Google Cardboards in astronomy

André Schaaff, Nicolas Deparis, Nicolas Gillet, Gilles Landais, Pierre Ocvirk, Dominique Aubert, **Observatoire de Strasbourg**

Pierre Lespingal, Pauline Kobersi, Jonathan Hurter, Vincent Stébé, Damien Teodori, **ENSIIE Strasbourg**

Arnaud Steinmetz, **Université de Strasbourg**

Jérôme Desroziers, **Université de Lorraine**

IVOA Cape Town, Education IG

CENTRE DE DONNÉES ASTRONOMIQUES DE STRASBOURG

IVOA

Asterics

Astronomy ESFRI & Research Infrastructure Cluster

Context, motivation

A continuous exploration of new technologies, especially in the 3D (and immersive) Visualization field.

Previous work around Oculus Rift but its public release has a lot of constraints (cost, hardware specifications, etc.).

More “low cost” oriented studies: a Smartphone is a basic equipment, a Google Cardboard is cheap and easy to find (=> wide audience).

On-going and coming projects

Cardboard as a funny add-on:

(Immersive) 3D Visualization

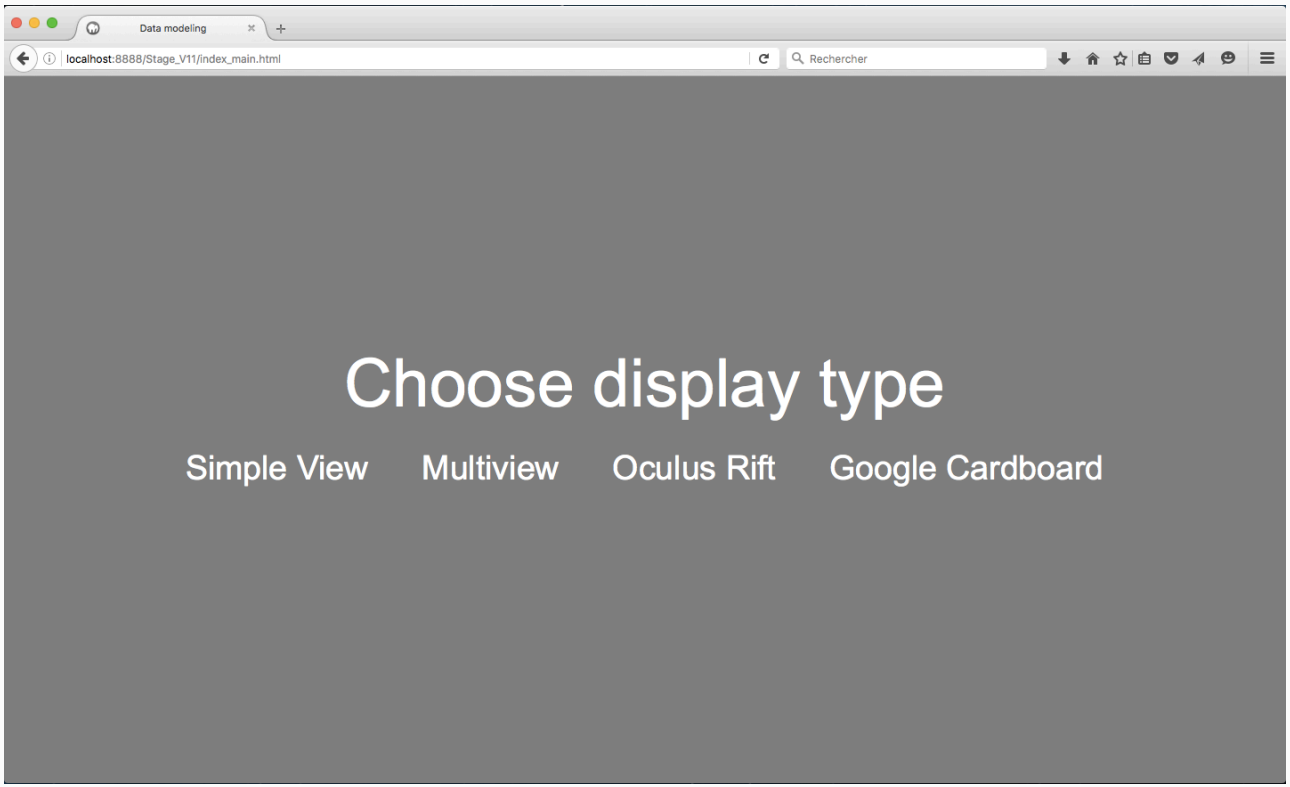
Cardboard dedicated:

