

SDO Data Pipeline: Helioviewer Status

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SDO Pipeline Meeting 17 September 2010, Royal Observatory of Belgium

Back-end Development

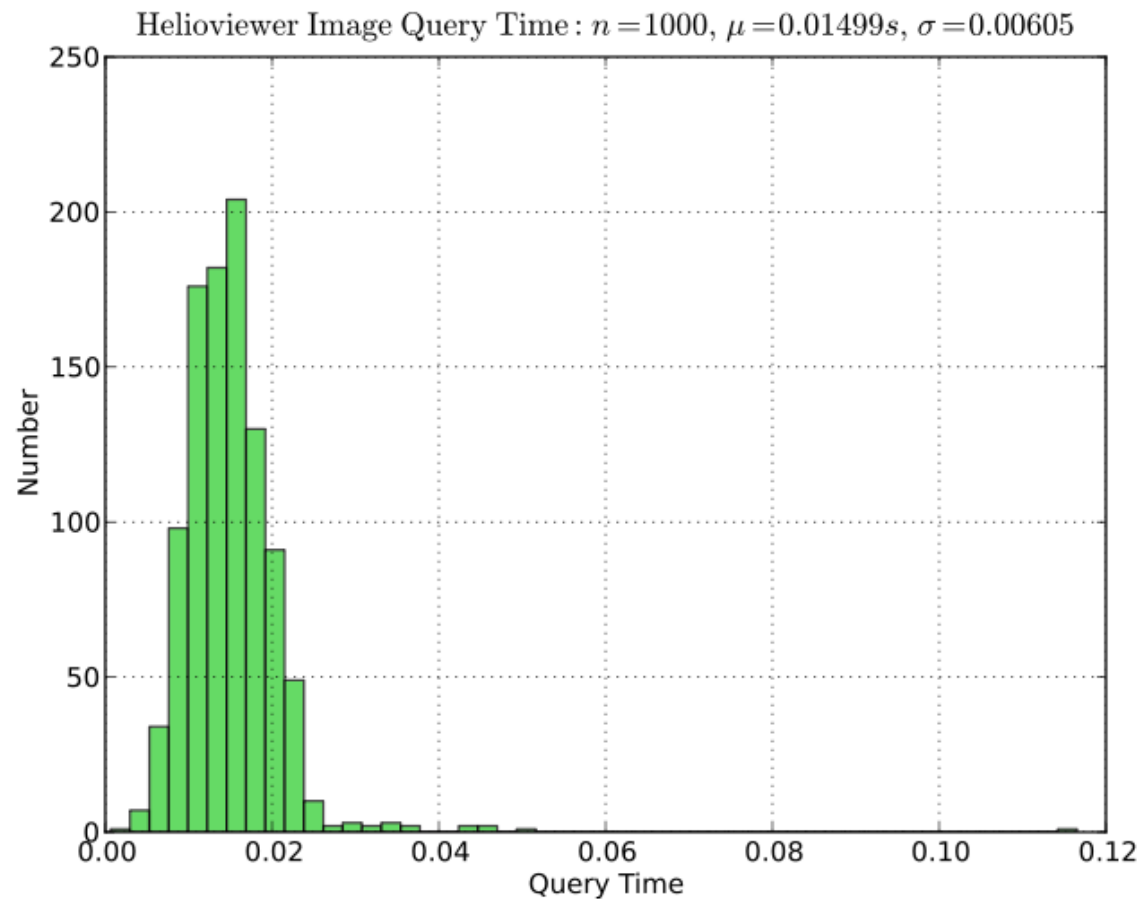
Dynamo (Hv.org/JHV Back-end)

- Modular Architecture
 - Common interface, validation and documentation
 - Easy to extend
 - Can chose which modules to support
 - Current modules: WebClient, JHelioviewer, Movies, Events
- Software Used
 - Kakadu (JPEG 2000)
 - GD (Color tables)
 - ImageMagick (Image processing)
 - FFmpeg (Movie generation)

