DECAT Observing Checklist

Emergency

If shit hits fan Armins Number is 443 794 4838, +56989675053 Alfredo
CTIO Control Room: ???d

Observing Calendar

2023A:
https://docs.google.com/spreadsheets/d/1g-WWJyIBY6Cr2rIK730OjCSbmfy2IMxL22tZiAcnkK0/edit?usp=sharing
https://docs.google.com/spreadsheets/d/1hW_tJTE4NVdnA8qV8kfF4C0lvVeYb1eVnopzQOMGuS8/edit?usp=sharing

Quick Links

Remote Observing
https://noirlab-edu.zoom.us/j/91397006421?pwd=TU5VMm91VUJMaTlFdkpjbTY0dnIrUT09#success

DECAT Obs Plans: https://github.com/gnarayan/decat_pointings/tree/main/2022B
CTIO Webcam (no VPN): https://www.ctio.noirlab.edu/~seecam/CTIO_webcam.jpg
SISPI GUIs page (VPN): http://system1.ctio.noao.edu:7001/apps/
CTIO Site Monitoring (VPN): http://139.229.13.222/web/CTIO/ctio_site_monitoring.php
CTIO Weather
https://climatologia.meteochile.gob.cl/application/diario/visorDeDatosEma/300034
CTIO Ephemeris:
https://noirlab.edu/science/observing-noirlab/observinnetwork-manager-openvpng-ctio/ephemeris/CTIO-2022-Ephemeris

New Observers

Prepare for remote observing with DECam:
https://noirlab.edu/science/observing-noirlab/observing-ctio/observing-blanco/cerro-tololo/Remote-Observing-Blanco

Review the DECam User Guide:
https://noirlab.edu/science/programs/ctio/instruments/Dark-Energy-Camera/User-Guide
Make sure you have a VPN client and VNC viewer installed.

A VNC viewer which works well on mac is VNC Connect by RealVNC (make sure you get VNC Viewer not server)

Join the DECAT Slack's channels: #schedule and #observing.

For passwords to any accounts - **CHECK WITH SUPPORT**
I.e. contact Alfredo (or join the Zoom and ask)

Note about the evening/morning twilight asteroid field scripts: These are time-sensitive and should be started at the requested time. If a script is running, it should be stopped and you should move on to the asteroid fields. Keep in mind that it may take the telescope some time to slew to the correct position.

Start of Night

Open the DECAT ObsPlan file for the night.
You'll find it in here: https://github.com/gnarayan/decat_pointings/tree/main/2021B
Review the obsplan in advance because there are usually instructions and options such as "if conditions are good do X" or "if you're behind schedule skip Y" or "interrupt this sequence at 3am and do northern target".

Get the JSON files here: https://github.com/gnarayan/decat_pointings/tree/main/jsons
Suggested workflow is to git clone the whole repo and do a fetch/pull before sunset to make sure you have all the most recent JSON files https://github.com/gnarayan/decat_pointings

Join the Zoom.
CHECK WITH SUPPORT

VPN to CTIO.
See VPN connection instructions below.

SSH from your local terminal.

ssh DECamObserver@observer2.ctio.noao.edu
Password: **CHECK WITH SUPPORT**

Open VNC Viewer.
Open your VNC Viewer and connect to
address: observer2.ctio.noao.edu
Or address: 139.229.14.42:7
password: **CHECK WITH SUPPORT**

Open Pointing Map
In the VNC it's nice to have the pointing map open.
From a terminal in the observer environment (i.e. - Kentools): pointing --refresh 30 &
This will give you the current telescope pointing, and filter, with a refresh rate of 30s.

Open the SISPI GUIs.
SISPI GUIs page: http://system1.ctio.noao.edu:7001/apps/
Mandatory GUIs: Observer Console
Useful GUIs: Comfort Display, Alarm History, ICS, Guider, Telemetry Viewer
Username: DECamObserver
Password: proposal ID of the scheduled program for that night (https://noirlab.edu/science/observing-noirlab/scheduling/mso-telescopes then select the proper semester on "CTIO Schedules" and click on CT-4m)

For reference, in 2022A the DECAT programs are:

2019A-0065	Yue Shen	COSMOS (x3), X3, and C3
2019A-0304	Paul Martini	E1+E2
2019B-0219	Xin Liu	S1+S2
2021A-0037	Yue Shen	S-CVZ.
2020B-0053	Dillon Brout	DEBASS
2021A-0275	Armin Rest	YSE
2022A-724693	Melissa Graham	DDF
2021B-0325	Armin Rest	Eta Car
2021B-0909	Scott Sheppard	Asteroids twilight
2021B-0038	Tom Shanks	eFEDS
2022A-388025	Palmese, Wang	DESIRT

Request 'observer' permissions
In the Observer Console, use the lock at the upper right corner to request to switch from 'user' to 'observer' status, and have permission to load the queue. You will need the actual full proposal id for the scheduled program (i.e., not necessarily your own DECAT program).