Multi Google Cardboards

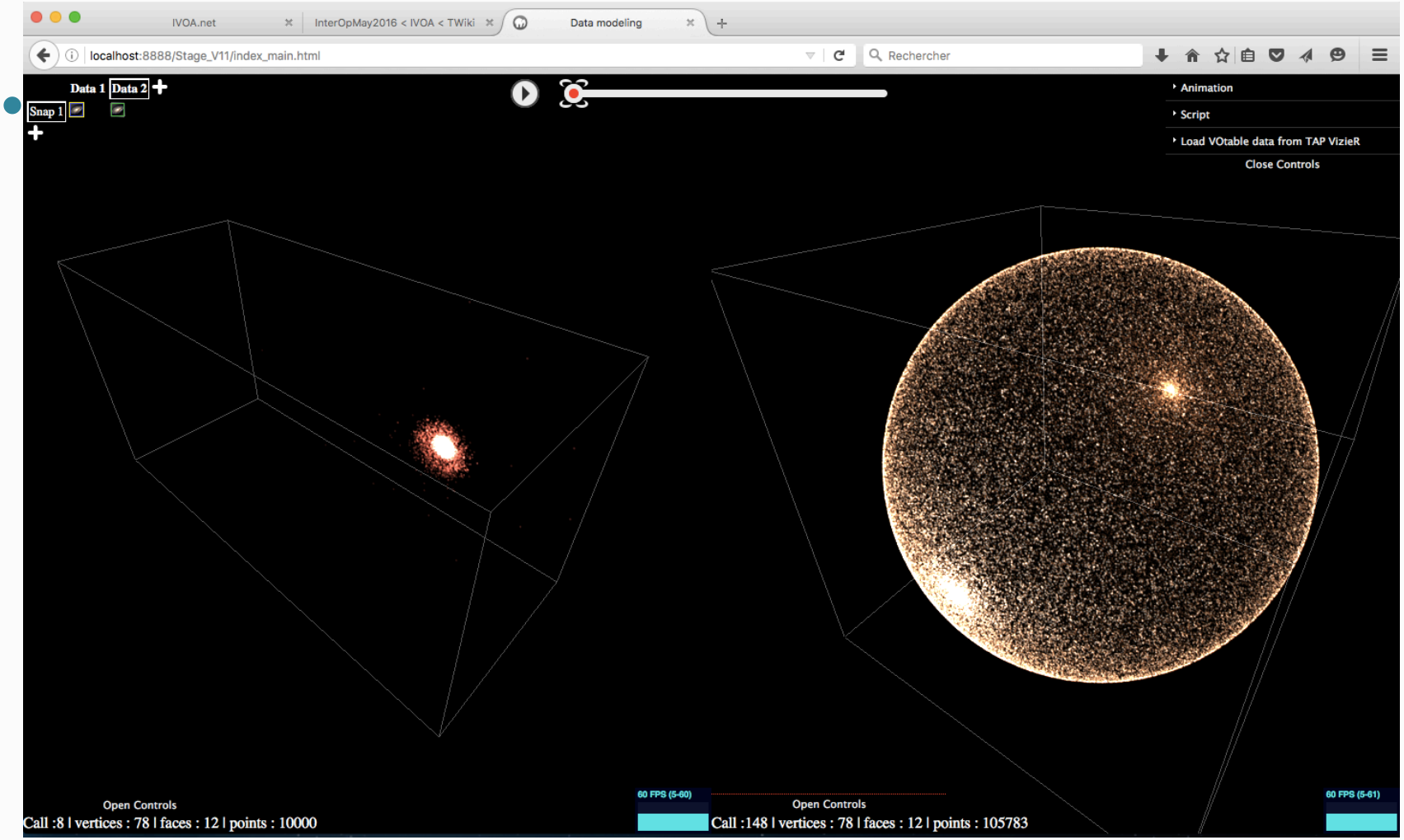
Google Cardboard Allsky survey viewer

(Immersive) 3D-Visualization project

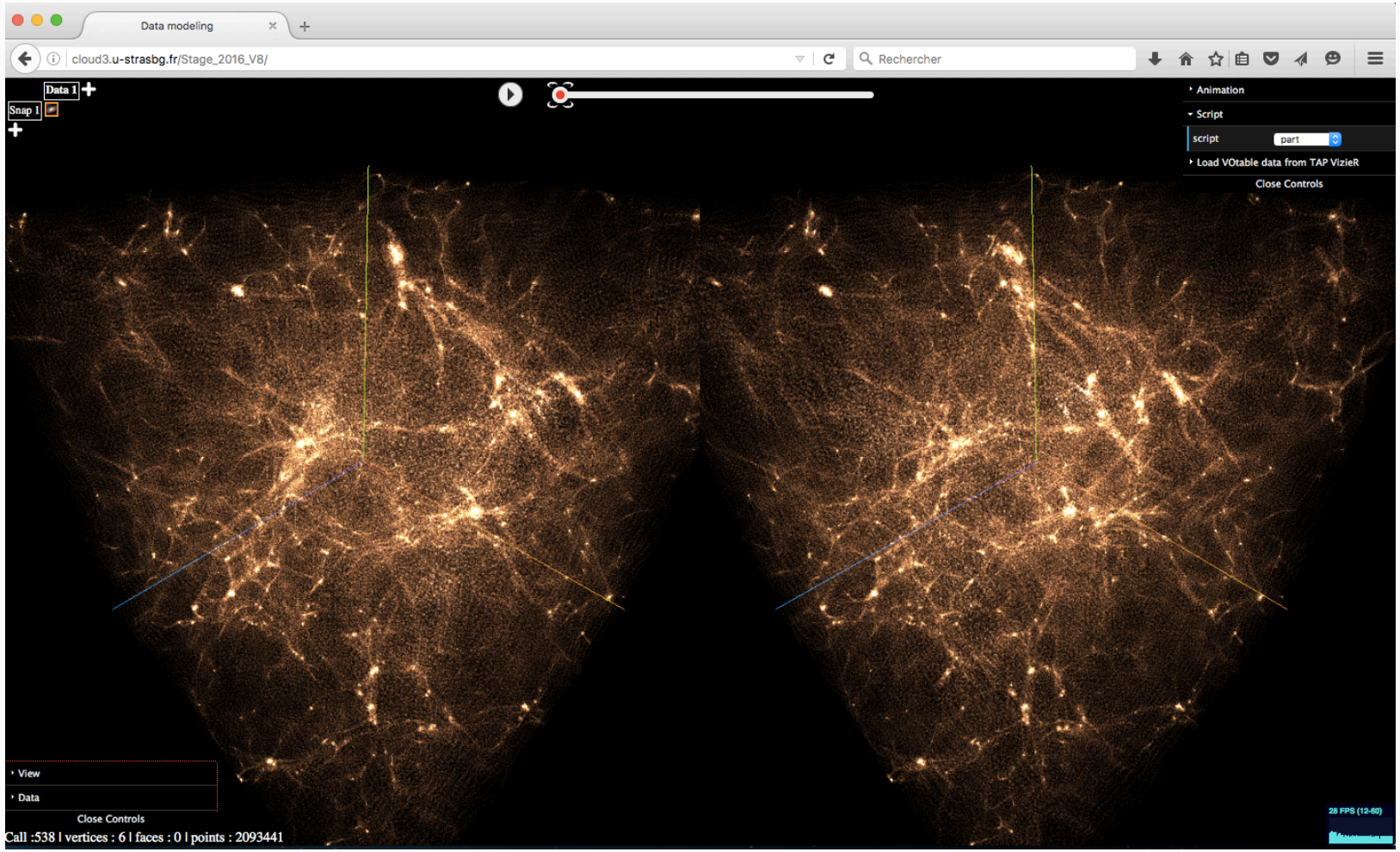
- 3D-Visualization of various datasets developed with Javascript / Three.js / WebGL providing a Google Cardboard view



