ESA Helioviewer Project
Status Update, April 2010

Daniel Müller
Juan Pablo García Ortiz
Jack Ireland

Markus Langenberg
George Dimitoglou
Bernhard Fleck

Ludwig Schmidt
V. Keith Hughitt
Stephan Pagel
The Helioviewer Project

Motivation

• Space missions generate huge amount of data: SOHO: ~0.2 GB/day, SDO: ~1.4 TB/day
• Large range of physical length-scales
• Many different data products available

Goal

• Create discovery infrastructure by
  • Enabling efficient data browsing and visualization
  • Linking data to knowledge bases and automated feature recognition algorithms

Implementation

• ESA SciOps/RSSD research grant
Helioviewer - Key Results in 2009/2010

- All 14+ years of SOHO images at your fingertips:
  www.jhelioviewer.org (Java App)
  www.helioviewer.org (web browser)

- NASA Solar Dynamics Observatory adopted JPEG 2000 with Helioviewer specs as main format for browse data. We will serve 30,000 images/day from NASA-funded Helioviewer server at GSFC.

- JHelioviewer:
  - Drastically improved performance: Implemented image processing + rendering on graphics card using OpenGL
  - Can access 13,000+ images of Mars Reconnaissance Orbiter/HiRISE (> 6 Gigapixels each)
JHelioviewer

What is JHelioviewer?
• Cross-platform Java App
• Client-server solution for browsing large data volumes, using
  • JPEG 2000 compression
  • JPIP for interactive streaming
  • OpenGL for fast rendering

What can JHelioviewer do for you?
• Interactively generate, play and overlay time series of high-res images with arbitrary cadence
• Perform image processing on-the-fly
• Connect to event databases, request science data
JPEG 2000 in a Nutshell

Advantages:

- **Multiple resolutions**
  [Images at different resolutions are automatically created during compression process]

- **Random image access**
  [Selected parts + quality layers can be accessed remotely]

- **Flexible file format** [can add metadata]

- **Well-suited for archives**
  [offers lossless mode, “Compress once, decompress many ways”]
Student Involvement

- Helioviewer Project has been attracting top talent from European universities: already >10 students so far
- Students gain valuable experience in software development
- ESA gets access to highly skilled young developers
- Open source approach is key

http://www.jhelioviewer.org
The Future

• Helioviewer framework could be customized to display any complex image data and metadata, e.g. planetary, astronomical, Earth sciences data

• JPEG 2000 could augment ESA science data archives and web pages for general public
Conclusions

• The Helioviewer Project offers exciting new functionality that enables users to explore petabyte-scale data archives

• With our software, you can
  • Interactively generate, play and overlay high-res movies
  • Perform image processing on-the-fly
  • Connect to knowledge bases

http://www.jhelioviewer.org
Thank you

http://www.jhelioviewer.org