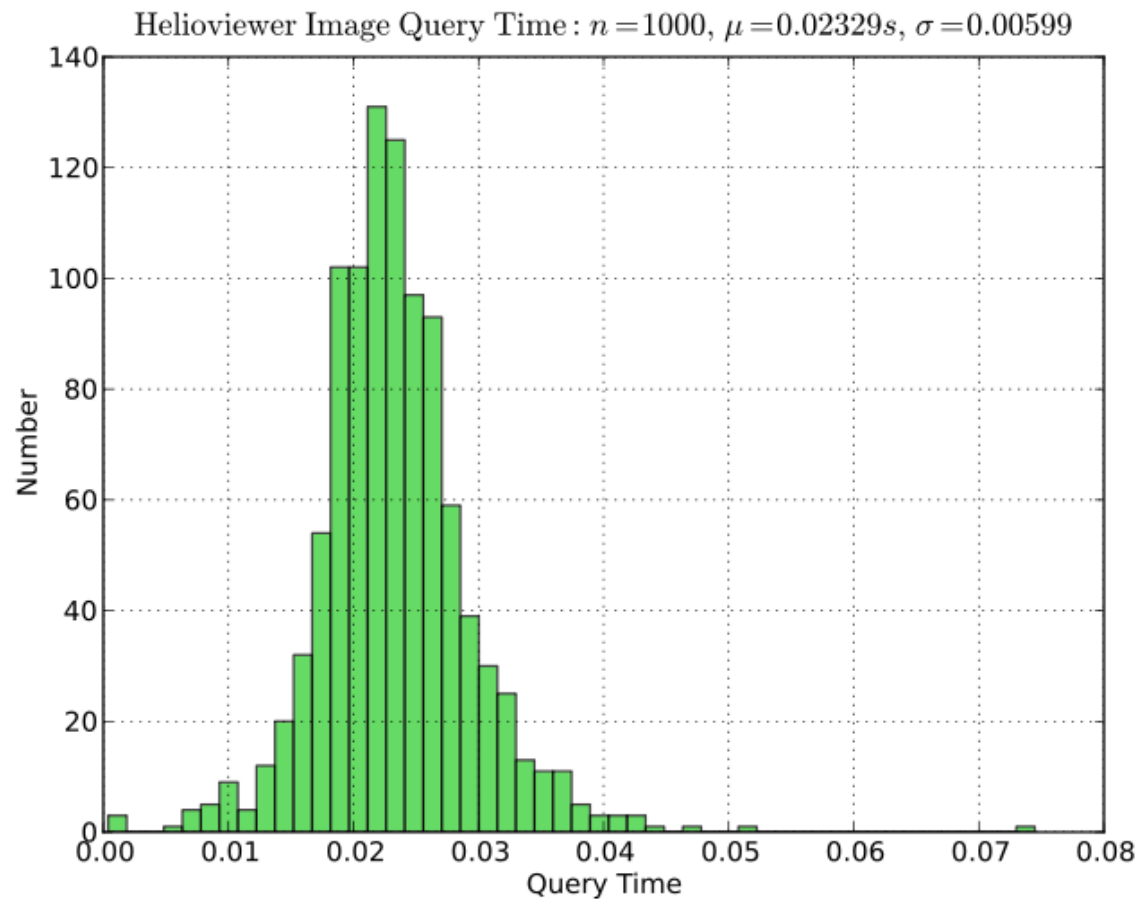
Database

- MySQL (Postgres should work as well)
- Scalable: queries optimized ($\sim 50\text{ms}/10^8$ records)
- Problem: Movies still take time

Benchmarking (MySQL)