(Immersive) 3D-Visualization project –VizieR catalogue data

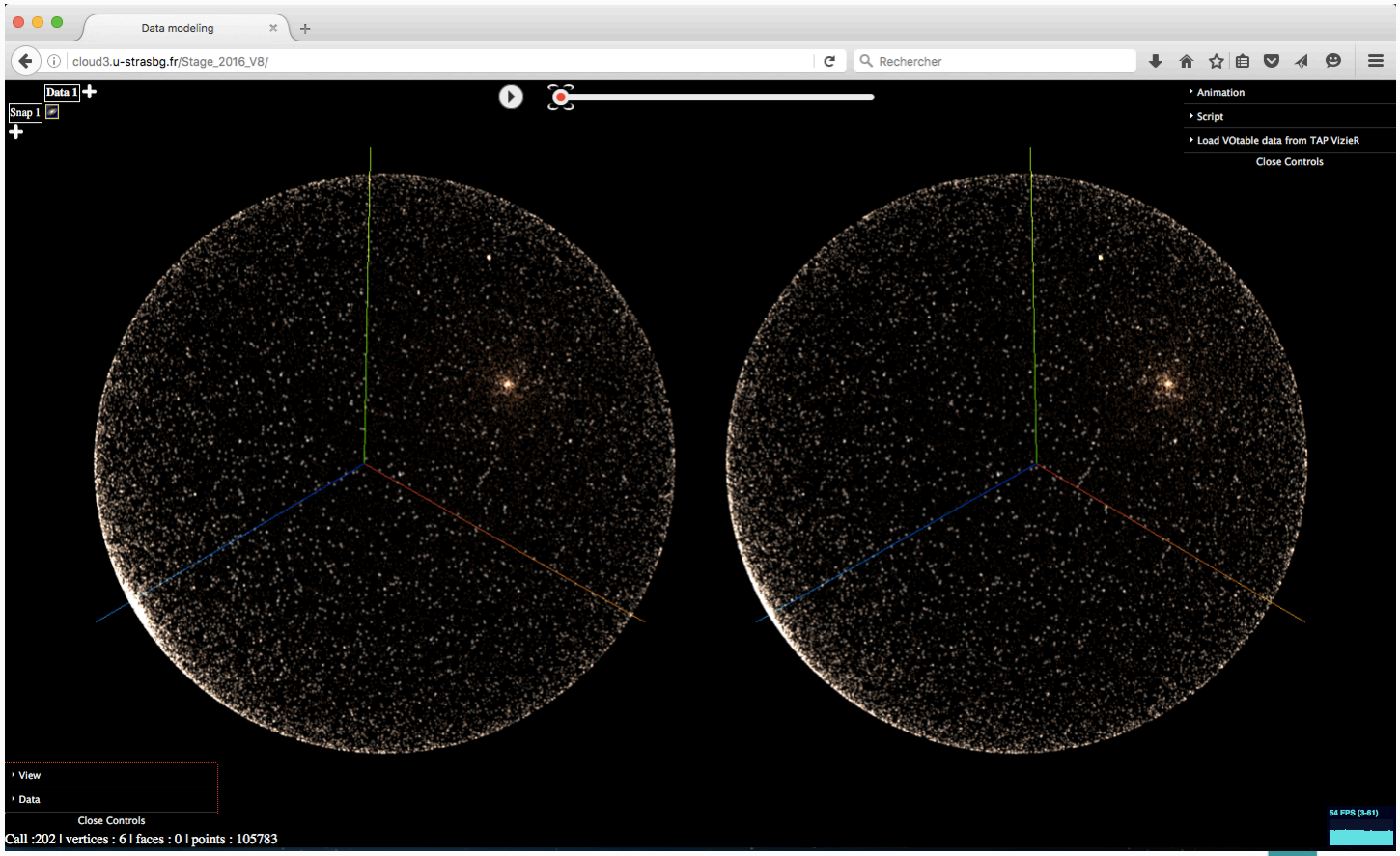


(Immersive) 3D-Visualization project – simulation data

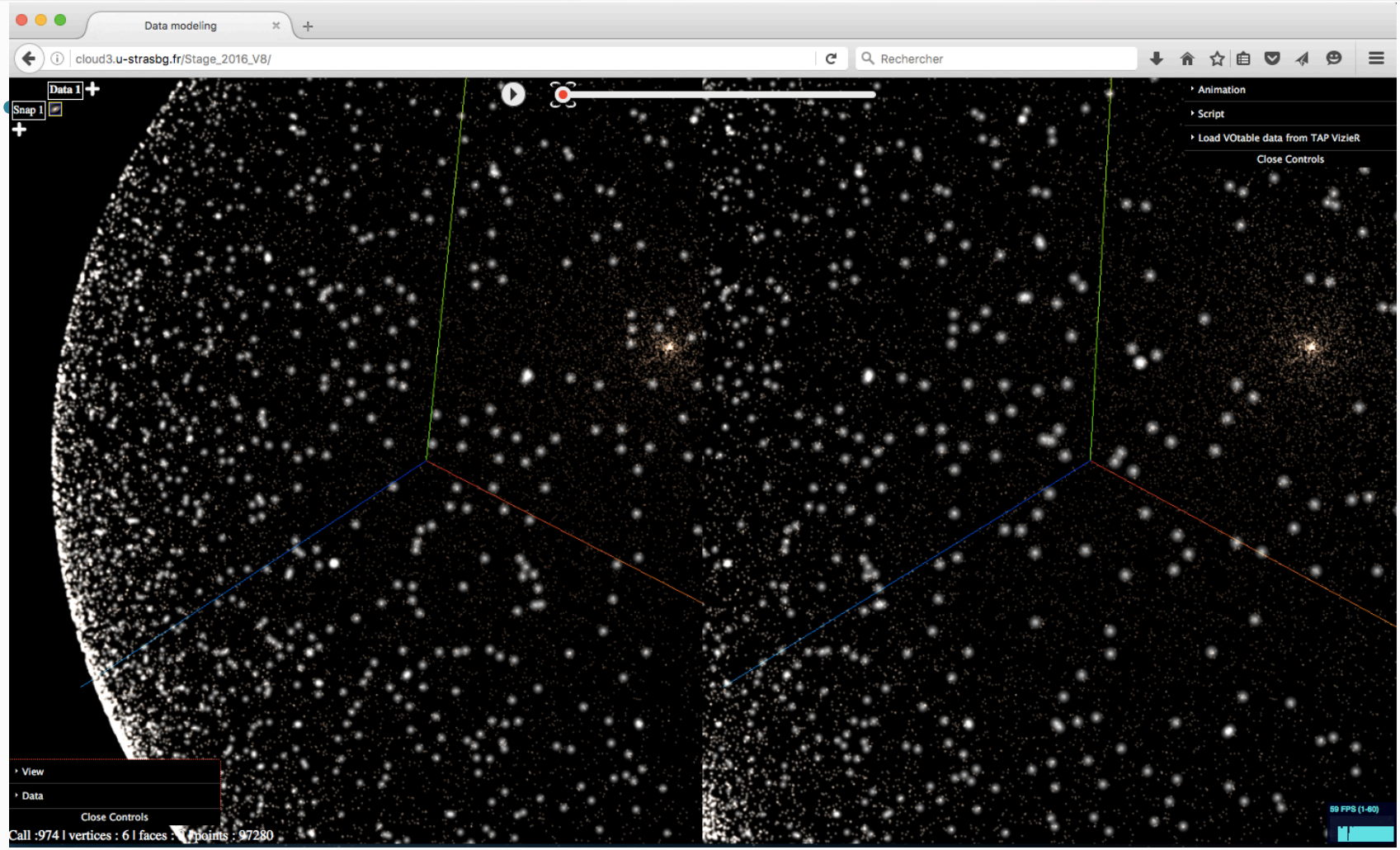


