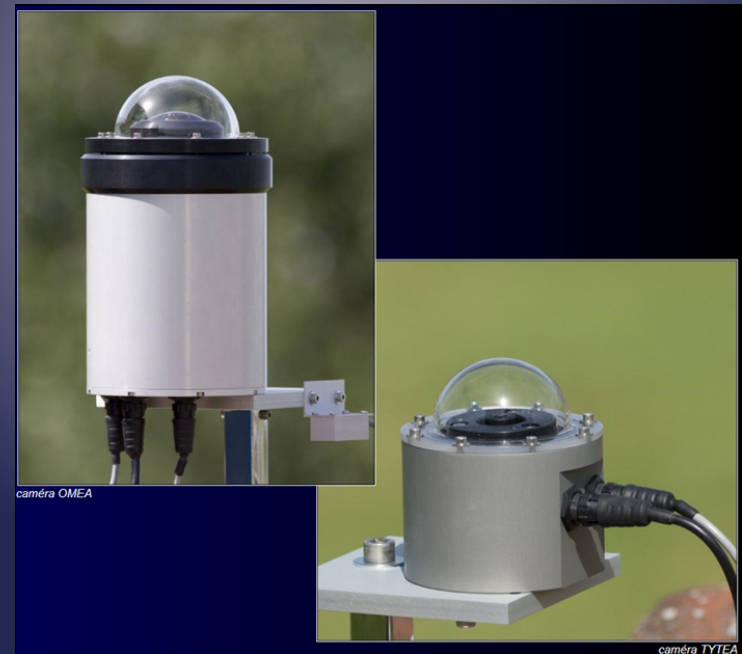
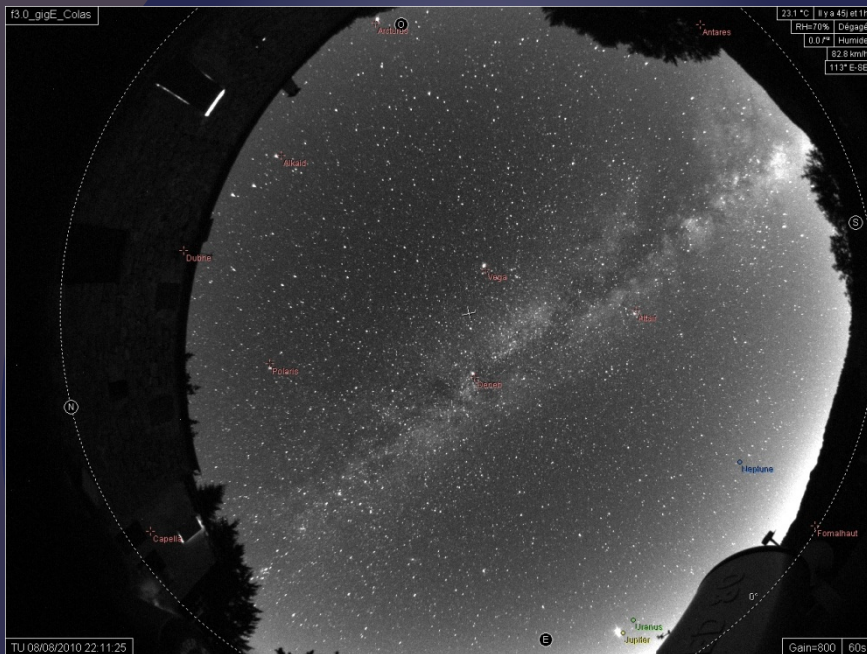


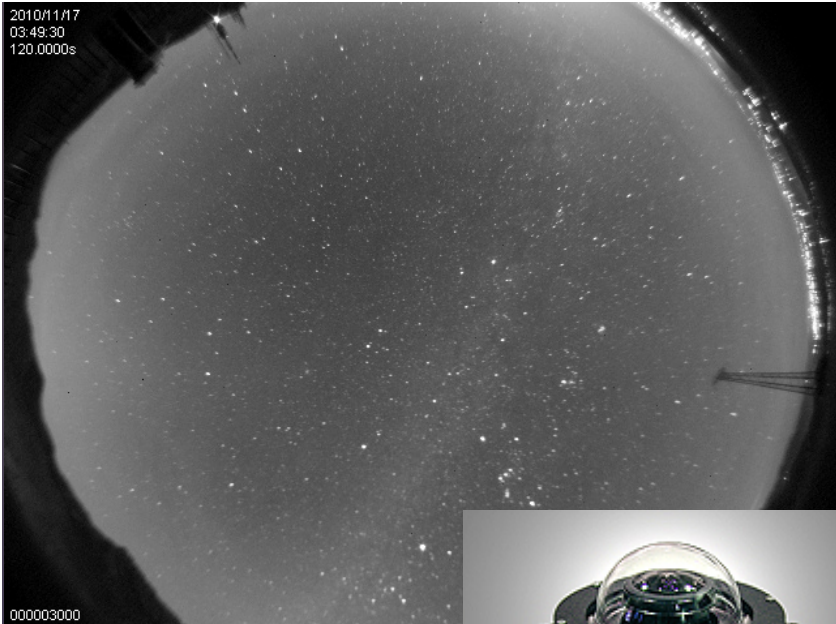
# « All-Sky » cameras for sky watching



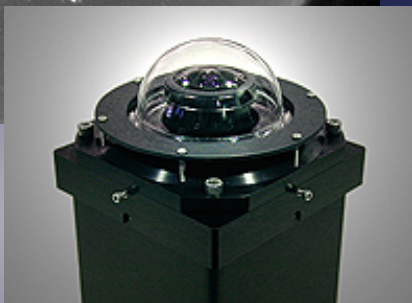
**ALCOR  
SYSTEM**

Enlarge your vision to whole universe !

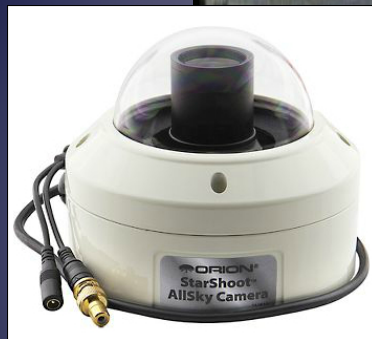
April, 2013



Camera #1



Camera # 3



Camera #2

## Competitor products



Camera #4

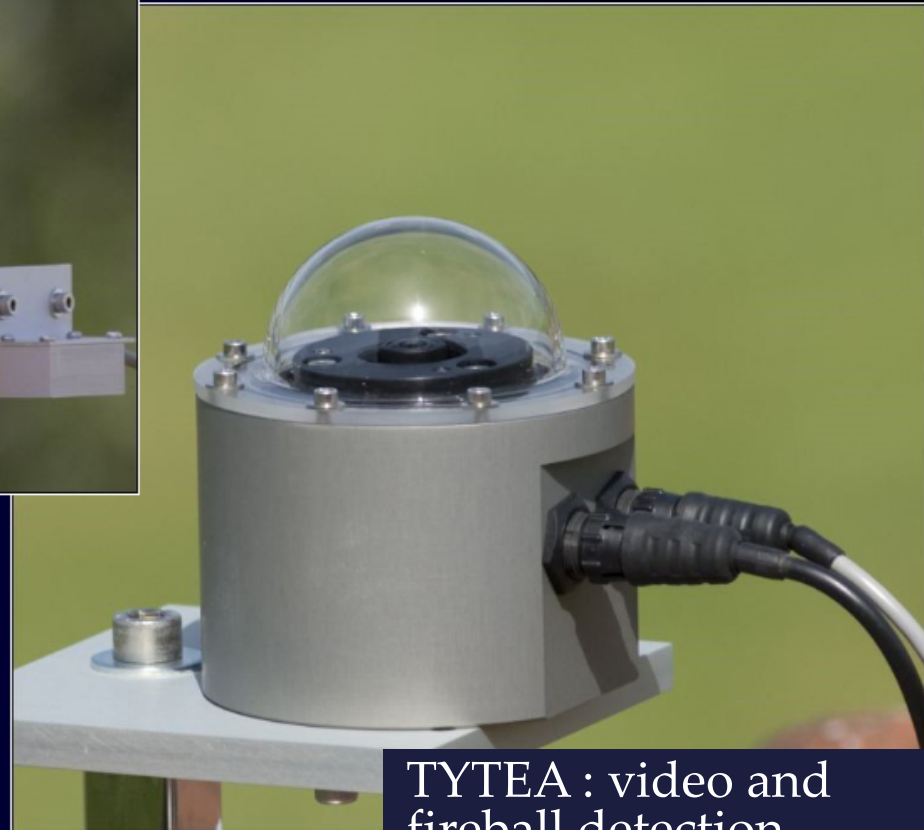


# Our products



OMEA : high resolution and long exposures oriented

- 1.3 to 2 millions pixels
- 100% digital
- Up to 15 frames/sec



TYTEA : video and fireball detection

- 0.3 to 0.8 millions pixels
- 100% digital
- Up to 60 frames/sec



# The OMEA all sky camera



# ALCOR SYSTEM's All-sky cameras



- ⌘ High quality image
- ⌘ Water tight connector (IP68)
- ⌘ No insect trespassing
- ⌘ Dome heater
- ⌘ Temperature/humidity sensors



# DUAL WORKING MODE



Long exposure mode (45s)

- ⌘ Clouds distribution
- ⌘ Sky quality (Light pollution, Moon)
- ⌘ High atmosphere (OH glow Northern lights)
- ⌘ Slow events: zodiacal light



Video mode

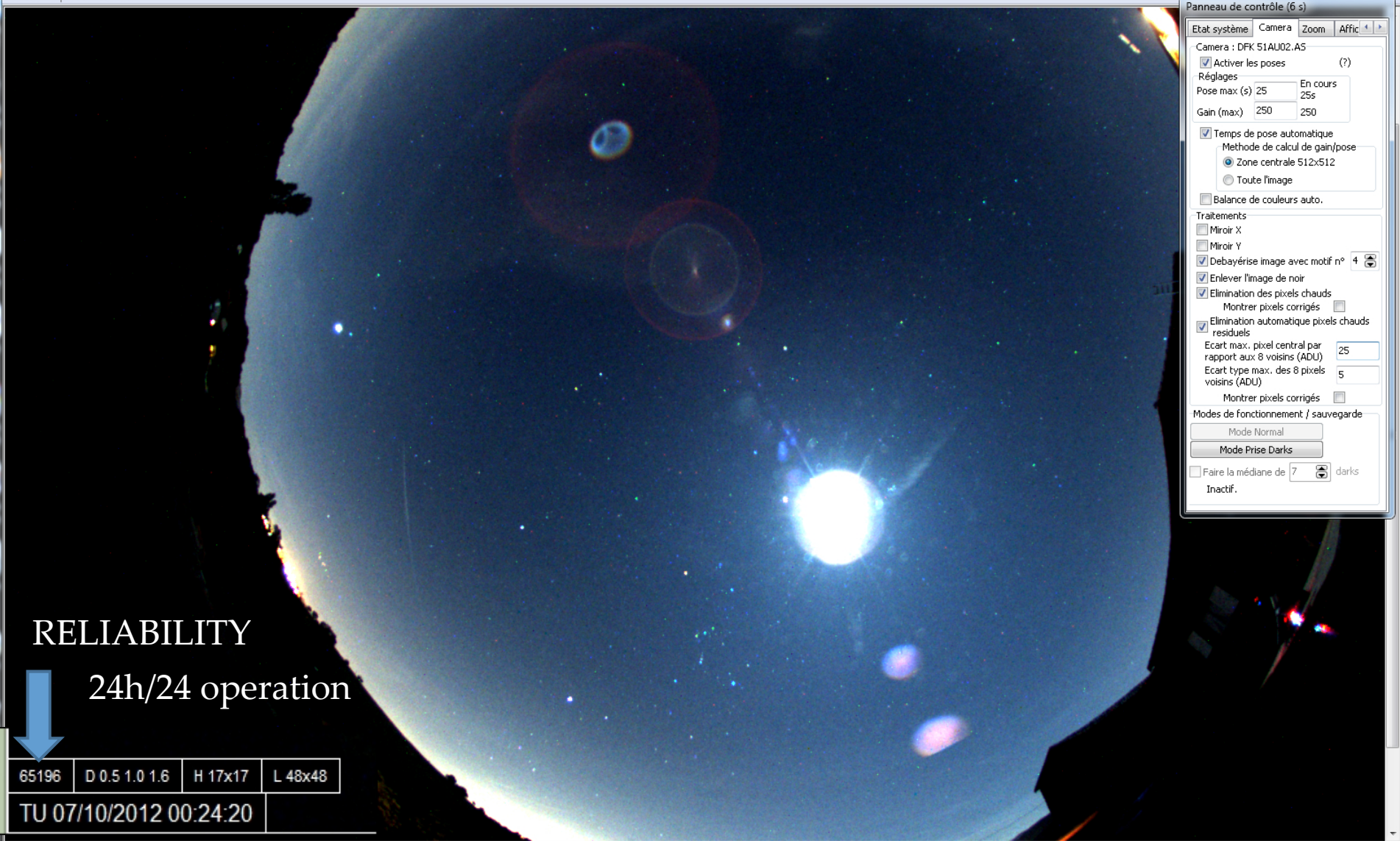
- ⌘ 10 to 60 frames per second
- ⌘ Fireball, satellites re-entry
- ⌘ Fast events
- ⌘ Real time video surveillance



# Software : long exposure mode

SKYWATCH v1.4.6 - 01/09/2012 Release Mode "Super user"

Fichier Options Divers



Panneau de contrôle (6 s)

Etat système Camera Zoom Affic

Camera : DFK 51AU02.AS

☒ Activer les poses (?)

Réglages

Pose max (s) 25 En cours 25s

Gain (max) 250 250

☒ Temps de pose automatique

Methode de calcul de gain/pose

☒ Zone centrale 512x512

☐ Toute l'image

☐ Balance de couleurs auto.

Traitements

☐ Miroir X

☐ Miroir Y

☒ Debayerise image avec motif n° 4

☒ Enlever l'image de noir

☒ Elimination des pixels chauds

Montrer pixels corrigés ☐

☒ Elimination automatique pixels chauds résiduels

Ecart max. pixel central par rapport aux 8 voisins (ADU) 25

Ecart type max. des 8 pixels voisins (ADU) 5

Montrer pixels corrigés ☐

Modes de fonctionnement / sauvegarde

Mode Normal

Mode Prise Darks

☐ Faire la médiane de 7 darks

Inactif.

RELIABILITY

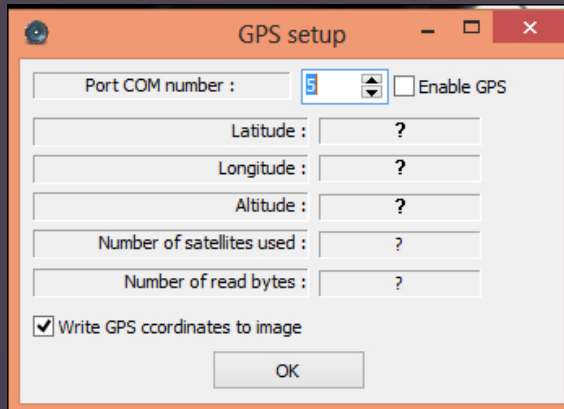
24h/24 operation

65196 D 0.5 1.0 1.6 H 17x17 L 48x48

TU 07/10/2012 00:24:20

Dernière pose à 05/10/2012 06:13:40 (377) (25s) Gain=250 [26s] X=554 Y=199 R=42 V=54 B=40 H=35.7° Az=139.4° Con. 10.5°C 74% RH

## GPS data



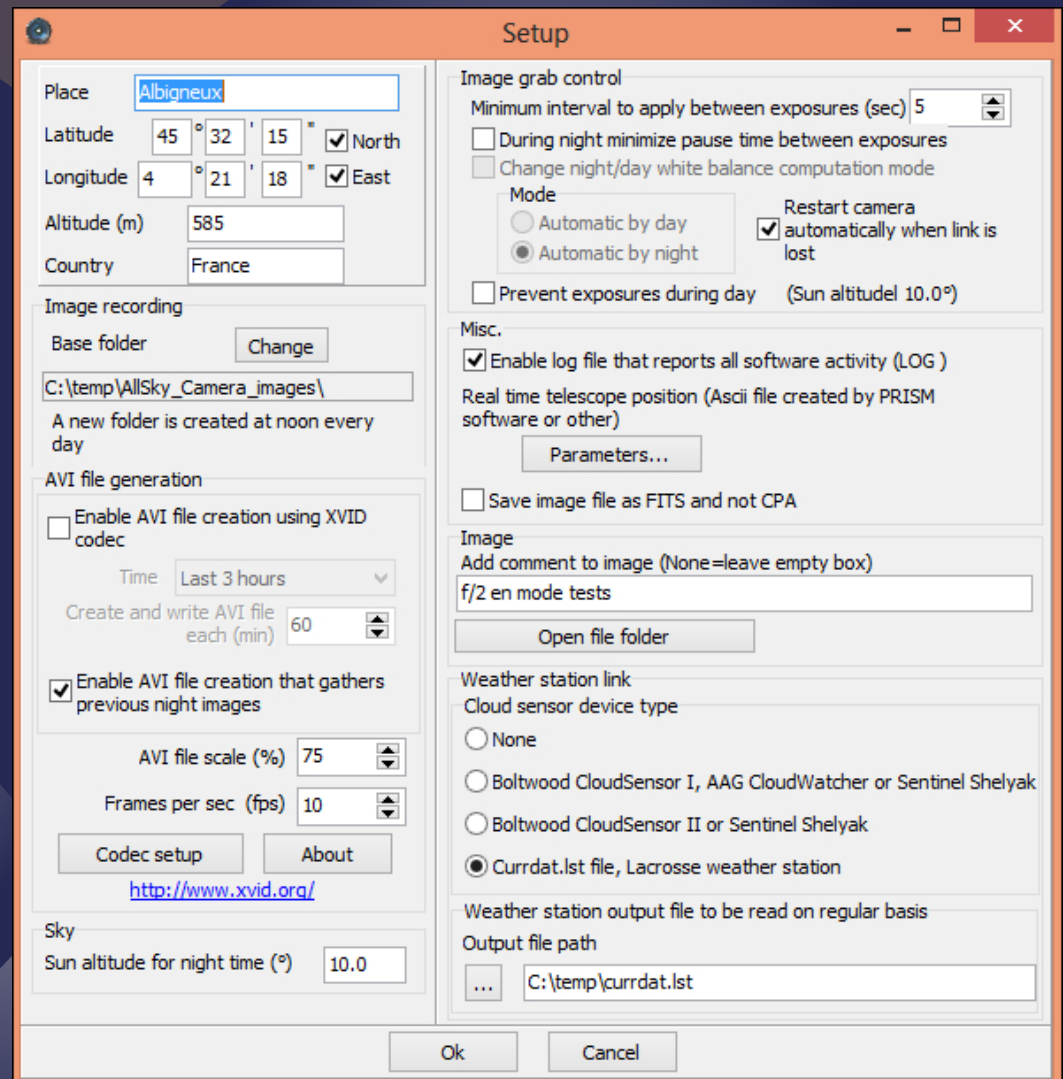
GPS setup

Port COM number :  ☐ Enable GPS

Latitude :  Longitude :  Altitude :  Number of satellites used :  Number of read bytes :  ☒ Write GPS coordinates to image

OK

## Control software...



Setup

Place

Latitude ° ' " ☒ North Longitude ° ' " ☒ East Altitude (m)  Country

Image recording

Base folder   A new folder is created at noon every day

AVI file generation

☐ Enable AVI file creation using XVID codec Time  Create and write AVI file each (min)  ☒ Enable AVI file creation that gathers previous night images

AVI file scale (%)  Frames per sec (fps)    <http://www.xvid.org/>

Sky

Sun altitude for night time (°)

Image grab control

Minimum interval to apply between exposures (sec)  ☐ During night minimize pause time between exposures ☐ Change night/day white balance computation mode Mode ☐ Automatic by day ☒ Automatic by night Restart camera ☒ automatically when link is lost ☐ Prevent exposures during day (Sun altitude 10.0°)

Misc.

