## OpenSpace: An open-source astrovisualization framework

Alexander Bock<sup>1,4</sup>, Emil Axelsson<sup>1</sup>, Karl Bladin<sup>1</sup>, Jonathas Costa<sup>4</sup>, Gene Payne<sup>5</sup>, Matthew Territo<sup>5</sup>, Joakim Kilby<sup>1</sup>, Masha Kuznetsova<sup>3</sup>, Carter Emmart<sup>2</sup>, and Anders Ynnerman<sup>1</sup>

<sup>1</sup>Linköping University <sup>2</sup>American Museum of Natural History <sup>3</sup>Community Coordinated Modeling Center <sup>4</sup>New York University <sup>5</sup>University of Utah

25 July 2017

Paper DOI: http://dx.doi.org/10.21105/joss.00281 Software Repository: https://github.com/OpenSpace/OpenSpace Software Archive: http://dx.doi.org/10.5281/zenodo.835206

## Summary

OpenSpace (2017; Bock et al. 2017) is an open source interactive data visualization software designed to visualize the entire known universe and portray our ongoing efforts to investigate the cosmos (Bladin, Karl and Axelsson, Emil and Broberg, Erik and Emmart, Carter and Ljung, Patric and Bock, Alexander and Ynnerman, Anders 2017; Bock, Pembroke, et al. 2015). Bringing the latest techniques from data visualization research to the general public and scientists (Bock, Marcinkowski, et al. 2015), OpenSpace supports interactive presentation of dynamic data from observations, simulations, and space mission planning and operations over a large span of sizes (Axelsson, Emil and Costa, Jonathas and Silva, Cláudio T. and Emmart, Carter and Bock, Alexander and Ynnerman, Anders 2017). The software supports multiple operating systems with an extensible architecture powering high resolution tiled displays, planetarium domes, as well as desktop computers. In addition, OpenSpace enables simultaneous connections across the globe creating opportunity for shared experiences among audiences worldwide.

## References

Axelsson, Emil and Costa, Jonathas and Silva, Cláudio T. and Emmart, Carter and Bock, Alexander and Ynnerman, Anders. 2017. "Dynamic Scene Graph: Enabling Scaling, Positioning, and Navigation in the Universe." In *Computer Graphics Forum, Proceedings of Eurovis.* 

Bladin, Karl and Axelsson, Emil and Broberg, Erik and Emmart, Carter and Ljung, Patric and Bock, Alexander and Ynnerman, Anders. 2017. "Globe Browsing: Contextualized Spatio-Temporal Planetary Surface Visualization." In *IEEE Transactions on Visualization and Computer Graphics*.

Bock, Alexander, Emil Axelsson, Kalle Bladin, Jonathas Costa, Gene Payne, Matthew Territo, Joakim Kilby, et al. 2017. "OpenSpace: An Open-Source Astrovisualization Framework." https://github.com/OpenSpace/

OpenSpace.

Bock, Alexander, Michal Marcinkowski, Joakim Kilby, Carter Emmart, and Anders Ynnerman. 2015. "OpenSpace: Public Dissemination of Space Mission Profiles."

Bock, Alexander, Asher Pembroke, M. Leila Mays, and Anders Ynnerman. 2015. "OpenSpace: An Open-Source Framework for Data Visualization and Contextualization." Poster Presentation at American Geophysical Union, Fall Meeting.

 $OpenSpace.\ 2017.\ ``Openspaceproject.com.''\ http://openspaceproject.com.''$