(Immersive) 3D-Visualization project – Cardboard view

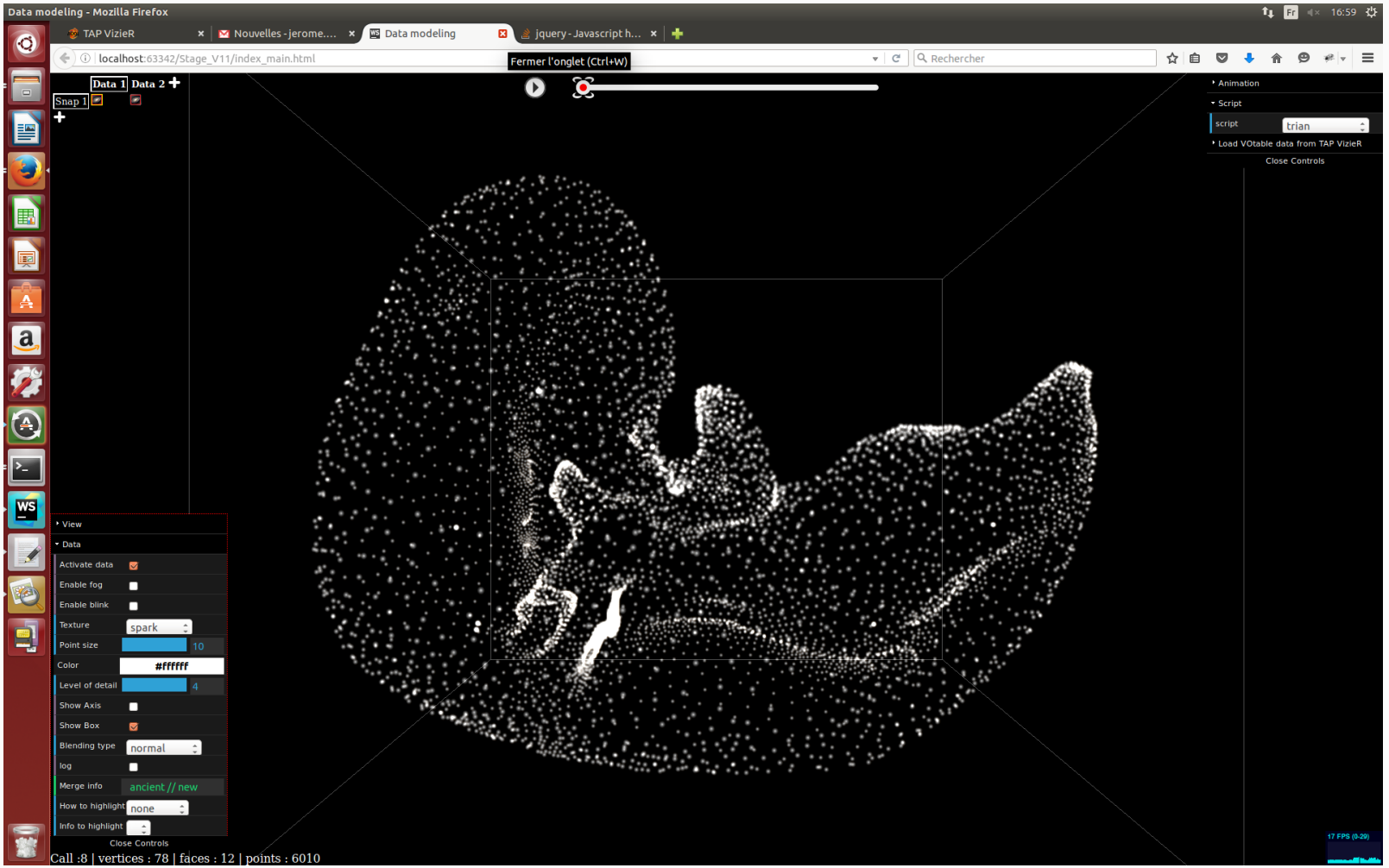
Cardboard view with catalogue data from VizieR (VOTable file or through TAP VizieR)



