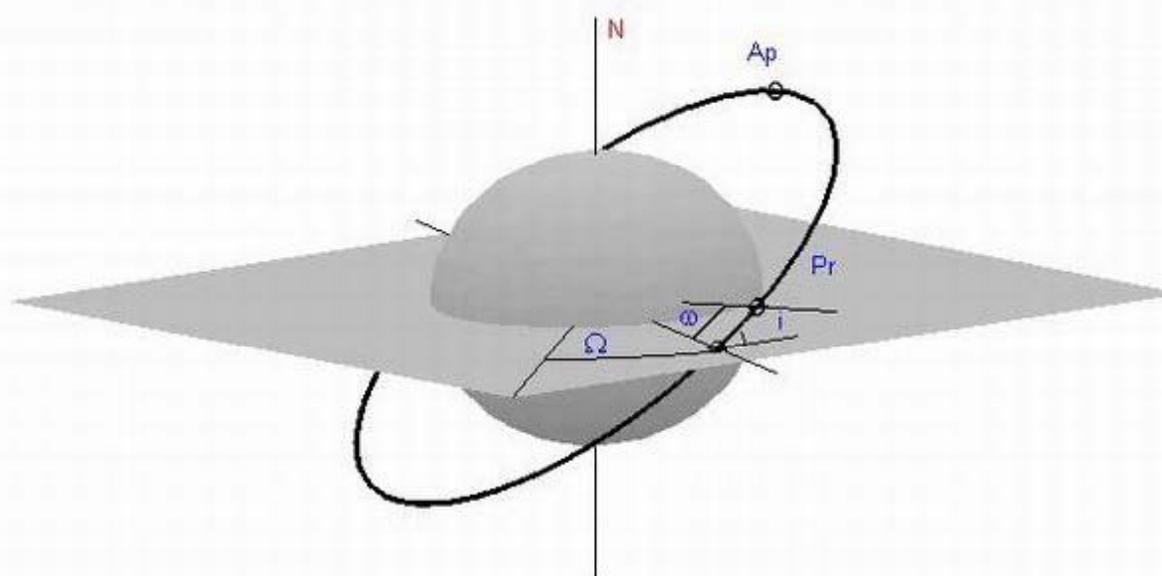
C: ±

Период: суток

J2:

dJ2:

Simulation of Keplerian orbits

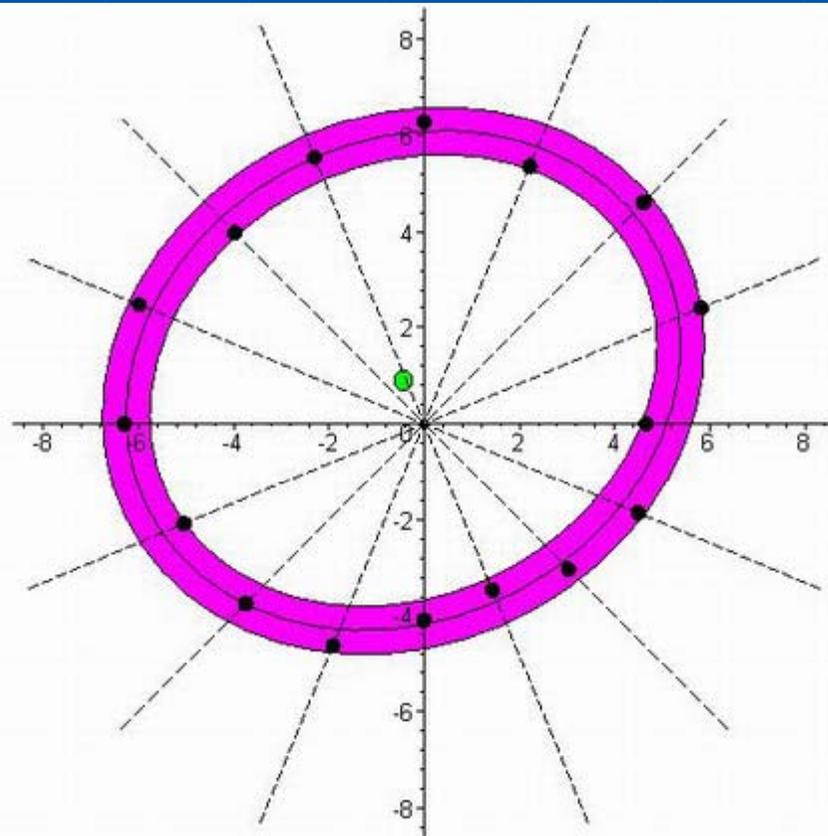


Scientific programs

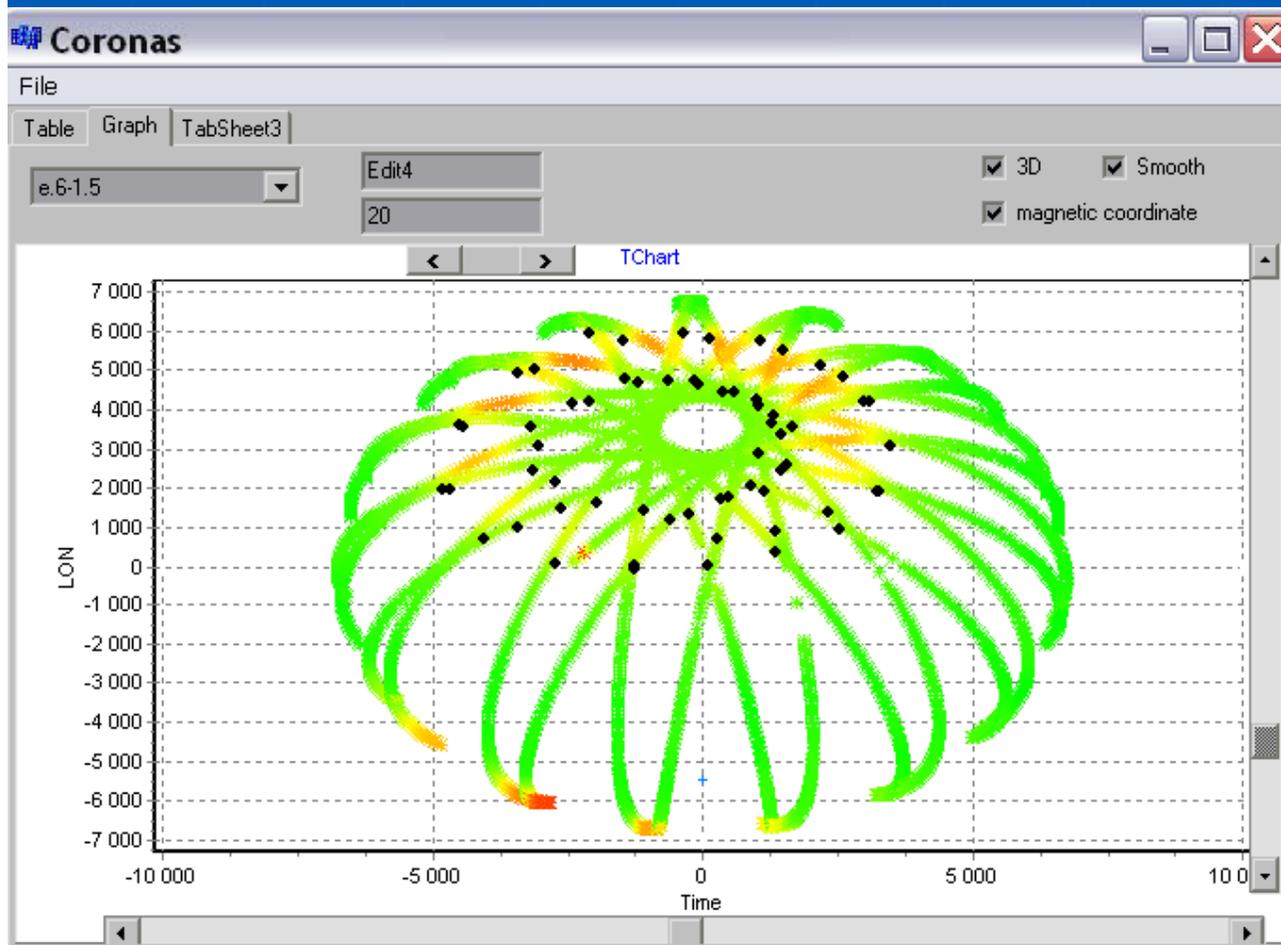
- Parameters of distribution of charged particles in Earth magnetosphere
- Dynamic of Sun spots
- Variation of magnetic field
- Spectral analysis from satellite antenna array

