AIA data products: specs for browse products

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AIA WWW/browse data products (Karel's slide unchanged)

	Required meta-data	Required AIA data	Required supplemental data	Time windows and temporal cadence	Field of view and spatial resolution	Output format(s)	Accessible via HPKB (IVORN)
Tracked Active Region movies	HPKB: AR	(E)UV images, 1k cutout	HMI magnetograms	Up to disk passage; 15m	1kx1k, full-res.	Movie: format(s) TBD	Y
Event summary movies	HPKB: all event types other than AR	(E)UV images, 1k cutout or 1k binned full fov	HMI magnetograms	Up to 6h; 5m	1kx1k, full-res. or full-fov	Movie: format(s) TBD	Y
(E)UV lightcurves	HPKB: AR	Total intensity, and AR-region intensity; all ch.	EVE light curves	Past three days; past 24h; 10s	N/A	Lightcurve images	N
(E)UV synopic maps	-	AIA (E)UV images; 1/day	-	Monthly summaries; 24h	Central meridian strips; 1k N-S	Images	N
Global DEM maps	-	AIA (E)UV images; 4/d	HMI magnetograms	6h	Full-Sun; 1kx1k rebinned	Images	N
Three-channel 'temperature' movies	-	AIA (E)UV images; 1/h	HMI magnetograms	Daily sumaries; 1h	Full-Sun; 1kx1k rebinned	Movie: format(s) TBD	N
Full-Sun low-resolution movies	-	(E)UV images	HMI magnetograms	1d, 5m and 7d, 30m and 28d, 1h	1kx1k rebinned	Movie: format(s) TBD	N
Comparisons of EUV images and model fields	HPKB: AR	AIA EUV images	HMI magnetogram; PFSS&NLFFF field models	12h	1kx1k full-res.	Images	Y? for highly nonpotential fields
PFSS-EUV comparisons	-	AIA EUV images	HMI magnetogram, PFSS model	12h	1kx1k rebinned full-fov	Images	Y: open-field regions
AIA&Ext.: Seg-mentation maps	HPKB: AR, CH, other events,	-	NOAA AR info, GOES flare info	1h	1kx1k rebinned full-fov.	Images: Carrington Maps + Disk Masks	N

Not funded under AIA contract. We will accommodate externally provided events (in standard xml format), or negotiate to support projects external to AIA.

AIA WWW/browse data products: movie parameters

	Duration (centered on time of event)	Temporal cadence	Dimensions (in pixels)	Spatial Extent	Update Frequency	How Often to Archive?
Full-disk Browse	75h 12.5d	5m 20m	1024×1024	full-disk	3h 12h	12h 36h
Tri-Color Temperature	75h 12.5d	5m 20m	1024×1024	full-disk	3h 12h	12h 36h
Active Regions	15h disk crossing	1m 15m	1280×720	cutout	1h 6h	4h final movie
Bright Point	*(none)*					
Coronal Dimming	5h	10s	1024×1024	full-disk	once upon event completion	final movie
Coronal Hole	*(none)*					
Coronal Wave	5h	10s	1024×1024	full-disk	once upon event completion	final movie
Filament	15h disk crossing	1m 15m	1280×720	cutout	1h 6h	4h final movie
Filament Eruption	5h	10s	1280×720	cutout	once upon event completion	final movie
Flare	5h	10s	1280×720	cutout	once upon event completion	final movie
Loop	*(none)*					
Oscillation	5h	10s	1280×720	cutout	once upon event completion	final movie
Sunspot	15h disk crossing	1m 15m	1280×720	cutout	1h 6h	4h final movie
Emerging Flux	15h	1m	1280×720	cutout	1h	4h

Some General Topics

- **Formats**
  - What formats are we using for images, movies, 3D arrays, segmentation maps?
  - Make most movies 1280×720 pixels (720p) and at most 900 frames long (30s at 30fps).
  - Toggle clock on/off?
  - Embed light curves underneath some movies?
- **Continuity**
  - For ongoing events that have movies associated with them (e.g., active region cutouts while the region is on disk), keep the constituent images for future updates to these movies.
- **Triggers**
  - Some modules should be triggered when new entries in the HEK appear.
  - Others are triggered at regular intervals (similar to a cron job).
- **Are there any other browse data products that should be added to the chart on the previous page?**

Tracked Active Region Movies

- **Purpose**
  - Create cutout movies of all active regions for browsing
- **Inputs**
  - HEK: active region events
  - AIA: (E)UV images (8 channels in all)
  - HMI: LOS magnetograms and WL images (2 channels)
  - cutout size (default 1280×720), cadence (e.g., 15 min for disk crossing, 1 min for daily movies)
- **Outputs**
  - 10 cutout movies (one for each channel) that are tracked, full-resolution, and at the desired cadence
- **Algorithm Outline**
  - Get (central) locations of active region from HEK (there will be multiple entries per AR)
  - Determine path (interpolate) of AR center between HEK entries
  - Between each pair of consecutive AR entries, fetch necessary HMI and AIA data (15-min sampling), and extract the 1280×720 swath around each AR center from each channel
  - Assemble cutouts into movie (and save)

