



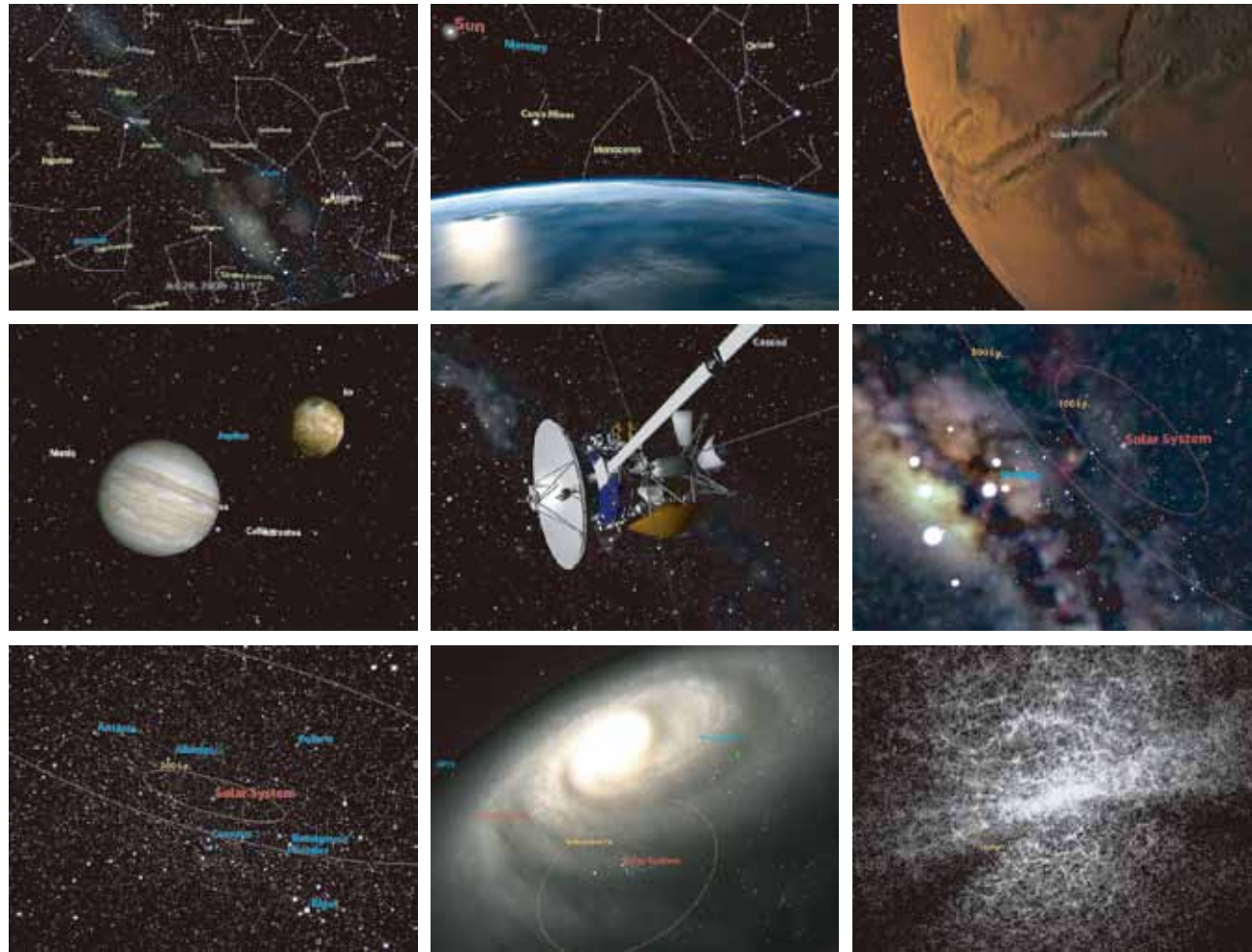
NATIONAL ASTRONOMICAL OBSERVATORY OF JAPAN
FOUR-DIMENSIONAL DIGITAL UNIVERSE PROJECT

4D2U

<http://4d2u.nao.ac.jp/>

Mitaka : The Four-Dimensional Digital Universe Viewer

Mitaka is software which visualizes the hierarchical structure of the Universe using data obtained from observations and numerical simulations. Users can seamlessly navigate across the Universe from Earth to the edges of the observable Universe. This software can be downloaded from the 4D2U website.