Parameters of distribution of charged particles in Earth magnetosphere (Slyapin V.A.)

Model of distribution

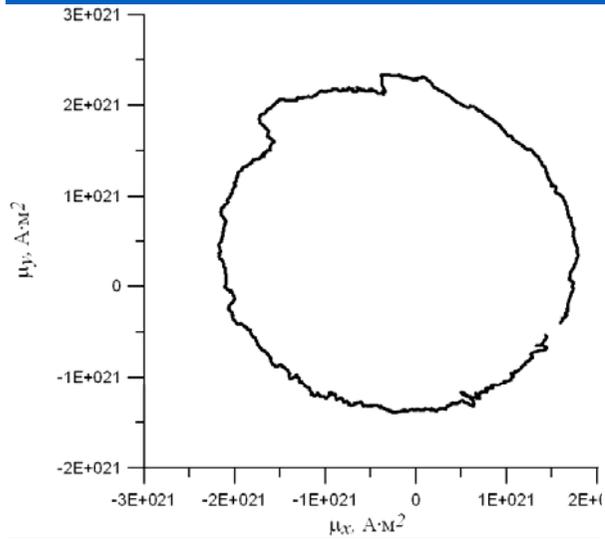


Parameters of distribution of charged particles in Earth magnetosphere (Slyapin V.A.)



Screen form
of program

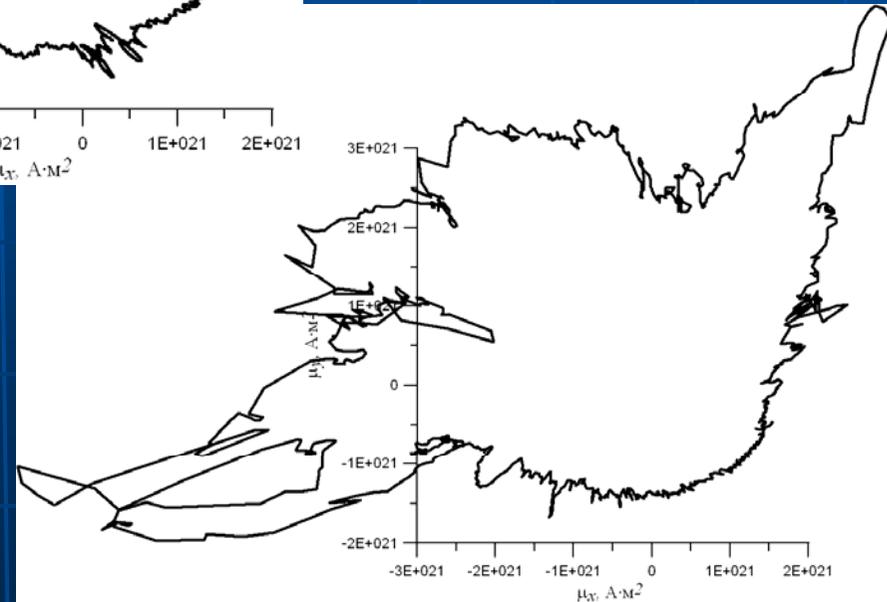
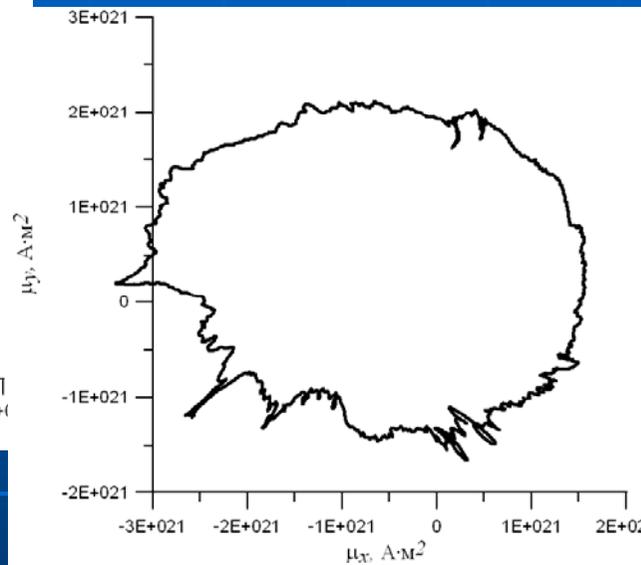
Structures of Earth magnetic field (Kornilov D.A., Mardasova Yu.A.)