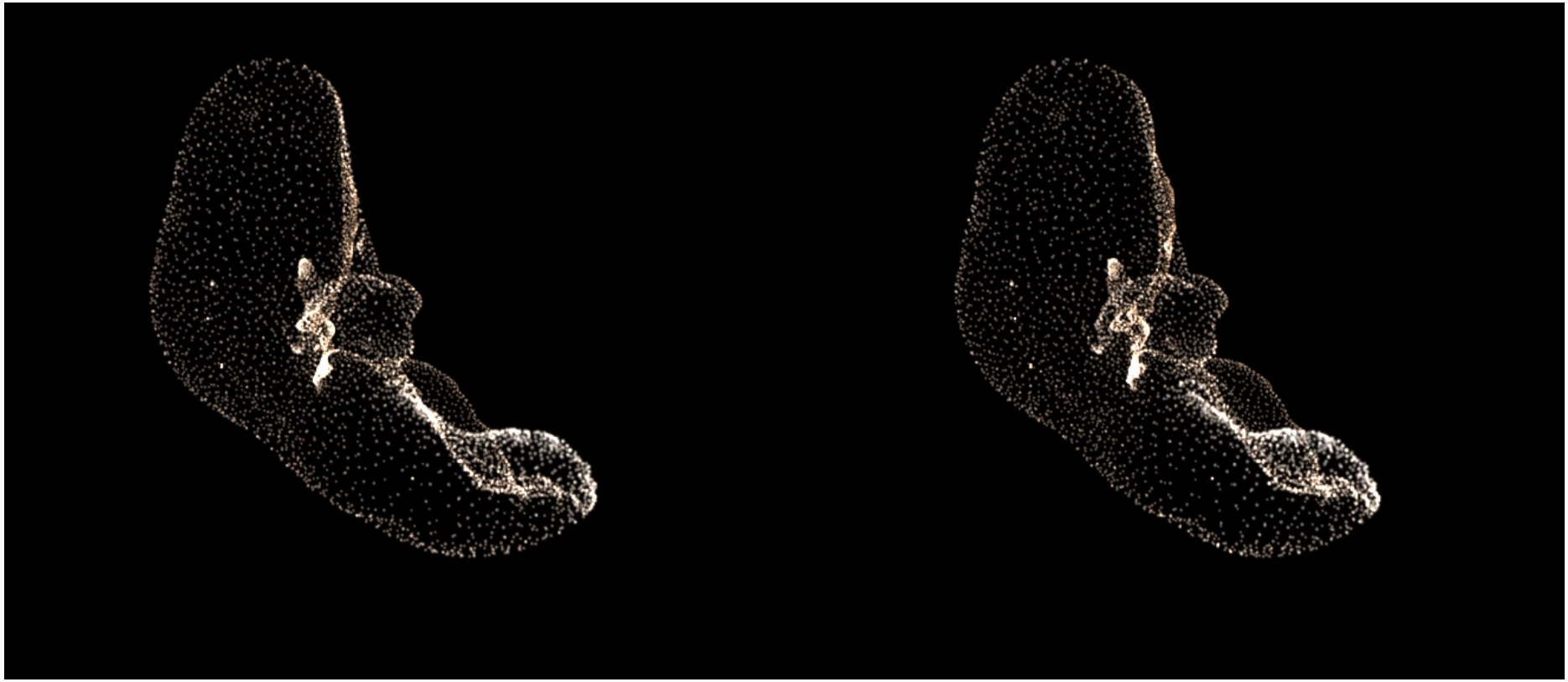
(Immersive) 3D-Visualization project – Navigation



