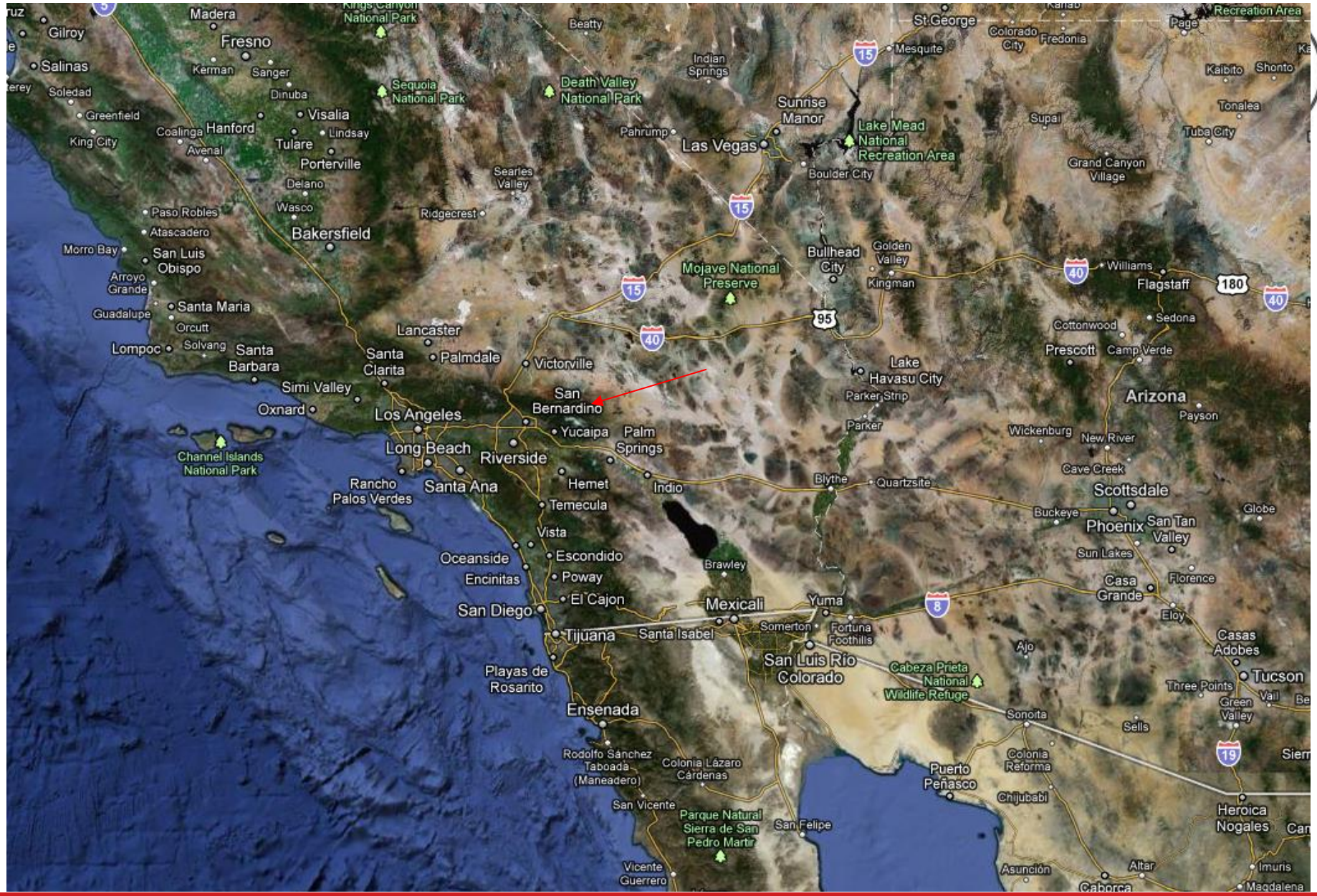
NST Instrumentation and Data

Big Bear Solar Observatory



NJIT New Jersey's Science & Technology University

Big Bear Solar Observatory

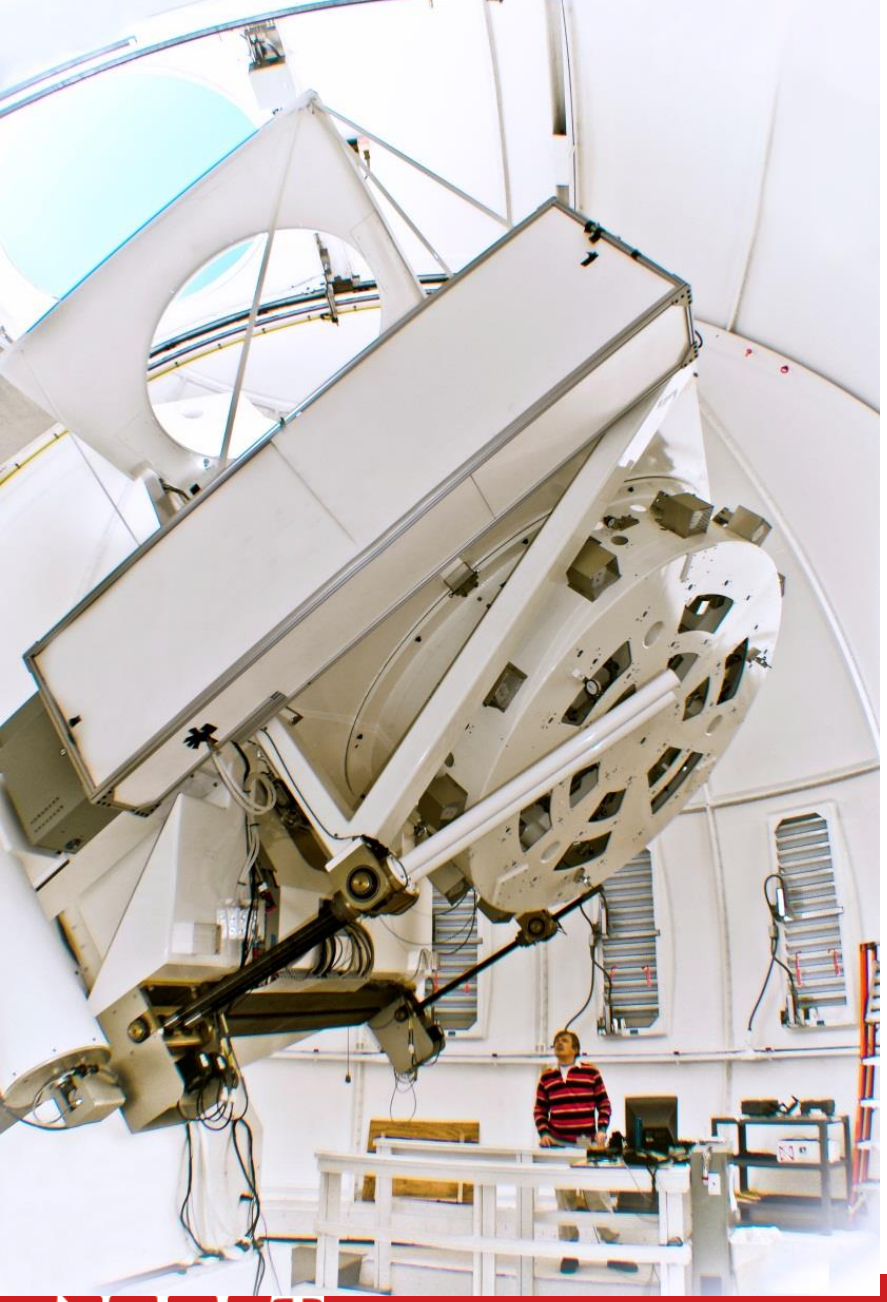
THE EDGE IN KNOWLEDGE

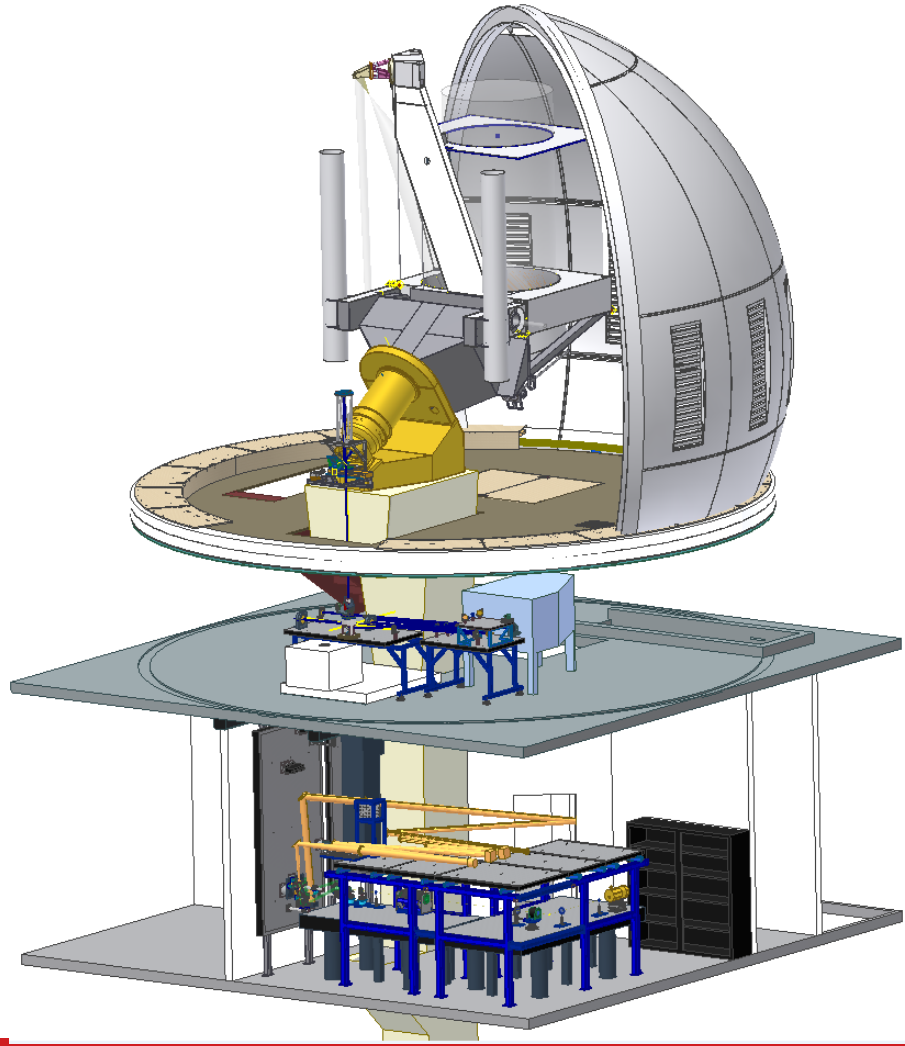

Fawnskin
Grout Bay
N Shore Dr
Big Bear Lake
Mallard Lagoon
Metcalf Bay
Kidd Cove
Fisher Cove
Boulder Bay
Cedar Lake
Big Bear Blvd
Stanfield Cutoff
Interlaken Shopping Center
Meadow Park
Bear Valley Community Hospital
Gold Mine Golf Course
Bear Mountain Resort
W North Shore
N Division Dr
38
18