☒ Enable log file that reports all software activity (LOG) Real time telescope position (Ascii file created by PRISM software or other)  ☐ Save image file as FITS and not CPA

Image

Add comment to image (None=leave empty box)

Weather station link

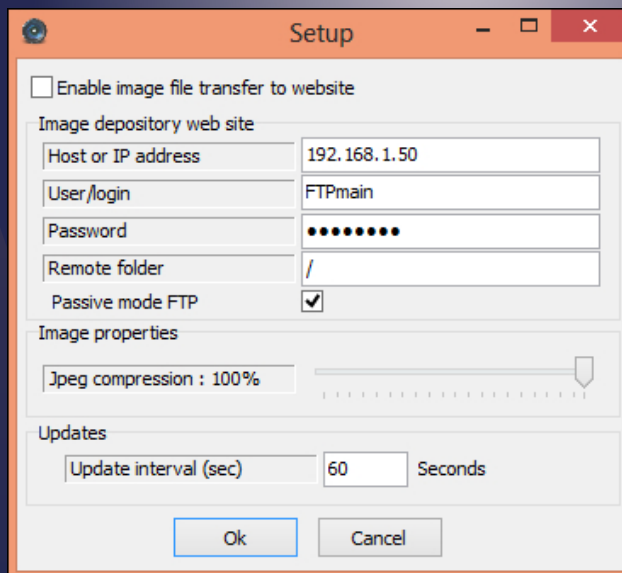
Cloud sensor device type ☐ None ☐ Boltwood CloudSensor I, AAG CloudWatcher or Sentinel Shelyak ☐ Boltwood CloudSensor II or Sentinel Shelyak ☒ Currdat.lst file, Lacrosse weather station

Weather station output file to be read on regular basis

Output file path

Ok Cancel

Images can be published to the web



Setup

☐ Enable image file transfer to website

Image depository web site

Host or IP address  User/login  Password  Remote folder  Passive mode FTP ☒

Image properties

Jpeg compression : 100%

Updates

Update interval (sec)  Seconds

Ok Cancel



# Software control panels

Control panel -> Camera readou...

System status Camera Zoom Disp

Camera status  
Camera readout starting(1 s)

AVI builder  
Full night AVI enabled !

Ephemerids  
UT time : 28-Mar-13 22:49:23  
Sid. time : 11h32m51s  
Sun Alt. : -39.452 °  
Day (10.0 °) UT: 06:25:41 in 16:23:41  
Moon alt. : 23.84 °  
UT set : 06:18:35 in 07:29:11

Post processing (darks)  
No dark subtraction enabled

Hot pixel (list)  
No hot pixel correction enabled

Auto. hot pixels  
No automatic hot pixel removal

FTP status  
Ftp disabled

CloudSensor/Sentinel  
Link enabled, no data can be read

Control panel

System status Camera Zoom Disp

Camera : CCD principal  
☒ Enable exposures (?)  
Settings  
Exp. max (s) 15 Pending 1.3s

☒ Automatic exposure time  
Gain/exp. computation method  
☐ 512x512 central area  
☐ All image  
☒ Circular fisheye

Processings  
☐ X Mirror  
☐ Y Mirror  
☒ Color image from Bayer array # 4  
☐ Remove dark frame  
☐ Hot pixel removal  
Show fixed hot pixels ☐  
☐ Automatic hot pixels removal  
Maximum gap with neighboring pixels (ADU) 20  
Maximum stdev with neighboring pixels (ADU) 30  
Show fixed hot pixels ☐  
Operating modes / file save  
Normal mode  
Darks frame recording mode  
☐ Do median stack of 7 darks  
Disabled

Control panel

System status Camera Zoom Display

X=60 Y=676 R=10 G=16 B=14  
H=6.2° Az=355.6°  
Zoom factor 3x

Red pixels

	59	60	61
677	10	10	10
676	10	10	10
675	9	10	10

Max gap: 0 RMS: 0.3 Mean.: 10

Green pixels

	59	60	61
677	16	15	16
676	16	16	17
675	16	16	16

Max gap: -1 RMS: 0.6 Mean.: 16

Blue pixels

	59	60	61
677	13	13	12
676	13	14	13
675	12	13	12

Max gap: 1 RMS: 0.2 Mean.: 13

Control panel

Camera Zoom Display Recording

Astronomy  
☐ Enable grid display  
☒ only horizon ☐ RA/DEC  
X Center (pixels) 640  
Y Center (pixels) 480  
Radius (pixels) 625  
North position (°) 180 0  
☐ Reverse East-West  
☐ Show main objects

Display  
☒ Auto display  
Manual display cuts  
High 205 255 255  
Low 4 5 5  
Red Green Blue  
Apply

Luminosity : 100

Contrast : 5

Amount of saturated pixels (%)  
8.6 %  
2.3 %  
7.2 %

Control panel (1 s)

Display Recording Measurement

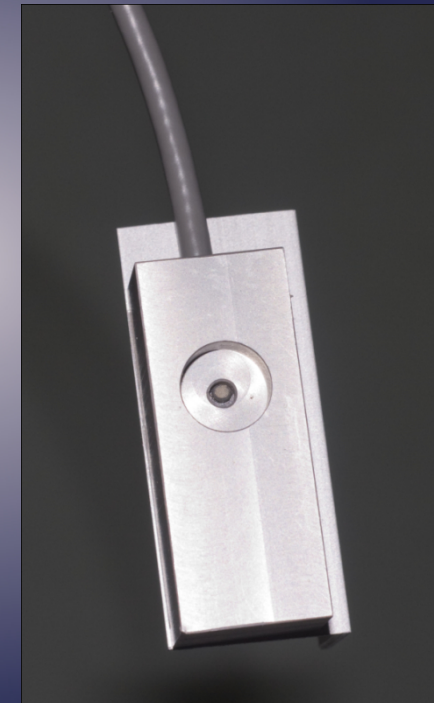
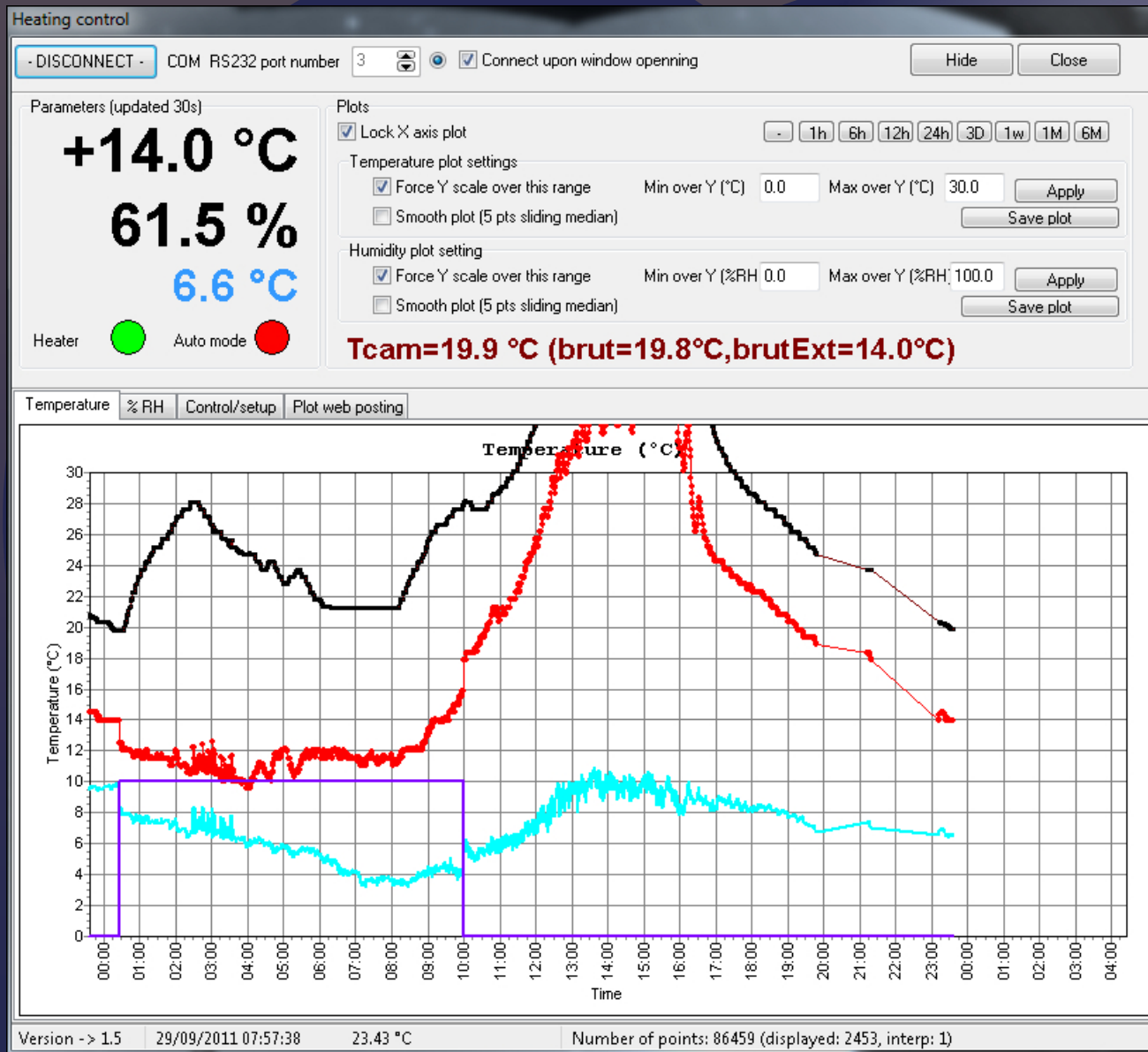
Sky background measurement  
☐ Display image as magnitude per  
Warning, works only if dark image is removed, and camera gamma parameter is set to 100 (if can be

References  
Exposure time ref. (s) 10.0  
Reference gain (if supported) 500  
Reference pixel signal (ADU) 30  
Reference Magnitude per arcsec<sup>2</sup> 20.00  
Lens aperture (f/) 3.0

Gain setting (if tunnable Gain)  
"a" factor 0.358170  
"b" factor 0.004045  
Signal (ADU) = a \* exp (b \* Gain)

Currently in use  
Lens aperture (f/) 3.0  
Apply

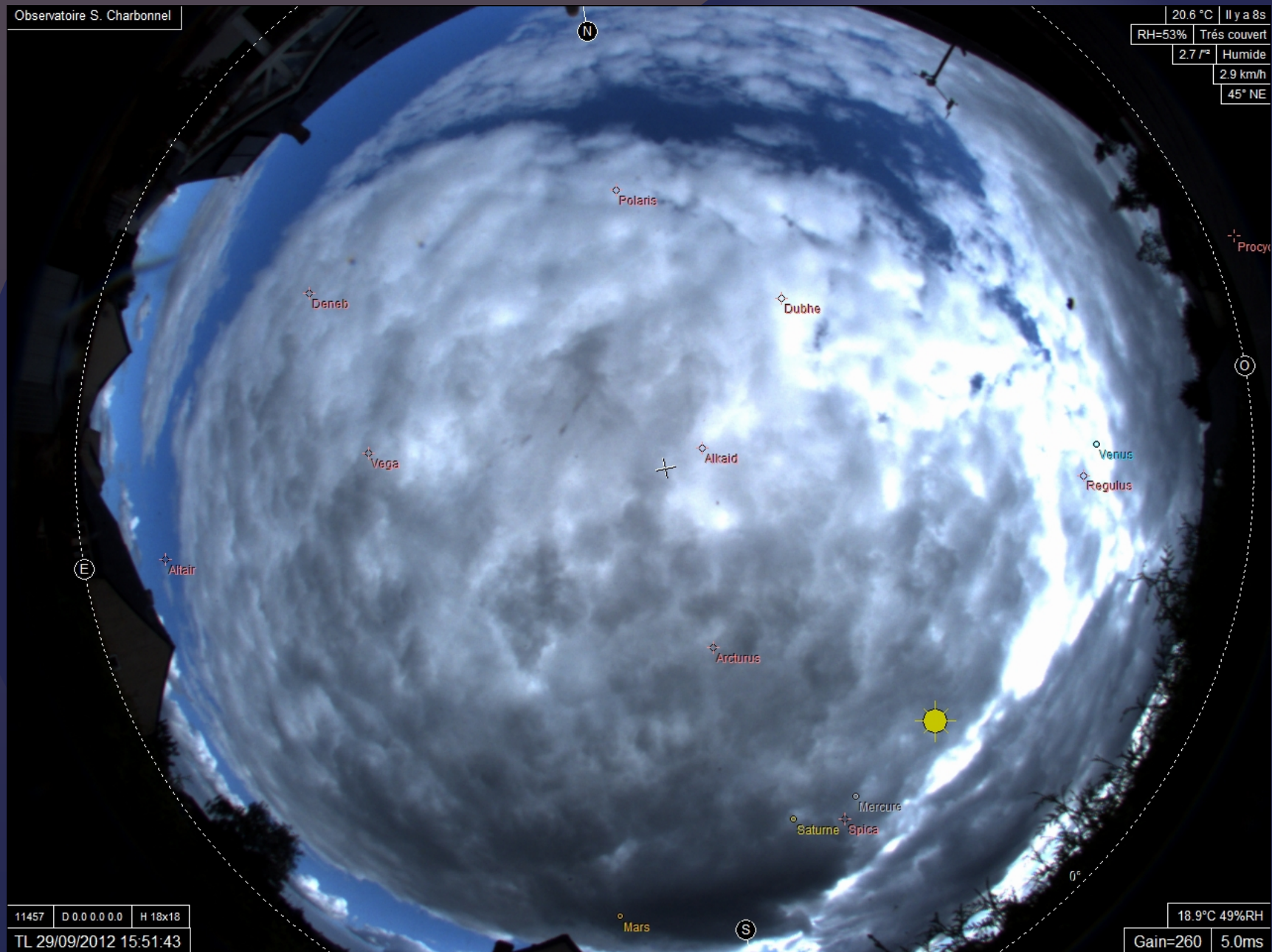
# OMEA camera (dome heating control)