19 April 2005,
GOES-10

21 April 2005,
GOES-10

22 April 2005,
GOES-10



Sun spots dynamic (Tyutyunnikov D.G.)

SAL (Sun Analysis Lab)

File Graph Analysis Interralsations Help

Series of images

- E:\Astronomie\DATA2\Sun23New.bmp
- E:\Astronomie\DATA2\Sun24New.bmp
- E:\Astronomie\DATA2\Sun25New.bmp
- E:\Astronomie\DATA2\Sun26New.bmp
- E:\Astronomie\DATA2\Sun27New.bmp
- E:\Astronomie\DATA2\Sun28New.bmp
- E:\Astronomie\DATA2\Sun29New.bmp
- E:\Astronomie\DATA2\Sun30New.bmp

Year: 2000
Month: March
Day: 1
Hour: 14
Minute: 0

Add Delete Clear

Load list Save list S...

Analysis

0%

Index Time

Units of time

- Years
- Months
- Days
- Hours
- Minutes

View spots

Save spot list

Save image list

OK Help

SAL
(Sun Analysis Lab)
(Module of program complex Satellite)

Version 1.0
Copyright (C) 2006

Comments: Programmer: Tyutyunnikov Dmitrij, Adress: Russia, Ylianowsk, Telephone Number: (8422) 61-96-55

Following web- sites contain archives of different solar images:

- www.spaceweather.com
- www.astrolab.ru
- www.nasa.gov
- www.astronet.ru

OK

Sun spots dynamic (Tyutyunnikov D.G.)

SAL (Sun Analysis Lab)