THE EDGE IN KNOWLEDGE

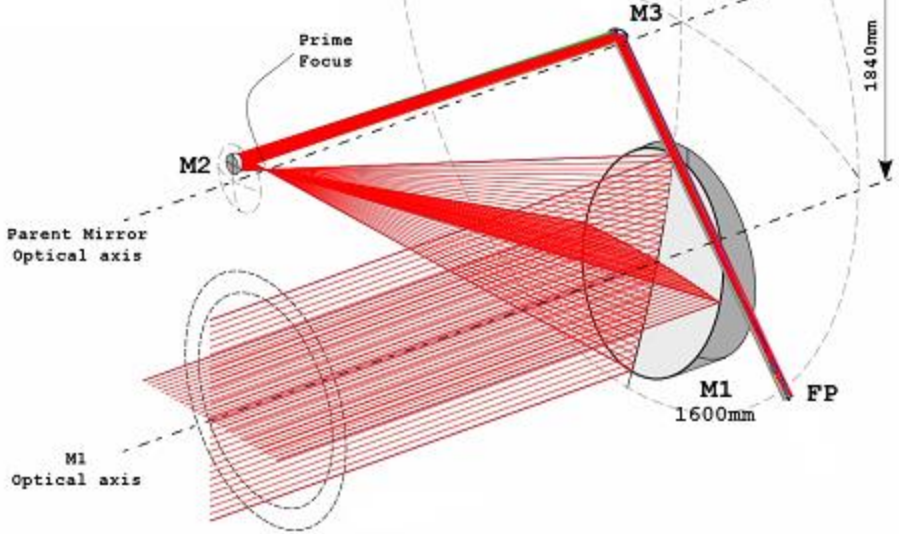

Big Bear Solar Observatory
38
38
38
N Shore Ln
Solar Observatory
Solar Observatory

1.6 m Clear Aperture Off-Axis Telescope





The New Solar Telescope



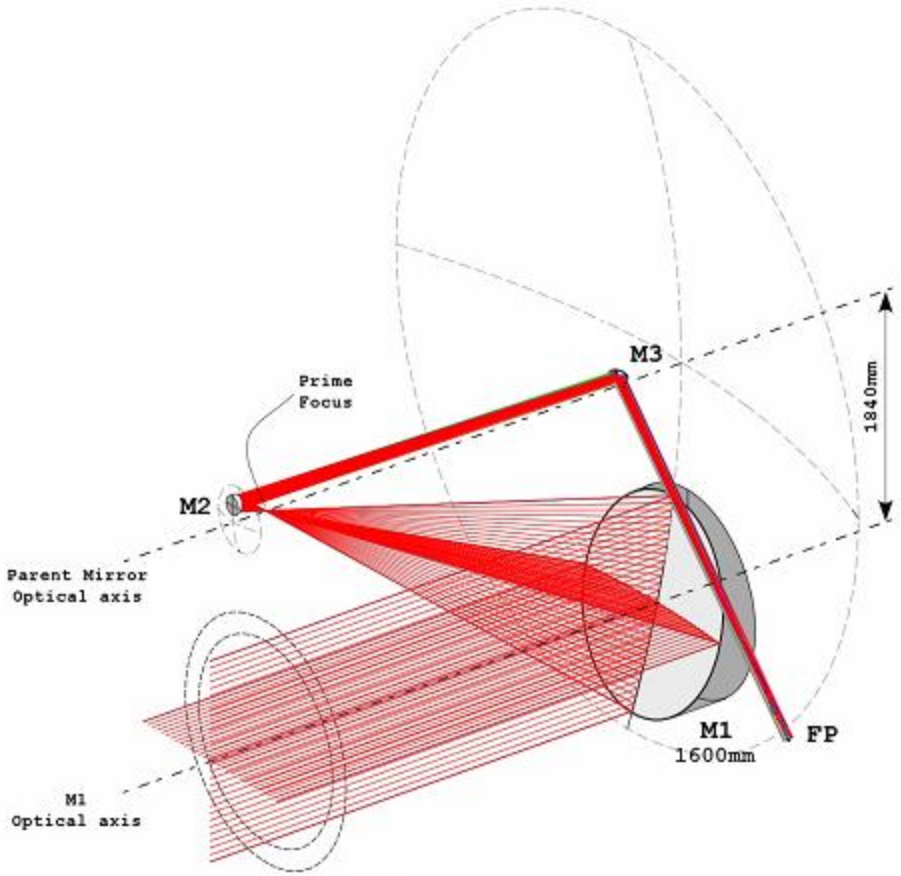
Optical Configuration

The NST configuration is a 1/5 scale copy of one segment of the Giant Magellan Telescope.

The NST primary was figured by Steward Obs. Mirror Lab as a technology test for the GMT, greatly reducing mirror figuring costs for the NST project.

The NST secondary mirror was manufactured by Space Optics Research Labs.

The New Solar Telescope



Optical Configuration

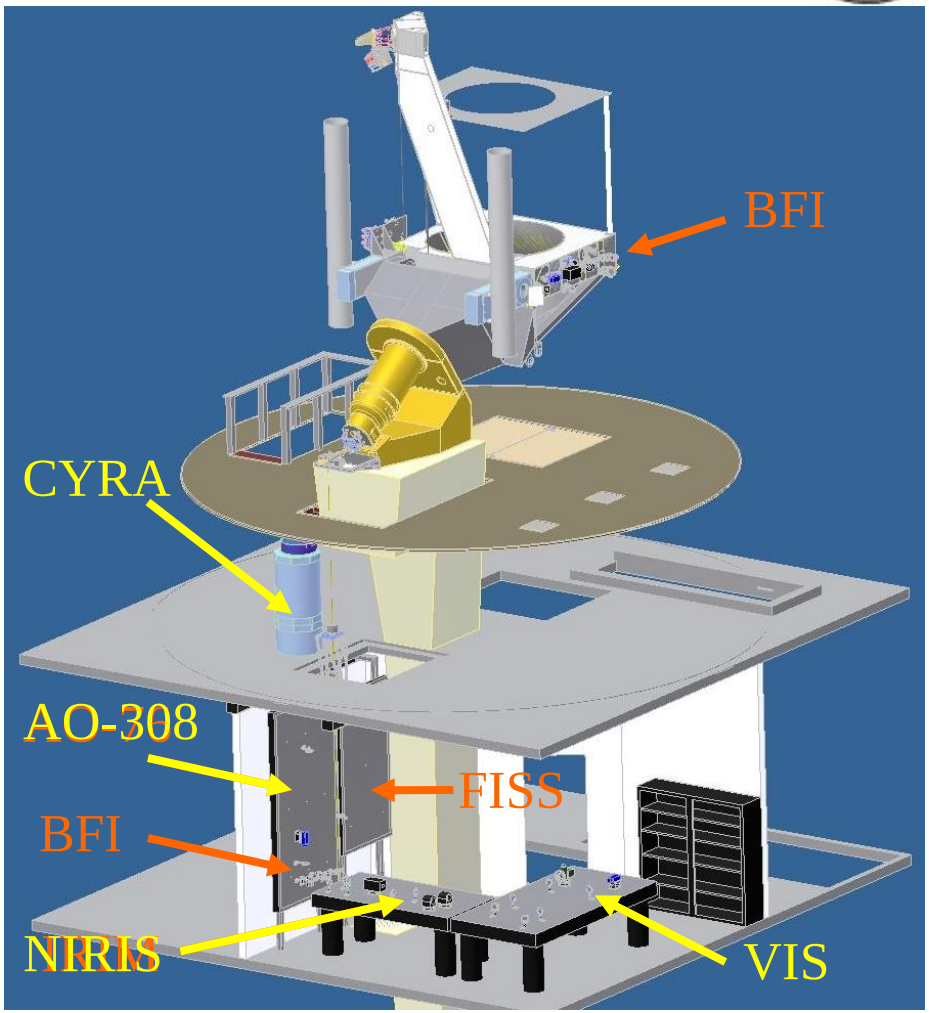
The NST is an off-axis section of a 5.3 meter, F/0.73 parabolic parent with an elliptical secondary. The off-axis distance is 1.84 m resulting in a 1.6 meter, F/2.4 primary.

Optical Parameters:

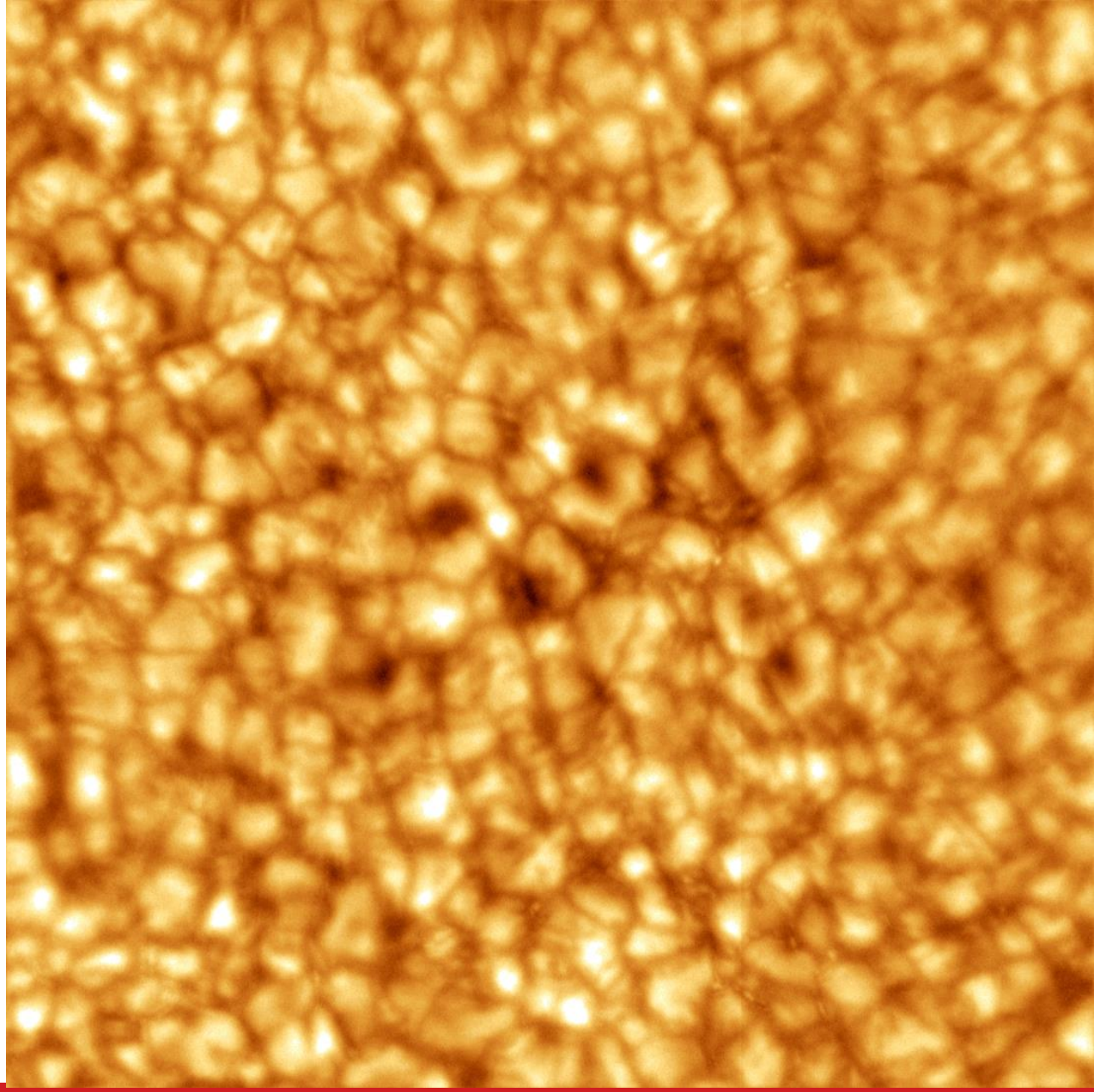
F/52 system
EFL = 8.32 m
Plate Scale = 2.48 arc sec/mm
180 arc sec field
Gregorian image = 72.6 mm

