

# Astronomy in *Second Life*: A User's Perspective

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## Key Words

Communication via social networking  
Multi-user virtual environments  
Second Life  
Outreach, informal education

## Summary

*Second Life* (SL) is a multi-user virtual environment that is not limited to adult social entertainment. SL is also a 3D playground for innovative instructors and education/outreach professionals in the sciences. Astronomy and space science have a presence in SL, but it could be so much more. This paper describes some of the current astronomy themed spaces in SL and briefly discusses future innovations.

Second Life<sup>1</sup> (SL) is a multi-user virtual environment (MUVE) owned and managed by a company called Linden Labs in San Francisco, California (USA). Residents use customizable building blocks called *prims* to sculpt and mould their world. Current user metrics<sup>2</sup> indicate that there are 4.3 million individual human users, roughly 8 million 3D avatars, with approximately 40,000 avatars in-world at any given time, and 500,000 repeat visitors. Second Life key metrics (current to May 2007) report that 28% of avatars were aged 18-24, 39% in the 25-34 age range, 21% in the 35-44 age range, and only 12% were 45 or older. This multi-user virtual world is truly international. Self-reported nationality data shows that 25% of users are from the United States as compared to 39% for European countries.

Popular press reports concentrate mostly on the gambling, "griefing"<sup>3</sup> and more adult content of this metaverse. However, at the 2007 Second Life Community Convention Education Track it was reported that 161 colleges/



Figure 1. The author's avatar, Ourania Fizgig, gazes through a small telescope to see The Eagle Nebula.

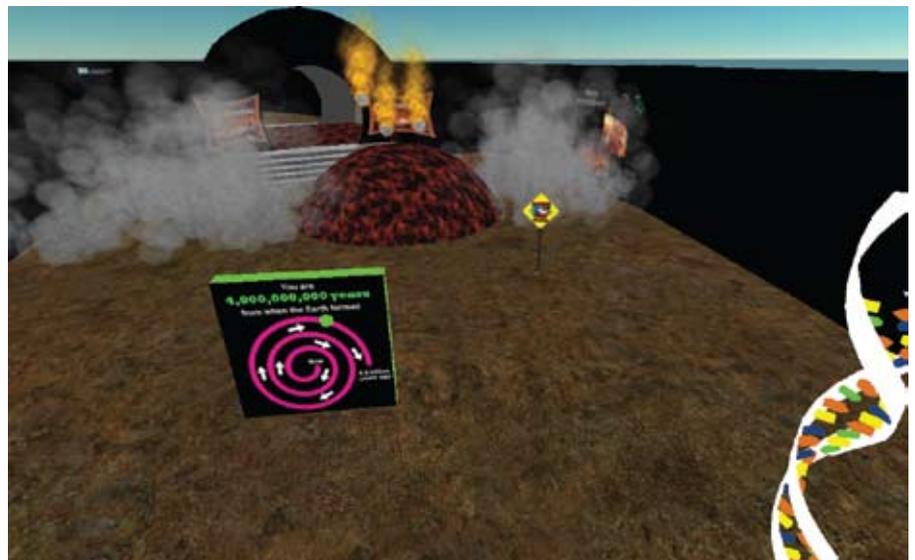


Figure 2. Portion of the Timeline of Earth Exhibit, from 4 million years ago showing a molten Earth leading into the Heavy Bombardment period where avatars have to dodge debris (Primary exhibit builder: David Huber).

universities have an active SL presence and 35-40 classes are taught in the virtual world. The science, humanities, medical, technology, business and law schools are all represented. Innovative faculty and instructional staff continue to develop educational experiences for their students with this bleeding-edge technology<sup>4</sup>. Informal education projects also take advantage of this amazing online program. Replicas of cathedrals, cities, artefacts, and historically significant role-playing sims<sup>5</sup> all exist to educate the general public. Most of the higher education projects are also open to the public to enjoy. Many sciences are represented

by the SciLands consortium of 34+ islands: genome research, physics, health sciences, information sciences, nanotechnology, biology, space technology, and astronomy are among those currently represented. In addition, the National Oceanic and Atmospheric Administration (NOAA) has a spectacular build<sup>6</sup> where you can not only see inside a hurricane, but watch a tsunami form and ruin a coastline. But what about astronomy?