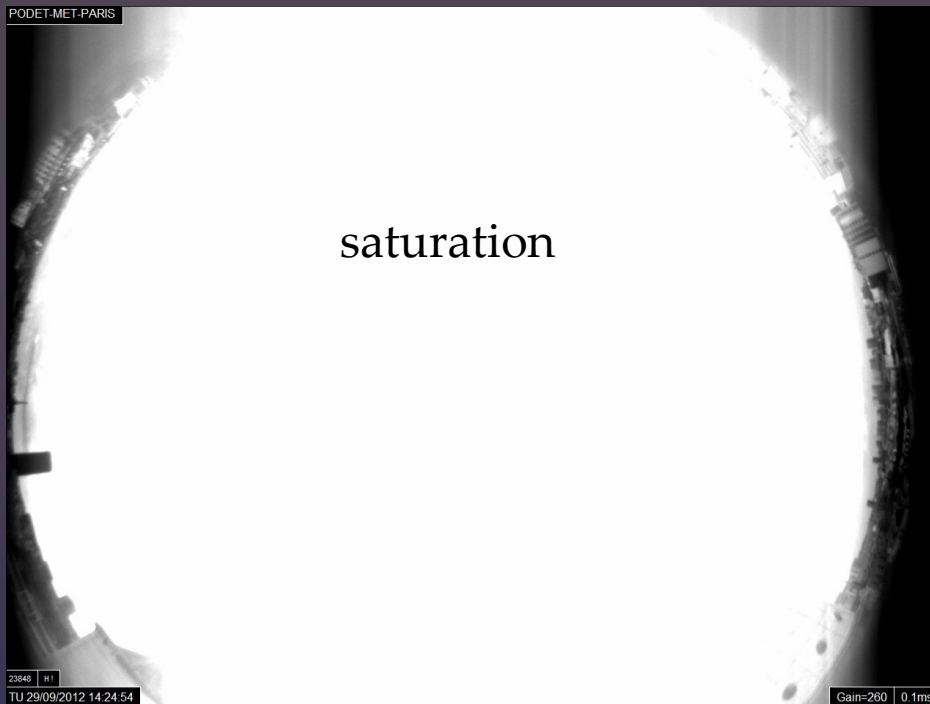
External temperature and humidity probe



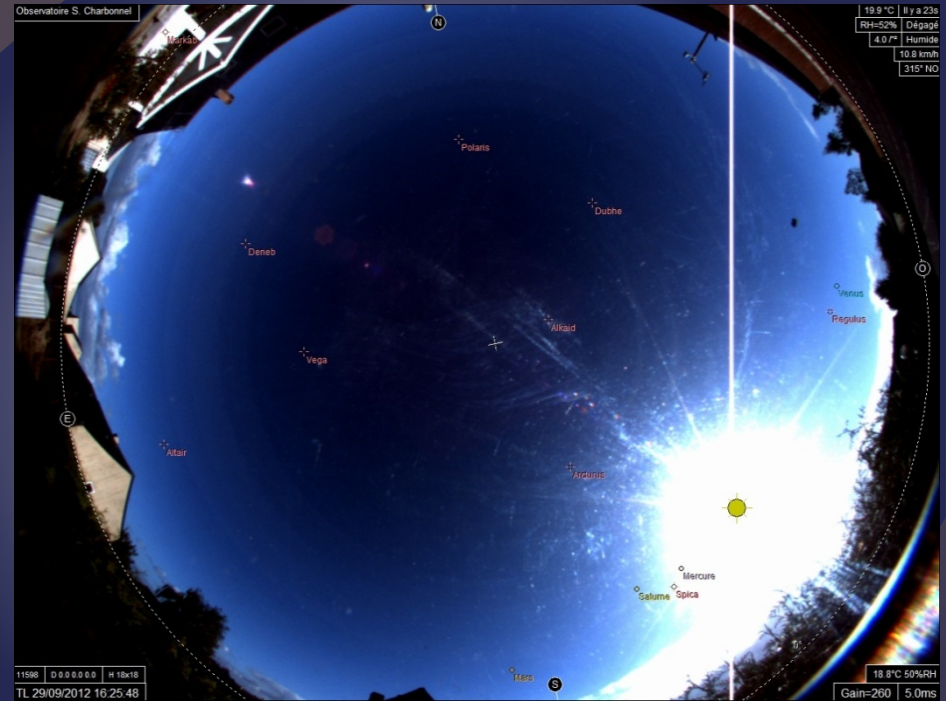
# Clouds : daylight image



# Auto-iris or not ?



Even with  $100\mu\text{s}$  exposure time, no auto-iris (camera has too much sensitivity)

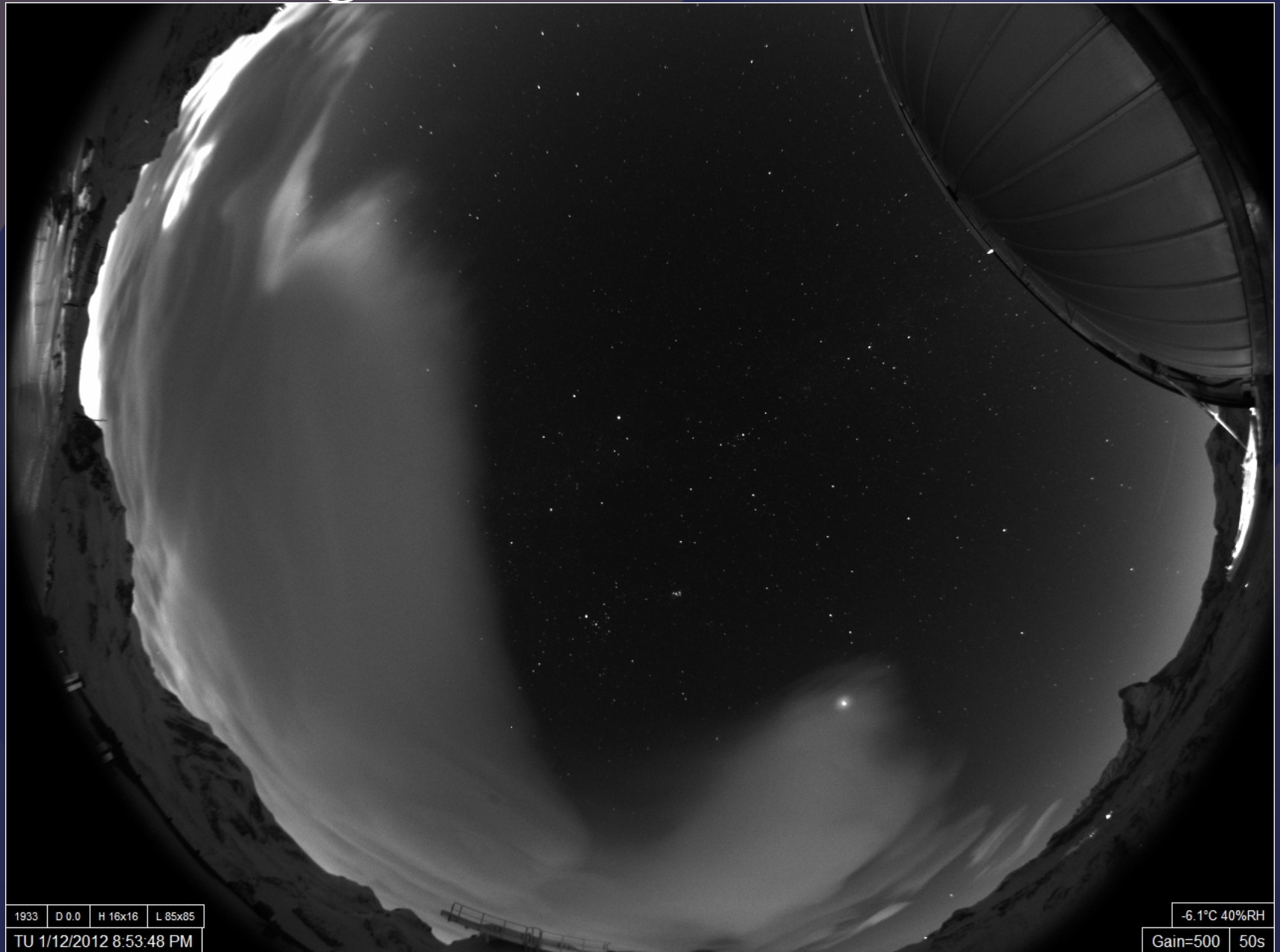


5 ms exposure time with auto-iris

-> Auto-iris with daylight sensor :  
100% autonomous



# Overnight clouds distribution



# Sky quality(180°x160°)

1.4 Million pixels





# Sky quality (180°x180°)

2.0 Million pixels





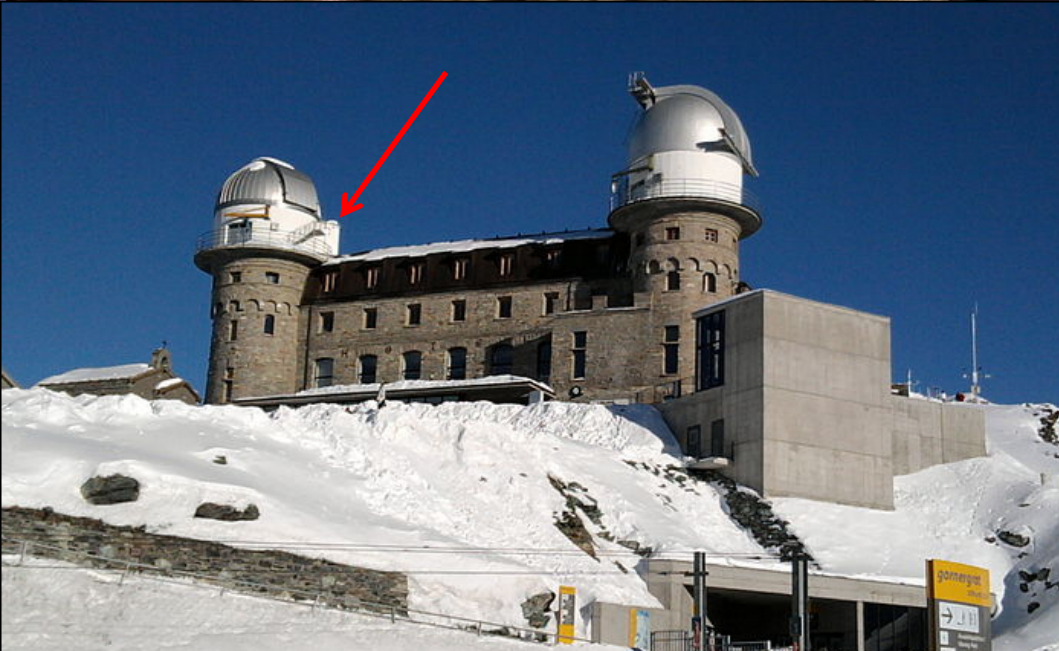
S.Vetter



# Gornergrat observatory / Switzerland



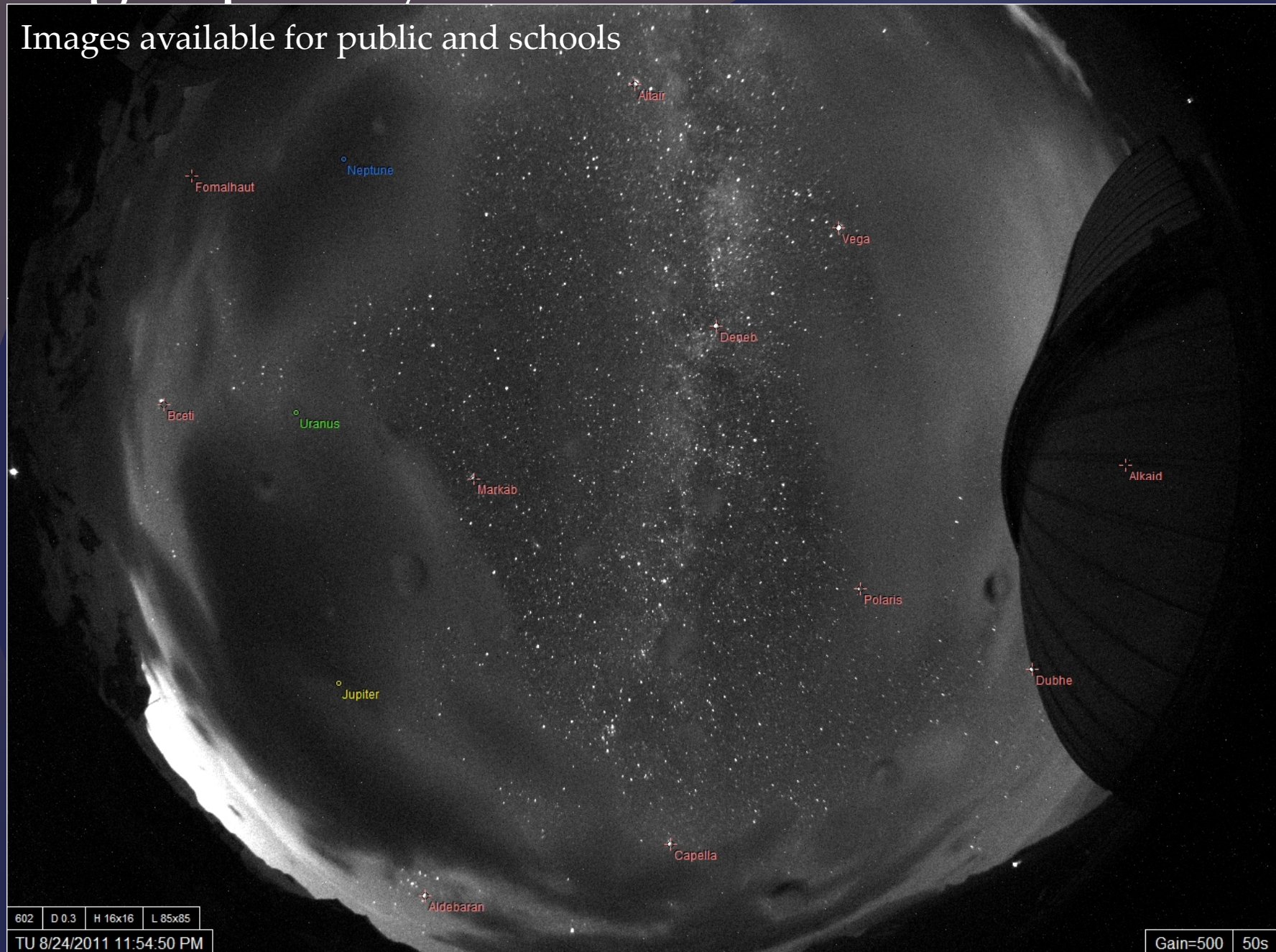
- OMEA 1.3M
- 10000 ft elevation
- Extreme climate condition
- Northern hemisphere





# High quality mountain skies

Images available for public and schools





# Summer sky



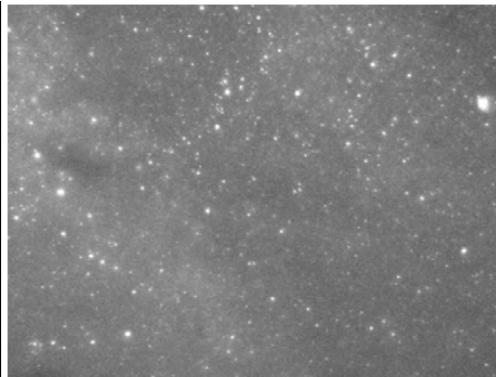


# Spring sky





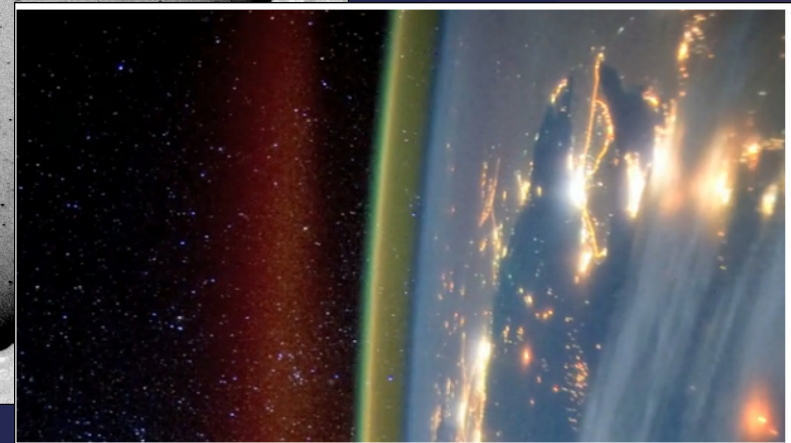
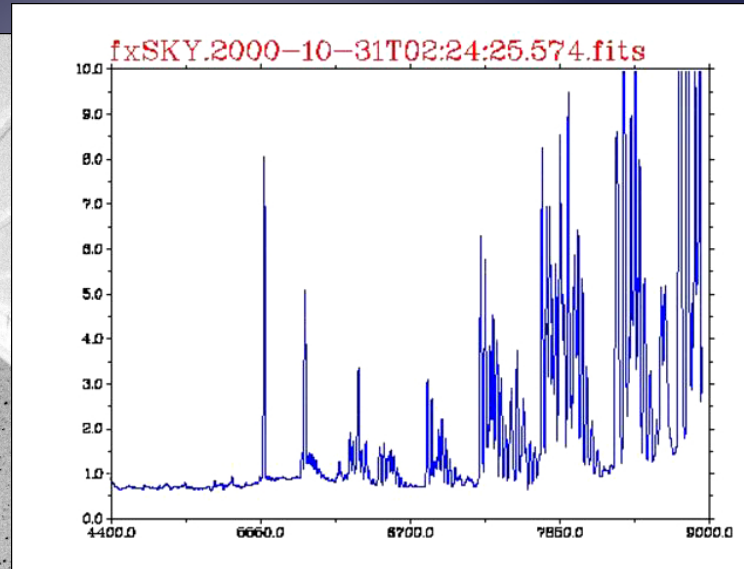
# Upper atmosphere : OH-GLOW