File Graph Analysis Interrelations Help

↑ ↓

S N

Si

Li Wi

Ti Fi

Index Time

Units of time

Years

Months

Days

Hours

Minutes

Plot errors

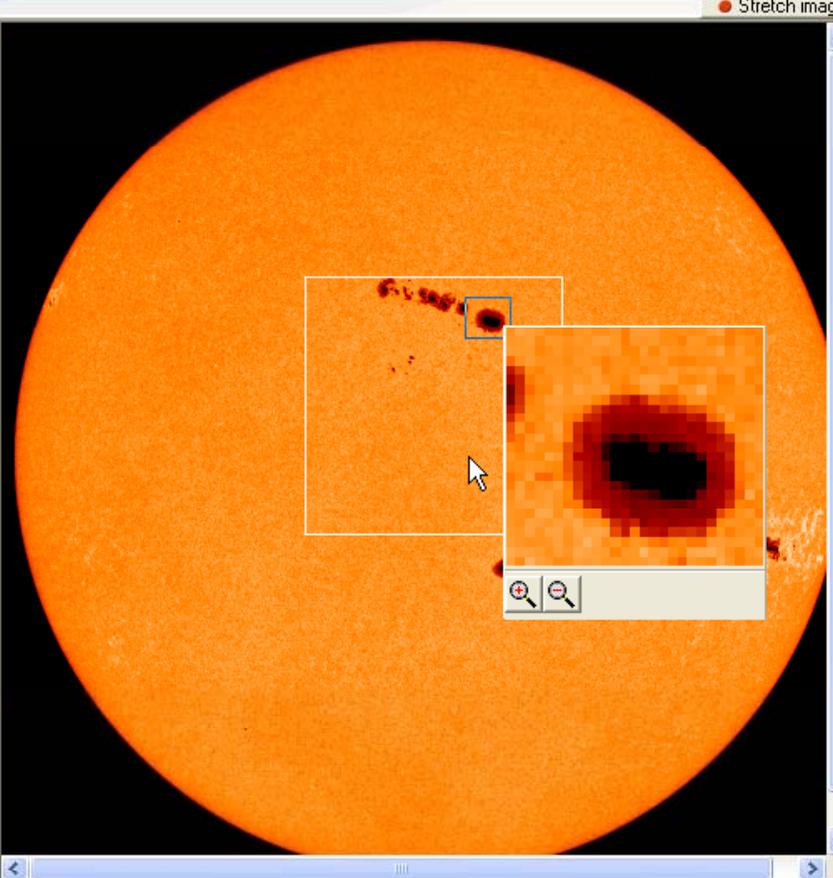
Save all in Data Base

View spots

Save spot list

Save image list

Stretch image



Area of spot selected: $1,768300 \cdot 10^9 \text{ km}^2$

Area of shadow: $6,527543 \cdot 10^8 \text{ km}^2$

Area of penumbra: $1,115545 \cdot 10^9 \text{ km}^2$

Length of spot: $4,568072 \cdot 10^4 \text{ km}$

Width of spot: $4,141502 \cdot 10^4 \text{ km}$

Spherical coordinates of spot: Phi: 81,93Grad; Theta: 71,42Grad

Coordinates of center of spot on image: X - 291 Y - 176

List of spots (use right button or drag and drop)

