

# Stereoscopic 3D Projections with MITAKA An Important Tool to Get People Interested in Astronomy and Space Science in Peru

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Accepted: 14 September 2013

**Abstract.** National Astronomical Observatory of Japan has developed space simulation software "Mitaka". By using Mitaka on two PCs and two projectors with polarizing filter, and look through polarized glasses, we can enjoy space travel in three dimensions. Any one can download Mitaka from anywhere in the world by Internet. But, it has been prepared only Japanese and English versions now. We improved a Mitaka Spanish version, and now we are making projections for local people. The experience of the universe in three dimensions is a very memorable for people, and it has become an opportunity to get interested in astronomy and space sciences. A 40 people capacity room, next to our Planetarium, has been conditioned for 3D projections; also a portable system is available. Due to success of this new outreach system more 3D show rooms will be implemented within the country.

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**Keywords:** public outreach, astronomical education.

## Introduction

National Astronomical Observatory of Japan has developed space simulation software "Mitaka". Anyone can download Mitaka from anywhere in the world by Internet. (But, it has been prepared only Japanese and English versions now.) The URL is: <http://4d2u.nao.ac.jp/html/program/mitaka/>

3D System uses Mitaka released by NAOJ's 4D2U project, the project's goal is to visualize astronomical data in a way that helps watchers feel as if they are witnessing the unfolding of the universe. "Four dimensions" refer to the three dimensions of space and the one dimension of time embedded in their data. "Digital" refers to computer graphics visualizations of digital data. The resulting acronym is "4D2U", and it is also astronomy's way of saying "4D to you" (Kokubo et al., 2005).

The 4D2U project is created by and for astronomers, but it is really a gift to the world.

For astronomers, the goal is to provide a rare 3D view of data to help with research. Unrestricted explorations in 3D are essential tools for understanding modern observational data and computer simulations.

For everyone else, the goal is to present the latest research results in a way that is scientifically accurate, but also fun and easy to understand (Kokubo et al., 2005).

To reach these goals, 4D2U project developed 4D visualization platforms and content, in the form of an experimental 4D visualization theater and a library of data visualizations. The data include observations and theoretical models of astronomical objects, and

computer simulations of astronomical phenomena. Since the project began in 2001, since that fundamental techniques for visualizing these different types of data was established (Kokubo et al., 2005).

Geophysical Institute of Peru have installed a planetarium donated by the Government of Japan (Cultural Grant) in 2008, but due to the lack of Scientific Culture in people it is hard to have people visiting our planetarium. On the other hand, 3D movies become popular in different cinemas. People of Peru are not familiar with "Planetarium" yet, but they know that they can enjoy watching "3D" movies. So we installed a 3D System next to the planetarium, and visitors incremented considerably. 3D System helps students to better understand of the Universe, and also makes people to visit the Planetarium.

## Used hardware

- We run Mitaka software on two PCs, two DLP (Digital Light Processing) projectors with circular polarizing filters, and audience watches through circular polarized glasses.
- Images are projected on an aluminum painted screen. Then we can enjoy space travel in three dimensions. In our case, we painted the whole front wall of the meeting room. Our giant screen is about 10 m x 3 m.

Hardware requirements are:

- ✓ OS : Windows XP/2000.
- ✓ CPU : Pentium4 1.8GHz or better.
- ✓ RAM : 512MB or more.
- ✓ Hard Disk Space : 50MB or more.
- ✓ Graphics Adapter: GeForce 3 or better.

- ✓ Display Resolution: 1024x768 pixels (XGA) or more.

We use the following hardware:

- ✓ OS : Windows 7.
- ✓ CPU : Intel Core i7 2.2GHz.
- ✓ RAM : 8GB.
- ✓ Graphics Adapter: NVIDIA GeForce GT 525M
- ✓ Display Resolution : 1280x768 pixels.