Ongoing Instrumentation

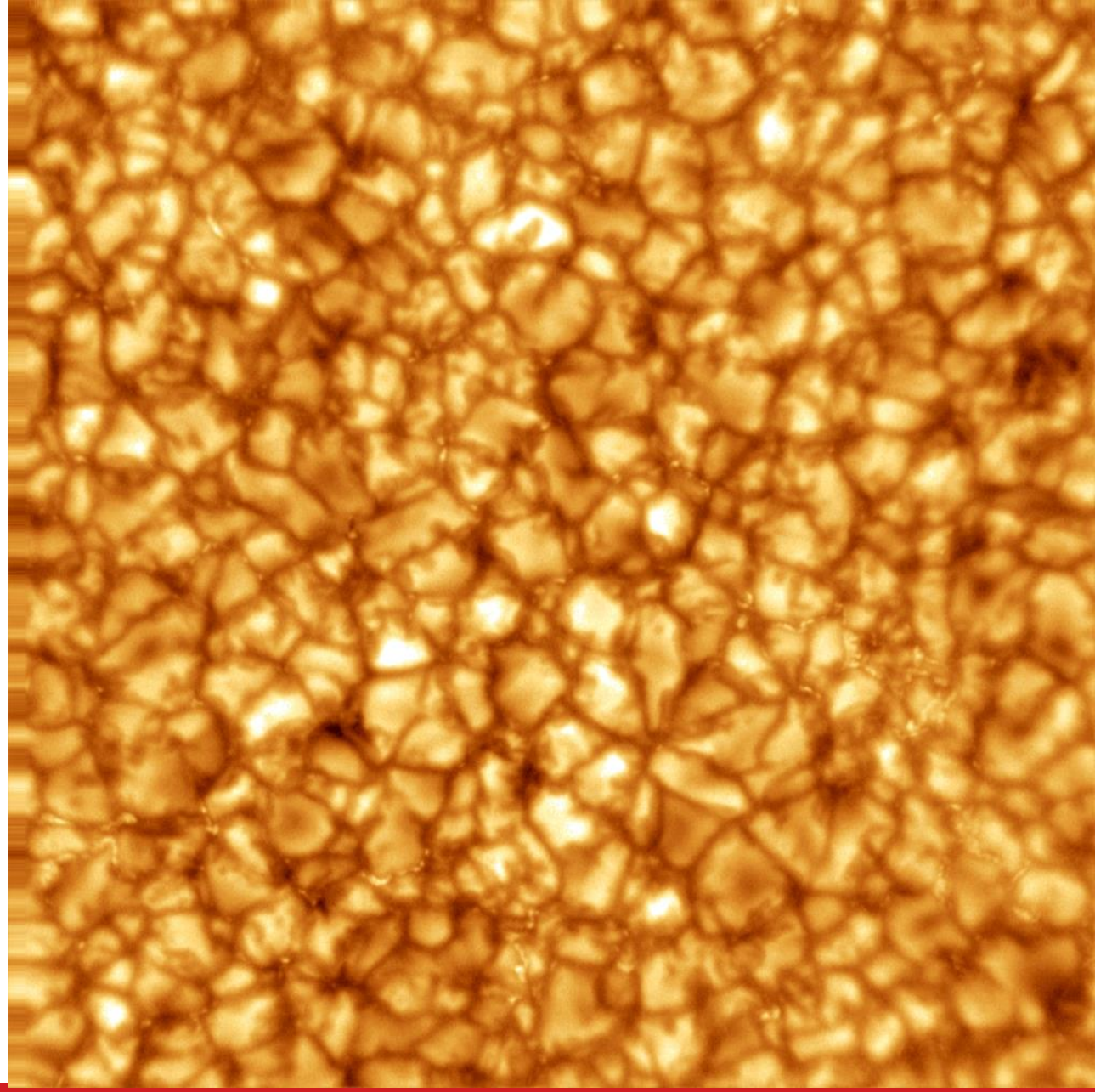
- Adaptive Optics (AO-308)
- Visible Imaging Spectrometer (VIS)
- Cryogenic Infrared Spectrograph (CYRA)
- Near InfraRed Imaging Spectropolarimeter (NIRIS)



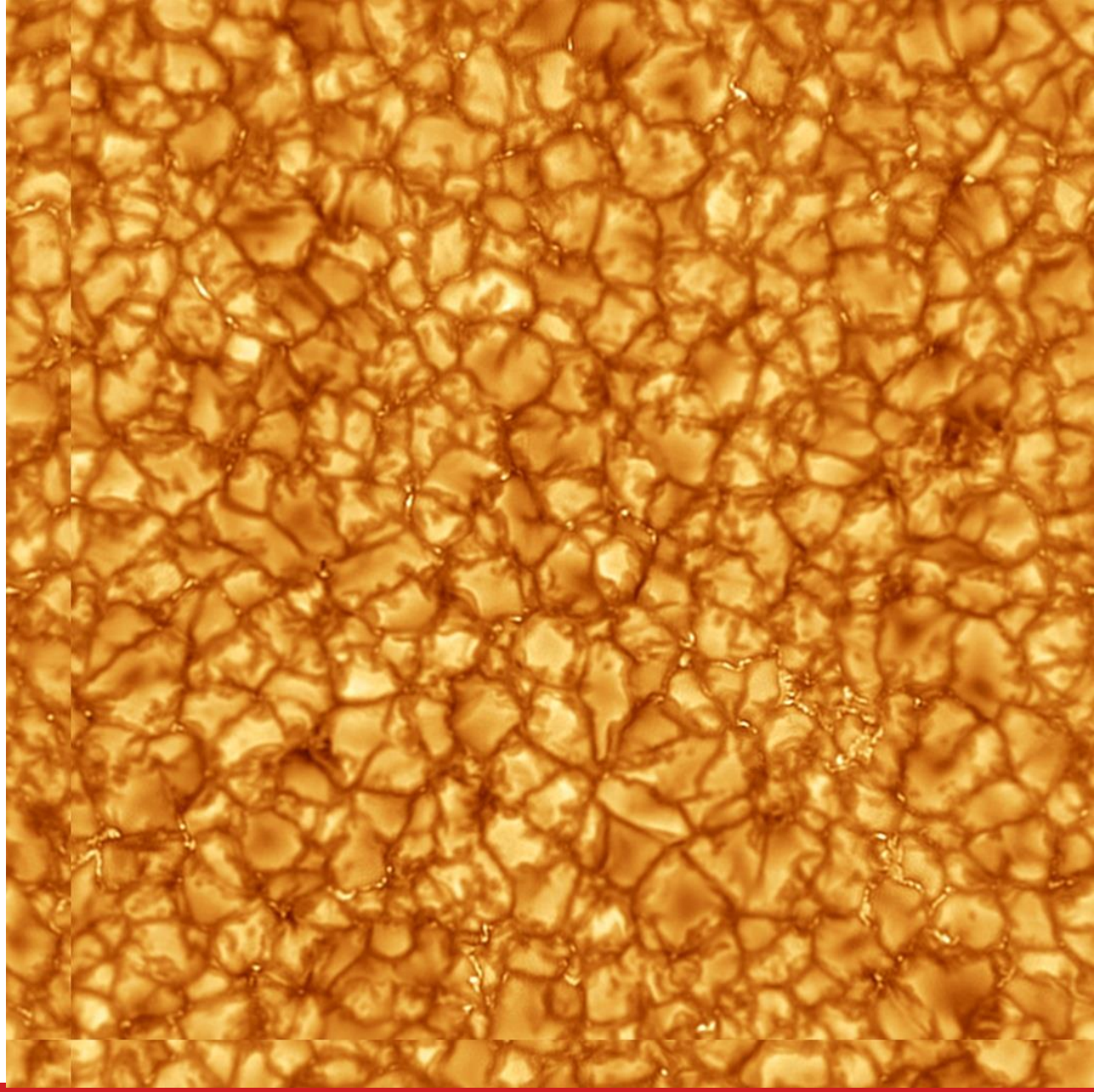
Typical Raw Image taken with TiO filter at 7057A