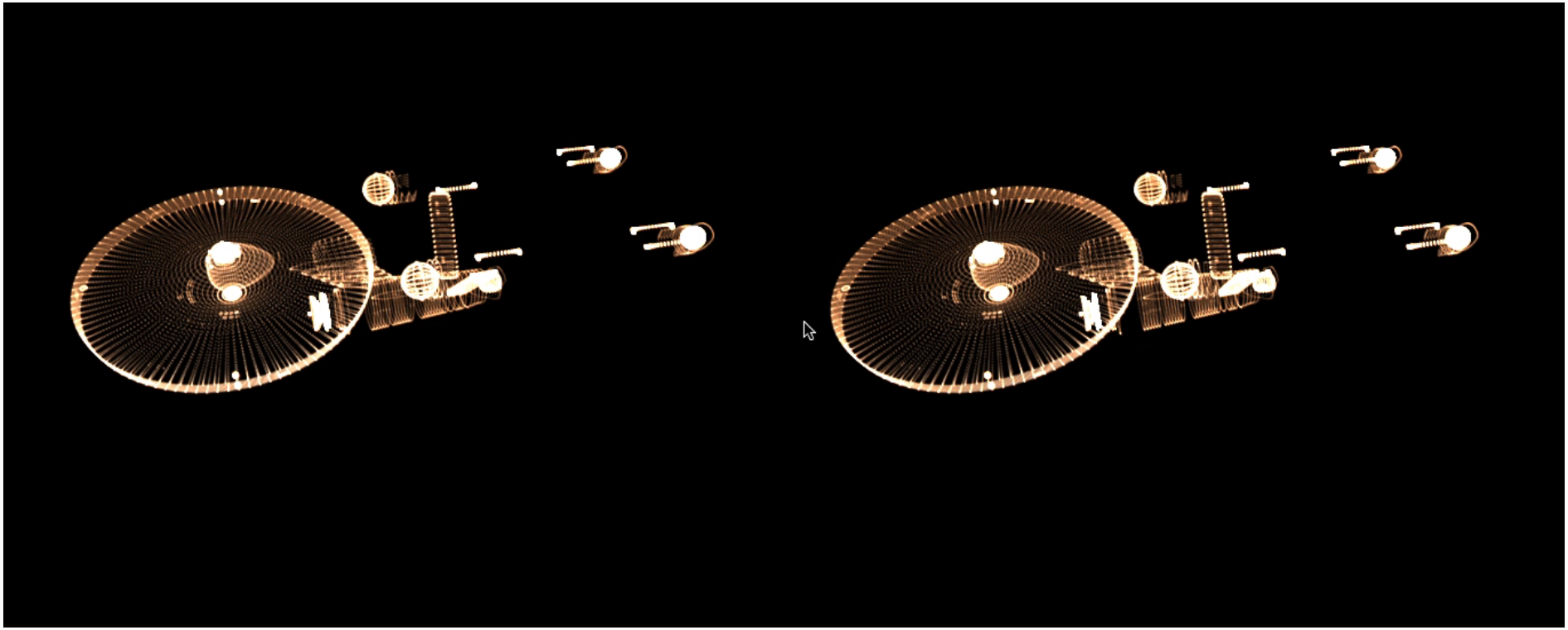
(Immersive) 3D-Visualization project – domain flexible



(Immersive) 3D-Visualization project – domain flexible (2)



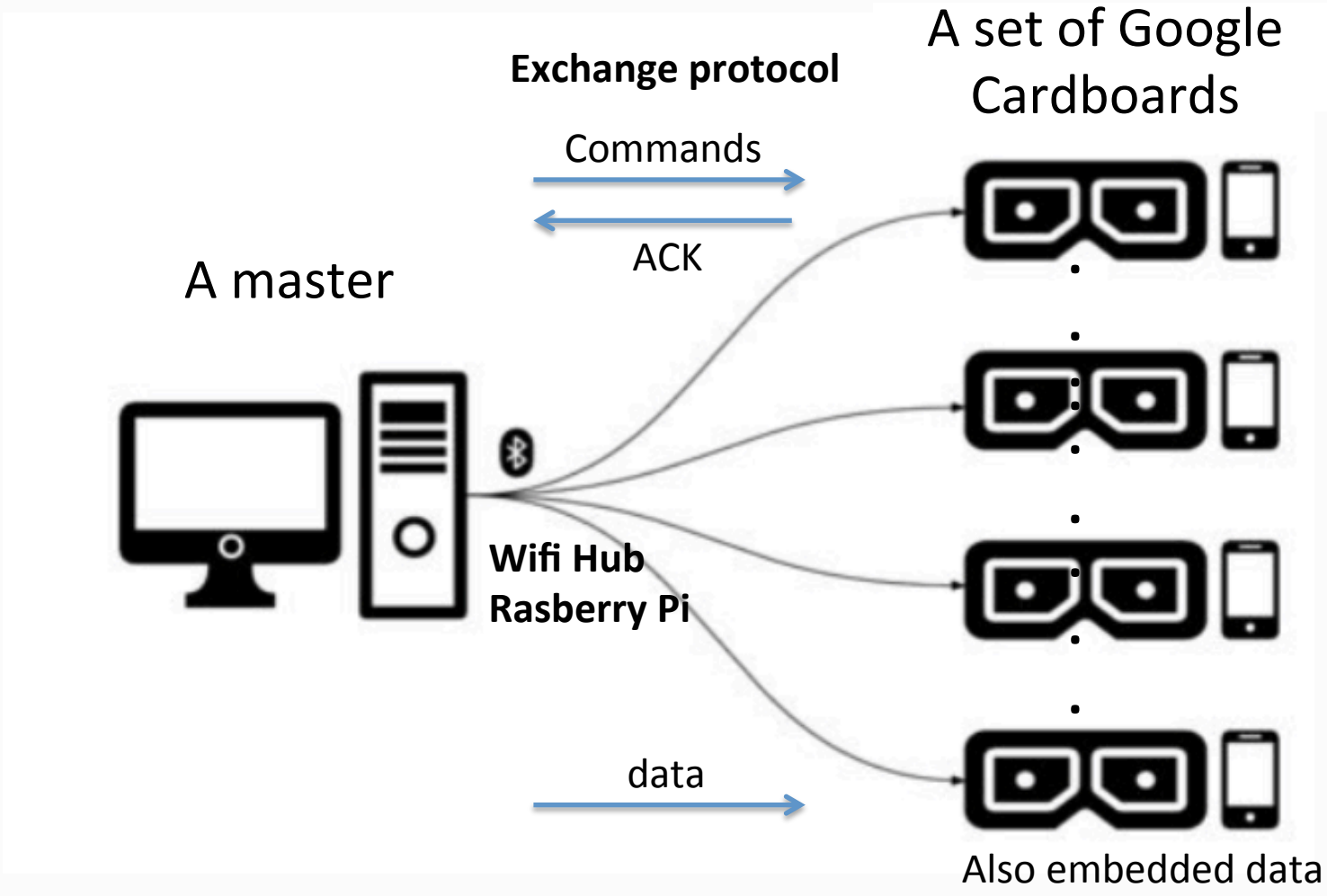
(Immersive) 3D-Visualization project – domain flexible… (3)