One disadvantage of using aluminum painting for the screen is reflection; from any angle of view, reflection of projector's light is a little annoying. But this is a little price to pay in order to have a great inexpensive 3D System. Success of our system will allow the installation of new 3D projection systems at different places.

### Mitaka Spanish Version

In coordination with NAOJ's 4D2U project, we made a Mitaka Spanish version, and now we are making projections for local people. The experience of the universe in three dimensions is very memorable for people of different places in Peru, and it has become an opportunity to get them interested in astronomy and space science.

A 40 people capacity room, next to our Planetarium, has been conditioned for 3D projections. Also, a portable system is available. Due to success of this new outreach system, more 3D showrooms will be implemented.

Our 3D presentations began in December 2011. During the period in which we have had 3D shows, more visitors have attended both, the Planetarium and the 3D showroom. Visitors can get two experiences about astronomy. The effect of astronomy education in our visitors has increased.

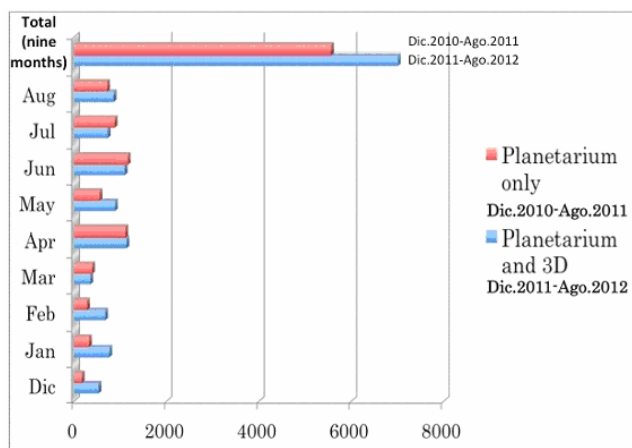


Fig1 No. of visitors (3D show started from Dec. 2011)

Fig.1 shows the number of visitors who have come to our Planetarium. During the period in which we have had 3D shows, more visitors have attended both, the Planetarium and the 3D showroom, although the above chart does not display this characteristic. With 3D means that we must make presentations twice: in

the planetarium and in the 3D showroom. Therefore, the difference is greater than that shown. The effect of astronomy education in our visitors became much greater. They have learned something new that was previously unavailable.

### Itinerant 3D System

With our portable Mitaka 3D System we have been able to make 3D presentations at:

- \*Astronomy Day (Lima, Capital of Peru; 300 visitors).
- \*University of Piura (Piura, 1050 km north from Lima; 250 visitors).
- \*Kuntur Wasi Museum (San Pablo, Cajamarca, 870 km northeast from Lima; 170 visitors).
- \*Magdalena de Cao, Salamanca and Cascas (Villages nearby Trujillo, 500 km north from Lima; 350 visitors).
- \*Ica (300 km south from Lima; 300 visitors).

In all of these places attendance was massive and people really enjoyed the presentations.

Our portable system requires a portable screen, so we painted with aluminum painting a 1.5 cm thick, 180 cm x 135 cm board.

### Conclusions

A 3D System is an important tool to get people of the world interested in astronomy and space science. Compared to the construction of a facility like a Planetarium, with a 3D System you can do astronomy education with only a relatively inexpensive purchase of equipment. Anyone can download Mitaka from anywhere in the world by Internet, and we can distribute a Mitaka Spanish version. By using a screen that can be carried, laptops and projectors, you can have a mobile Mitaka 3D system.

Let's get people of the world interested in astronomy!

### Acknowledgments

To the Japan International Cooperation Agency Senior Volunteer Program for letting me share my experiences in Astronomy Education to Geophysical Institute of Peru's Planetarium staff. To my colleagues of Japan Overseas Cooperation Volunteers around Peru, who supported me during Itinerant 3D projections at their working places. To the Geophysical Institute of Peru, for letting me do this job, what I really like, astronomy.

### References

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