AO corrected Image taken with TiO filter at 7057A

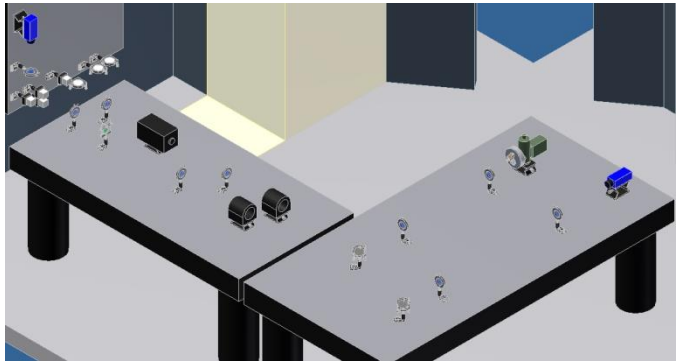


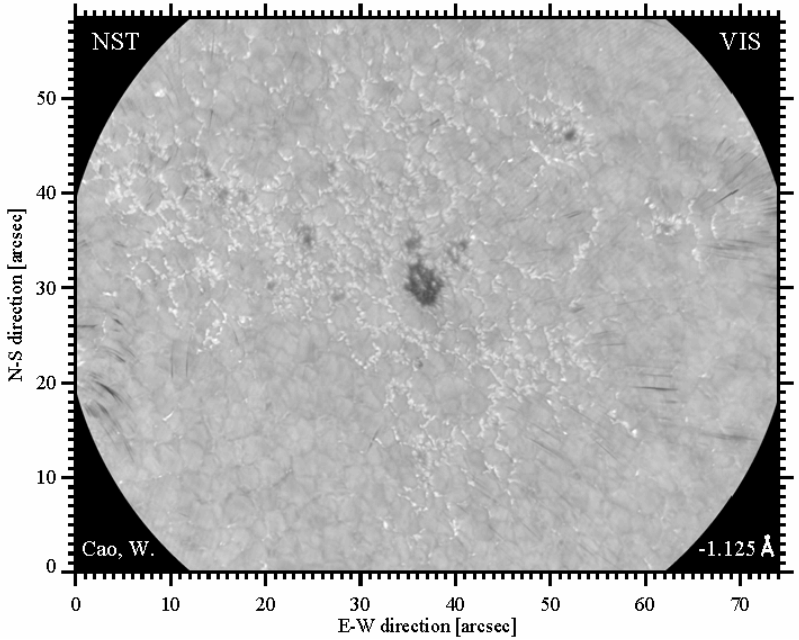
AO corrected + speckle Reconstructed Image taken with TiO filter at 7057A

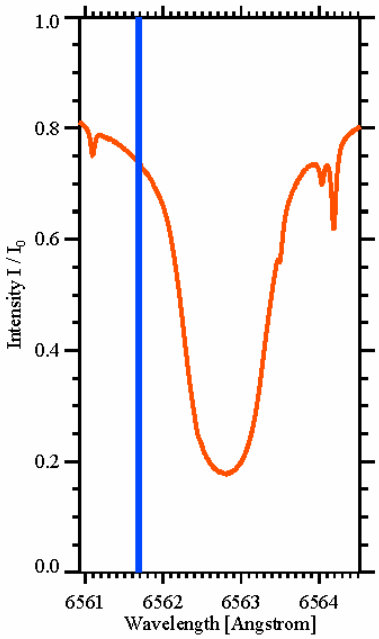


Visible Imaging Spectrometer

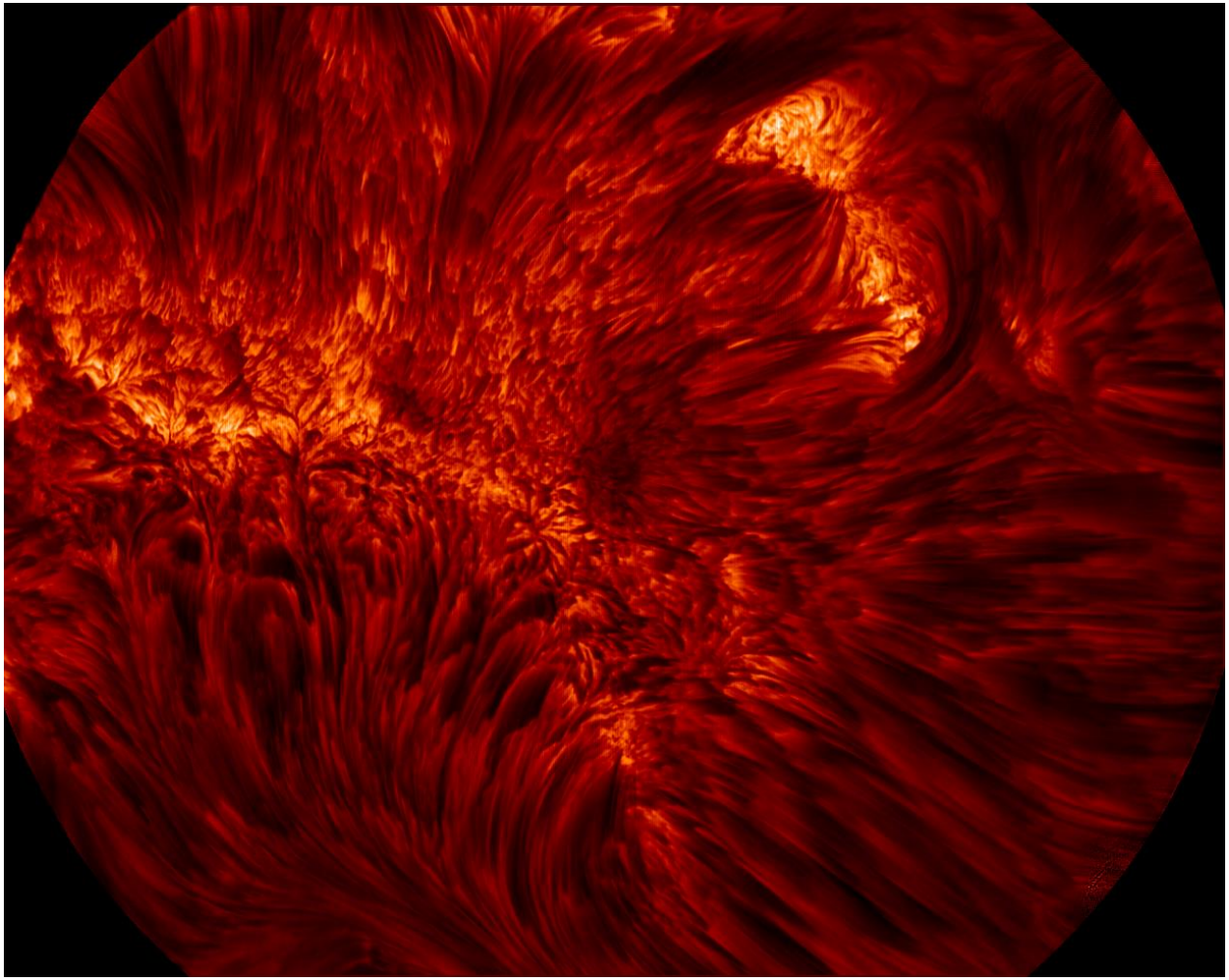
- Single Fabry-Pérot etalon plus narrow band interference filter
- Spectrometer before NST AO-308 installation
- Wavelength coverage: 550 – 700 nm
- Band pass: 5.8 pm
- Telecentric optical configu
- Field of view: 45” by 45”
- Available spectral lines:
  - Hα (656.3 ± 0.15 nm
  - Fe I (630.2 ± 0.15 nm)
  - NaD_2 (588.9 ± 0.15 nm
- Spectrometry cadence:
- < 15 s



