EduCosmos: participative science for students

Olga Suárez, Philippe Bendjoya, Lyu Abe, Jean-Pierre Rivet

olga.suarez@oca.eu
Summary of the presentation

- EduCosmos: objectives and schema
- Origin: C2PU project (the history, refurbishing of the telescope, the images, the science)
- EduCosmos: the project
  - Teacher training
  - Observations
  - Scientific program
EduCosmos

- This project allows secondary-school classes to participate into a real research project lead by scientists from the « Observatoire de la Côte d’Azur » - Nice, France
- Students will use two 1-m telescopes belonging to a larger project based on research and education: C2PU – Centre Pédagogique Planète et Univers
- Telescopes located at 1200m altitude, and ~ 60 km from Nice
- Objectives:
  - To arouse students’ interest by scientific subjects
  - To introduce students to the scientific methodology
  - To bring scientists and teenagers closer to each other
Conceptual diagram of EduCosmos

- Teacher training
- Student formation
- Research
  - To arouse interest about science
  - To learn the scientific methodology
  - To encourage curiosity

Scientists
Teachers
Students
The C2PU project
(Centre Pédagogique Planète et Univers-
Center for education in Astronomy and Earth Sciences)

- Use of two 1-m telescopes for research and University education. C2PU team: J.P. Rivet, Ph. Bendjoya, L. Abe, O. Suarez (OCA)

- Old telescopes used in the 90’s for interferometry studies.

- Beginning of the refurbishing of the telescopes – June 2010

- First light of the West telescope – 2012
Mirror: transport-polishing; mechanics

Blank in Zerodur - diameter 106 cm

Polishing: David Vernet (Collège de France)
West telescope
First light

- West telescope first light in August 2012

Galaxy NGC891

Dentelles du Cygne
First light

M16 nebulae

Globular cluster M13
First light

Nébuleuse M20
(NGC6514)
« Trifide »

Nébuleuse NGC6946

Nébuleuse M20
(NGC6514)
« Trifide »
First light

M27

NGC7635
Last image (12th July 2013)
First scientific data

Star occultation by the asteroid Sylvia and its satellite – 5th January 2013
Collaborative work
Teacher training

- Objectives:
  - To provide teachers with the scientific knowledge necessary for the scientific program
  - Presentation of the possibilities of working with students

- Sessions teacher - students
  - Introduction to the scientific program
  - Scientific methodology
  - Preparation of observations
  - Preparation of data reduction

- Observations – 2 sessions during the school year
  - Remote or local
Research project

- Research project: asteroid lightcurve + asteroid occultations (Col: C2PU team, P.Tanga, M.Delbo-OCA)
- Data reduction: simplified method – comparison with professional treatment
- Online publishing of the data – collaborative work
- Interest: solar system on the school programs, asteroids-attractive subject
- GAIA – FUN (Follow-up network)
Teacher training

- First training scheduled on November 2013
- Agreement with national education
- One or two training courses per year – max. 15 teachers/course
- Plateau de Calern (Observatory) – 2 days + 1 night observation
- Astronomy:
  - General astronomy
  - Research program – asteroids: lightcurves, occultations:
    Description and context
  - The telescopes, observations, data reduction
- Pedagogy:
  - Approach to students
  - Adaptation of the scientific subject to the school curriculum
  - Organization of the work with the students
After the training: the teacher – students work

- Learning sessions between the teacher and students
- Depending on the class level
  - Approach to the scientific program
  - Approach to the scientific procedure
  - Session with the researches involved on the scientific program – possibility of direct interaction or via videoconference
  - Observation preparation
  - Learning of the data reduction procedure
The observations

- Possibility to observe remotely or locally - 2-3 hours sessions

- Remotely:
  - Need of a telescope operator at the Observatory
  - High-school opened during night hours
  - Guide of the observations in the classroom or by videoconference

- At the telescope:
  - Student trip to the Observatory
  - Possibility to sleep at the observatory
  - Real life of an observatory and the night sky
  - Cold!

- Students work in parallel by groups – importance of the preparation
Data analysis

- Simplified method
- Importance of rigorous analysis
- Help of EduCosmos team
- Reduced data available on-line
- Sharing of data with other teams
Estimate of participation

- 15 teachers/training course (participation of several teachers from the same center is encouraged)

- First year (2013/2014): 10-15 classes with 20 students each = 200 students

- Following years: teachers that have followed the training are allowed to continue in the project the following years + 15 new teachers/year

- Limit: 1 EduCosmos observation/week ~ 20-30 classes/year (~500 students)
International projection and funding

- Project with possibility of international opening – remote observing
- Possibility to participate to joint scientific projects with different institutions
- Possibility to share telescope time

- Funding:
  - OCA – telescopes C2PU, personnel
  - Local authorities
- Answer to European and French call for proposals
Thanks!