Geophysical Research Abstracts
Vol. 15, EGU2013-5909, 2013
EGU General Assembly 2013

WebGL for Rosetta Science Planning

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Rosetta is a mission of the European Space Agency (ESA) to rendez-vous with comet Churyumov-Gerasimenko in 2014. The trajectory and operations of the mission are particularly complex, have many free parameters and are novel to the community. To support science planning, communicate operational ideas and disseminate operational scenarios to the scientific community, the science ground segment makes use of Web-based visualisation technologies. Using the recent standard WebGL, static pages of time-dependent three-dimensional views of the spacecraft and the field-of-views of the instruments are generated, directly from the operational files. These can then be viewed in modern Web browsers for understanding or verification, be analysed and correlated with other studies. Variable timesteps make it possible to provide both overviews and detailed animated scenes. The technical challenges that are particular to Web-based environments include: (1) In traditional OpenGL, is much easier to compute needed data on demand since the visualisation runs natively on a usually quite powerful computer. In WebGL application, since requests for additional data have to be passed through a Web server, they are more complex and also require a more complex infrastructure. (2) The volume of data that can be kept in a browser environment is limited and has to be transferred over often slow network links. Thus, careful design and reduction of data is required. (3) Although browser support for WebGL has improved since the authors started using it, it is often not well supported on mobile and small devices. (4) Web browsers often only support limited end user interactions with a mouse or keyboards. While some of the challenges can be expected to become less important as technological progress continues, others seem to be more inherent to the approach. On the positive side, the authors' experiences include: (1) low threshold in the community to using the visualisations, (2), thus, cooperative use of the products, and (3) good and still improving tool and library support.