A-Half: Once Vsub is turned on.
Operator will load a script to do two zeros, then a break, then a pointing check, then a break, then another, and then a break. Breaks will pause the queue until the observer hits 'Go'.

Check the pointing (start of A-Half and throughout the night as needed).
Generally the operator will check the pointing offset and make any needed adjustments.
To do this yourself, after an image is taken (above, the pointing check) run the Kentools 'center' command which will tell you the current pointing offset in arcseconds (see below).
To see plots, SISPI GUIs → Telemetry Viewer → Pointing, and look at the "Pointing Offsets" plot.

B-Half: Update Observer, Prop ID, Program, and Investigator
Under the "System Control" tab of the Observer Console, click Edit, then Clear (you MUST clear before editing or it will cause problems), then enter your name as the Observer, the night's Prop ID. Let the Program and Investigator auto-fill from the Prop ID.

~~**Obtain standard star (and repeat at end of night).**~~ ****2021B+: we don't do this anymore****
The obsplan creator may have already found a standard star and put it in the schedule. In 2021B, if there isn't a standard in the obsplan, don't do one.
If you do need to find a standard to do, use the Kentool observer tool 'standards' to find the name of a low-airmass standard star. Then find the appropriate DECam script (zirg at evening twilight, griz at morning twilight) for that standard star and execute it. Click on "Load Exposure Script" and then "Select DECam Script" to see the list of all existing standard star scripts.

During the Night

Using the Observer Console
Instructions on using the observer console:
http://www.ctio.noao.edu/noao/content/Taking-Exposures-0
Load the scripts (JSON) files that have been scheduled for DECAT.

Night Log (for DECAT)
Keep night log as a new sheet in the shared DECAT Google spreadsheet:
2021A:
https://docs.google.com/spreadsheets/d/1hW_tJTE4NVdnA8qV8kfF4C0lvVeYb1eVnopzQOMGuS8/edit?usp=sharing
2021B:
https://docs.google.com/spreadsheets/d/1hW_tJTE4NVdnA8qV8kfF4C0lvVeYb1eVnopzQOMGuS8/edit?usp=sharing
2022B:

https://docs.google.com/spreadsheets/d/1g-WWJyIBY6Cr2rIK730OjCSbmfy2IMxL22tZiAcnkK0/edit?usp=sharing

Kentools 'observer' package
Enter Kentools via terminal command-line call 'observer'. Exit with 'exit'.
You can type "commands" on the terminal line for a list.

OK to run via ssh in your home terminal.
standards -- provide a few standards available now (or at specified date/time)
ephem -- print ephemerides to screen (sun rise/set etc.)
center -- check pointing of most recent image
seeingall -- analises most recent image and returns seeing

Should be run via VNC b/c they cause a data visualization window to open.
load -- load S4 from last img (or specify 'load expnum S12')
bigload -- load the full frame
pointing -- report the pointing offset from the last image; opens pointing map
inv -- report the inventory
seeing -- allows you to select a star in the loaded image in ds9

'godb' package
Enter godb via terminal command-line call 'godb'. Exit with 'exit'.
qcInv -- quality control inventory, will print list of exposure metadata
--> expid ra dec ut fil time secz psf sky cloud teff Object
→ https://noirlab.edu/science/programs/ctio/instruments/Dark-Energy-Camera/User-Guide/During-Night
inv -- inventory, prints a list of all exposures for the night

Tracking RA/Dec of telescope and other useful parameters: ics gui
For long slews, sometimes it may not be clear to the observer if the telescope is still moving to the target, or if the telescope operator has not ok'd the long slew. You can track the current telescope position and the target positions in the "ics" SISPI GUI, the 4th panel: "TEL RA/DEC" and "Target RA/DEC", and ask the telops what the status is if you think the telescope should move, but it doesn't. It also shows the current airmass, hour angle, and UTC time! Very useful panel!

Weather Monitoring
Start RASICAM (requires flash, view via VNC window)
http://rasicam.ctio.noao.edu/RASICAMWebService/static/RASICAMwebService.html
http://139.229.13.3/
http://139.229.13.4/ - this is upward facing webcam

Or, start RASICAM by opening a terminal window in your VNC connection to observer2, and typing "rasicam.sh".