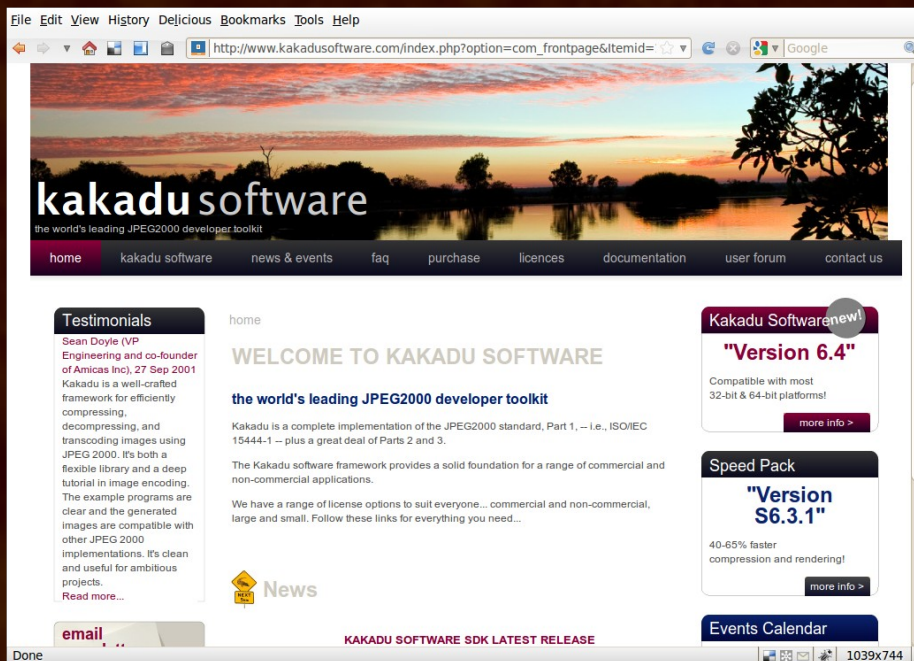


Benchmarking (Postgres)



JPEG 2000 Software Support

Kakadu



- Fast (0.4s for 4k x 4k AIA image)
- Advanced features (ROI, JPX creation)
- Proprietary (but compiled code is distributable)
- \$600 for non-commercial license

OpenJPEG

- Not so fast (1.5s for 4k x 4k AIA image)
- Some support for advanced feature (no ROI or JPX generation)
- Open-source, actively being developed
- \$0

Open
JPEG

Helioqueueer

- Built on a sophisticated queuing system, “Resque,” used by GitHub
- Makes it possible to support demanding requests (movies)
- Also useful for running background tasks: cache warming, clean-up, processing new data)
- Accessed via Dynamo or by using a proxy server

Resque Web Interface

[File](#) [Edit](#) [View](#) [History](#) [Delicious](#) [Bookmarks](#) [Tools](#) [Help](#)

http://localhost:5678/overview

Overview Working Failed Queues Workers Stats Schedule Delayed




Queues


The list below contains all the registered queues with the number of jobs currently in the queue. Select a queue from above to view all jobs currently pending on the queue.

Name	Jobs
hek_poll	0
image_loader	0
on_demand_movie	0
failed	63


3 of 6 Workers Working

The list below contains all workers which are currently running a job.

Where	Queue	Processing
 Europa:1386	ON_DEMAND_MOVIE	OnDemandMovieMaker just now
 Europa:1393	ON_DEMAND_MOVIE	OnDemandMovieMaker just now
 Europa:1391	ON_DEMAND_MOVIE	OnDemandMovieMaker just now

 [Live Poll](#)

Powered by [Resque](#) v1.10.0
Connected to Redis namespace resque on redis://localhost:6379/0

Done 1039x744

What needs to be done?

- Improve existing functionality:
 - Helioqueueur Interaction (better movie time estimation and status information)
 - Better caching (naming conventions, smarter cache-warming, cleanup)
- New functionality:
 - VSO Interaction
 - SSW Cut-out service support (Maybe on front-end?)
 - Improve distributed architecture
- Other:
 - Helioqueueur documentation and further testing

Distributed Architecture

- Currently very simplistic (can spread load across several mirror servers)
- Next step: decentralized, peer-peer replication
- Example: Apache Cassandra (nice, but non-relational)

Server Requirements

Easy

Ubuntu 10.04

Fedora, CentOS, RHEL

Other Linux distros

OS X

Forget
about it...