Image2: Spot12

Image2: Spot13

Image2: Spot12

Image3: Spot10

Image5: Spot14

Image6: Spot10

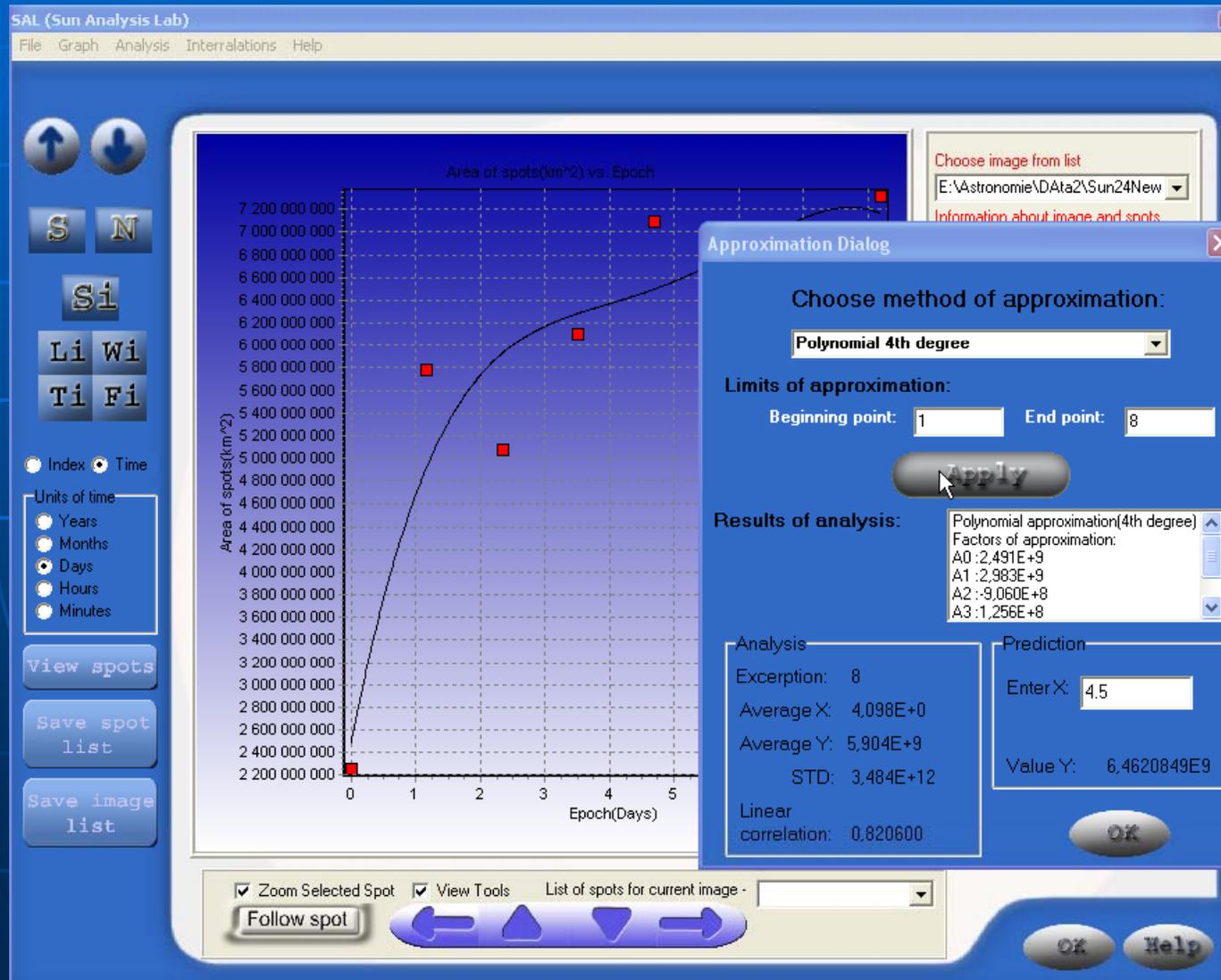
Image7: Spot16