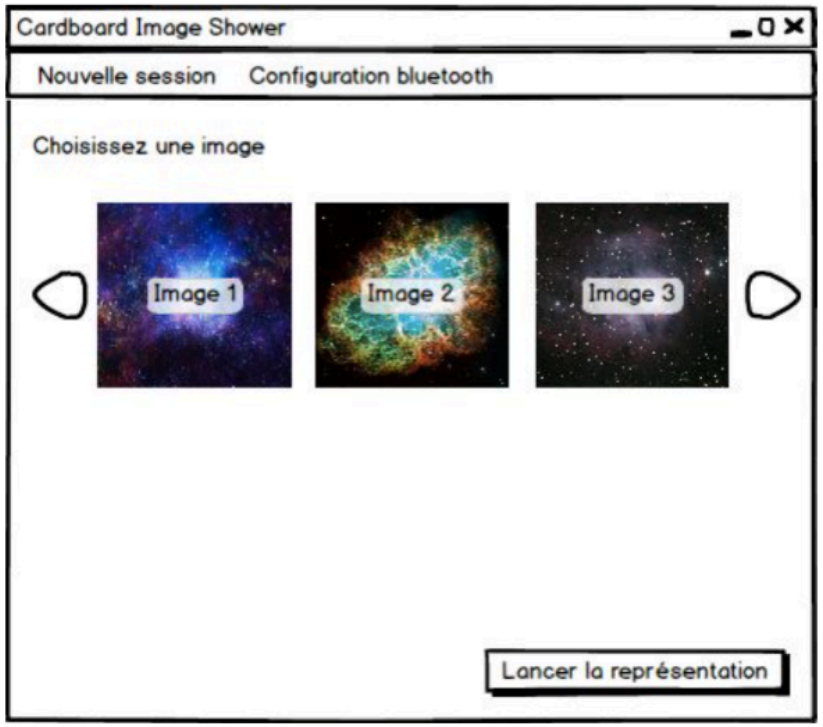
Multi Google Cardboard project

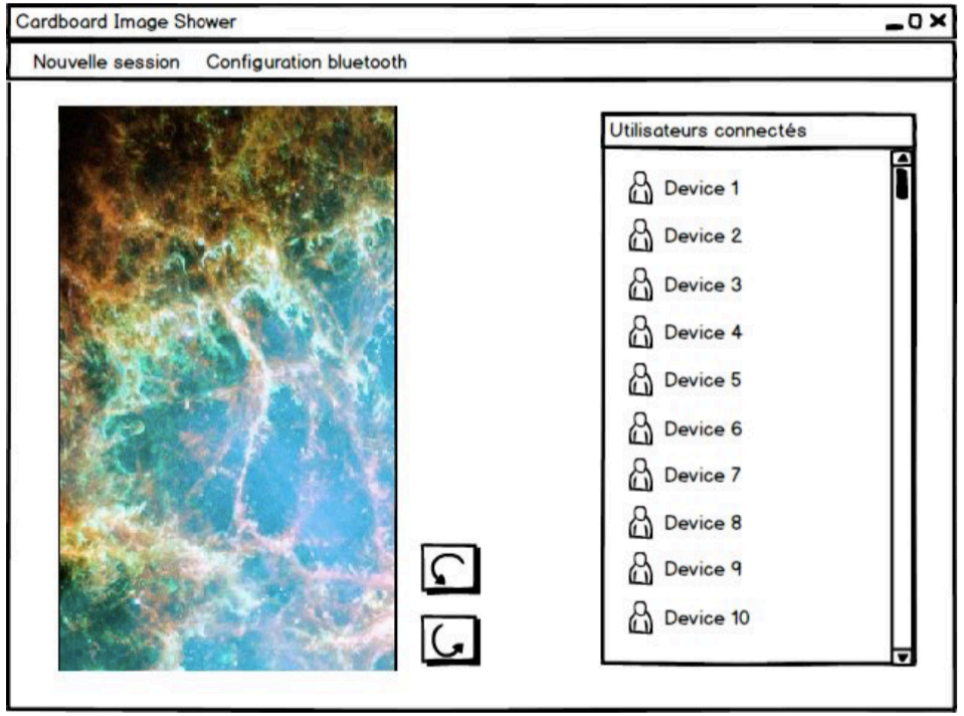
- The aim of this project is to evaluate (and to validate) the use of multiple Google Cardboards associated to a master application on a laptop or a desktop (or why not an Internet tablet).
- Steps
  - Bluetooth / Wifi connexion between the master and the Smartphones, commands / data sending from the master to the Smartphones (with an ACK), dedicated exchange protocol (in JSON)
  - Visualization of the data on the Smartphones which react to the commands (zoom, rotation, URL to load data, etc.) sent by the master