Visible Camera

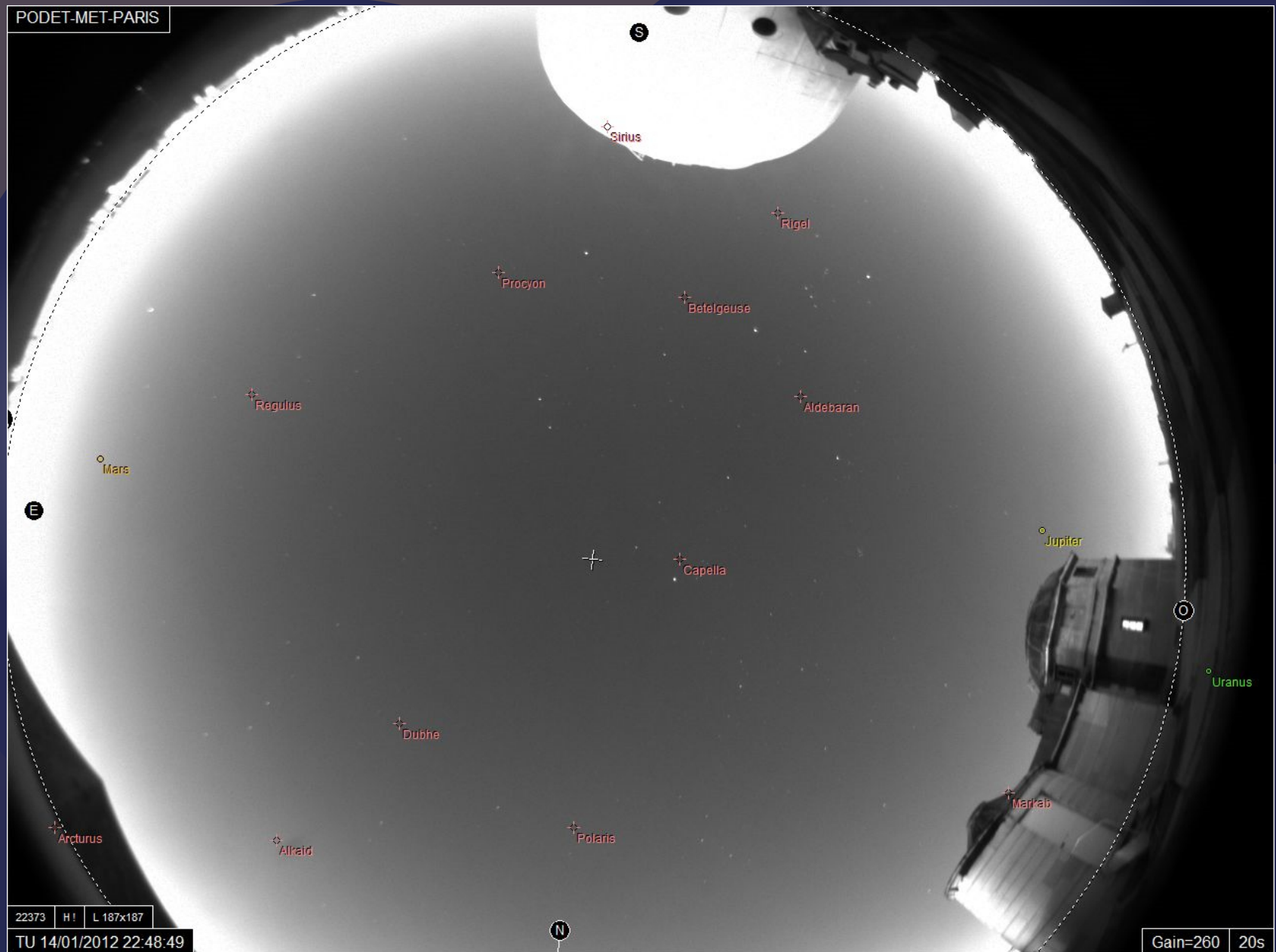


SWIR Camera





# PARIS observatory (downtown)



# Siding Springs, Australie



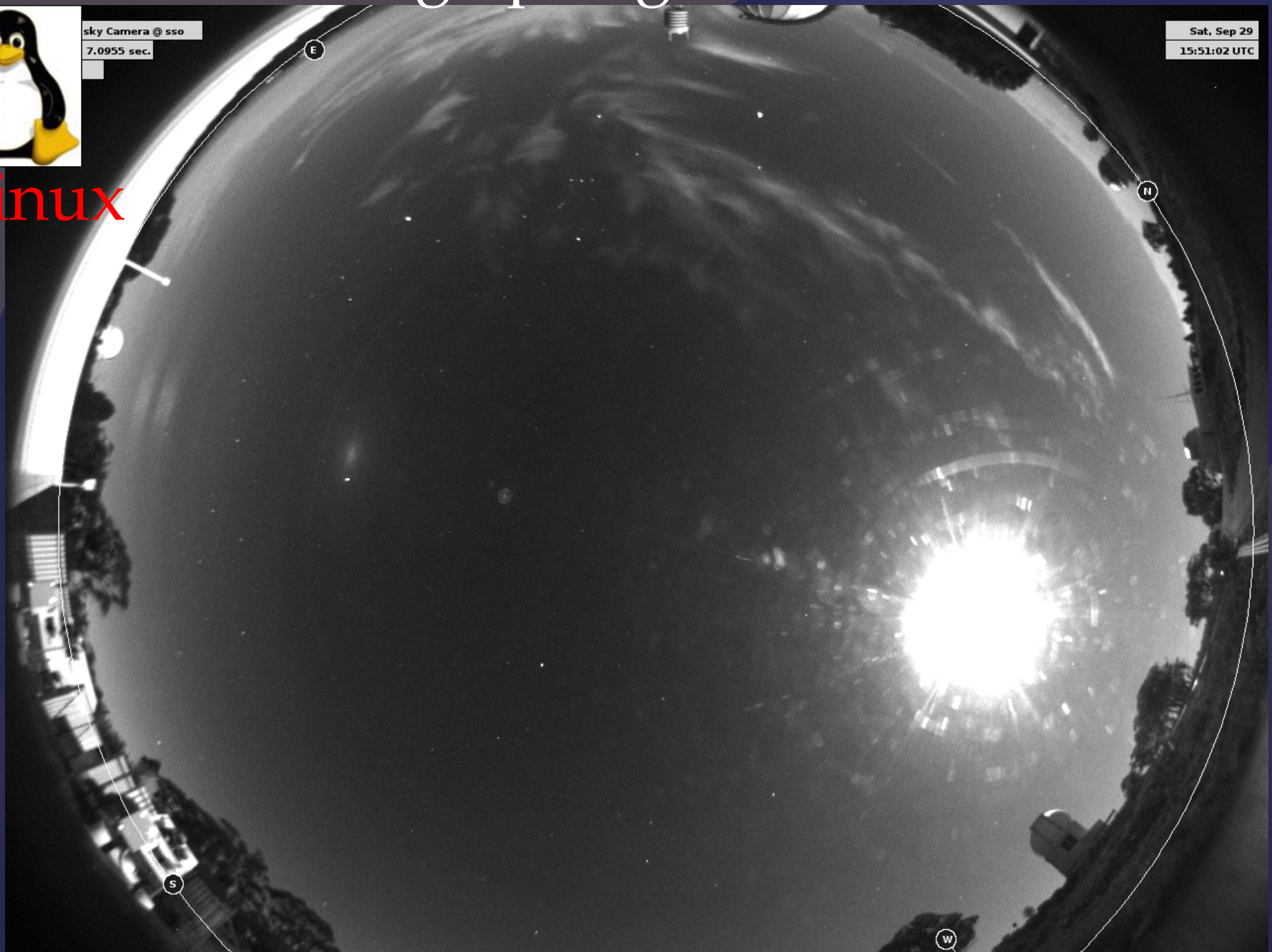
sky Camera @ sso

7.0955 sec.

Sat, Sep 29

15:51:02 UTC

Linux





HAT SOUTH all sky camera @LCO  
Gain = 1023  
Exp. time= 60.0000 sec W

Thu, Aug 5  
02:11:22 UTC



Linux

Las Campanas, Chili

HAT SOUTH all sky camera@LCO  
Gain = 1023  
Exp. time= 0.0131 sec    W

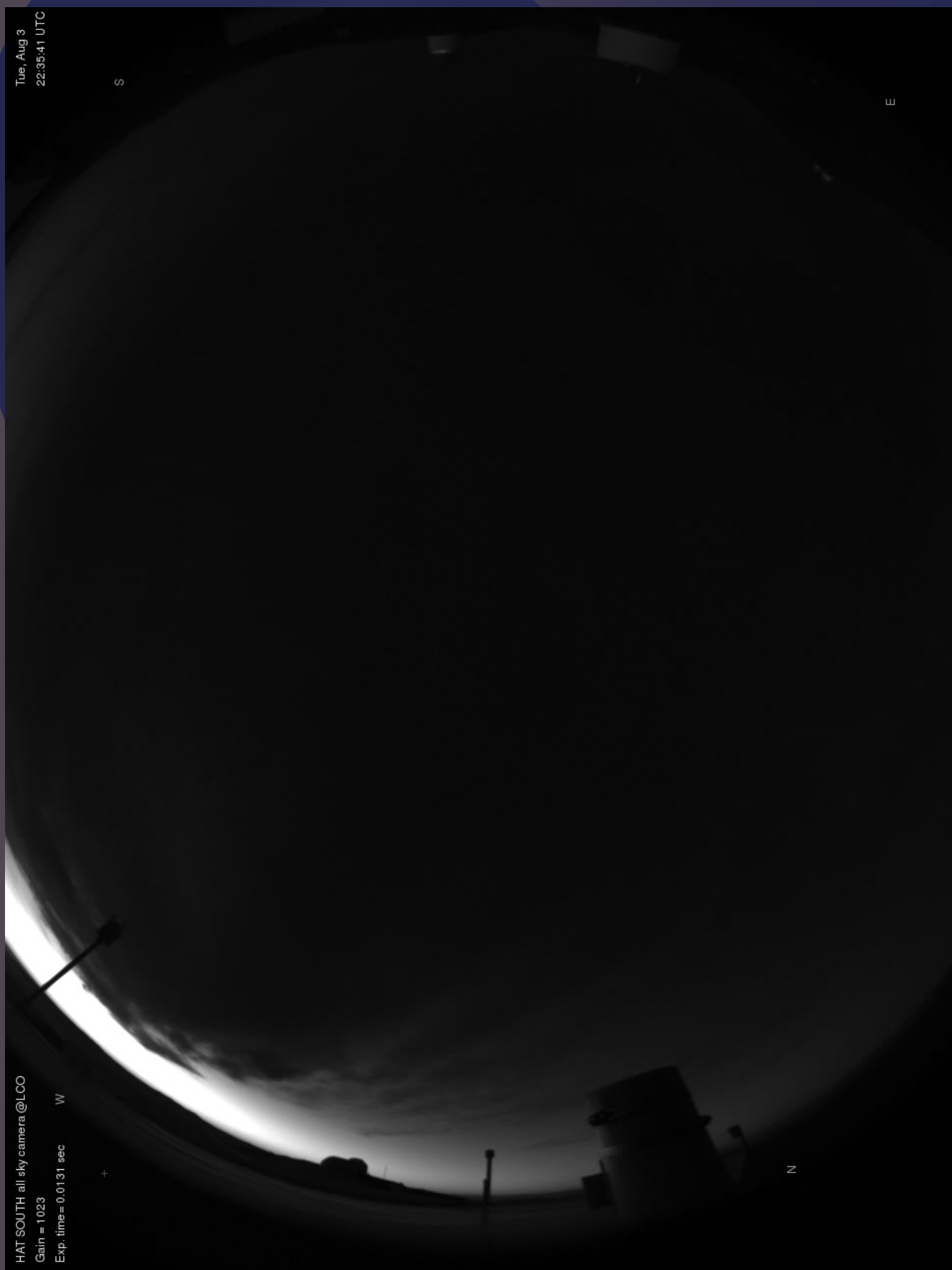
Tue, Aug 3  
22:35:41 UTC

+

S

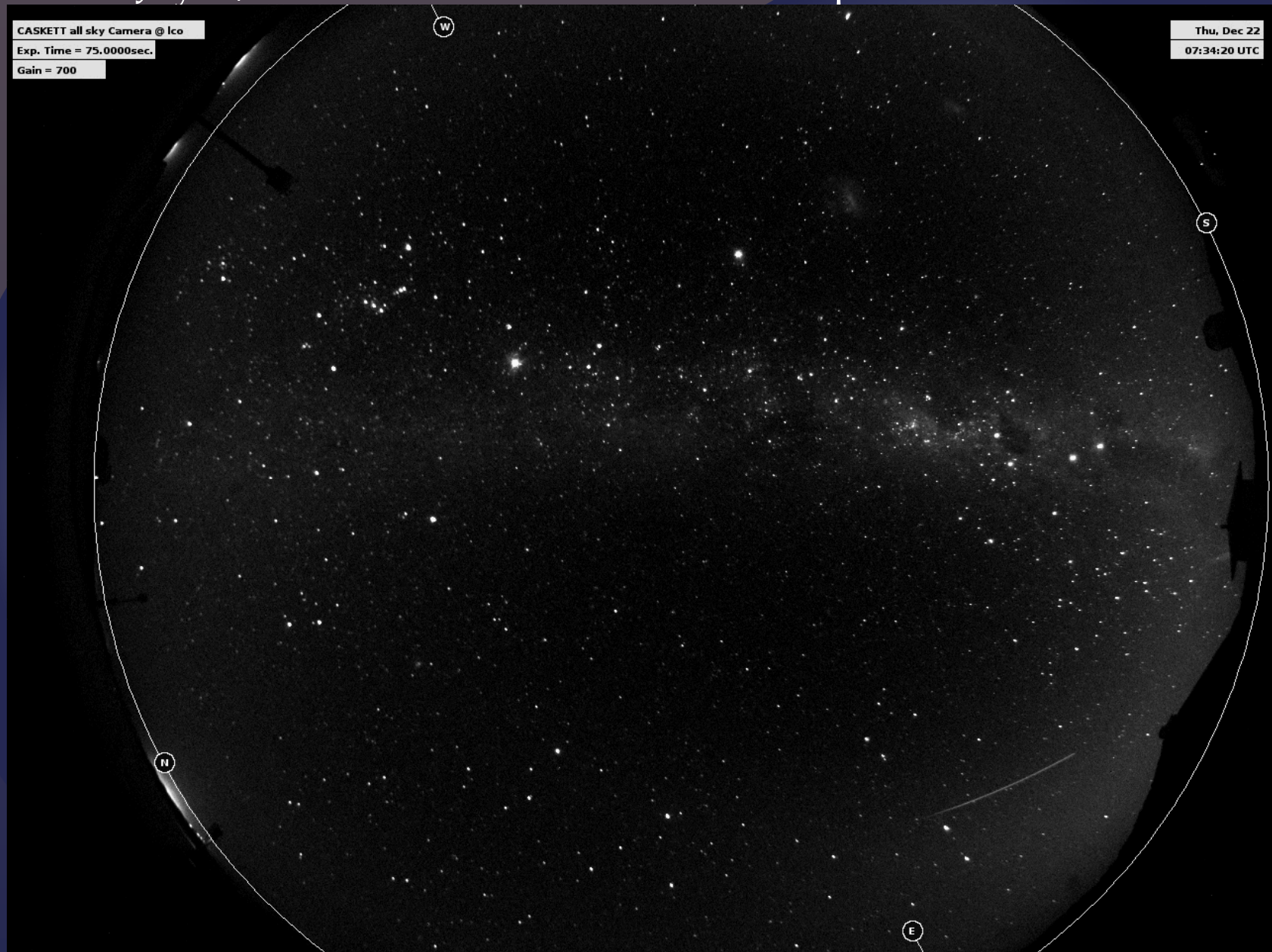
E

N





# LoveJoy C/2011 W3 comet rise at Las Campanas

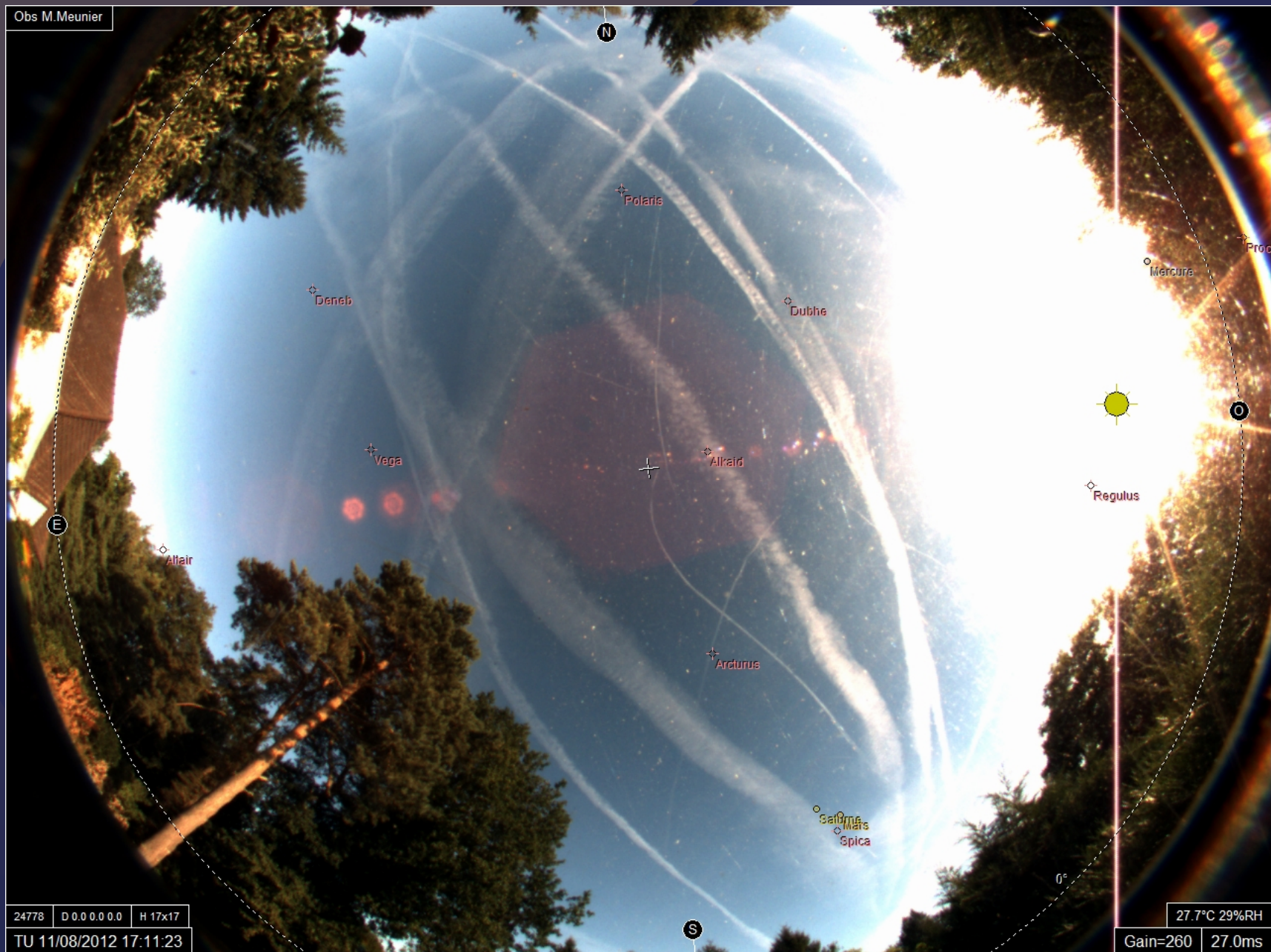


Animated GIF



Plane contrails ...