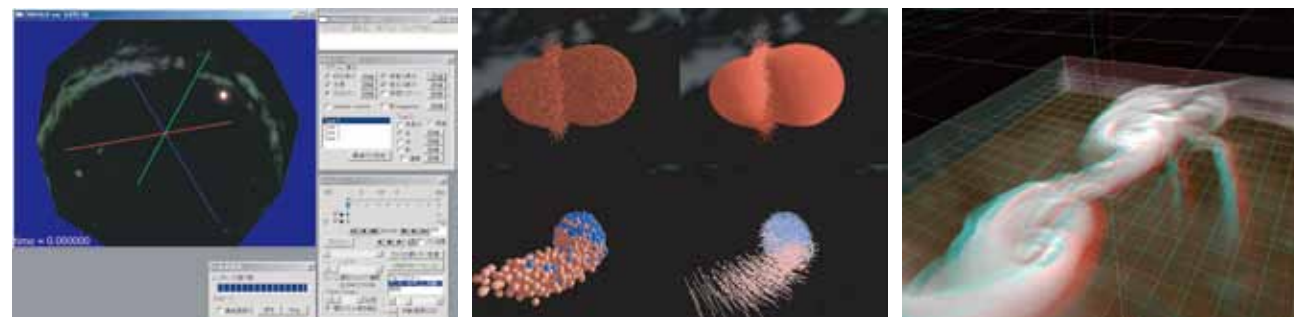
System Requirements:

OS : Windows 8/7/Vista/XP **CPU :** Pentium4 1.8GHz or better **Memory :** 512MB or more
Graphics Adapter: GeForce3 or better **Display Resolution :** 1024 x 768 pixels (XGA) or more
Hard Disk Space : 50MB or more

Zindaiji & Oosawa : Astronomical Many-body Simulation and Volume Data Visualizer

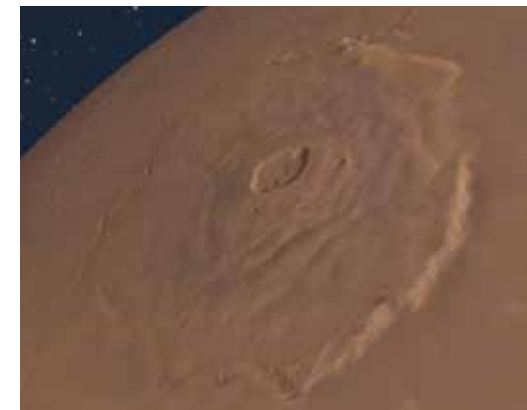
Zindaiji is software for visualizing the data of many-body simulations. Equipped with an intuitive interface, this software can show simulation results from any point of view and produce high quality movies.

Oosawa is a GUI front-end tool using Pov-Ray for ray tracing of volume data time series. Users can edit the movies using a timeline.



The 4D2U Project produces movies visualizing observational and computational data. The movies are available at the 4D2U website. The following pictures are examples from the movies.

Movies Based on Observational Data



Mars Exploration

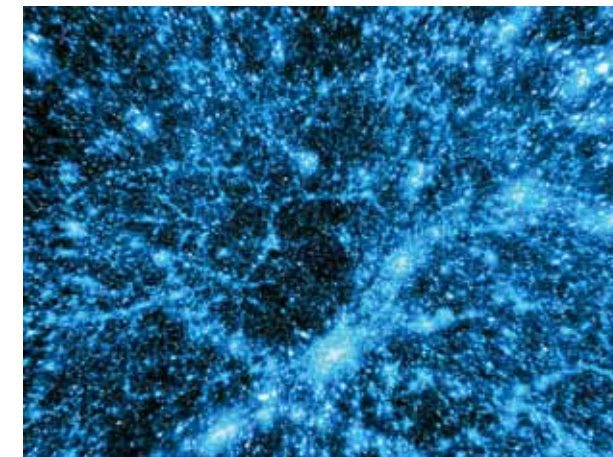
This video provides a tour of Mars from Mt. Olympus to Valles Marineris. This 3D model of Mars is based on data obtained by the Mars Global Surveyor. (Data provided by MEGDRs.)



"KAGUYA's Moon" Exploring the Lunar Surface

This stereoscopic lunar surface model is based on data obtained by the laser altimeter (LALT) and the terrain camera (TC) on the lunar orbiter space craft "KAGUYA". (Data provided by JAXA, LISM/TC team and RISE Project, NAOJ.)