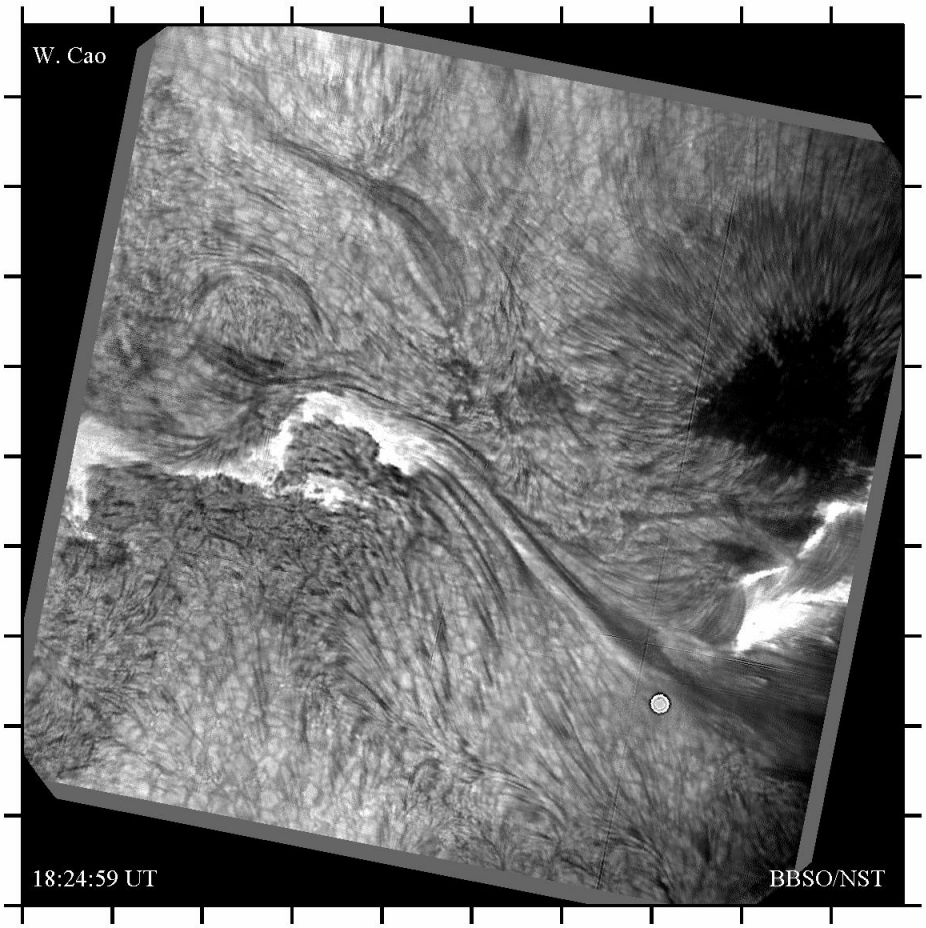




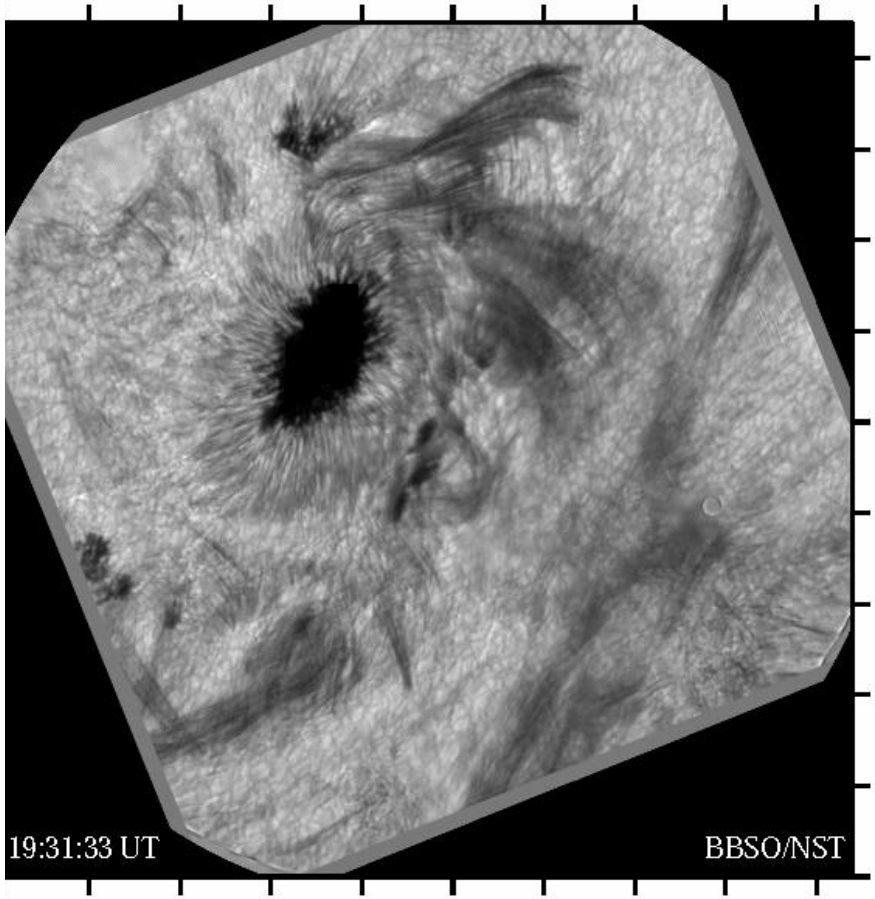
VIS: 1st Light Observations



He I 1083 nm Observations



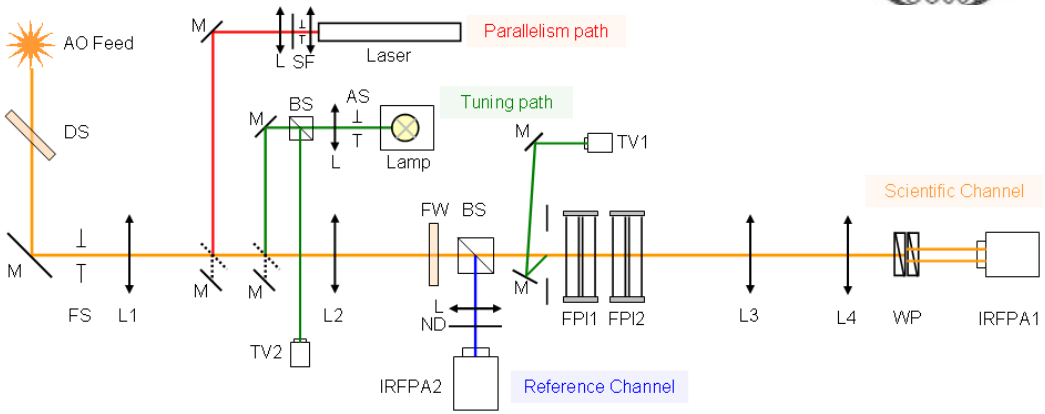
A microflare on May 24, 2012

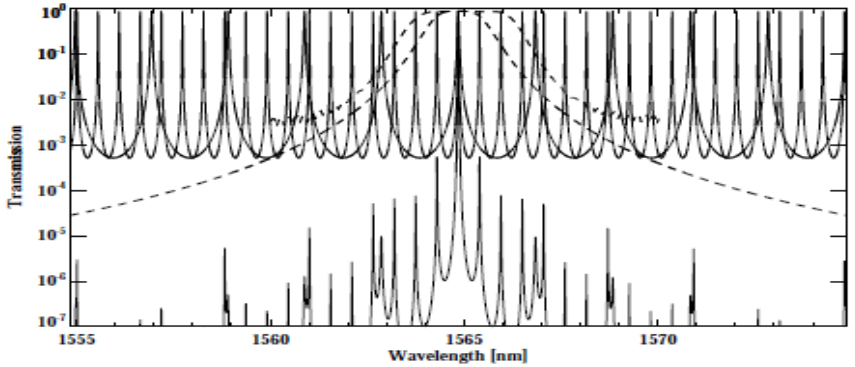


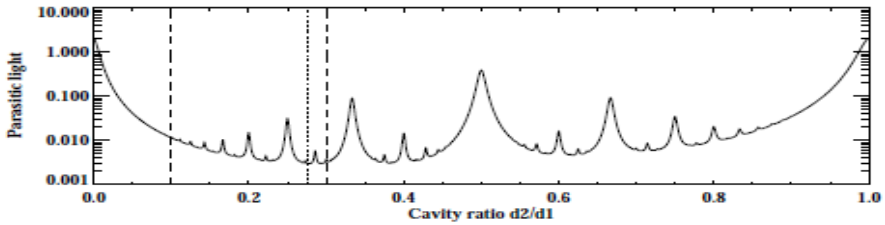
A C9.5 flare on July 5, 2012

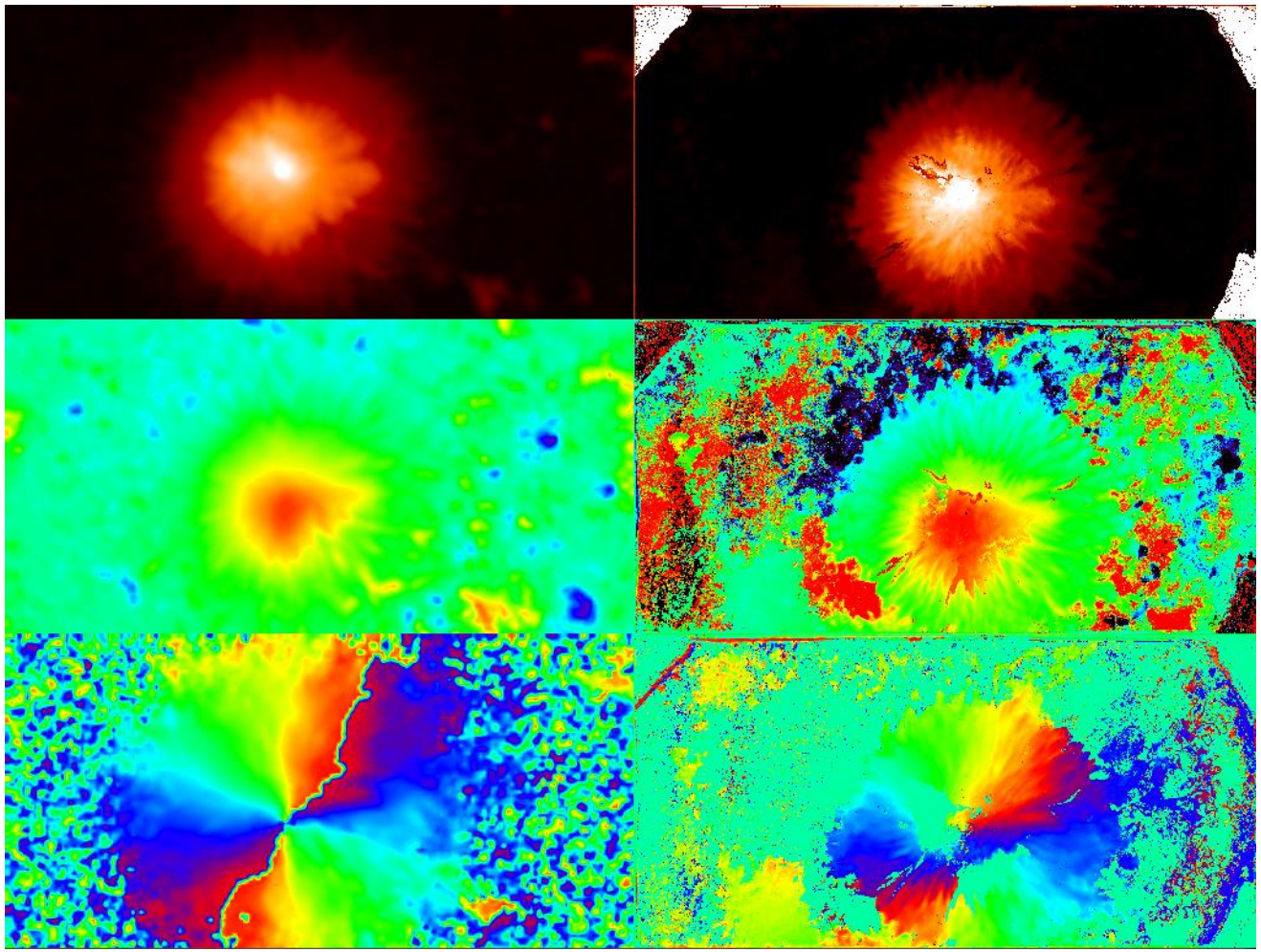
2nd Generation -- NIRIS

- Dual Fabry-Pérot etalons with apertures of 100 mm
- Wavelength coverage: 1000–1600 nm (He I 1083 and Fe I 1565 nm)
- New HgCdTe 2K by 2K camera with a frame rate up to 65 Hz
- Achromatic rotating waveplate
- Spectral resolving power: > 10^5
- Telecentric optical configuration
- Field of view: 85”
- Polarimetry sensitivity: 10^{-4} I_c
- Spectroscopy cadence: < 5 s
- Vector spectro-polarimetry cadence: < 10 s