# Seine & Marne, France





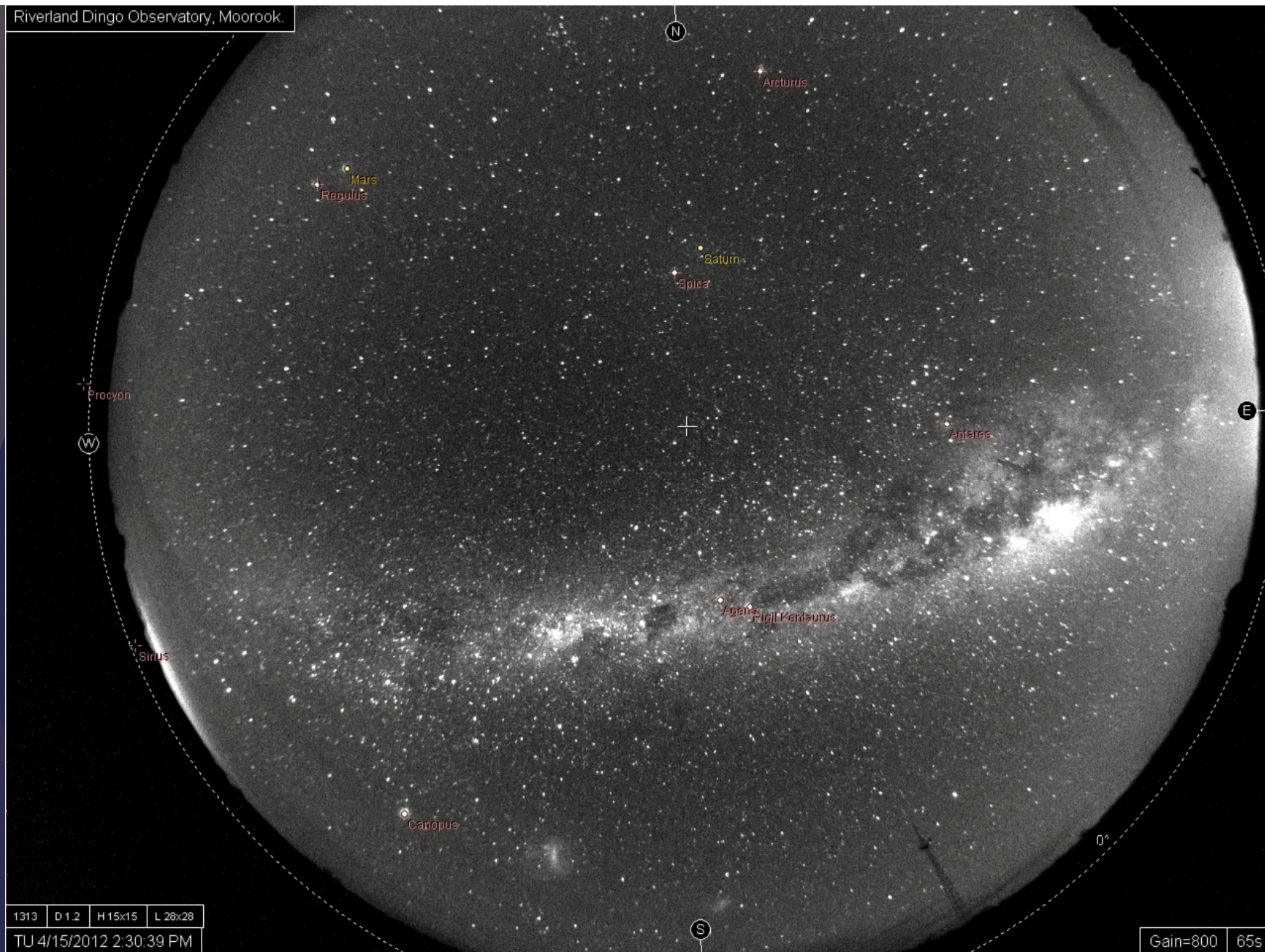


Riverland Dingo  
Obs., Australia  
*Remote telescopes farm*

OMEA-1.3M camera



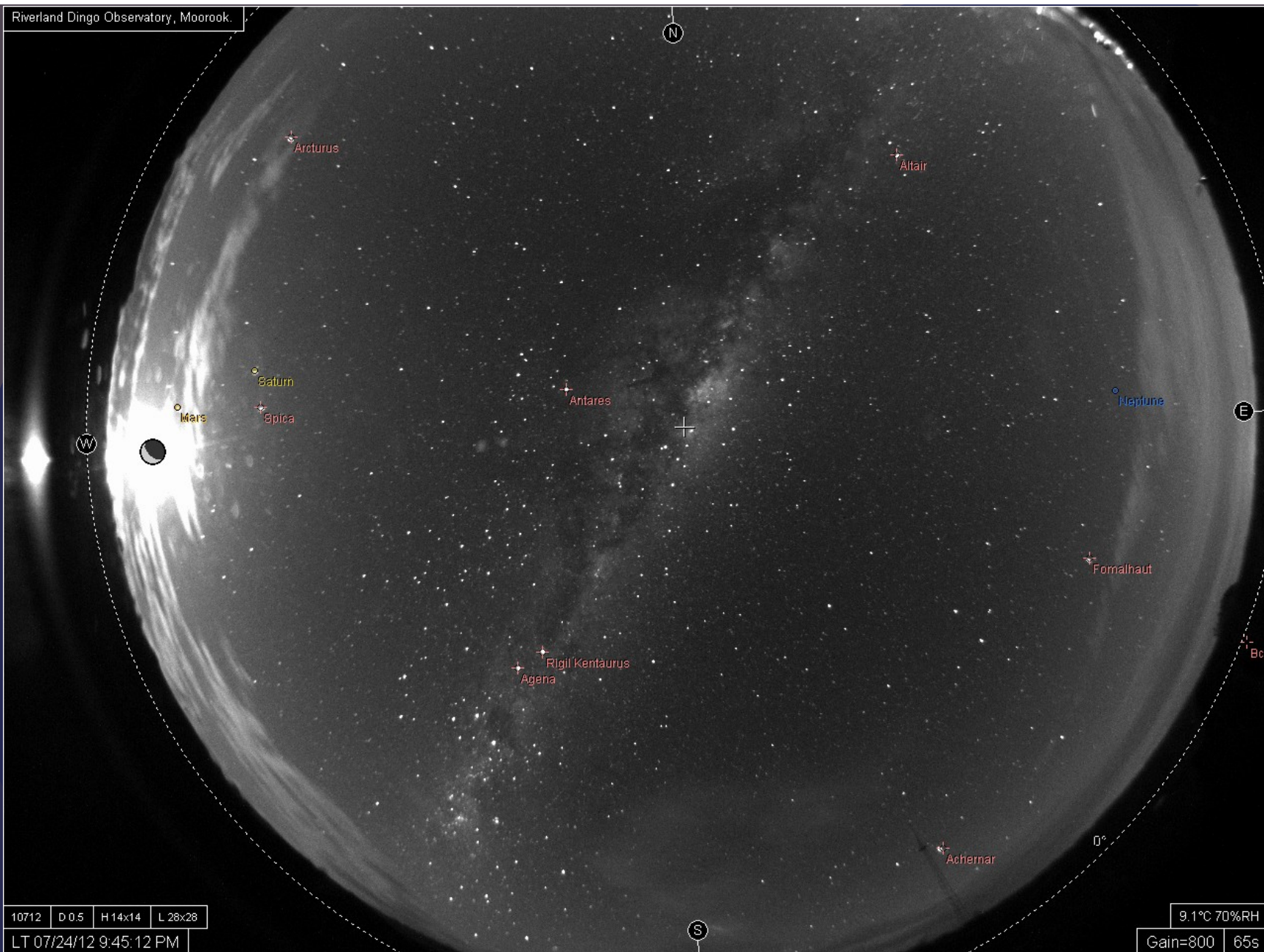
Riverland Dingo Observatory, Moorook.



# Riverland Dingo Obs., Australia



Riverland Dingo Observatory, Moorook.

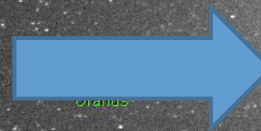


Riverland Dingo Obs., Australia



Riverland Dingo Observatory, Moorook.