Zoom Selected Spot View Tools List of spots for current image - STC

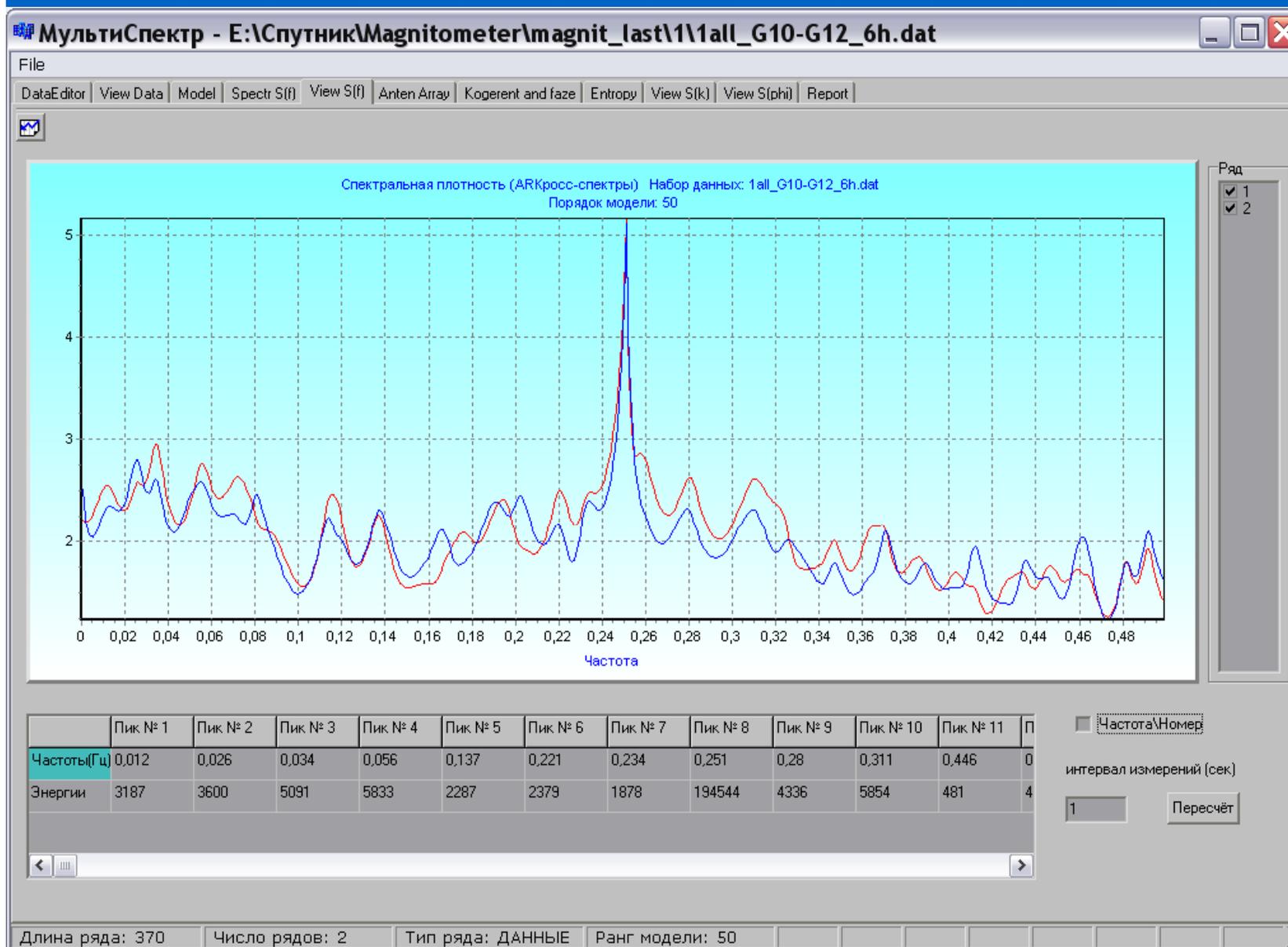
Follow spot

OK Help

Sun spots dynamic (Tyutyunnikov D.G.)