Multi Google Cardboard project - Architecture

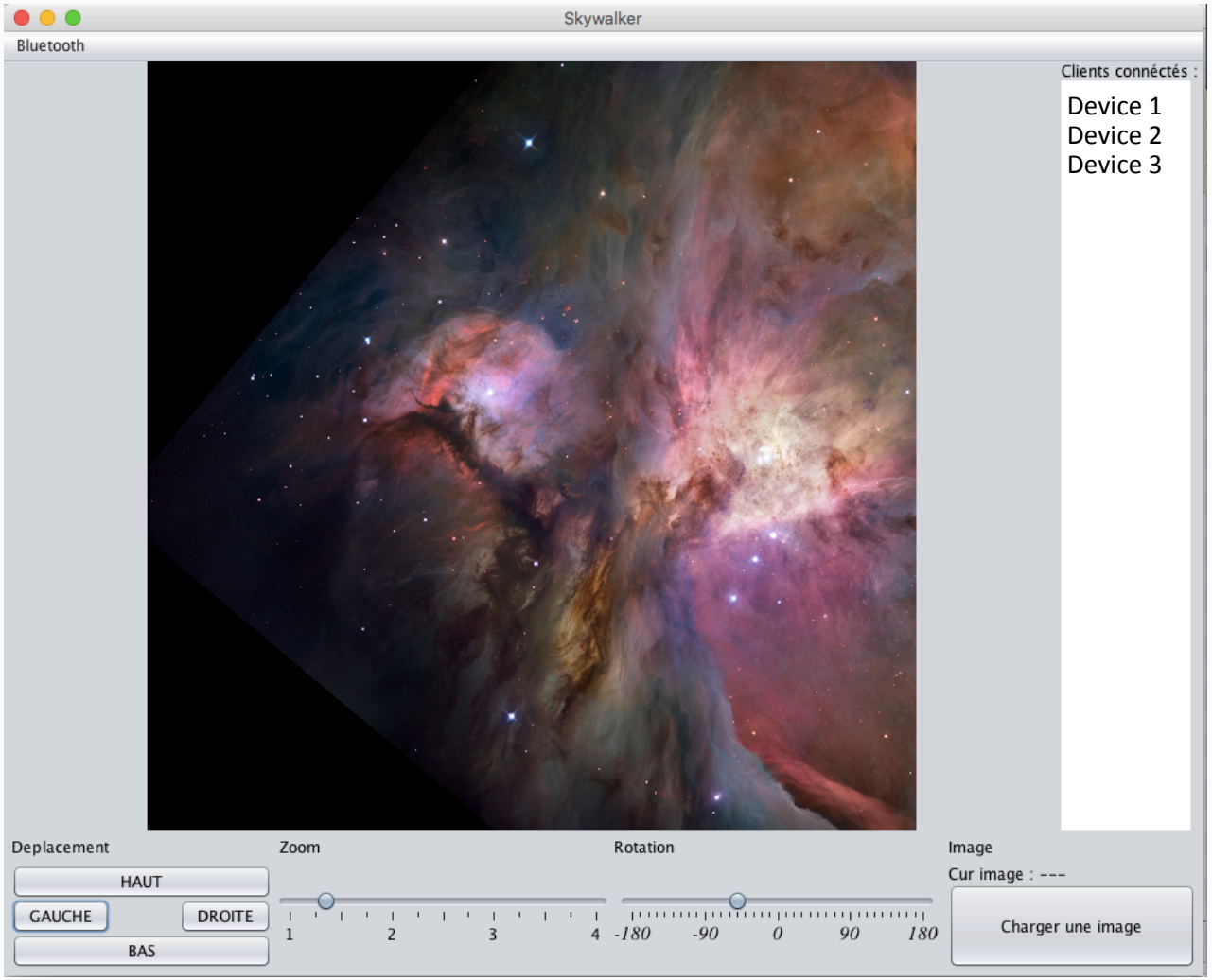


Multi Google Cardboard project - Master side – study phase





Multi Google Cardboard project - Master Java application prototype



Multi Google Cardboard project – technical side

- On the master side
  - a simple Java application managing the (Bluetooth for one or two Cardboards) or Wifi (with a Rasberry Pi as Hub for 10, 20, .. Cardboards) connexions, sending the (JSON based) commands and the data
- On the Smartphone side
  - Cardboard SDK
  - link with the master
  - execution of the master's commands (zoom, rotation, etc.)
  - display of the images (selected by the master)

Multi Google Cardboard project – other kind of use

- Selection on the master side of 4 pictures displayed in the Google Cardboards
- Example of use:
  - If you look to the North you will see Andromeda in optical
  - If you look to the East you will see Andromeda in Infrared
  - Etc.

Google Cardboard Allsky survey viewer

- The idea is to construct the whole sphere for a given HEALPix order
  - View from inside
  - The order is static, no progressive navigation (but probably zooming on specific objects)
- Possible switch between different wavelenghts
  - If you could see the Sky in radio...

Collaboration, conclusion

- Open to collaboration for all these projects
  - (Immersive) 3D Visualization not far from the first release
    - Looking for various datasets, possible help to write a dedicated reader
  - Multi Google Cardboard project
    - Mostly a proof of fact, should be re-used in other projects, sources will be available after the project deadline (June 2016)
  - Allsky Survey Viewer
    - Available for Planetarium, education, etc.
    - Deadline: end of (Northern) Summer