Zodiacal light



18204 D 1.2 H 14x14 L 34x34  
LT 06/23/12 5:21:55 AM

-0.2°C 101%RH [ON]  
Gain=800 65s

Riverland Dingo Obs., Australia



PODET- MET Pic du Midi

5309 D 0.5 H 22x22  
TU 08/08/2012 21:28:48

Gain=450 55s

# Pic du Midi obs (School & public images)

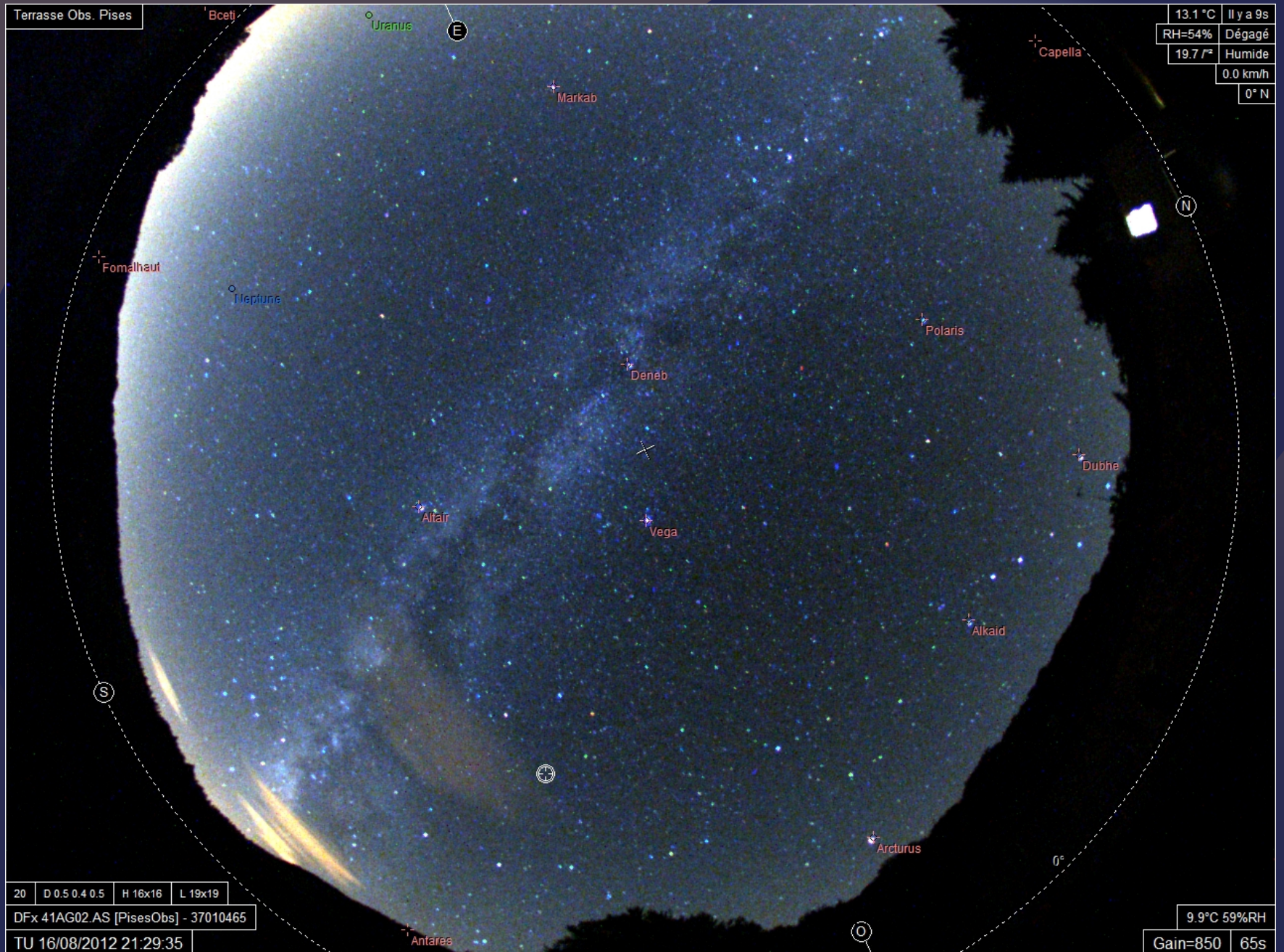


# Color camera version



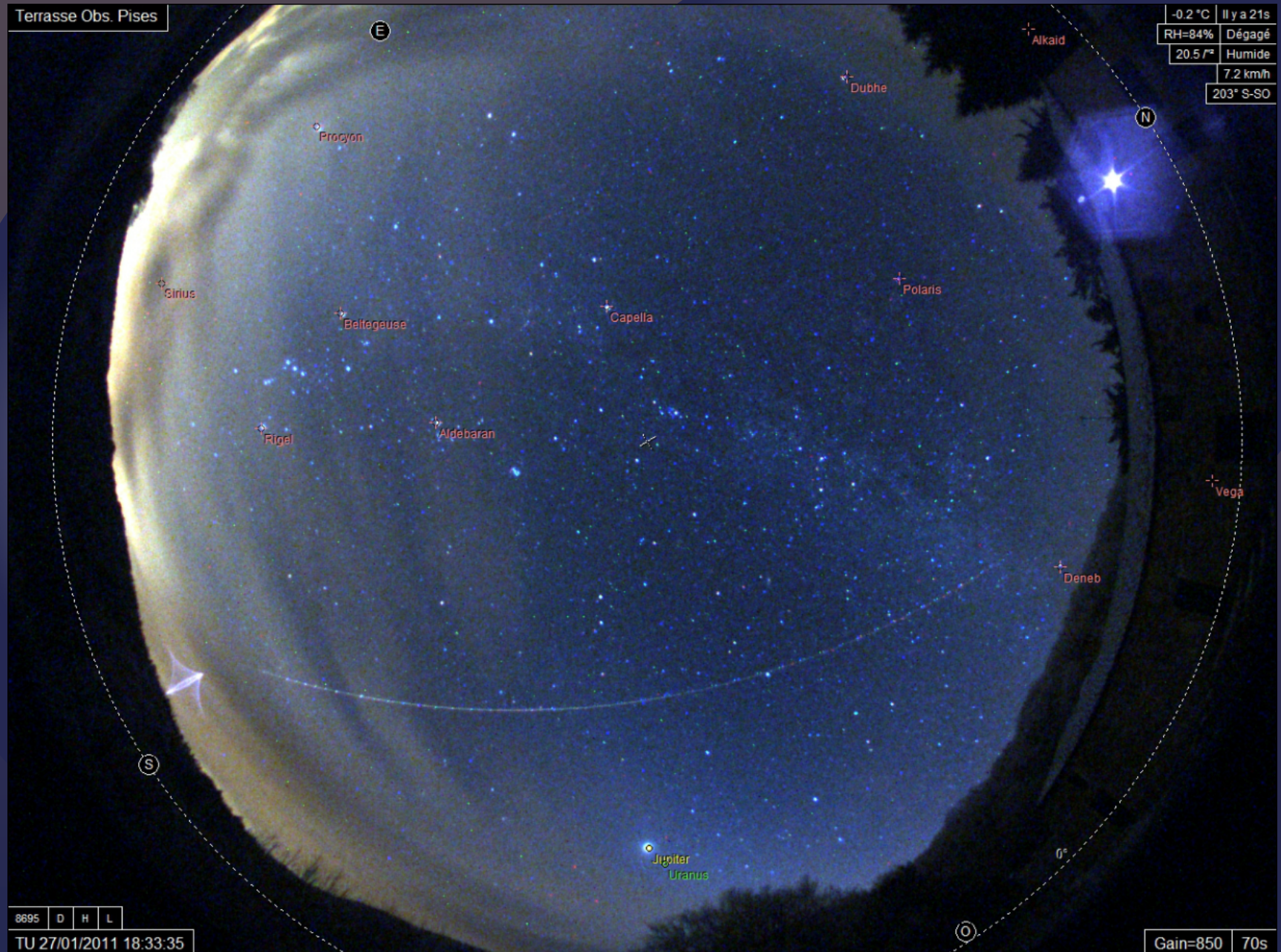


# Color camera version





# Color image sample





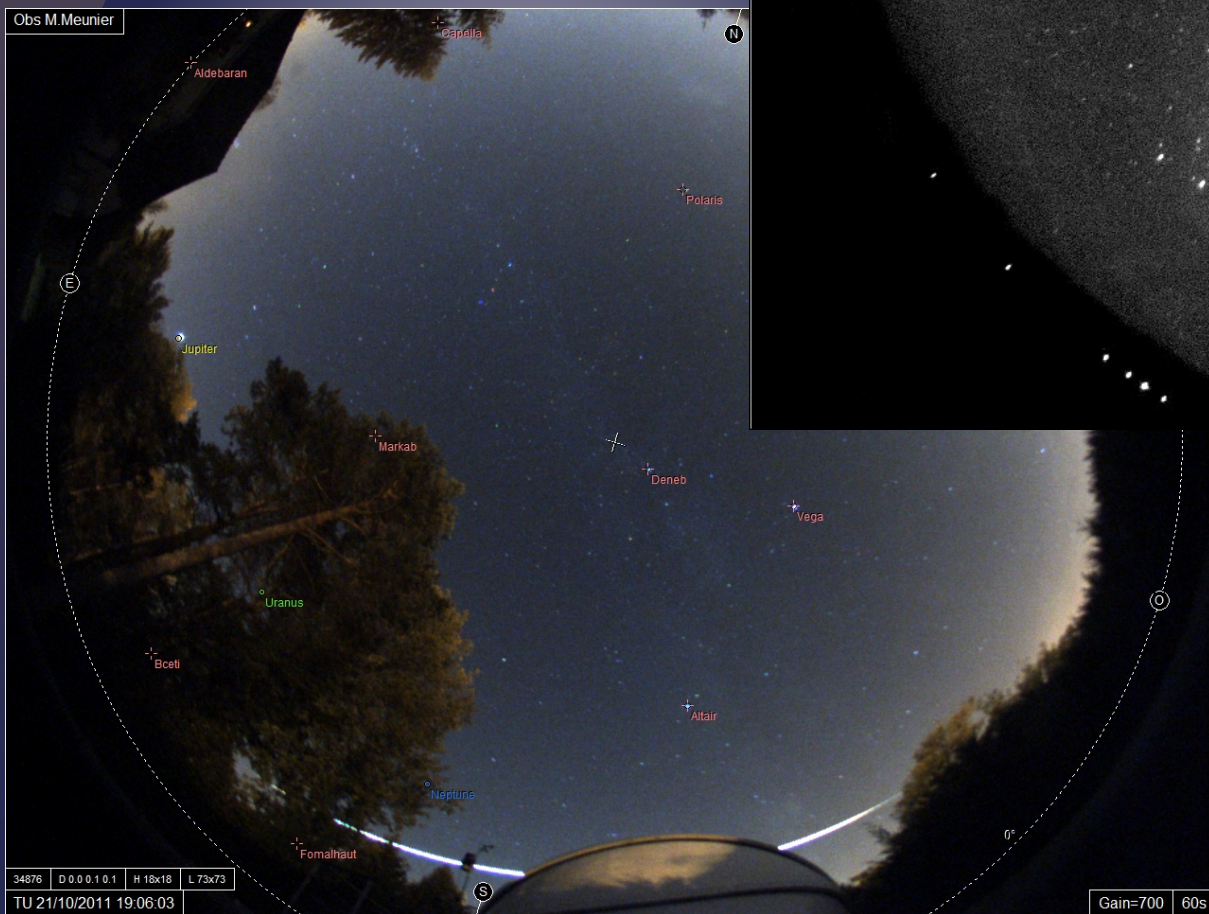
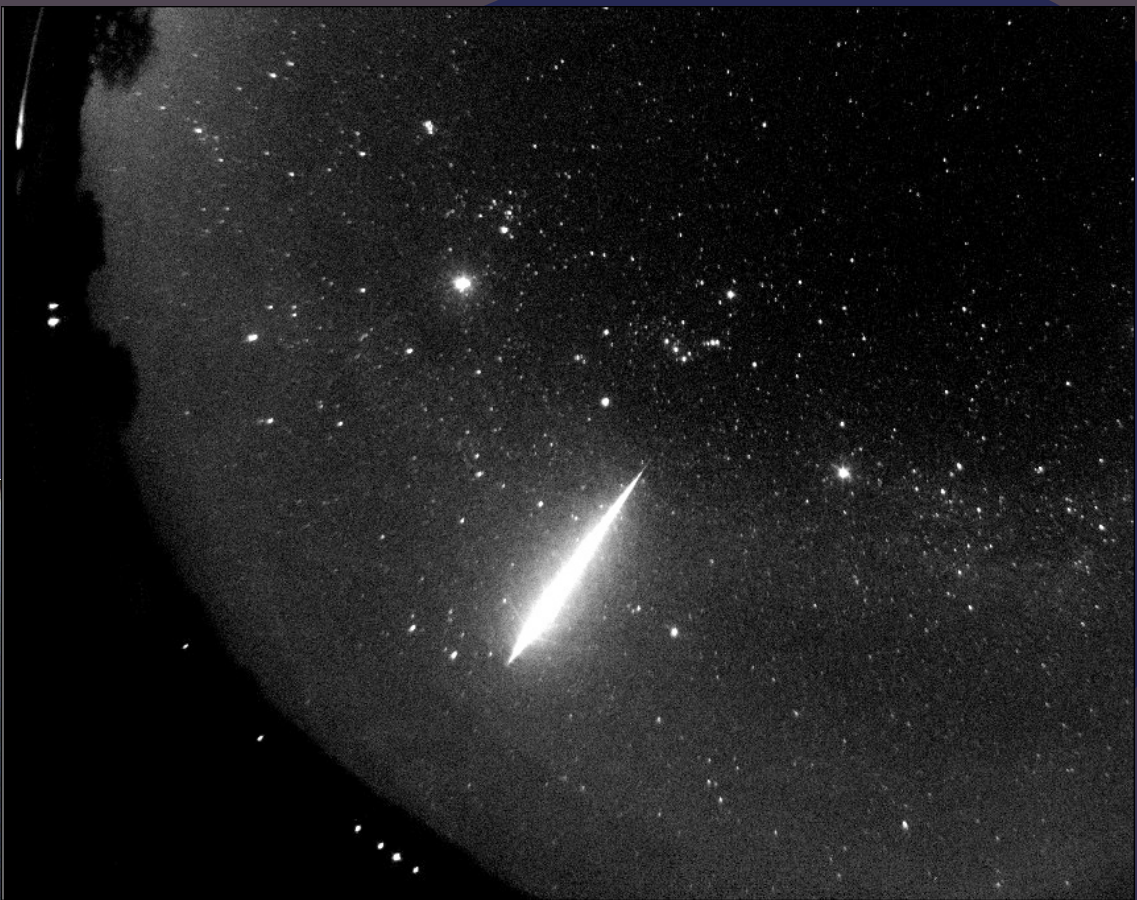
# Fireballs...

Obs M.Meunier





# Fireballs...

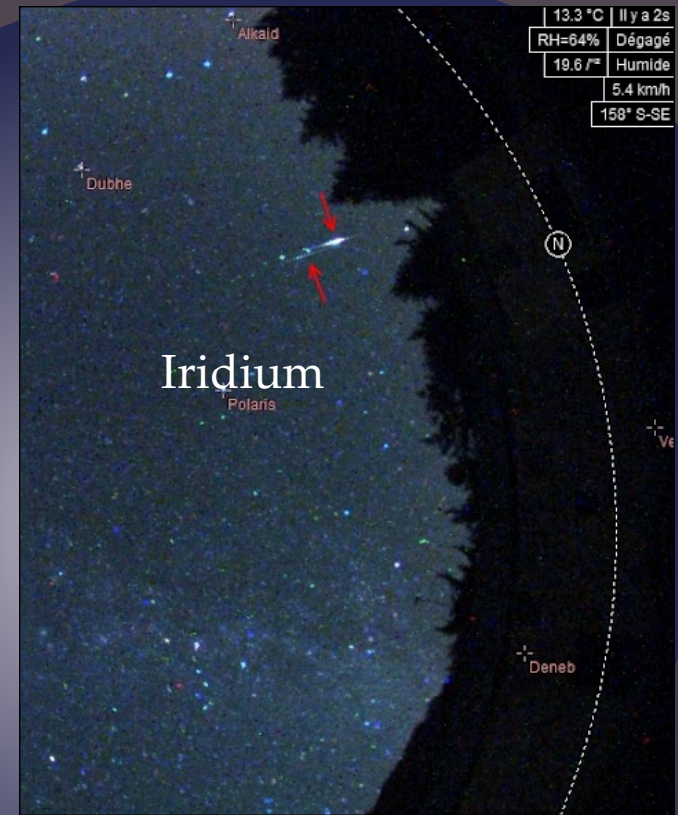


Chile

France



# Satellites

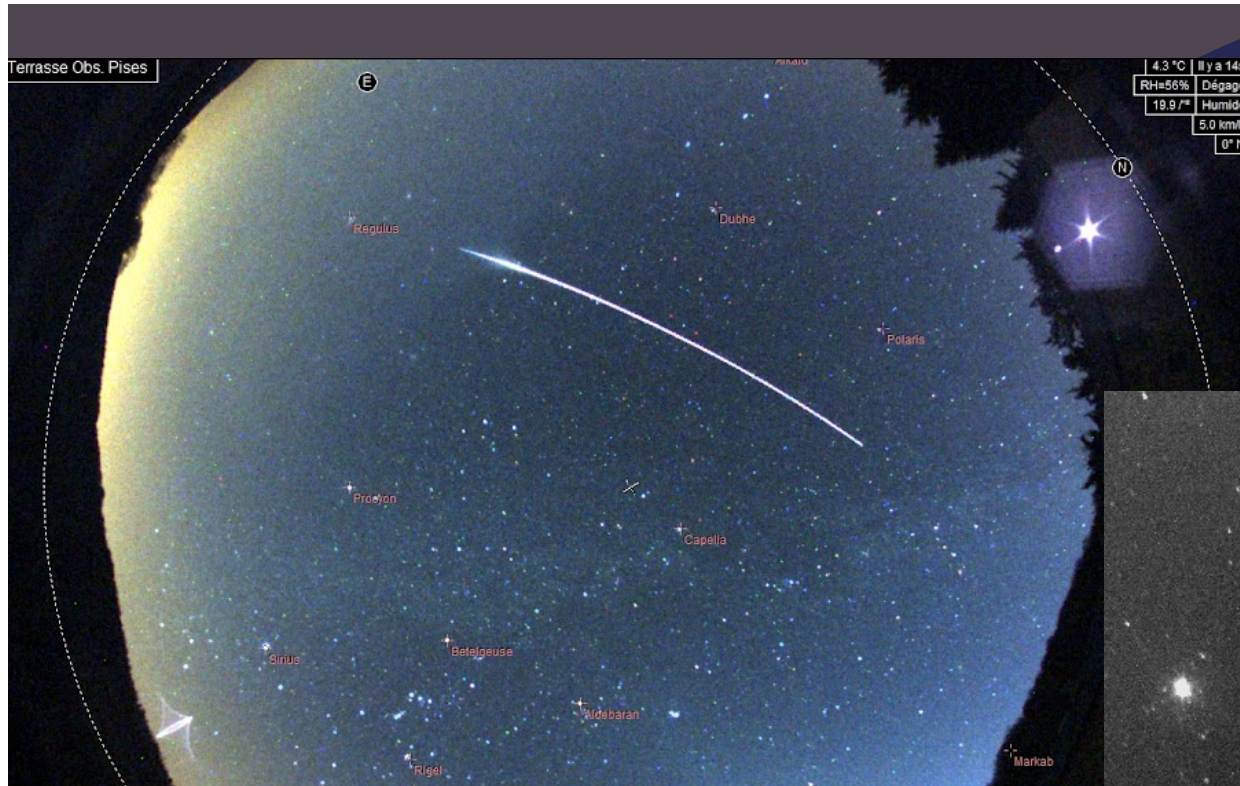


Cosmo-SkyMed



Sky is crowded of satellites





ISS transit

Space Obs – A. Maury

Chinese rocket / satellite  
separation



Time lapse video



# Daylight rainbow captured

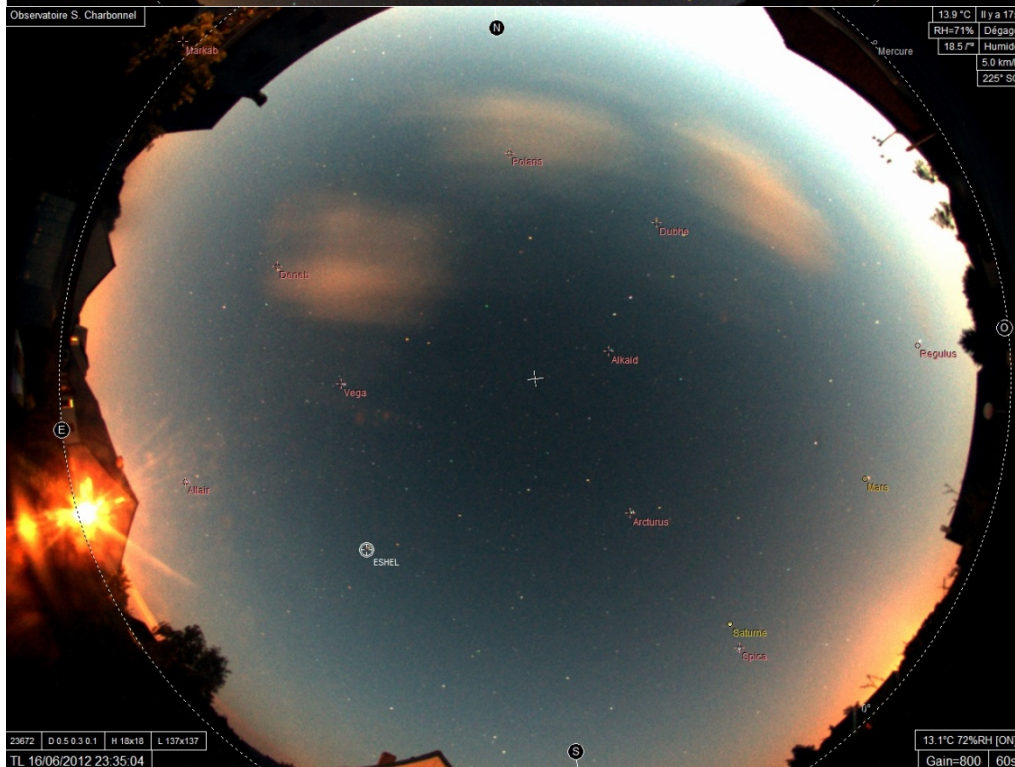


# Northern hemisphere summer solstice

Latitude = 43N France

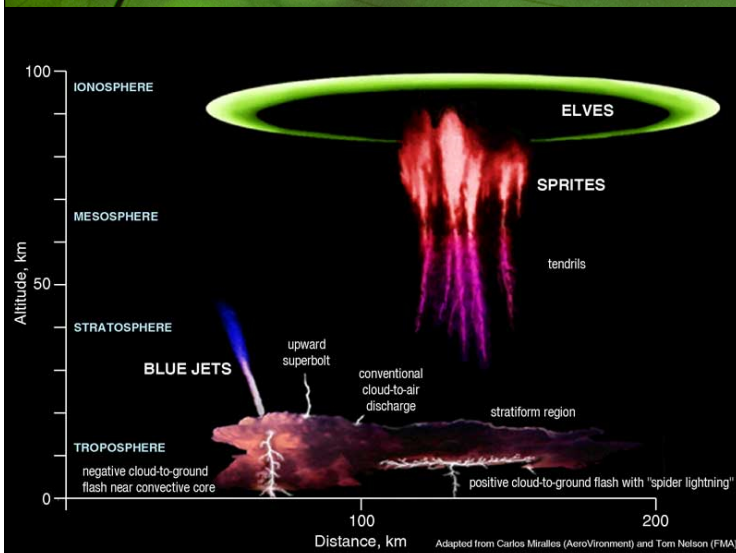
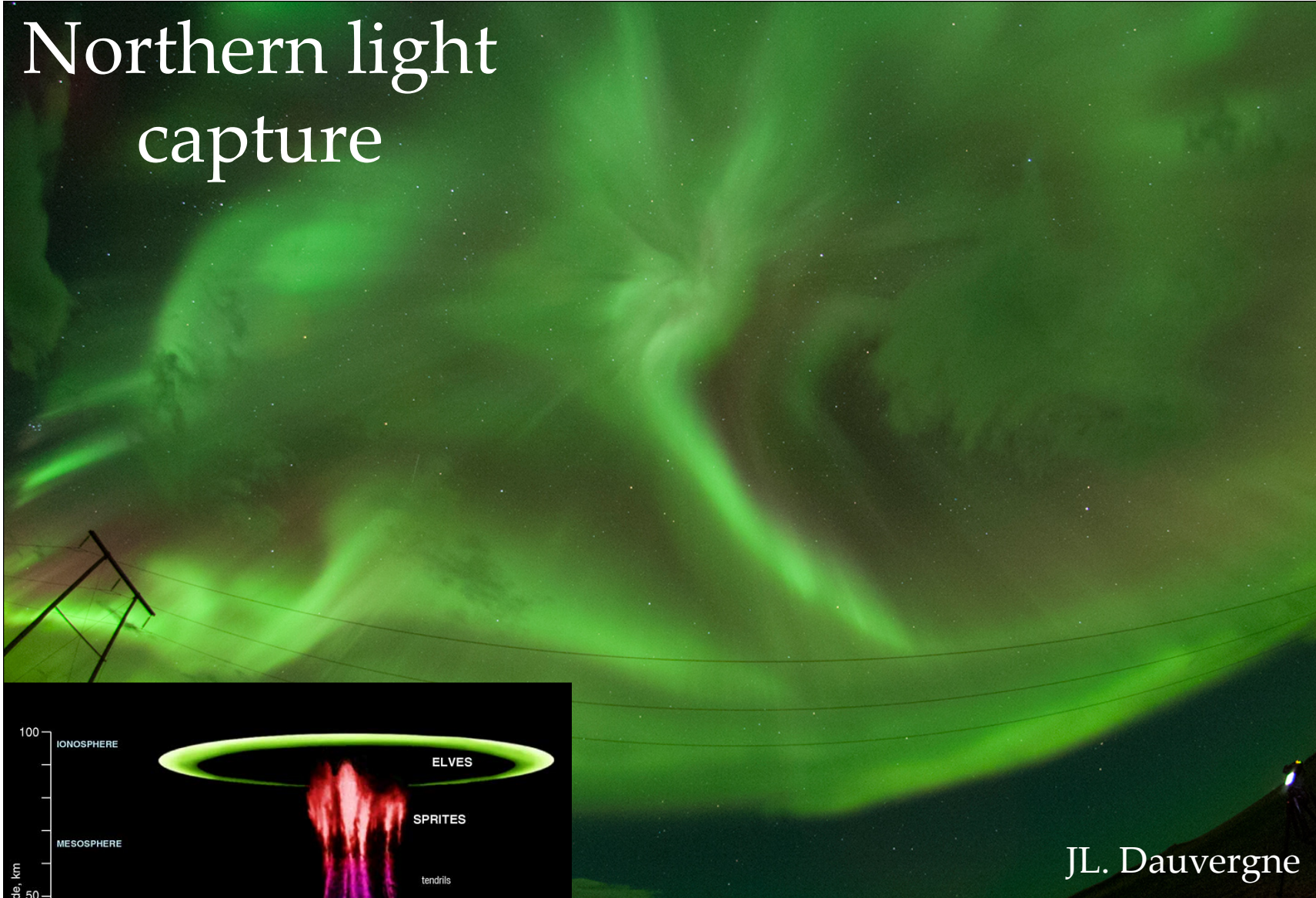
A the same time and date  
but at different latitudes,  
on June 16th...  
Dawn difference

Same exposure as above  
Latitude = 49N France





# Northern light capture



Can potential get  
Sprites, Elves...

