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Using Free, Open Source Stellarium Software for IYA2009

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Stellarium is a free, open source planetarium for your computer. It shows a realistic sky in 3D, just like what you see with the naked eye, binoculars or a telescope. It runs on MacOSX, Linux/Unix, and Windows, and it can be downloaded from `http://Stellarium.org`.

The following lists some ideas for using the software to address goals and focus areas of the International Year of Astronomy 2009.

Stellarium can help astronomy educators reach many of the goals of IYA2009. Here are some examples:[1]

1. Increase scientific awareness:
   Stellarium is both scientifically accurate and visually engaging. Selecting an object provides basic information about that object: apparent magnitude, distance, etc. The program can be used to teach audiences in beginning through advanced astronomy, on topics including planetary features, planetary motion, stellar evolution, celestial navigation, finding objects in the sky, and more.

2. Promote widespread access to new knowledge and observing experiences:
   Stellarium is used by the ESO (formerly the European Southern Observatory, now the European Organisation for Astronomical Research in the Southern Hemisphere) to create a method for scientists to search, distribute, and share visual data. As Stellarium is free and open source, there are no barriers erected by proprietary source code. Stellarium can open up new observing experiences by providing ideas of what to look for in the night sky.

3. Empower astronomical communities in developing countries:
   Free, scientifically accurate, and customizable software is one of the best ways to do this.

4. Support and improve formal and informal science education:
   Stellarium can be used to demonstrate beginning through advanced astronomy concepts. The user interface is very simple, so even upper elementary students can quickly learn to run the software. It has been used in a stand alone kiosk exhibit used by the general public.

5. Provide a modern image of science and scientists:
   No obvious applications of Stellarium to reach this goal, aside from the fact that Stellarium is under active development by scientists at the ESO.

[1]Text of the goals from `http://www.astronomy2009.org/about-iya2009-mainmenu-37.html`

6. Facilitate new networks and strengthen existing ones:
   Stellarium has an active development team and a worldwide network of thousands—perhaps hundreds of thousands—of users. The forum section of the Stellarium website enables users/developers to communicate directly with each other, sharing ideas, troubleshooting tips, software scripts, etc.

7. Improve the gender-balanced representation of scientists at all levels and promote greater involvement by underrepresented minorities in scientific and engineering careers:
   No obvious applications.

8. Facilitate the preservation and protection of the world's cultural and natural heritage of dark skies in places such as urban oases, national parks and astronomical sites:
   Stellarium has a light pollution simulation that can demonstrate the effects of unshielded lighting on our skies. Watching dim stars disappear as light pollution increases provides a visual and emotional explanation of why we need to reduce light pollution.

Some ideas for using Stellarium to address specific focus areas of IYA2009:

Classrooms and Families : Families can use Stellarium to plan observing sessions by setting the software for their location and viewing time to determine what will be visible. Classroom teachers can use the software to cover numerous astronomical concepts such as moon phases, eclipses, rotation and revolution, planetary features, constellation legends, deep space objects, etc.

Cultural Astronomy : Stellarium has constellations from several different cultures, including Chinese, Egyptian, Norse, Inuit, Lakota, and more. Labels have been translated into more than 40 languages, with translations into more languages underway.

Dark Skies : As noted above, Stellarium has a light pollution simulation that can wash out the sky and viscerally demonstrate light pollution. It has been used at city council meetings to provide a visual demonstration of the effects of unshielded lighting on the night sky.

Looking Through a Telescope : As noted in the Classrooms and Families section above, you can determine where to point your telescope during an observing session using Stellarium. You can even simulate views from telescopes of differing powers, or, for example, set the sky time to 1610 to show the sky Galileo saw. The software also has a telescope control feature.

Science Centers, Observatory Visitor Centers, and Planetaria : These applications are very similar to those of the Classrooms and Families. Observatories with their own deep space object images can add them to Stellarium and display them in situ. Stellarium can be a good substitute for nights when observing the real sky is impossible due to cloud cover, etc. Planetariums can purchase digital projection systems that run Stellarium,

or use Stellarium on a desktop computer to supplement their existing projection system.

In short, Stellarium offers many applications pertinent to reaching the goals and audiences of IYA2009. As it is free, open source, and multi-platform, there are essentially no limitations on who can use the software. Astronomy educators can provide the Stellarium URL to everyone who attends their programs, enabling their audiences to continue exploring astronomy-for free.

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