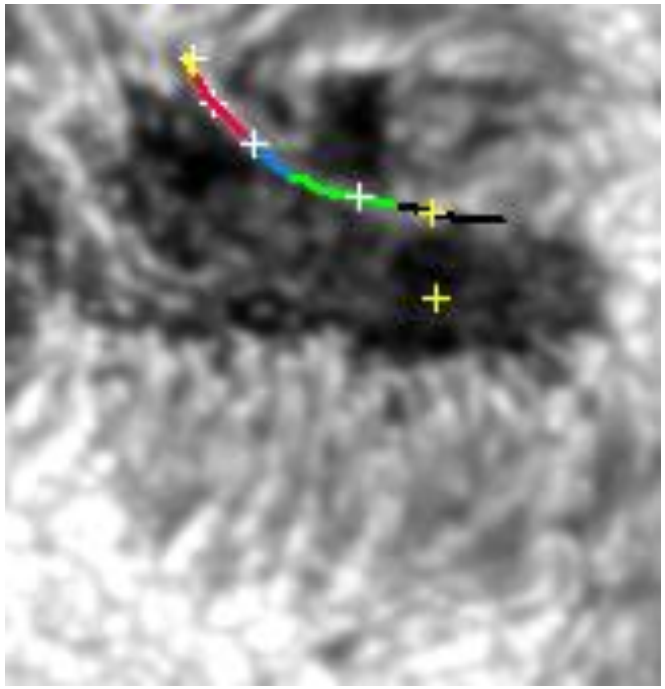


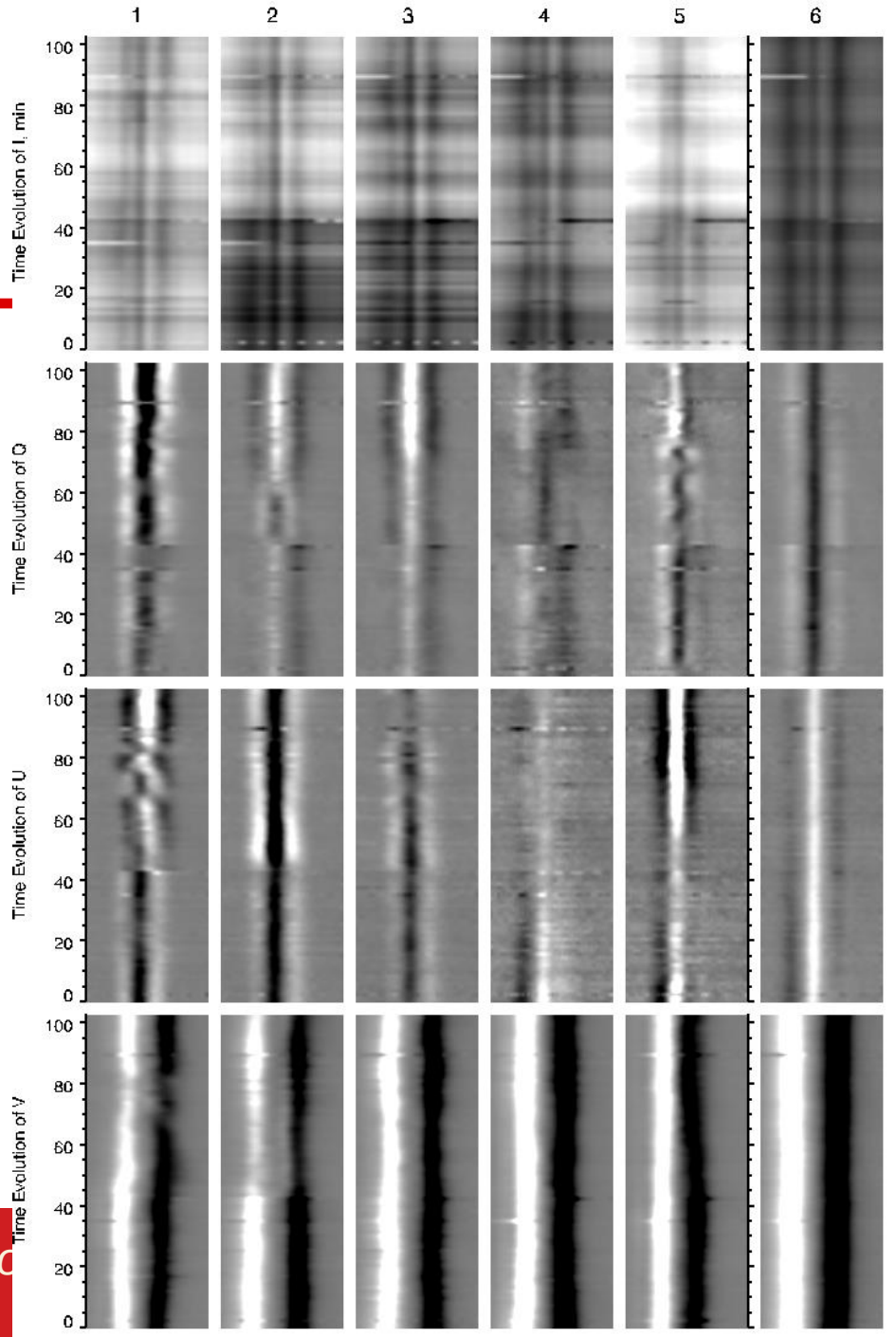




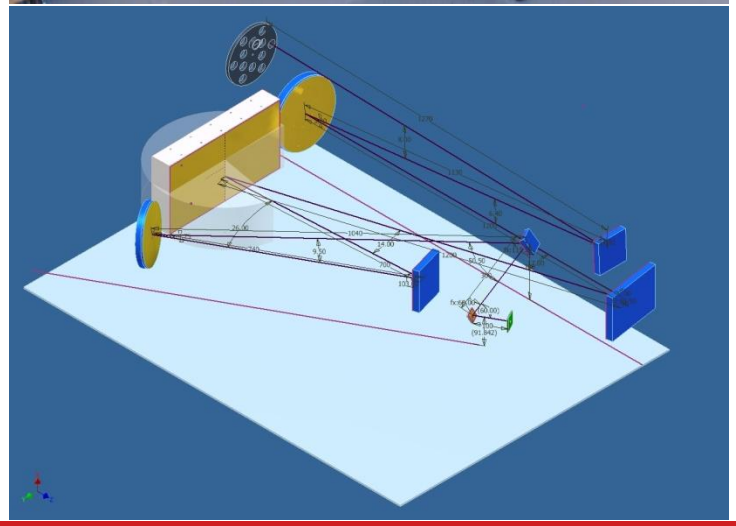


Evolution of Stokes





Cryogenic IR Spectrograph



- Operating Temperature of 77 K to minimize background thermal emission
- Spectral range 1.0 to 5.0 μm
- Spectral resolving power > 10^5
- Spatial resolution: diffraction-limited for wavelengths > 2 μm
- Temporal modulation 10 Hz with dual beam differential polarimetry
- Field of view: 75"
- Image stabilization: Tip/tilt
- Image rotation compensator
- image scanner, context imaging and guiding
- HAWAII 2RG 2K × 2K HgCdTe camera with a frame rate up to 65 Hz

Data Format

- Data are taken in a form of bursts. The burst size is 25 – 70 images and they are saved as one fits file
- One burst is acquired within 2 – 4 sec
- Each burst is later speckle reconstructed to produce one image
- Min cadence of the photospheric data is 12 sec; VIS (Halpha) 2 sec and more depending on the wavelength selection
- The data archive is not available online. Only a summary web page is generated and available on line
- The data can be requested using a web form. Zipped tar-balls will be available for download withing minuts to hours, depending on the data size

NST Data Catalog

www.bbso.njit.edu/~vayur/NST_catalog/2015/07/26/index.html

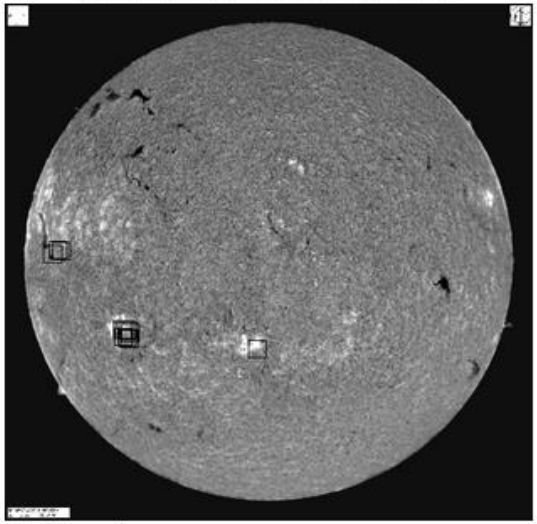
Search

TFD GOES FDHA R->E ADS_ABS Vyu G Taste E-Read IDL Help Obs Tools NST_cat MyFTP KyivPost

BBSO NST Data Finder - 2015-07-26T22:58:07

Previous Day | BBSO Archive and Observing Log | Next Day

NST Data Coverage
16:20:44.8 - 22:58:7.9 UT



Data Samples

bbso_tio_pcosr_20150726_162044.fts | thumb | header
bbso_tio_pcosr_20150726_170105.fts | thumb | header
bbso_tio_pcosr_20150726_173437.fts | thumb | header
bbso_tio_pcosr_20150726_180825.fts | thumb | header
bbso_tio_pcosr_20150726_184155.fts | thumb | header
bbso_tio_pcosr_20150726_191520.fts | thumb | header
bbso_tio_pcosr_20150726_193704.fts | thumb | header
bbso_tio_pcosr_20150726_200837.fts | thumb | header
bbso_tio_pcosr_20150726_204211.fts | thumb | header
bbso_tio_pcosr_20150726_211045.fts | thumb | header
bbso_tio_pcosr_20150726_221739.fts | thumb | header
bbso_tio_pcosr_20150726_225107.fts | thumb | header

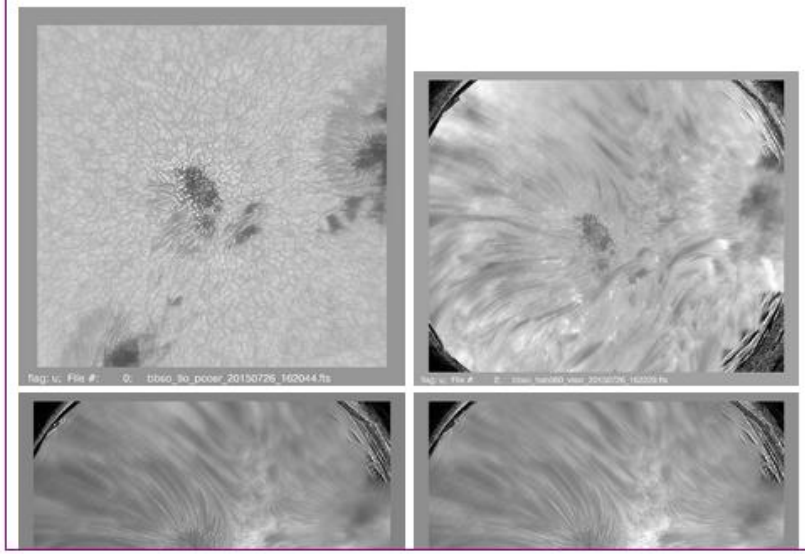
Top

DATE: 2015/07/26
FILTER: TIO, VIS
OBS TIME: 16:20 - 22:58 UT
TARGET: NOAA 12390
SEEING, DATA QUALITY: good, mostly stable
OBSERVER: cp
OBS COMMENTS: Center spot

Comments by Scientist:PI: A. Joshi
See Obs Logs for more info...