(https://noirlab.edu/science/observing-noirlab/observing-ctio/observing-blanco/cerro-tololo/Remote-Observing-Blanco)

A bunch of site-related links are here
http://www.ctio.noao.edu/noao/node/29

Summit station local time at CTIO and sun altitude here (via VPN only)
http://139.229.13.222/web/CTIO/ctio_site_monitoring.php
Similar weather data as above (but no times, no sun alt) but outside VPN:
CTIO Site Environmental Conditions

Weather forecast
https://www.eso.org/gen-fac/pubs/astclim/forecast/meteo/CIRA/
https://www.yr.no/en/forecast/daily-table/2-3895825/Chile/Coquimbo%20Region/Provincia%20de%20Elqui/Observatorio%20Astron%C3%B3mico%20Cerro%20Tololo

Monitor your progress through the schedule.
Monitor the sun altitude. Twilight starts at -18deg and observing stops at -11 deg.
Monitor the time in CLT and match it to the times in the night schedule, watch out if you're getting ahead or behind of the schedule as some observations have tight constraints.

If you are getting **significantly** behind, say there is a technical issue and you stop for 1h. Don't just continue where you left off, this will put you at bad airmasses, rather jump ahead to the spot that is scheduled around that time. Say you go back on sky at 3am CLT, then go to the schedule for which the time is 3am or earlier. Use common sense!

Bad Seeing/Bad weather
If the seeing is bad (>2" seeing) and/or a lot of extinction (but still some objects there, i.e. you can still get 17th mag objects), you can do some of the bright targets, e.g. the low-z SN from DEBASS or the low-z SN from YSE. Don't stop observing! Only stop observing for technical issues or if the extinction is so high that you can't get any 17th mag targets anymore even with longer exposure times.

If you are running out of targets….
This is probably because of a scheduling error (shame on you Armin!). Repeat observations that are at a reasonable airmass, don't stop observing! Feel free to call Armin and give him some verbal spanking ;).

External Webcam (VPN)
Blanco Webcams | CTIO (noao.edu)

Internal Webcam (VPN)
View through the dome: http://139.229.13.4
CTIO: https://www.ctio.noirlab.edu/~seecam/CTIO_webcam.jpg

Quality Control monitoring
SISPI GUIs page: http://system1.ctio.noao.edu:7001/apps/
SISPI GUI → Telemetry Viewer → Image Health
Monitor plots of the FWHM (seeing), ellipticity, number of stars per image.
Use godb tool 'qcInv' to periodically review the seeing and airmass of the images.
Use the Kentool 'seeingall --help'

Pointing Monitoring
SISPI GUIs page: http://system1.ctio.noao.edu:7001/apps/
SISPI GUI → Telemetry Viewer → Image Health (seeing plot)
SISPI GUI → Telemetry Viewer → Pointing
MLG: Typically I'll put in a break and fix pointing offsets if they sum to more than 20".

Looking at images
In the VNC Viewer
load expnum ccdalphanumeric

Get the ccdalphanumeric code from here
https://github.com/gnarayan/decat_pointings/blob/main/DECamOrientation.png

Downloading images to local machine, and display a certain detector:
In kentools, run any of the commands that load an image (e.g., "center", "seeingall").
This will display the FULL filename on the screen, e.g.,
prompt> center
/home4/images/fits/2021A-0275/DECam_00984984.fits.fz
On your home machine which is VPNed to CTIO:
scp
DECamObserver@observer2.ctio.noao.edu:/home4/images/fits/2021A-0275/DECam_00984989.fits.fz .
ds9 -zscale 'DECam_00984989.fits.fz[S31]'

End of Night

Obtain standard star (same procedure as start of night). *IF* obsplan says to.
Use the kentool observer tool 'standard' to find the name of a low-airmass standard star.
Then find the appropriate DECam script (zirg at evening twilight, griz at morning twilight) for that standard star and execute it. Do that in the Observer Console by clicking on "Load Exposure Script" and then "Select DECam Script".

Make inventory files.
Use the 'godb' tools and the 'qcInv' and 'inv' functions to make files of the inventory and quality control inventory.