Toaster oven

Windows



Optimizing server hardware for Helioviewer

1. CPU
2. Memory
3. Disk space

Our Server

- AMD Opteron 4u
- 16 x 2.6 Ghz CPUs
- 96 Gb memory
- 14 Tb storage (expandable to 48Tb)
- Ubuntu 10.04 Server, XFS, RAID 5

JPIP Server

- Works fairly well
- Looking into alternative open-source options

Front-end Development

Browse Clients:

Helioviewer.org
JHelioviewer
hqTouch

Helioviewer.org

- New features:
 - AIA support
 - Screenshot and movie creation
- Support:
 - Firefox 3+
 - Google Chrome
 - Safari
 - IE 7/8 (Better with chrome-frame), IE9

What needs to be done?

- Improve existing functionality:
 - Fix screenshot/movie interface issues, add support for more advanced requests
 - Client-side tiling
- New functionality:
 - VSO Interaction
 - HEK Interface (module is done, just needs front-end)
 - Normalize movie generation (VP8, H.264, Flash, .tar.gz?)
 - Cut-out service

JHelioviewer

- New Features (in trunk):
 - AIA Support
 - VSO Querying
 - HEK interaction
 - Simplified UI

hqTouch

More on this soon...

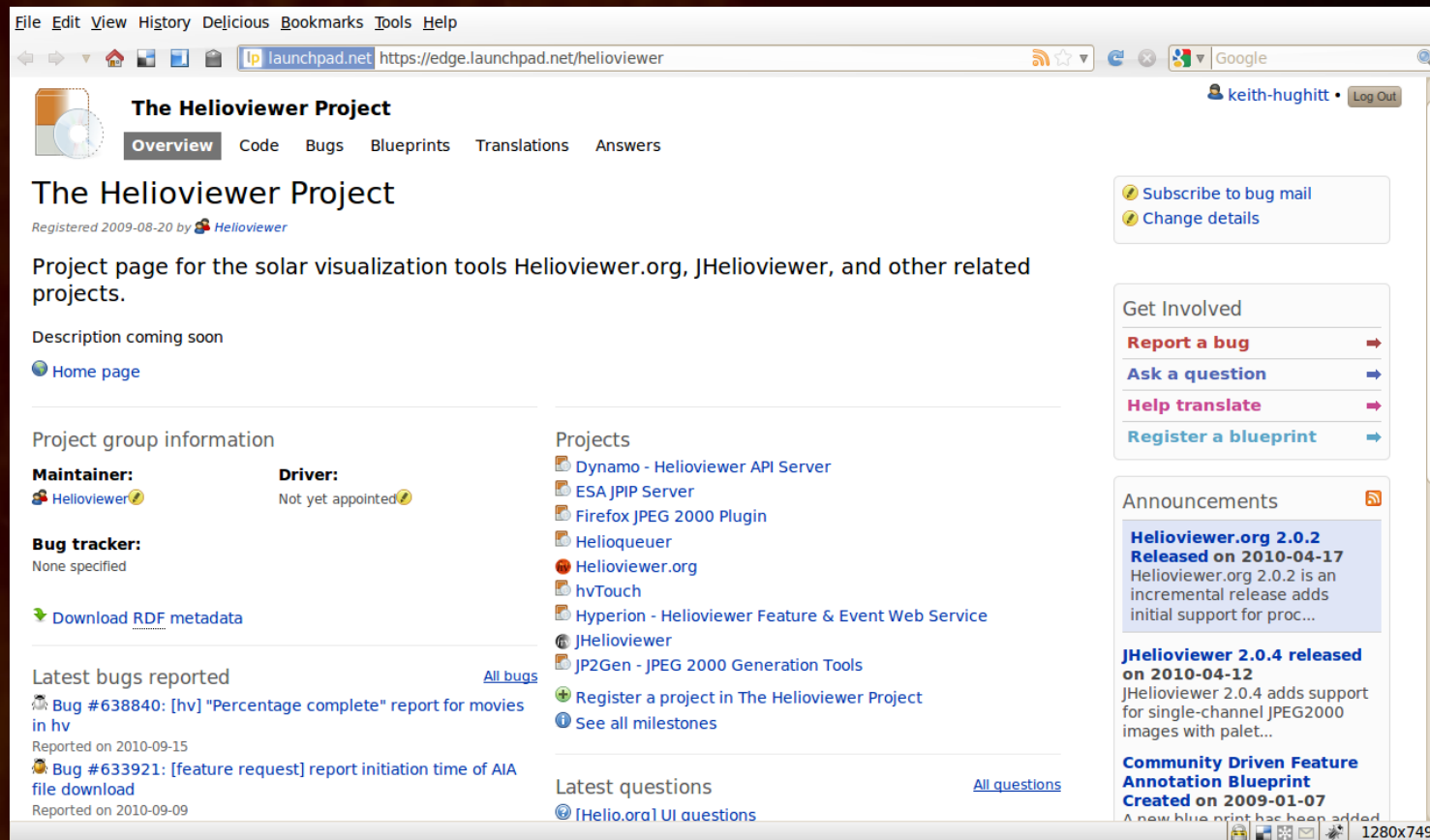
Other issues:

Hardware Malfunction

Providing Feedback

- Bug-reports/Feature-requests (Launchpad)
- Mailing List

Bug reports & feature requests



The screenshot shows the 'The Helioviewer Project' page on Launchpad.net. The browser's address bar displays 'https://edge.launchpad.net/helioviewer'. The page header includes a navigation menu with 'Overview', 'Code', 'Bugs', 'Blueprints', 'Translations', and 'Answers'. The main content area features the project title, a description, and a 'Description coming soon' message. A 'Home page' link is provided. The 'Project group information' section lists the maintainer as 'Helioviewer' and the driver as 'Not yet appointed'. The 'Bug tracker' section indicates 'None specified'. A 'Download RDF metadata' link is available. The 'Latest bugs reported' section lists two bugs: Bug #638840 and Bug #633921. The 'Projects' section lists various tools and services, including 'Dynamo - Helioviewer API Server', 'ESA JPIP Server', 'Firefox JPEG 2000 Plugin', 'Helioviewer.org', 'hvTouch', 'Hyperion - Helioviewer Feature & Event Web Service', 'JHelioviewer', and 'JP2Gen - JPEG 2000 Generation Tools'. The 'Latest questions' section lists a question about the '[Helio.org] UI questions'. The right sidebar contains a 'Get Involved' section with links to 'Report a bug', 'Ask a question', 'Help translate', and 'Register a blueprint'. The 'Announcements' section lists two releases: 'Helioviewer.org 2.0.2 Released on 2010-04-17' and 'JHelioviewer 2.0.4 released on 2010-04-12'. The page footer shows the browser's status bar with the address '1280x749'.

The Helioviewer Project

Overview Code Bugs Blueprints Translations Answers

The Helioviewer Project

Registered 2009-08-20 by Helioviewer

Project page for the solar visualization tools Helioviewer.org, JHelioviewer, and other related projects.

Description coming soon

[Home page](#)

Project group information

Maintainer: Helioviewer

Driver: Not yet appointed

Bug tracker: None specified

[Download RDF metadata](#)

Latest bugs reported [All bugs](#)

Bug #638840: [hv] "Percentage complete" report for movies in hv
Reported on 2010-09-15

Bug #633921: [feature request] report initiation time of AIA file download
Reported on 2010-09-09

Projects

- Dynamo - Helioviewer API Server
- ESA JPIP Server
- Firefox JPEG 2000 Plugin
- Helioviewer.org
- Helioviewer.org
- hvTouch
- Hyperion - Helioviewer Feature & Event Web Service
- JHelioviewer
- JP2Gen - JPEG 2000 Generation Tools

[Register a project in The Helioviewer Project](#)

[See all milestones](#)

Latest questions [All questions](#)

[Helio.org] UI questions

Get Involved

- [Report a bug](#)
- [Ask a question](#)
- [Help translate](#)
- [Register a blueprint](#)

Announcements

Helioviewer.org 2.0.2 Released on 2010-04-17
Helioviewer.org 2.0.2 is an incremental release adds initial support for proc...

JHelioviewer 2.0.4 released on 2010-04-12
JHelioviewer 2.0.4 adds support for single-channel JPEG2000 images with palet...