Movies Based on Simulation Data



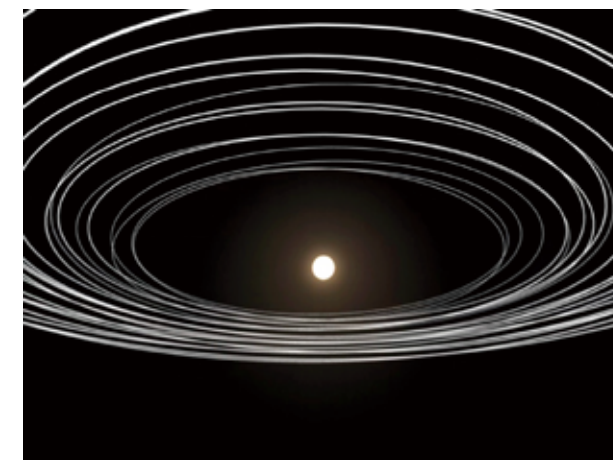
Formation of the Large Scale Structure

This movie shows the results of an extensive many-body simulation which calculates the evolution of the distribution of dark matter from 13 billion years ago to the present. (Data provided by Hideki Yahagi and Masahiro Nagashima.)



Galactic Merger

This movie shows a collision of two disk galaxies which activates star formation and causes the formation of massive star clusters. (Data provided by Hidenori Matsui.)



From planetesimals to Earth-like Planets

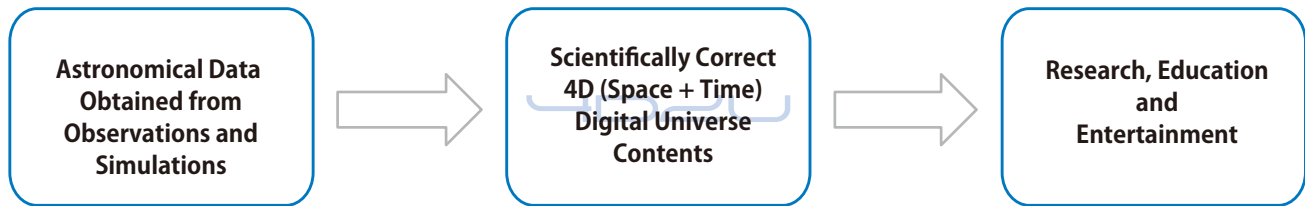
This movie shows the planet formation process, from planetesimals colliding in the protoplanetary disk up to two Earth-like planets. (Data provided by Eiichiro Kokubo and Hidenori Genda.)



Formation of the Moon

This video shows how the Moon formed from a proto-lunar disk created by a collision between the proto-Earth and another protoplanet. (Data provided by Takaaki Takeda and Robin M. Canup.)

The Four-Dimensional Digital Universe (4D2U) Project develops the “4D2U contents” presenting celestial bodies and astronomical phenomena in 4 dimensions (3D spatial dimensions + time). As the name implies, this project aims to bring the Universe in 4D “to you (2U)”, using scientifically correct visualizations based on astronomical observations provided by telescopes and numerical simulations provided by supercomputers. The 4D2U contents are useful not only for scientific research and education, but also for various roles such as entertainment.





Using the 4D2U Contents

Anyone can download the Mitaka software and movie contents from the 4D2U website free of charge.



4D2U Website: <http://4d2u.nao.ac.jp/>
Mitaka : http://4d2u.nao.ac.jp/html/program/mitaka/index_E.html

For personal use and educational use at schools:

Anyone can use the 4D2U contents for personal or non-commercial educational purposes without needing apply for permission. Explicit credit shall be given to the 4D2U Project, such as “Courtesy of the 4D2U Project, NAOJ.”

Showings at museums and planetariums, and use in movies and published materials:

Parties wishing to use the 4D2U contents for these purposes shall request permission by e-mail (4d2u-apply@nao.ac.jp) prior to showing the contents or reproducing the materials.

4D2U Dome Theater

The 4D2U Dome Theater at Mitaka Campus, which opened in March 2007, offers a full dome stereoscopic experience. Everybody can enjoy the movie contents presenting the latest astronomical research and/or a journey through the Universe with Mitaka software. The movie contents and the software used in the theater were developed by the 4D2U Project.



A scene of the 4D2U Dome Theater projecting Mitaka contents.

Contact Information

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