Ourania Fizgig (my avatar) was created in December 2006 as I prepared for an undergraduate non-major general science course on "Life

in the Universe”, taught by Professor Chris Impey at the University of Arizona. I was asked to design, implement and manage an astrobiology/astronomy-related project in Second Life with the students. A handful of students were courageous and innovative enough to participate. We decided to build a scale model showing the timeline of Earth, from 4.6 billion years ago to the present. The exhibit has the timeline stretched along a spiral structure with images, 3D models, movies and Notecards<sup>7</sup> of text to provide content to the audience. The early content revolves around geological and atmospheric processes, but once life emerges, the timeline focuses on biology and chemistry. We



Figure 3. Breathtaking view of the International Space Station and the Space Shuttle Endeavour.

plan to build a “Timeline of the Universe” wrapper for the Earth timeline, placing the Earth in context with the rest of the Universe and thus being able to add beautiful astronomical imagery. This ambitious initial build was completed in August 2007 and is found in the sky of the LivingintheUniverse sim<sup>8</sup>.

This project is not the only astronomy-themed sim in Second Life, which also has the Interna-

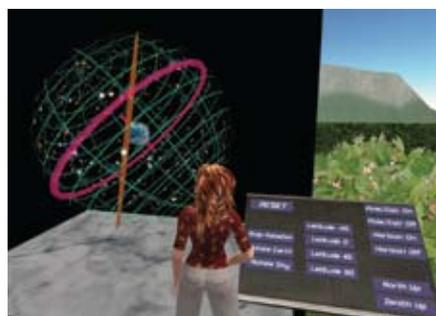


Figure 4. Interactive Celestial Sphere at the SL Science Center.

tional Spaceflight Museum<sup>9</sup>, JPL’s (Jet Propulsion Lab) Explorer Island<sup>10</sup>, SL Planetarium<sup>11</sup>, SL Science Center<sup>12</sup>, and NASA Colab<sup>13</sup>. In addition, some astronomy minded avatars have built small telescope models that show limited astronomical imagery. Others play with planet textures to create scale models of the Solar System and decorative orreries. NASA Live TV streams into SL at numerous locations for special events like launches or other public programming. In March 2006 the Exploratorium (San Francisco, California) hosted a live video feed of the eclipse from Turkey in Second Life. The accompanying eclipse exhibit built by SL

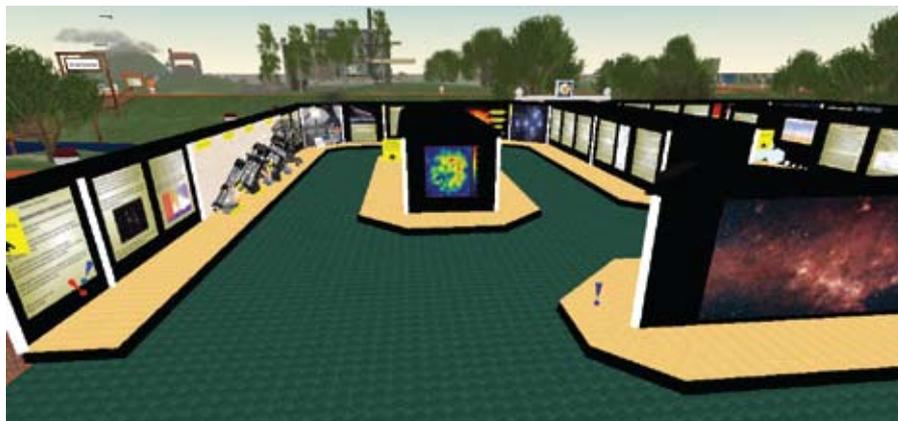


Figure 5. Roger Amdahl’s Physics and Astronomy display space in Primrose.

architect Aimee Weber<sup>14</sup> is still well visited and referenced today. They also streamed the rare transit of Mercury into SL from observations at Kitt Peak Observatory in Arizona. The popular astronomy podcast, Slacker Astronomy<sup>15</sup>, also has a small bit of land in SL to visit.