The background is a solid dark blue. Overlaid on this are two large, overlapping circles of a slightly lighter shade of dark blue. The circles overlap in the center, creating a darker blue intersection. The text is centered horizontally across the middle of the image.

# The TYTEA all Sky Camera

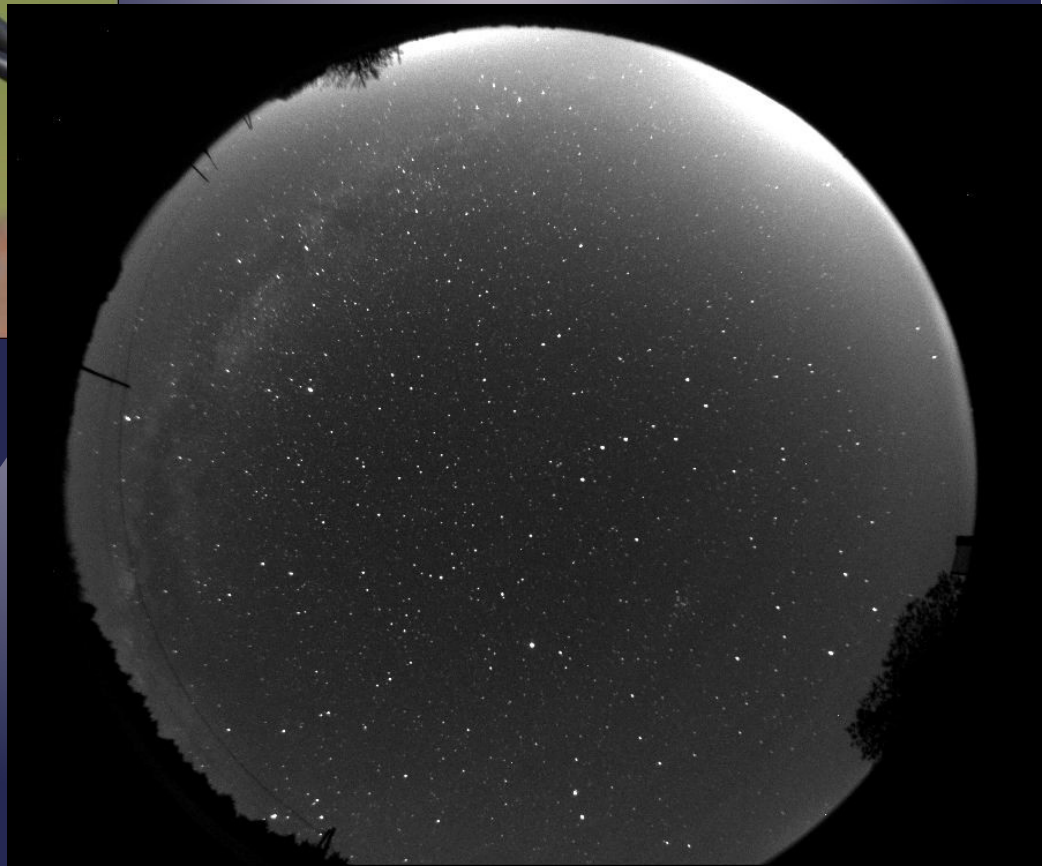


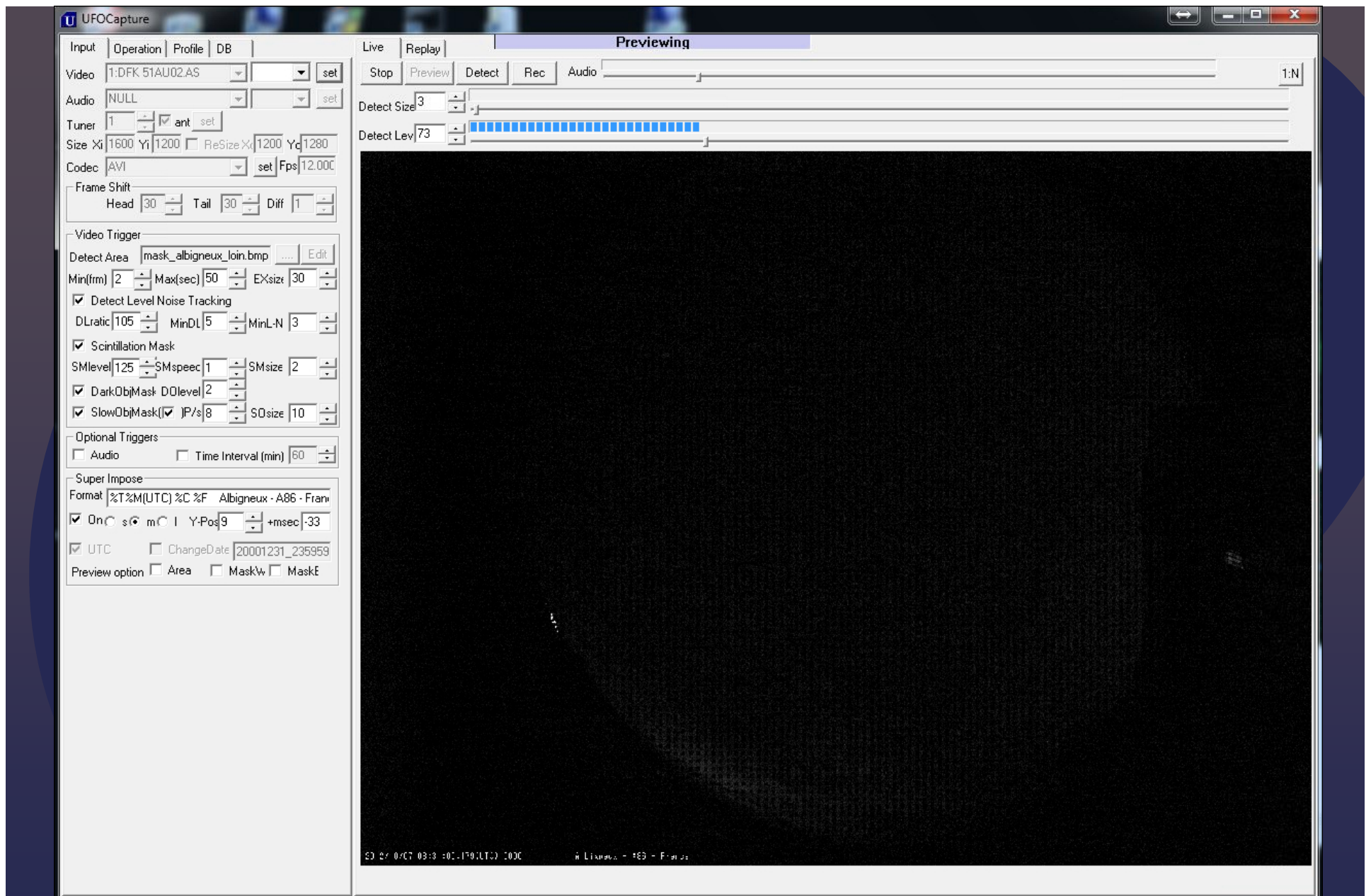
- ⌘ TYTEA camera : lower costs
- ⌘ Optimized for falling object detection (video mode)
- ⌘ Able also to work with long exposures
- ⌘ 100% digital



Long exposure  
Image

It works well  
also !