Community Driven Feature Annotation Blueprint Created on 2009-01-07
A new blueprint has been added

www.launchpad.net/helioviewer


helioviewer-dev

File Edit View History Delicious Bookmarks Tools Help

http://groups.google.com/group/helioviewer-dev

Gmail Calendar Documents Web Reader more keith.hughitt@gmail.com | My Groups | Favorites | Profile | Help | My Account | Sign out

Google groups

 Helioviewer Development





Home New since last time: 28 messages

[edit welcome message]

Discussions 9 of 368 messages view all » + new post

[\[Helioviewer-dev\] Helioviewer AIA Test Images Part 2](#)
By Daniel Mueller - Aug 24 - 4 authors - 3 replies
[No new images since Friday 20th August](#)
By Jack Ireland - Aug 22 - 1 author - 0 replies
[\[Helioviewer-dev\] AIA image scaling comparison](#)
By Daniel Mueller - Aug 6 - 3 authors - 2 replies
[\[Helioviewer-dev\] Meta Data for SDO data on Delphi](#)
By Helge Dietert - Aug 5 - 4 authors - 7 replies
[\[Helioviewer-dev\] Re: SDO/AIA Data on Delphi](#)
By Daniel Mueller - Aug 5 - 6 authors - 8 replies
[\[Helioviewer-dev\] Usability Question: What to do when a user requests a movie for a "low cadence" data-set?](#)
By Keith Hughitt - Aug 4 - 2 authors - 2 replies
[\[Helioviewer-dev\] Setting the data source from JHV](#)
By Keith Hughitt - Jul 31 - 2 authors - 1 reply
[\[Helioviewer-dev\] Server source code](#)
By David Zakar - Jul 30 - 2 authors - 3 replies
[Access for JHelioviewer Plugins to Solar Events](#)
By Laszlo Istvan Etesi - Jul 30 - 1 author - 0 replies

Members 25 members view all » + invite members

 dmuell...@rssd.esa.int Member
 dza...@carrastro.com Member
 Alen Member
 Alex Member

Create some pages

Stopped

HOME

DISCUSSIONS

MEMBERS

PAGES

About this group

Edit my membership

Group settings

Management tasks

Invite members

Sponsored links

[DKIM en DomainKeys](#)
Digitale e-mail handtekening versterkt uw primaire bedrijfsproces!
[www.domainkeysidentifiedmail.nl](#)

[Europe's Top Headhunters](#)
Only Jobs From 150.000 €
Access over 7,000 Headhunters!
[www.Experteer.com](#)

[Bons Plans Restaurants](#)
Inscrivez-vous pour les recevoir.
Jusqu'à 70% de réduction !
[www.GROUPON.be/Bruelles](#)

Group Info

Members: 25

Language: English

Group categories: Not categorized

1039x744



Creating Helioviewer compliant JPEG 2000 images from FITS files

It's easy

- IDL contains a JPEG2000 file object.
- SSW IDL can be used to read in solar FITS files and write out a Helioviewer-compliant fits file.

JPEG 2000 Files

- Extension is .jp2.
- Is in two parts: a XML header, and the wavelet coefficients.
- Can be losslessly or lossy encoded.

Helioviewer Compliance

- XML header contains some small number of keywords describing the image
 - pixel size in arcsec, image size
 - centre of FOV in arcsec
 - radius of Sun as measured
 - observation time
- *All these are already in the source FITS files*


Helioviewer Compliance

<meta>

<fits>....</fits> *copy of FITS keywords*

<helioviewer>....</helioviewer>

</meta>



*details on
the
creation of
the JP2 file*

Helioviewer Compliance Requirements

- Filename specification
- Storage directory structure
- FITS keywords \Leftrightarrow XML key-value pair minimal set.
- *information is available online, but will be made much clearer shortly.*