One astronomical adventure in SL is a content-rich display space created by avatar Roger Amdahl<sup>16</sup>. He takes us through the basics of electromagnetic radiation, telescope optics, interferometry, spectroscopy and their relation to astronomical objects. Another individual astronomy project is an interactive Celestial Sphere created by avatar Prospero Frobozz<sup>17</sup>. Avatars can manoeuvre their camera or view to be inside The Celestial Sphere and watch. Numerous educational activities can be built around the manipulated views as the controls adjust the projection of the sphere to reflect any latitude on Earth.

The SL Planetarium<sup>18</sup> is managed by avatar Chaac Amarula. Anthony Crider, a real-life professor at Elon University, has used the planetarium for instruction. Scripted shows are imagined, designed, and implemented by his students. A working replica of a Meade telescope sits outside the SL planetarium. Students can be engaged with the 3D model as they learn how to operate such a telescope in real life.

Science School<sup>19</sup> is a notable higher education project that is located on the SciLands conti-

nent and focuses on physics and astronomy education. Their sim houses the Second Life Observatory, modelled on the Mount Evans Meyer-Womble Observatory at the University of Denver. Astronomical imagery can be seen through the eyepieces of the telescope if the camera controls are worked correctly.

The Jet Propulsion Lab (JPL) at Caltech has a strong and growing presence in SL and based on Explorer Island with amazing model building of past, present, and future space technology. In one area it appears they are experimenting with stereoscopic images of the lunar and Martian surfaces. One corner<sup>20</sup> of their sim is dedicated to recreating portions of Mars. Avatars should watch for dust devils, rovers, and bouncing Mars airbags. Exhibits under development sit high above Explorer Island. The Victoria Crater model is inspiring and the view of the Space Shuttle Endeavour and the International Space Station (under construction) over Earth is breathtaking. Their sim also hosts the obligatory scale model of the Solar System.

In August 2007 I participated in the SL launch event at Explorer Island for the Phoenix Mars Mission. My colleague is a part of the Phoenix Mars EPO (education and public outreach team) and was asked to speak in SL on launch day. She was at Cape Canaveral anxiously awaiting the live launch. I was in Tucson and up at 3 a.m. to watch the live launch video feed in SL. We collaborated for her interview over the phone as she gave me details and answered



Figure 6. Second Life planetarium and telescope.



Figure 7. View of the International Spaceflight Museum.

questions from the SL audience, and I typed the answers through her avatar. Following the actual launch, I updated her on the rocket once it left their view at Cape Canaveral but was still being shown zoomed-in for the video feed. The power of social computing was evident that morning when the sim filled around launch time as many avatars wanted to see the video feed.

Last on the list of astronomy themed places in Second Life is the well-known International Spaceflight Museum, the original driving force of the SciLands consortium. Here models (some working) of various rockets, satellites and vehicles are displayed. There is some specific astronomy content spread throughout the sim and it also contains a scale model of the Solar System.

In general, Second Life seems to lack hardcore astronomy content — all those beautiful images of galaxies, nebulae, and star clusters from the world's telescopes and the rich contextual information that comes from the various education and public outreach offices. Where are they? Why haven't they found Second Life? My sources tell me they have, that it is just a matter of time and development cost. The International Year of Astronomy may also play a role in bringing more astronomy to Second Life. I can imagine installations of images being peppered throughout SL at special events and

in high traffic sims to mimic the real life cornerstone IYA (International Year of Astronomy) 2009 project, The Universe from Earth<sup>21</sup>. I'd personally like to see an aggregator of astronomical images and contextual information brought into an SL exhibit space. This may become possible in the coming year if grant monies are forthcoming. Now that we have Google Sky<sup>22</sup>, how can that integrate with Second Life? NOAA may be leading this bleeding edge of development with their Second Earth<sup>23</sup> project that melds Second Life and Google Earth to deliver visualized weather and other data for scientists and the general public. Ponder the possibilities for astronomy, a Second Sky perhaps?