After Reconstruction Info:PI; A. Joshi
Quick Look Low Resolution TiO, Ha-0.6A, Ha-0.2A, Ha, Ha+0.2A, Ha+0.6A, Movies

Reconstructed Images Samples:



ox (2) - vyurchyshyn@... | Big Bear Solar Observatory | BBSO NST Request System

www.bbso.njit.edu

Search

BBSO
Big Bear Solar Observatory

NJIT New Jersey Institute of Technology

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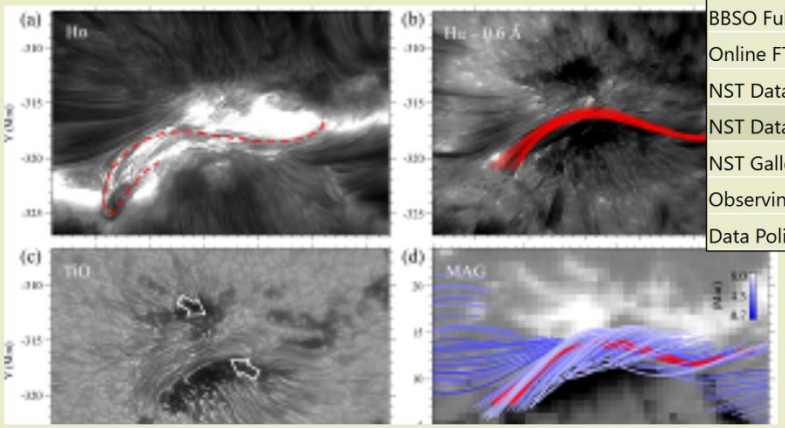
- Activity Report
- Latest Images
- Ha Full Disk Live
- BBSO Full Disk Hα Page
- Online FTP Data Archive
- NST Data Catalog
- NST Data Request Form
- NST Gallery
- Observing Logs
- Data Policy

News: Call for NST Observing Proposals

BBSO Home Page

May 1, 2015: NST Peers Deep into the Sun to Track the Origins of Space We

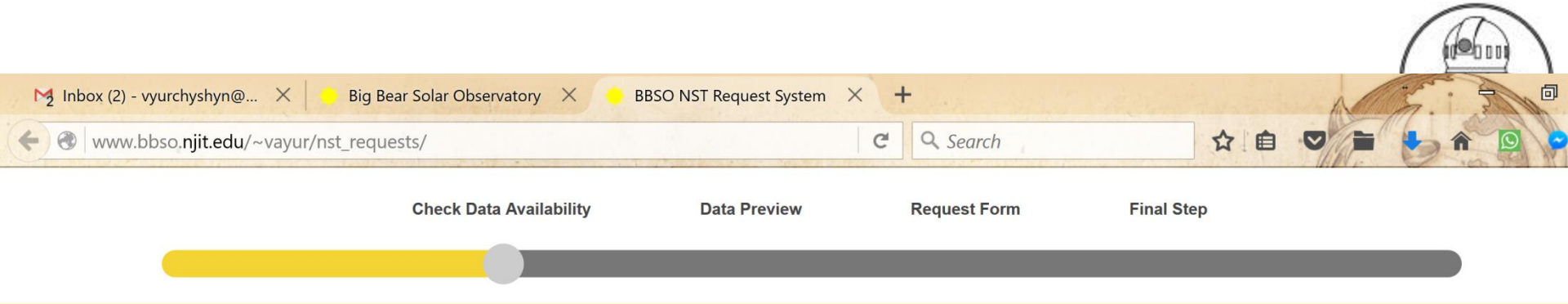


s are highly twisted, agnetic fields. They are ability of plasma involved which may have adverse cts. However, the resolution of coronal ntly used by previous ies of flux ropes seriously biguous and detailed identification of flux ropes and their relation to eruptions. Moreover, the evolution of flux ropes has not been observed in the low solar atmosphere such as the chromosphere. Here we present a flaring twisted flux rope using the highest resolution chromospheric images from the 1.6 m New Solar Telescope at Big

Read More ...

- Publications from NST Observations
- NST Press Release & Media
- NST Data Catalog
- NST - IRIS Data Catalog
- As part of the preparation for the Starlight Festival, a new

njit.edu/~vayur/nst_requests/


Inbox (2) - vyurchyshyn@...
Big Bear Solar Observatory
BBSO NST Request System
www.bbso.njit.edu/~vayur/nst_requests/
Search
Check Data Availability
Data Preview
Request Form
Final Step
Please Enter the Date of the requested data
Enter the month here in the format MM
06
Enter the day here in the format DD
20
Enter the year here in the format YYYY
2015
Check Data Availabilty

Inbox (2) - vyurchyshyn@... | Big Bear Solar Observatory | BBSO NST Request System

www.bbso.njit.edu/~vayur/nst_requests/#data

Search

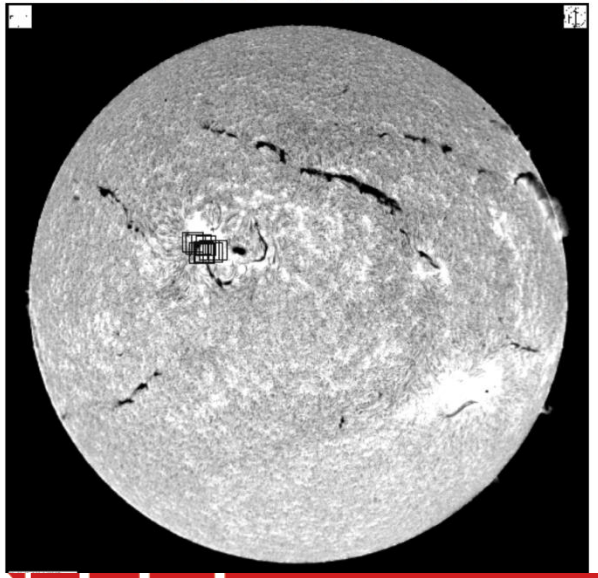
Check Data Availability — Data Preview — Request Form — Final Step

Click Here to request this data **Request Form**

BBSO NST Data Finder - 2015-06-20T22:51:52

Previous Day | BBSO Archive and Observing Log | Next Day

NST Data Coverage
16:46:40.0 - 22:51:52.2 UT

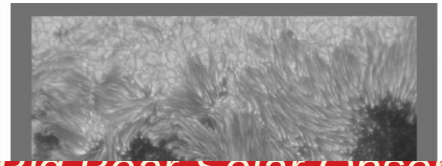


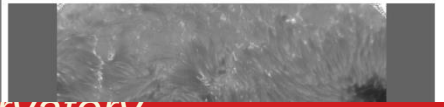
DATE: 2015/06/20
FILTER: TIO, VIS
OBS TIME: 16:46 - 22:51 UT
TARGET: NOAA 12371
SEEING, DATA QUALITY: very good, stable
OBSERVER: cp
OBS COMMENTS: Following spot group

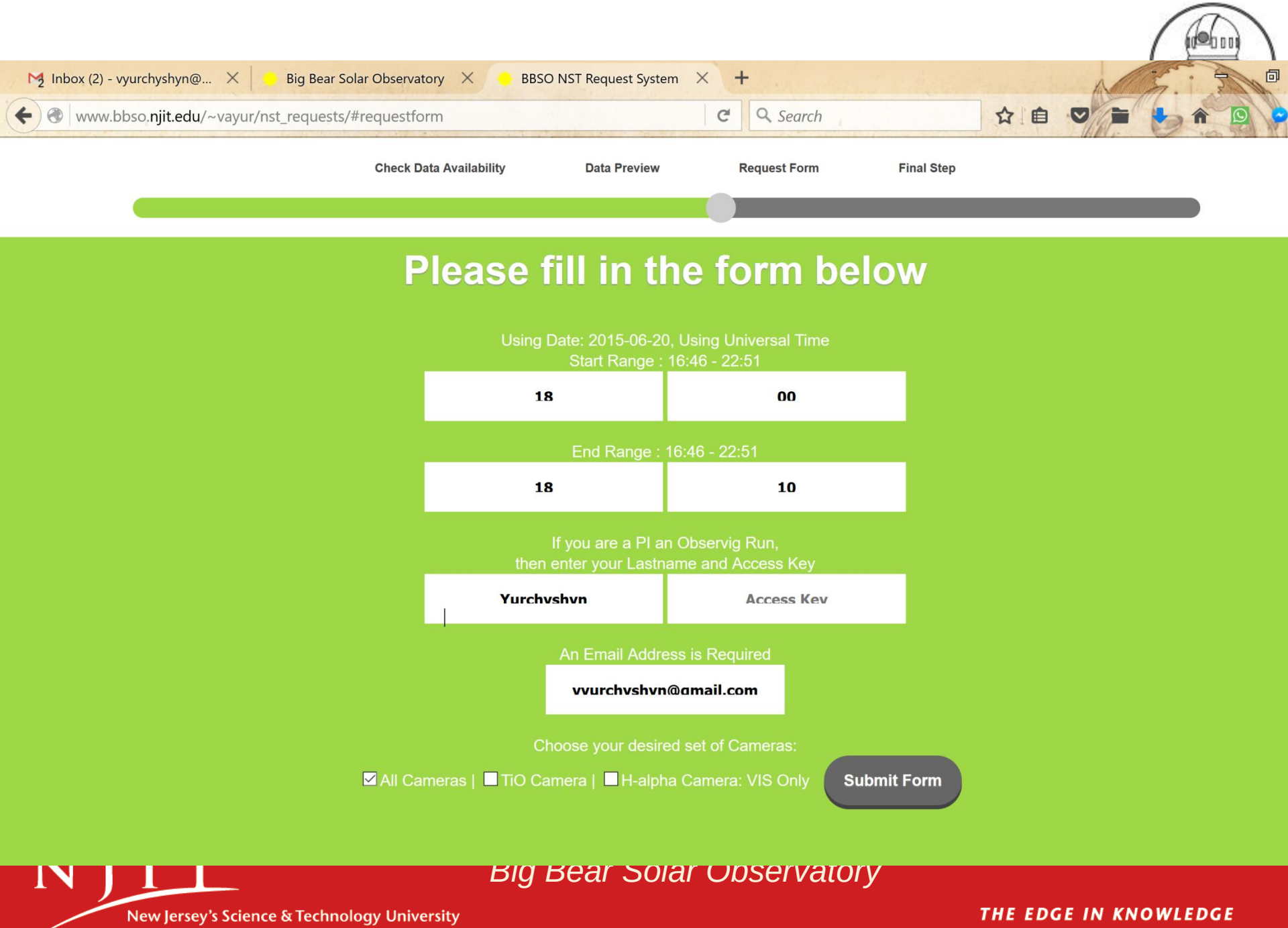
Comments by Scientist:PI: Xu, Y
See Obs Logs for more info...