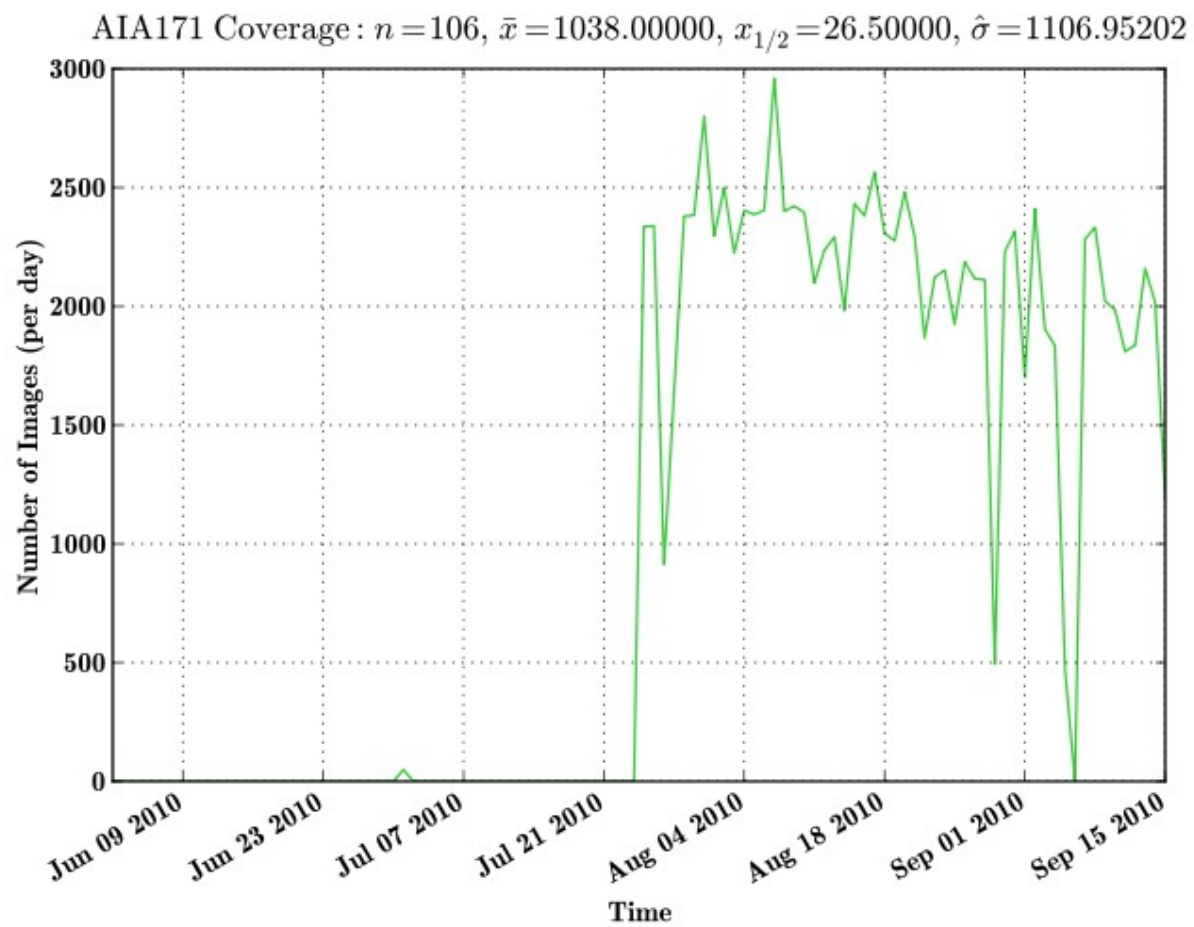
JP2Gen

- Converts SOHO MDI, EIT, LASCO C3/C2 FITS to JP2.
- Converts AIA to JP2
- Handles all of the requirements
- Install Bazaar code management tracking software, download JP2Gen, make contributions, or....
- Ask me for the code and i'll send it to you.

AIA

- IDL> HV_AIA_LIST2JP2_GS,<*string array of AIA file names*>
- Full 4k x 4k FITS files go in, full 4k x 4k JPEG2000 FITS files come out.
- Around 1s per FITS file (desktop, 8 core)
- Compression ratio of 64:1
- Helioviewer Project JP2 files have a 36 s cadence (limited by our storage).