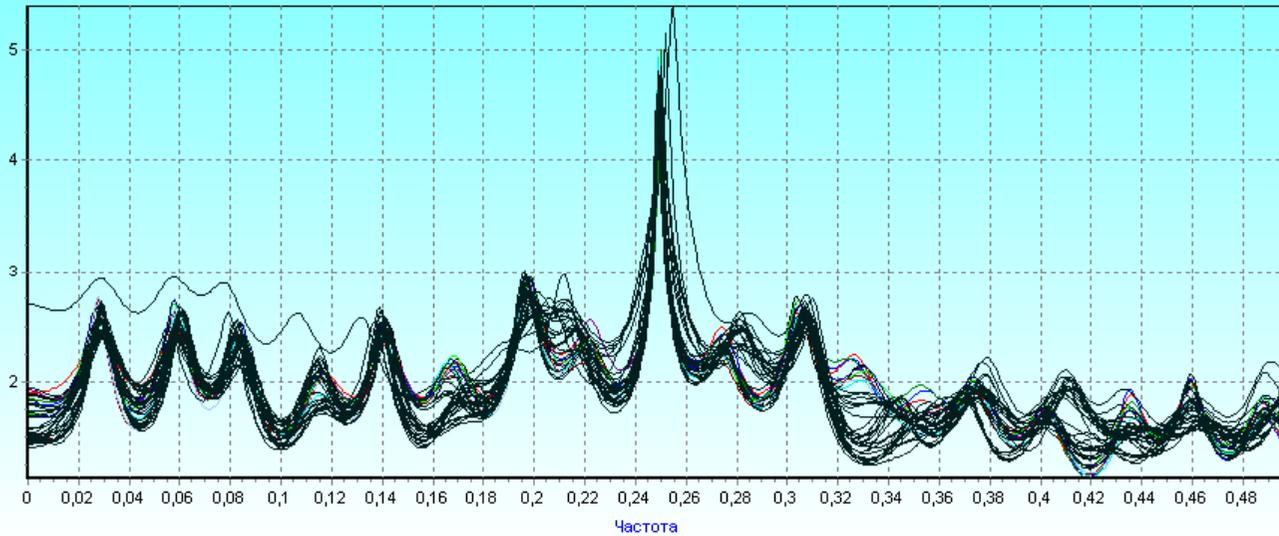


Spectral analysis



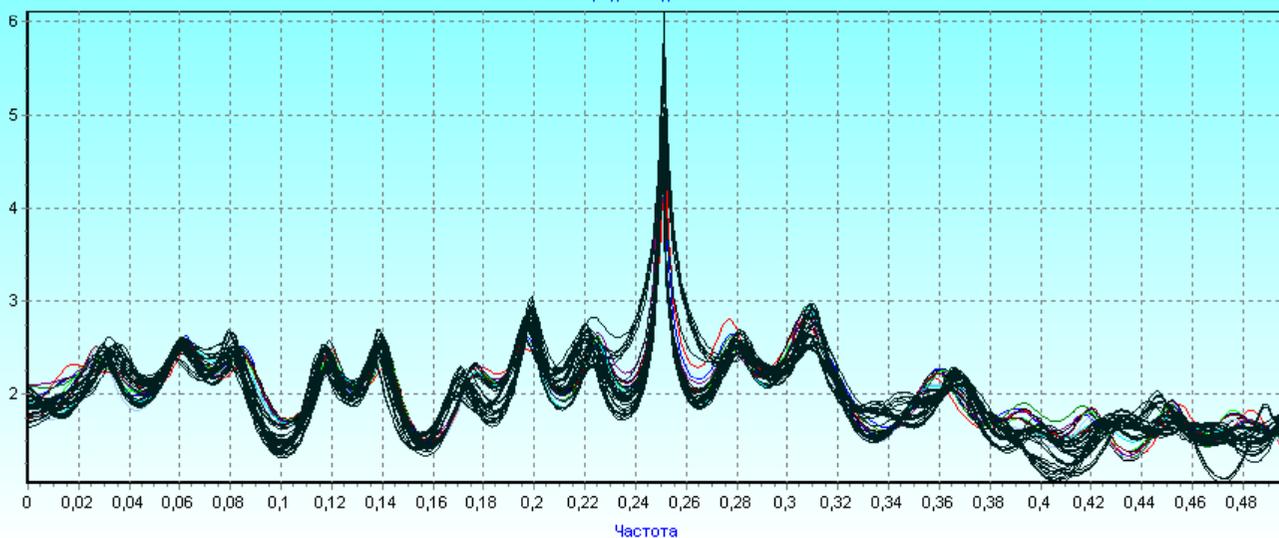
Spectral analysis

Спектральная плотность (AR-спектры) Набор данных: all_G12_6h.dat
Порядок модели: 40



GOES-12

Спектральная плотность (AR-спектры) Набор данных: all_G10_6h.dat
Порядок модели: 40



GOES-10



ULYANOVSK State University

Physics and technic faculty Department of theoretical and mathematical physics

Спасибо за внимание!
Thank you for attention!

<http://cosmos2005.ulsu.ru>

Ульяновский государственный университет

Universat, Moscow, 2006

Физико-технический факультет

Кафедра теоретической и математической физики