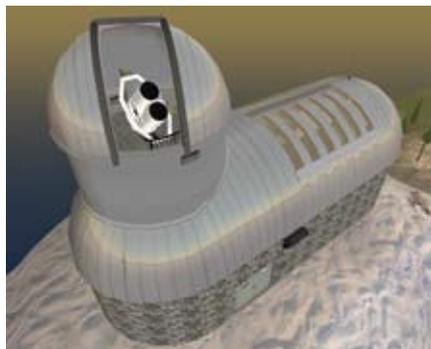


Figure 8. Second Life Observatory modelled on the University of Denver, Mt Evans Meyer-Womble Observatory.

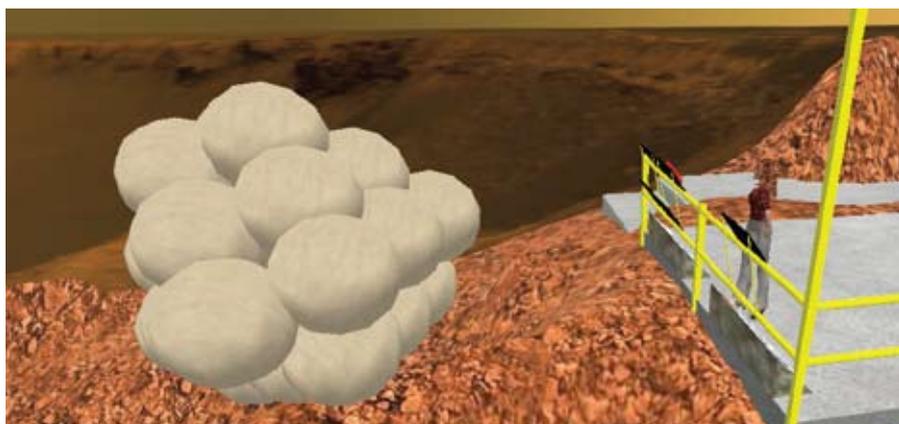


Figure 9. My avatar triggering a re-enactment of the rover airbag landing on Mars.

## Bio

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## Notes

1. Second Life, a multi-user virtual environment owned by Linden Labs. <http://secondlife.com>
2. <http://blog.secondlife.com/2007/06/12/may-2007-key-metrics-published/>
3. Griefing is an act of vandalism in online virtual worlds.
4. Bleeding-edge technology is technology that is at the very forefront of technological advancement, i.e. ahead of cutting edge technology.
5. Sim refers to a 65,000 square meter space in SL in which 15,000 prims are available for building.
6. <http://slurl.com/secondlife/Meteora/177/161/27/>
7. A Notecard is a simple text window shown on the screen. Content creators in SL can easily give information to avatars using this method.
8. <http://slurl.com/secondlife/LivingintheUniverse/45/190/251/>
9. <http://slurl.com/secondlife/Spaceport%20Alpha/48/78/24/>
10. <http://slurl.com/secondlife/Explorer%20Island/182/155/23/>
11. <http://slurl.com/secondlife/Spaceport%20Alpha/22/52/22/>
12. <http://slurl.com/secondlife/Infotainment%20Island/57/131/31/>
13. <http://slurl.com/secondlife/NASA%20CoLab/245/112/22/>
14. <http://slurl.com/secondlife/Science%20School/119/168/24/>
15. <http://slurl.com/secondlife/Carmine/115/24/180/>
16. <http://slurl.com/secondlife/Primrose/228/59/86/>
17. <http://slurl.com/secondlife/Infotainment%20Island/81/90/31/>
18. <http://slurl.com/secondlife/Spaceport%20Alpha/22/52/22/>
19. <http://scienceschool.wordpress.com/about/>
20. <http://slurl.com/secondlife/Explorer%20Island/65/36/52/>
21. <http://www.astronomy2009.org/content/view/302/91/>
22. <http://earth.google.com/sky/skyedu.html>
23. <http://sl.nmc.org/2007/08/29/upcoming-teachers-buzz-noaa-interactivity-and-sl-metrics-mon-3-sep-9am-pdt/>