Coverage

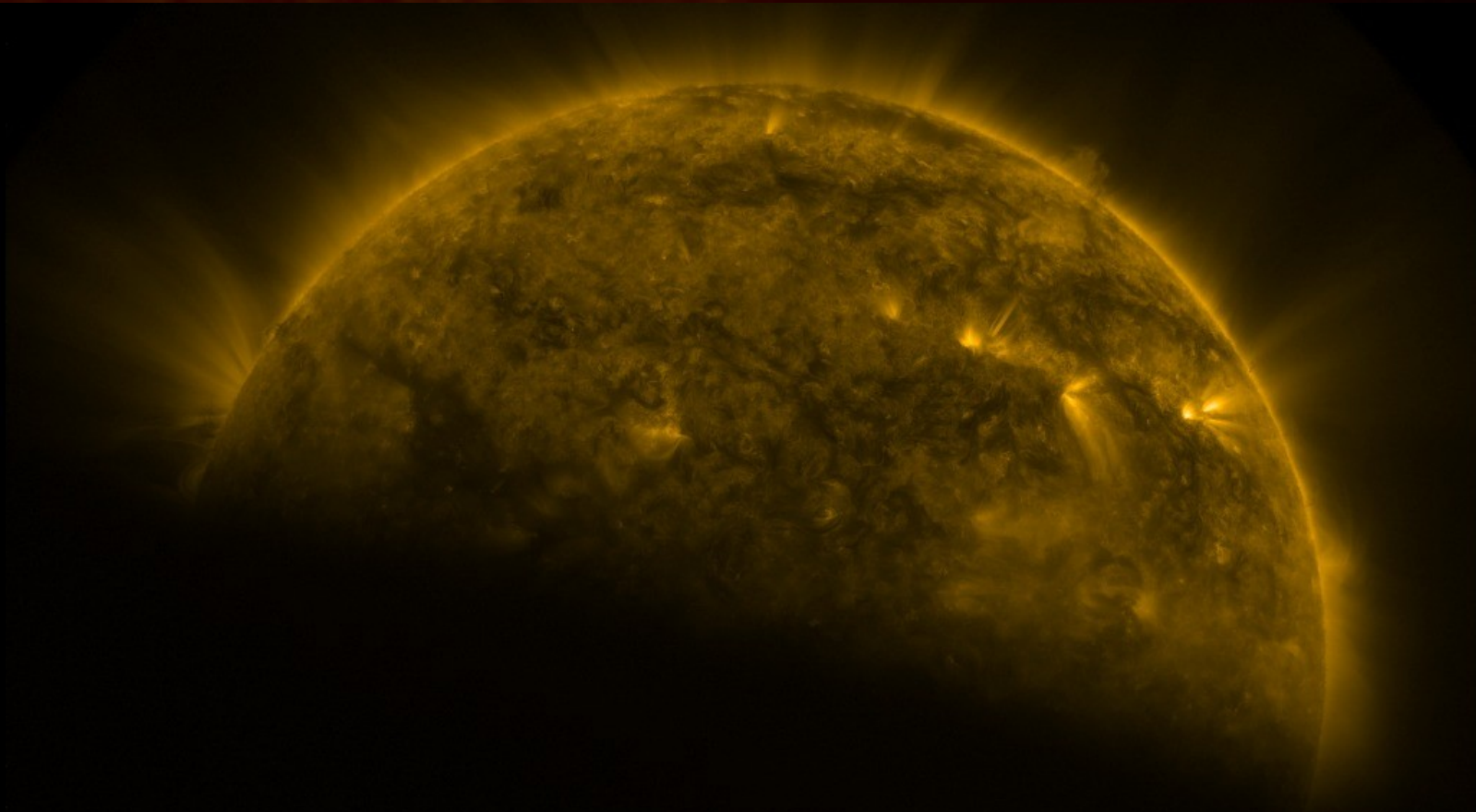


Distributing JPEG 2000 Data?

Information

- www.helioviewer.org/wiki
 - contains information on JP2Gen, but is about 6 months out of date.
 - Will be updated by the end of the month to reflect the current state of the art.
- <https://launchpad.net/helioviewer>
 - main Helioviewer Project website

The End



AIA 171

2010-09-17 06:30:48

www.helioviewer.org