Event Summary Movies

- **Purpose**
  - Create cutout movies of HEK events (except active region events) for browsing
- **Inputs**
  - HEK: all events other than active regions
  - AIA: (E)UV images (8 channels in all)
  - HMI: LOS magnetograms and WL images (2 channels)
  - movie size (default 1280×720), cadence, duration
- **Outputs**
  - 10 tracked, full-res, cutout movies (one for each channel)
- **Algorithm Outline**
  - Get (central) locations and event time from HEK
  - For each entry, get HMI and AIA data (5-min sampling), for a time period of ±3hr of event time, and extract the 1280×720 area around each central location from each channel
  - Assemble cutouts into movie (and save)

(E)UV Light Curves

- **Purpose**
  - Create plots of integrated light vs. time for each full-disk AIA waveband, and for each active region cutout
- **Inputs**
  - HEK: active region events
  - AIA: (E)UV images (8 channels in all)
  - EVE: Light curves
  - duration (default 3 dy), sampling rate (default 10 s)
- **Outputs**
  - Light curve plots showing past history of integrated (E)UV emission of either full disk or individual active regions
- **Algorithm Outline**
  - For date/time of record, get past data, and integrate signal from each image (and save)
  - Get bounding box of each active region from HEK (there will be multiple entries per AR)
  - Determine path (interpolate) of active region center between HEK entries
  - Integrate signal over tracked bounding box (and save)
- **Loose Ends**
  - How should bounding box evolve from entry to entry for the same AR?
  - Can 3 dy dataset be zoomed in on (like a Yahoo! stock chart) to see 1 dy data?
  - How often are these done? Can these be made on demand?

Global DEM Maps

- **Purpose**
  - Create DEM maps from set of AIA images, done every 6 hr
- **Inputs**
  - AIA: (E)UV images (8 channels in all)
  - image size (default 4k-by-4k), number of temperature bins (default ??)
- **Outputs**
  - Full-res, full-disk DEM map of the sun
- **Algorithm Outline**
  - Get AIA (E)UV images
  - [Ask Paul Boerner for DEM code]
  - Save
- **Loose Ends**
  - How many temperature bins in DEM map?

Tri-channel Temperature Movies

- **Purpose**
  - Create binned movies of corona with three of the AIA channels represented as one RGB plane
- **Inputs**
  - AIA: (E)UV images (3 channels)
  - Mapping between (E)UV channels and color
  - image size (default 1024×1024), cadence, duration
  - mapping of AIA channels to colors
- **Outputs**
  - Full-disk movie
- **Algorithm Outline**
  - Get AIA channels of interest for at desired cadence
  - Bin images down to desired resolution, map channels to colors, make movie (and save)

Full-sun Browse Movies

- **Purpose**
  - Create rebinned movies of photosphere and corona
- **Inputs**
  - AIA: (E)UV images (8 channels in all)
  - HMI: LOS magnetograms and WL images (2 channels)
  - image size (default 1024×1024), cadence, duration
- **Outputs**
  - 10 full-disk movies
- **Algorithm Outline**
  - Get AIA and HMI channels of interest
  - Bin down images to 1280×720, and make movie (and save)

Active Region Model Magnetic Field Line Overlays

- **Purpose**
  - Create images of model fields overlaid on (E)UV coronal loops for all active regions, produced every 6 hr
- **Inputs**
  - HEK: Coronal field models (PFSS and NLFFF) and active region events
  - AIA: (E)UV images from 171 and 195 channels, maybe more
  - HMI: LOS magnetograms (1 channel)
  - cutout size (default 1280×720), list of AIA channels to use
- **Outputs**
  - Full-res cutout images of active regions with model fieldlines overlaid
- **Algorithm Outline**
  - Get (central) locations of active regions from HEK
  - For each active region, get HMI and AIA data, and extract the 1280×720 area around each central location from each channel
  - Get (or generate) field lines from the suite of models from HEK
  - Reproject field lines onto cutout images (and save)

Full-Disk Model Magnetic Field Line Overlays

- **Purpose**
  - Create images of model fields overlaid on (E)UV coronal loops for the full disk, every 6 hr
- **Inputs**
  - HEK: Coronal field models (global models only)
  - AIA: (E)UV images in 171 and 195 channels
  - HMI: LOS magnetograms (1 channel)
  - image size (default 1024×1024), list of AIA channels to use
- **Outputs**
  - Full-disk images of active regions with model fieldlines overlaid
- **Algorithm Outline**
  - Get HMI and AIA data
  - Get (or generate) field lines from the desired models from HEK
  - Reproject field lines onto full-disk images (and save)

AIA + External Segmentation Maps (to be defined)

- **Purpose**
  - Create bitmaps of locations of various events in the HEK
- **Inputs**
  - HEK: AR, BP, CD, CE, CH, CW, EF, FI, FE, FL, LP, OS, SS events
  - sampling rate
- **Outputs**
  - Full disk 4k-by-4k I*4 arrays, with each bitplane containing the locations of all points interior to the bounding boxes of each HEK event
- **Algorithm Outline**
  - Get all events from HEK within 30min of date/time of record
  - Get bounding boxes of each events
  - Set corresponding pixels in appropriate bitplane (and save)
  - There are a lot of empty bitplanes — this is intended (to have room for future event classes, or other things that can be stored in a binary format)