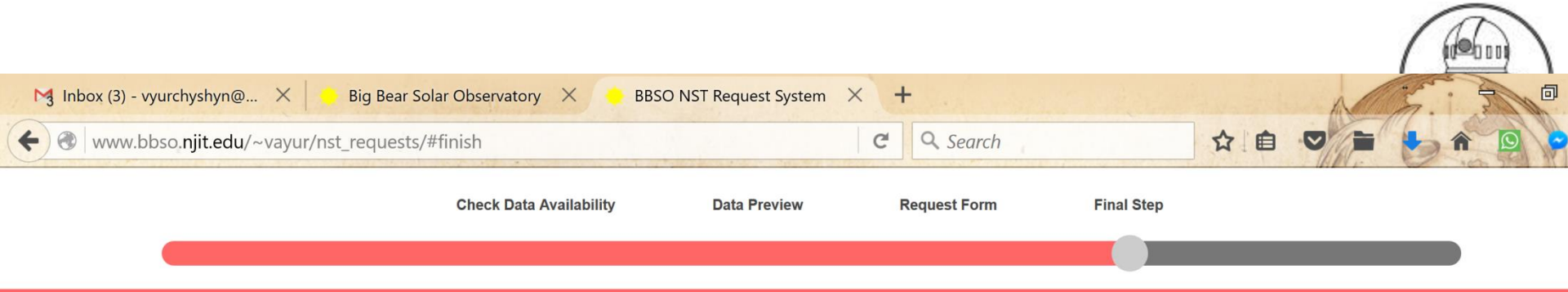
After Reconstruction Info:
Quick Look Low Resolution TiO, Ha-1.0A, Ha-0.6A, Ha, Ha+0.6A, Ha+1.0A, Movies

Reconstructed Images Samples:






Inbox (2) - vyurchyshyn@...
Big Bear Solar Observatory
BBSO NST Request System
www.bbso.njit.edu/~vayur/nst_requests/#requestform
Search
Check Data Availability
Data Preview
Request Form
Final Step
Please fill in the form below
Using Date: 2015-06-20, Using Universal Time
Start Range : 16:46 - 22:51
18
00
End Range : 16:46 - 22:51
18
10
If you are a PI an Observig Run,
then enter your Lastname and Access Key
Yurchyshyn
Access Key
An Email Address is Required
vyurchyshyn@gmail.com
Choose your desired set of Cameras:
All Cameras | TiO Camera | H-alpha Camera: VIS Only
Submit Form



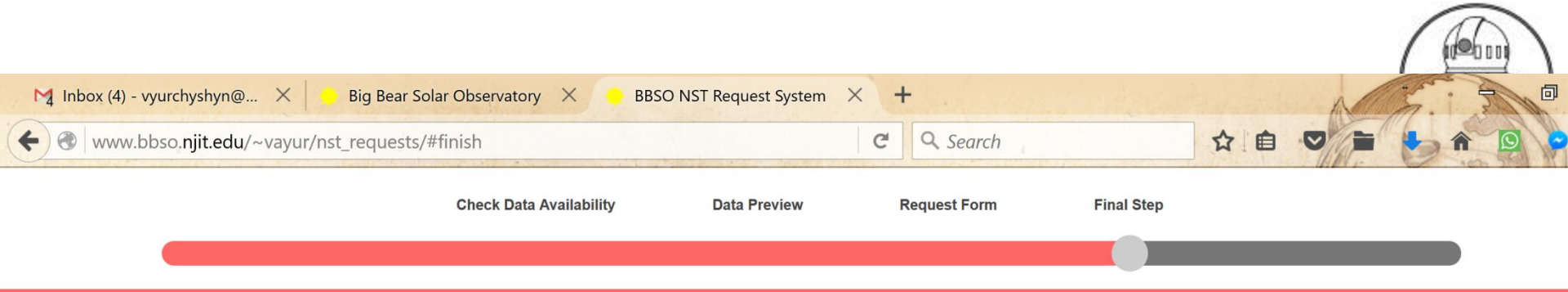
The NST Data Form has been submitted!

This page will automatically check for the data every 10 seconds, please be patient as the process will take up to 30 min.
If you do no wish to keep this tab open, simply wait for the email to arrive, it will also contain a ftp link to the data.
If you have an ftp client setup, the link will open in that client, if not it will open in a new tab in your browser.

Checking again in: 00:05 seconds

Waiting for data from TiO Cam.

Waiting for data from H-alpha Cam.



The NST Data Form has been submitted!

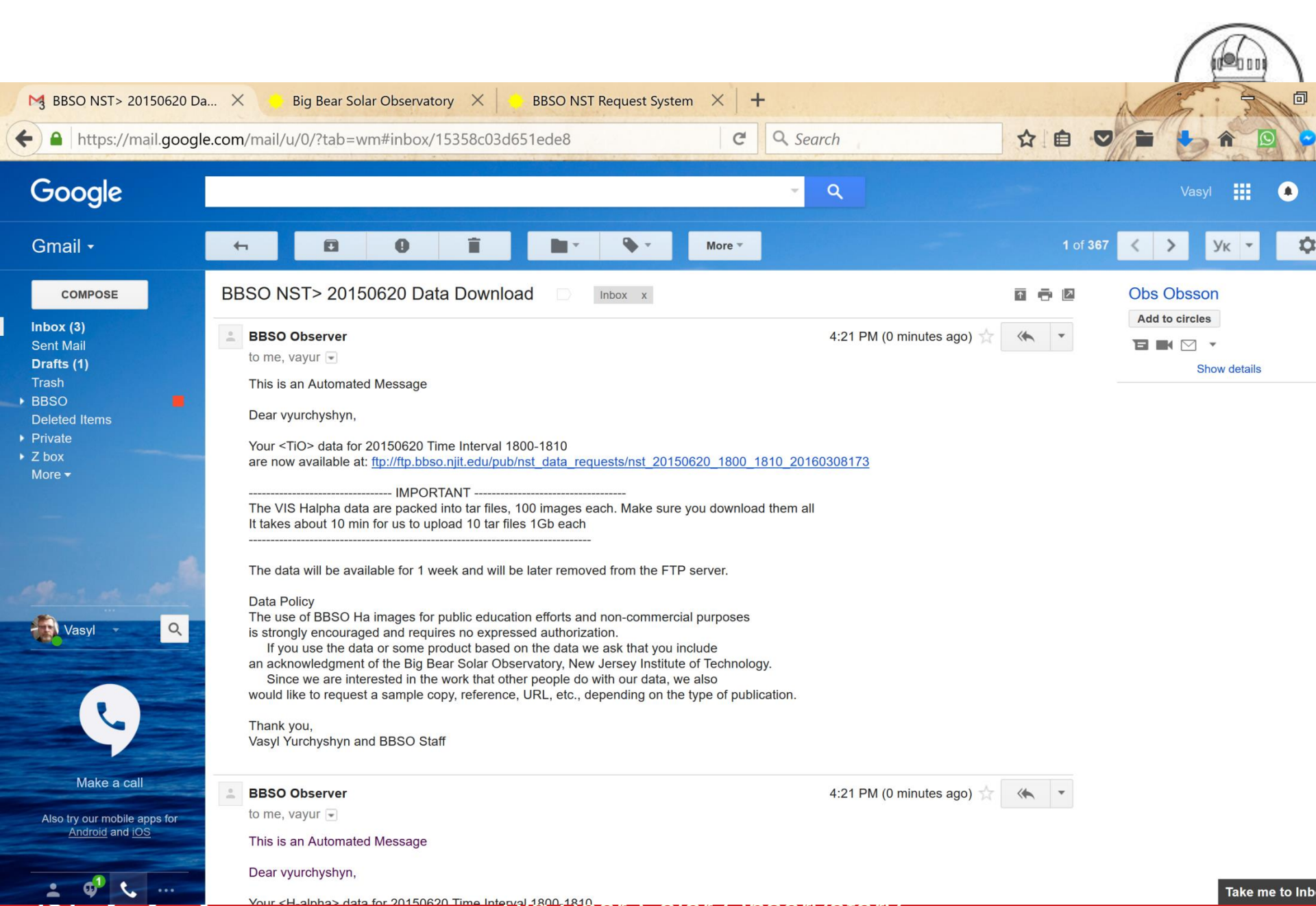
This page will automatically check for the data every 10 seconds, please be patient as the process will take up to 30 min.
If you do no wish to keep this tab open, simply wait for the email to arrive, it will also contain a ftp link to the data.
If you have an ftp client setup, the link will open in that client, if not it will open in a new tab in your browser.

TiO Cam Data are Ready

Click Here for FTP link to TiO Data

H-alpha Cam Data are Ready

Click Here for FTP link to H-alpha Data


BBSO NST> 20150620 Da...
Big Bear Solar Observatory
BBSO NST Request System
https://mail.google.com/mail/u/0/?tab=wm#inbox/15358c03d651ede8
Search
Google
Vasyl
Gmail
More
1 of 367
COMPOSE
Inbox (3)
Sent Mail
Drafts (1)
Trash
BBSO
Deleted Items
Private
Z box
More
Vasyl
Make a call
Also try our mobile apps for Android and iOS
BBSO NST> 20150620 Data Download
Inbox x
BBSO Observer
4:21 PM (0 minutes ago)
to me, vayur
This is an Automated Message
Dear vyurchyshyn,
Your <TiO> data for 20150620 Time Interval 1800-1810
are now available at: ftp://ftp.bbso.njit.edu/pub/nst_data_requests/nst_20150620_1800_1810_20160308173
---------- IMPORTANT ----------
The VIS Halpha data are packed into tar files, 100 images each. Make sure you download them all
It takes about 10 min for us to upload 10 tar files 1Gb each
The data will be available for 1 week and will be later removed from the FTP server.
Data Policy
The use of BBSO Ha images for public education efforts and non-commercial purposes
is strongly encouraged and requires no expressed authorization.
If you use the data or some product based on the data we ask that you include
an acknowledgment of the Big Bear Solar Observatory, New Jersey Institute of Technology.
Since we are interested in the work that other people do with our data, we also
would like to request a sample copy, reference, URL, etc., depending on the type of publication.
Thank you,
Vasyl Yurchyshyn and BBSO Staff
BBSO Observer
4:21 PM (0 minutes ago)
to me, vayur
This is an Automated Message
Dear vyurchyshyn,
Obs Obsson
Add to circles
Show details
Take me to Inb

Data Availability and Policy

- All TiO (photospheric) data are available upon request
- All VIS (H-alpha) data 9 month and older are available upon request
- Most recent (<9 mon) data: only H-alpha lie center, no off band
- Most recent (<9 mon) offband data are available only via PI's permission
- CYRA and NIRIS data are not available thru the request form

Observations and Planning

- May 1 – July 31 – Scheduled according to requests, both internal and external
- Aug 1 – Sept 10 – NAOC Observations
- Sept 15 – April 30 patrol observations; no schedule

- Observe IRIS target whenever possible
- NST-IRIS Event list