In the terminal with ssh connection:
godb
invPrint
qcInvPrint
From your local computer grab the file, e.g.:
scp DECamObserver@observer2.ctio.noao.edu:/user/DECamObserver/20210318.qcinv .
Password: **CHECK WITH SUPPORT**

Always report the qcInv output to the collaboration here (or in the same directory as obsplan, or just upload to the DECAT Slack #observing channel if you don't have write permissions to the DECAT GitHub):
https://github.com/gnarayan/decat_pointings/tree/main/2021B

CTIO Night Report
Login at: http://www.ctio.noao.edu/noao/
User: astronomer
Pwd: **CHECK WITH SUPPORT**
And then go to this link: **http://www.ctio.noao.edu/noao/node/add/night-report**

From menu, Astronomers → Observing → Create Night Report

CTIO end of night stuff (including link to the CTIO Night Report, which must be filled out)
http://www.ctio.noao.edu/noao/content/End-Night-2

- who was present - **this is very important for the CTIO staff**! Make sure you double check with the telescope operator which names should be there and what their role is.
- which program was done (PI name, propid, prop title) Here you just need to write the program from the schedule, not all DECAT programs.
- weather conditions by quarter

Change status back to 'user' from 'observer' in Observer Console
Use the lock icon at upper right.

Complete Night Log (for DECAT)
Make sure you completed the DECAT night log with observer notes in the shared DECAT Google spreadsheet (as mentioned above).

Troubleshooting

Guider Issues "No active CCDs" or "Continuous null centroids limit exceeded"
Guider-related alarms like that could be related to crowded fields messing with the guider. Look at the SISPI GUI "Telemetry Viewer → Guider → No. of CCDs used", see if it dropped to zero. Look at the SISPI GUI "Guider" and if there is more than one point source in the window, ask

the support scientists to reduce the guider exposure time. 600ms is the default. 100ms is appropriate for crowded fields.

Crowded field issues?
Sometimes in our DECaPS fields, the PSF, pointing, ellipticity etc. can see to be off b/c it's hard to get good solutions for those in very crowded fields.
And as mentioned above, guiding can fail in crowded fields, usually fixed by setting guider exptime to 100ms (also ok to stop guider if needed).

Vsub was off.
Every time vsub is turned off you need to add two "zeros" (bias frames) to the queue and do that first after turning back on.

Pointing Limits / Horizon Limits
https://noirlab.edu/science/programs/ctio/telescopes/victor-blanco-4m-telescope/Horizon-Limits
For targets that are very high declination, you have to be careful to observe them during the exact right time of the night to avoid hitting limits of the telescope as shown at the link.

Moon avoidance is built into the pointing limits. DECam will skip any observations in the queue that violate pointing limits and they will appear as "unexecuted" (dark green dots). The threshold is 10 degrees.

Moon Background
If image backgrounds exceed ~8000 counts consider doing multiple shorter exposures (but take care to account for the additional readout overheads).
Safe in cloudy conditions and moon illumination up to 40000.

Erroneous dark dots in Exposure History in Observer Console
If it shows dots staying dark green after exposure had ended, indicating a potential problem, try refreshing the browser first. Could just be that internet was down/slow and the telemetry was not received.

"Can't communicate with shutter" or "Shutter synchronization problem"
In one case this turned out to be an invalid PROP-ID (no semester after year), fixed by editing the JSON file and re-attempting. Operator must first clear issues, in order to return to the queue.

"You are in the Occlusion Danger Zone"
In this case the dome azimuth and the telescope azimuth are off by more than the specified tolerance (see |Tel Az - Dome Az| in the Alarm History list), but the tolerance is set very low. Usually when this alarm is triggered there is no actual problem, but always check the next image for signs of vignetting (i.e., darkened edges) and repeat it if that seems prudent.

Telemetry Viewer -- plots axes are too big / aren't showing what I want to see

E.g., one exposure had a very ‘bad’/false pointing offset and now the axes are too big to see the real variability in pointing offset:

- Telemetry Viewer → Full Viewer → Time Plots
- Namespace: exposure / Table: exposure
- last 7 hours / check ‘ra offset’ and ‘dec offset’
- set value range to, e.g., -30 +30 to reset the y-axis

But you can use the Full Viewer to plot anything vs. anything; to download data use queries, etc.

CTIO DECam Support Pages
http://www.ctio.noao.edu/noao/node/2581
This page has LOTS of trouble-shooting solutions!

