Abstract
We present a novel solar data browser geared towards SDO’s AIA data. It is based on the JPEG 2000 compression standard to enable highly efficient browsing in space and time. Our approach is both flexible, scalable and platform-independent. The random code stream access of the JPIP protocol minimizes data transfer and can encapsulate meta data as well as a multiple spectral channels in one data stream.

What is JPEG 2000?
JPEG 2000 is a wavelet–based image compression standard. It was created by the Joint Photographic Experts Group with the intention of superseding their original discrete cosine transform–based JPEG standard (created about 1991) and offers multiple advantages over other compression schemes.

Advantages of JPEG 2000
- Multiple resolution representation: Images at different resolutions are automatically created during the wavelet compression process
- Random code stream access and processing via the JPIP protocol: Huge images can be accessed while downloading only selected parts of the image
- Quality layers: Images are displayed at increasingly better quality as data transfer progresses
- Flexible file formats: allows for handling of metadata and for remote access
- Superior compression performance
- Read/write routines built into IDL

Challenges:
- JPEG 2000 is not yet fully supported by most web browsers, therefore JHelioviewer is encapsulated in a Java Web Start application

JHelioviewer Implementation
The JHelioviewer application is built using
- Kakadu Software³ (C++ implementation of the JPEG 2000 standard, used under non-commercial license)
- Open–source J2KViewer²
- Java Web Start: JHelioviewer can be launched from web browser or as a stand–alone application.

Current Functionality:
- Efficient zooming & panning
- Selecting images by instrument and date
- Tabbed image browsing
- Display FITS header
- Cross–platform: runs on OS X, Linux, Windows XP

Future Work:
- link to image data bases & knowledge base
- multi–spectral data stream (all SDO AIA channels in one)
- image overlays and annotations
- image processing
- use Motion JPEG 2000 to store image sequences
- bridge gap between Java application and web browser–based application (possibly by tiling images on–the–fly)

References
¹http://www.jpeg.org/jpeg2000/
²http://dltj.org/arcticle/gsoc–jpip/
³http://www.kakadusoftware.com

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