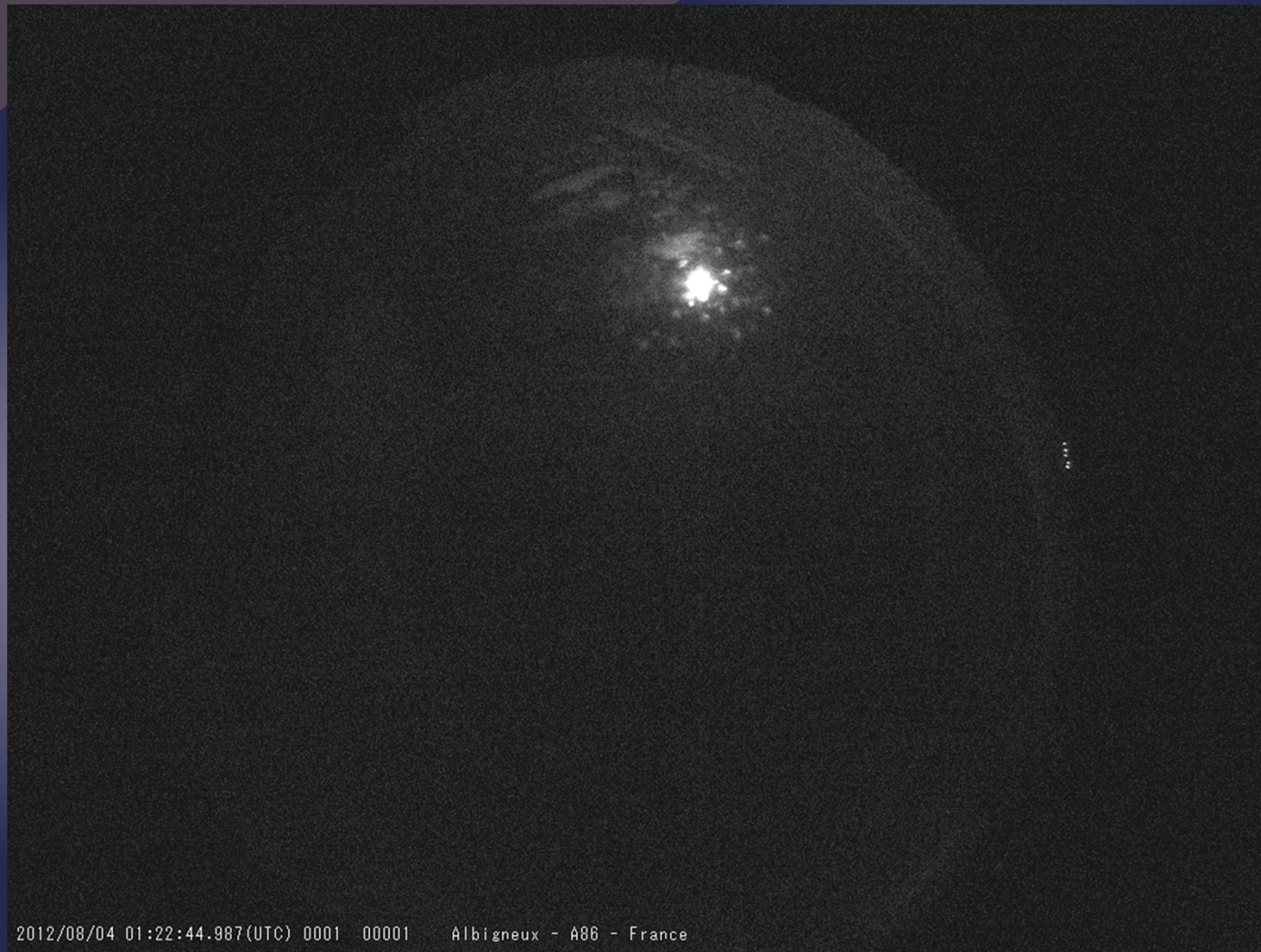




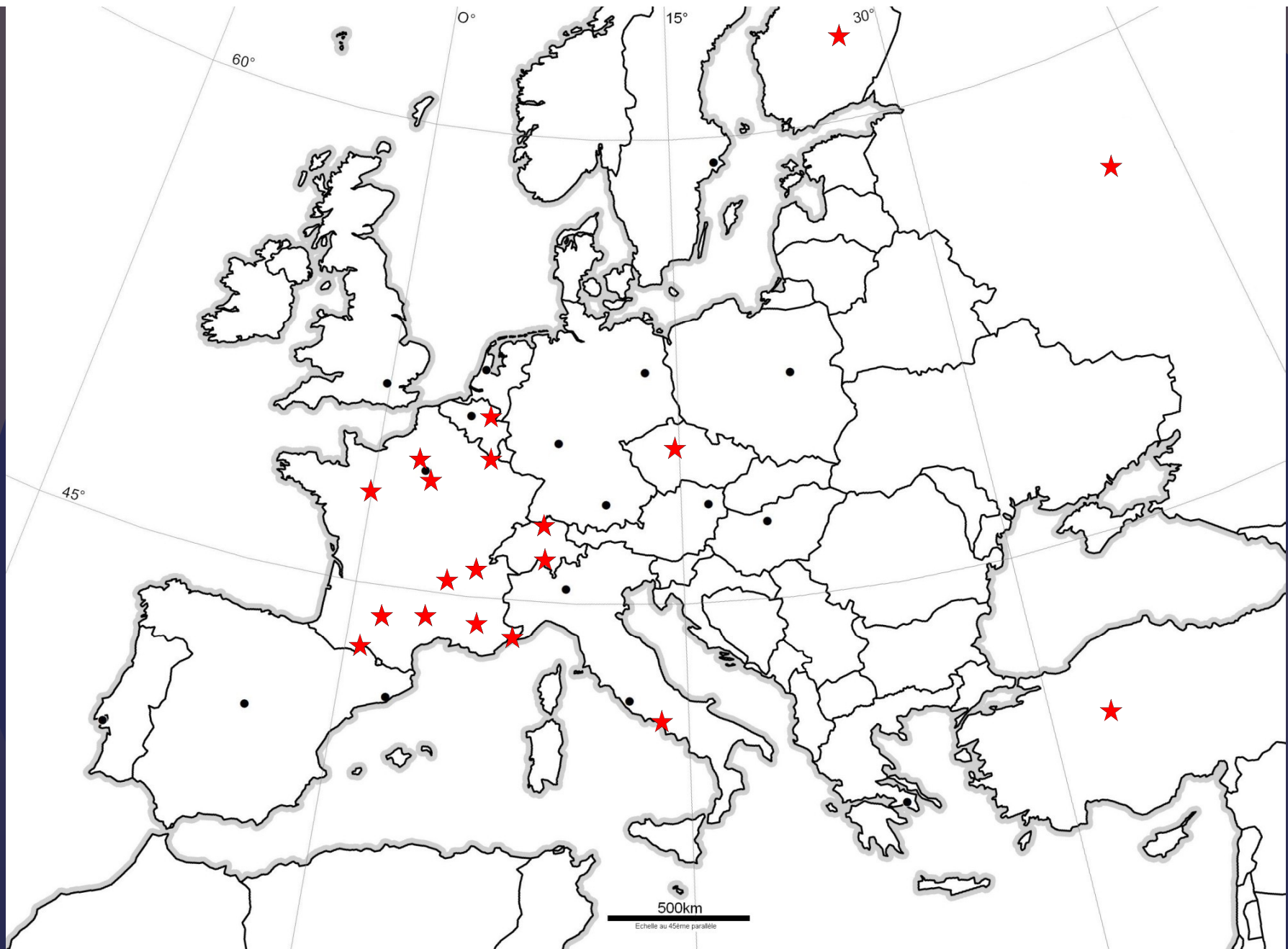
Can run with UFOcapture



# TYTEA camera video sample



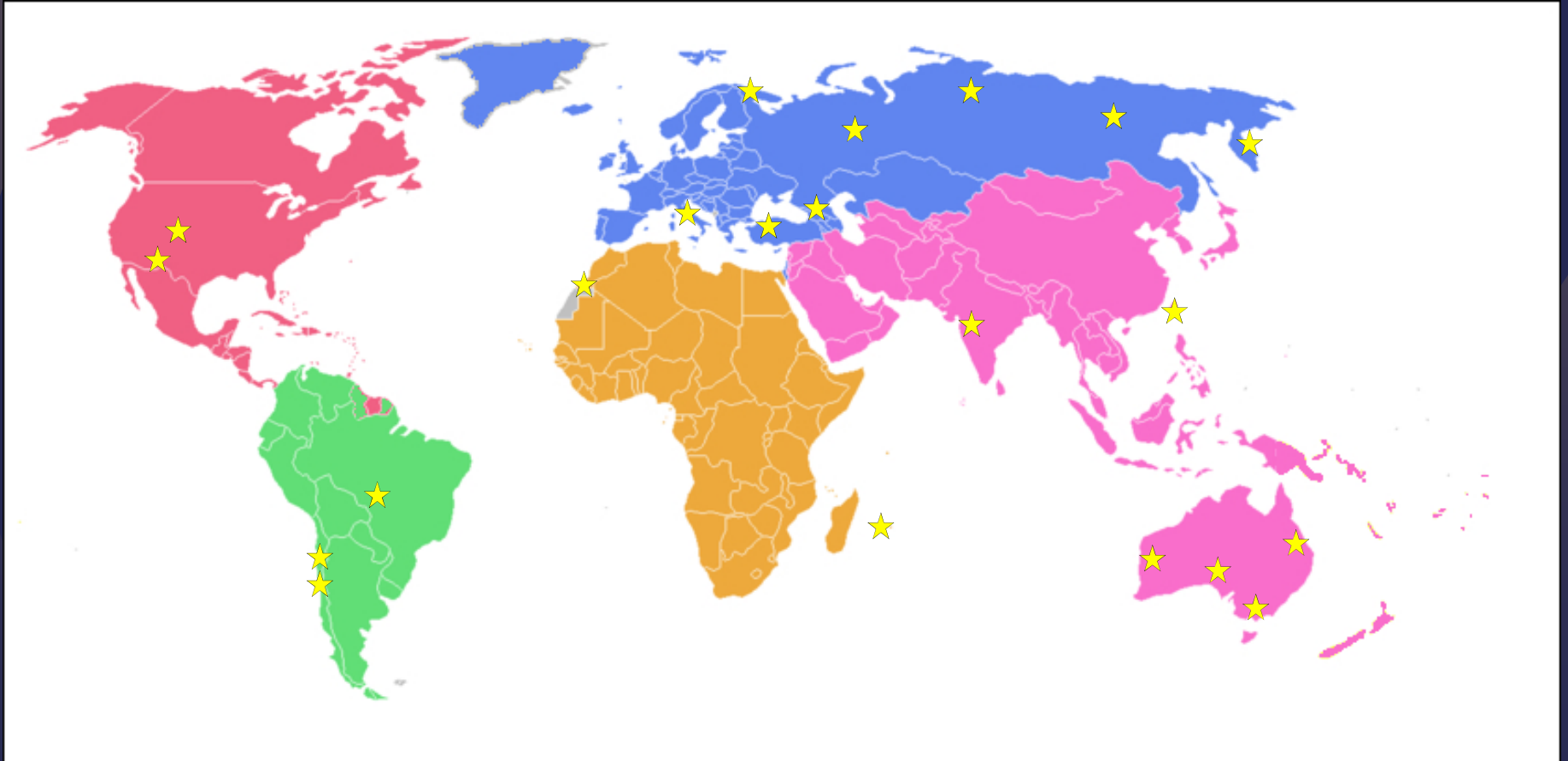
- Capture automatically video when something changes/moves (UFOcapture)
- High resolution image, high frame rate (4x more pixels than analog cameras)
- PROGRESSIVE video mode, no interlacing !



European network of OMEA cameras



# Our cameras throughout the world



A real world wide network....

# Customers who trusted us ....

## List of link of users/institutes using our camera, this is real time images

- [Riverland Dingo Observatory](#) (Australia)
- [Observatoire de la Césuvrie](#) (France)
- [Observatoire Albignieux](#) (France)
- [Gornergrat Observatory](#) (Switzerland)
- [Observatoire des Pises](#) (France)
- [Observatoire du Pic du Midi](#) (France)
- [Space obs \(Chili\)](#) (Chile)
- [Observatoire de la Bute aux lièvres](#) (France)



## List of camera users (sorry, because of low internet bandwidth in these places, direct link to real time images cannot be disclosed)

- Las Campanas Observatory (Chile)
- INAF (Italy)
- HAT south (Australia)
- Moscow University
- Observatoire des Males (Reunion island / CNRS)
- Astronomy & Astrophysics Division (India)
- Curtin university (Australia)
- Siding Springs (Australia)
- ITelescope.net (Australia)
- New Mexico Skies (USA)
- Institute of Astronomy and Astrophysics (Taiwan)
- Observatoire de Haute-Provence (OHP)



Curtin University



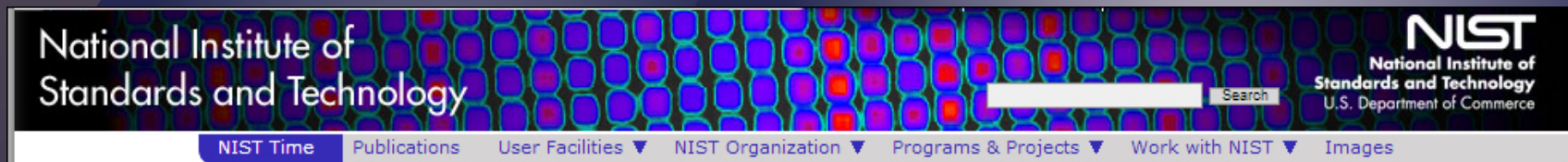
new  
mexico  
skies





# USA reference customers

⌘ National Institute of Standards and Technology (NIST)



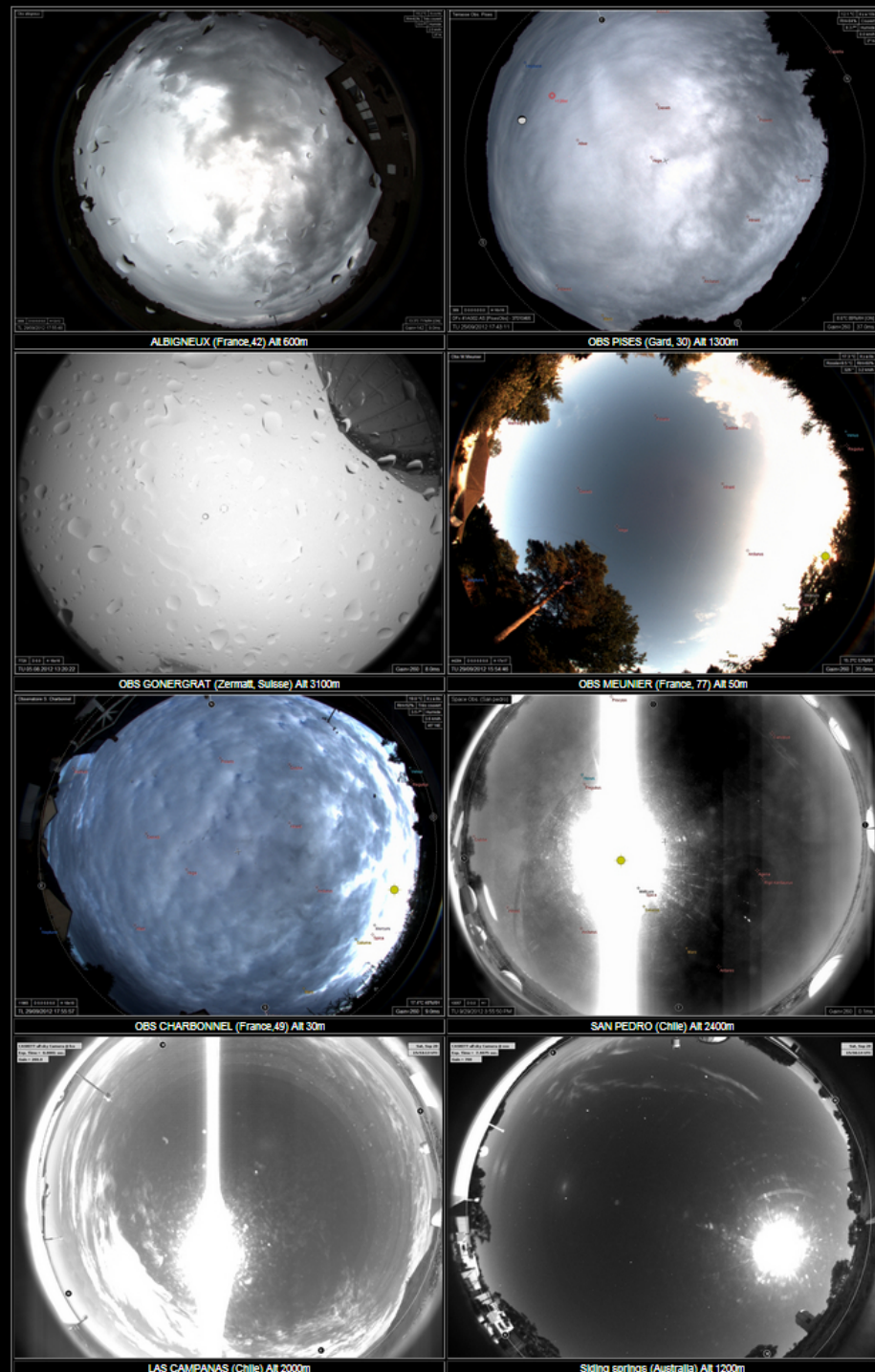
⌘ Lowell Observatory



⌘ New Mexico skies



A real time worldwide  
ALL-SKY camera  
network is visible with  
only few clicks





The background is a solid dark blue. Overlaid on this are two large, overlapping circles of a slightly lighter shade of dark blue. The circles are positioned such that they overlap in the center, with the left circle partially obscured by the right one.

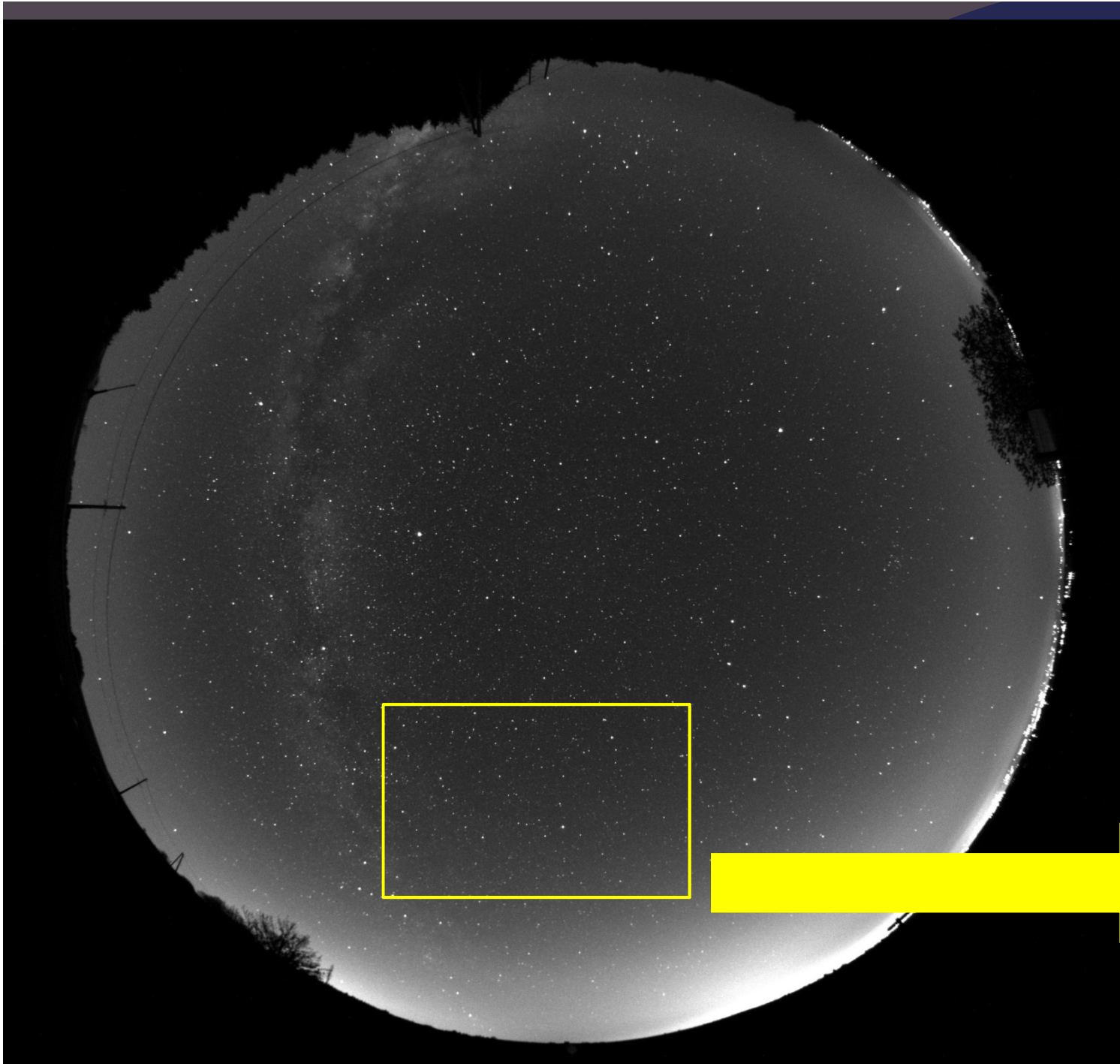
# The EUDA All Sky Camera

# EUDA camera



- 8 millions pixels
- Long exposure
- Professional range product





100% scale  
crop

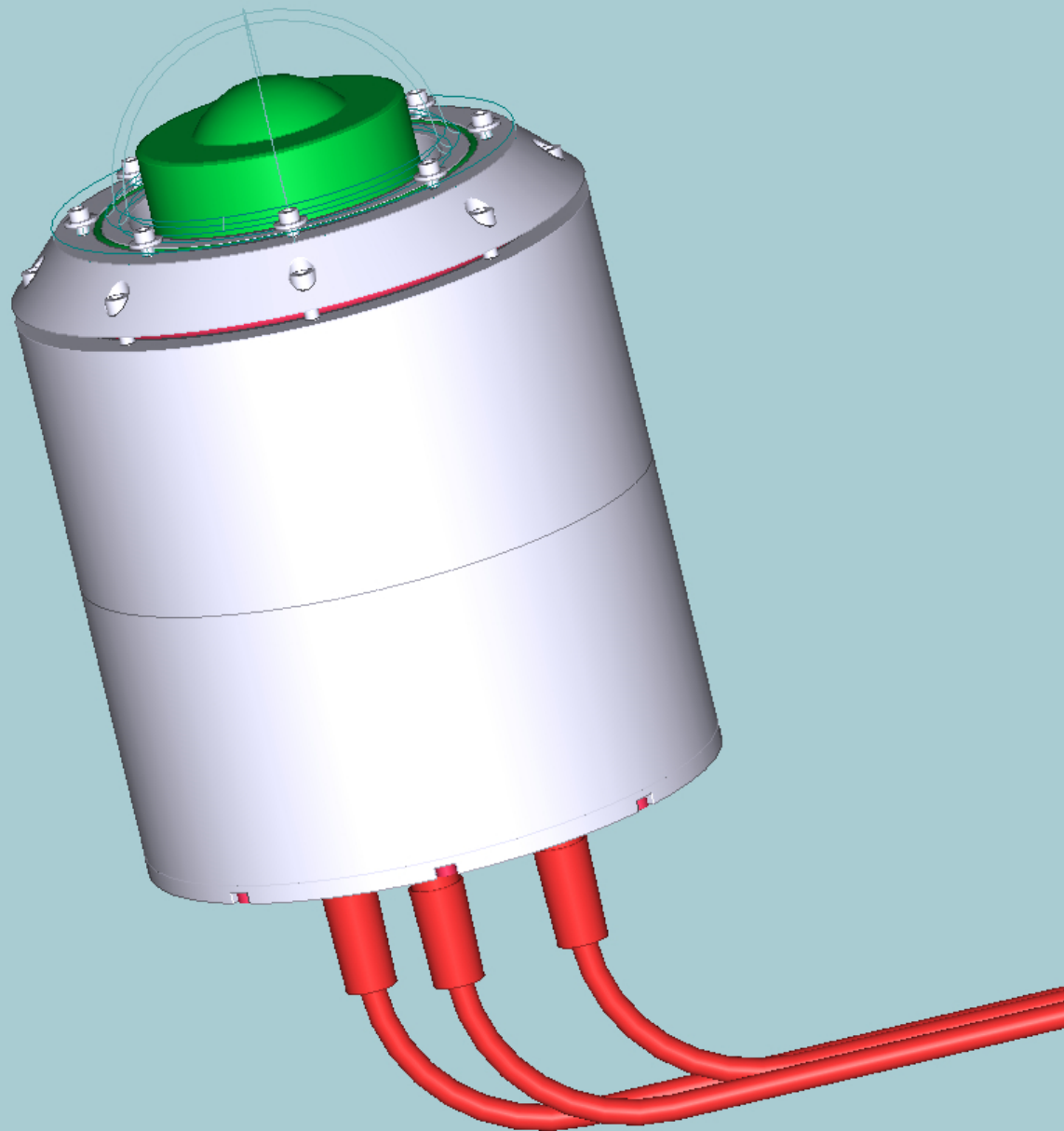
# EUDA camera : extreme resolution



Comets can be discovered...



# EUDA all-sky camera



# EUDA camera

- ⌘ 8 millions pixel product
- ⌘ 16 bits data output
- ⌘ Automatic dome heater (based on external sensors and current weather)
- ⌘ Dedicated software
- ⌘ FITS and auto time lapse builder
- ⌘ 20 m USB 2.0 reliable link
- ⌘ Customized filter (IR cut or Johnson filters)
- ⌘ Thermalized and cooled sensor
- ⌘ Currently in production
- ⌘ Pre-orders can be placed



The image features a dark blue background with two large, overlapping circles of a slightly lighter shade of blue. The circles are positioned such that they overlap in the center, creating a Venn diagram-like effect. The text '- The end -' is centered within the overlapping area.

- The end -