VPN Connection Instructions

VPN accounts for DECam remote observing

Group settings are the same for all accounts:
IPSec gateway: 139.229.10.238
IPSec ID: lsremobs0
IPSec secret: **CHECK WITH SUPPORT**
From mac: System Preferences -> Network -> Add VPN (Type: Cisco)
Passwords for accounts: **CHECK WITH SUPPORT**

Individual accounts info:
Xauth username tolobs01
Xauth username tolobs02
Xauth username tolobs03
Xauth username tolobs04
Xauth username tolobs05
Xauth username tolobs06

For Ubuntu users:
Install vpnc:
> sudo apt-get install vpnc

Then add a file (need to sudo this):
/etc/vpnc/myconf.conf

In that file put:

IPSec gateway 139.229.10.238
IPSec ID lsremobs0
IPSec secret <group secret>
Xauth username tolobs03
Xauth password <user password>

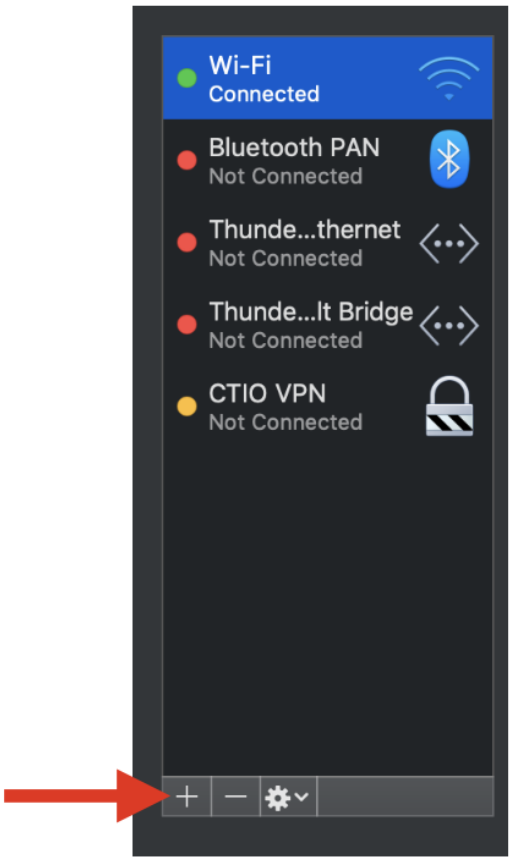
You can get group secret and user password from support.
Note that the user password is different for each user (tolobs03 or tolobs01 etc)

To connect do (you may or not need –local-port 0):
sudo vpnc myconf --local-port 0
To disconnect:
sudo vpnc-disconnect

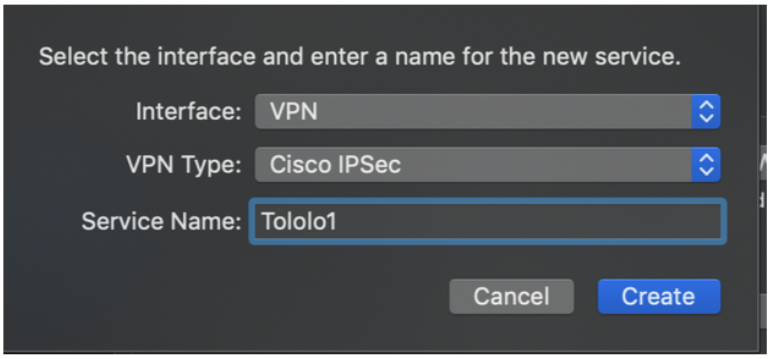
Configuring a VPN account in MacOS

- Go to System Preferences —> Network

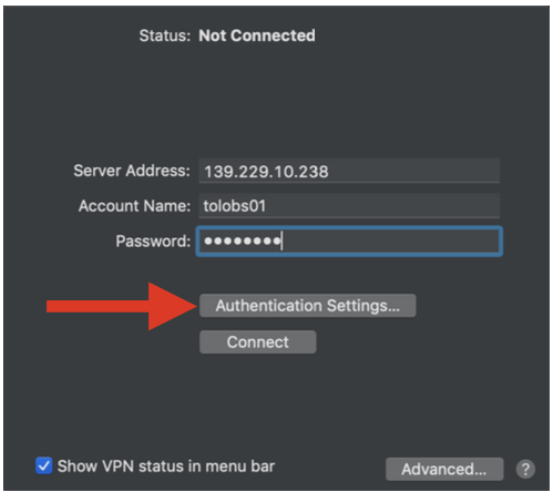
- In the right side panel, click “+” to add new service



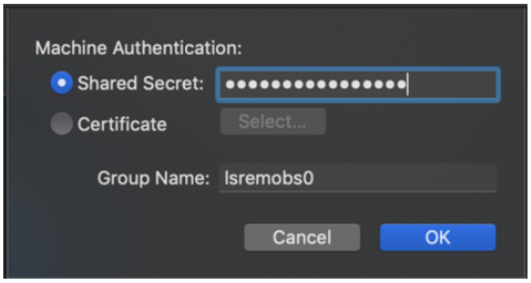
- Select the new VPN service and choose a name for it. Then click on “Create”



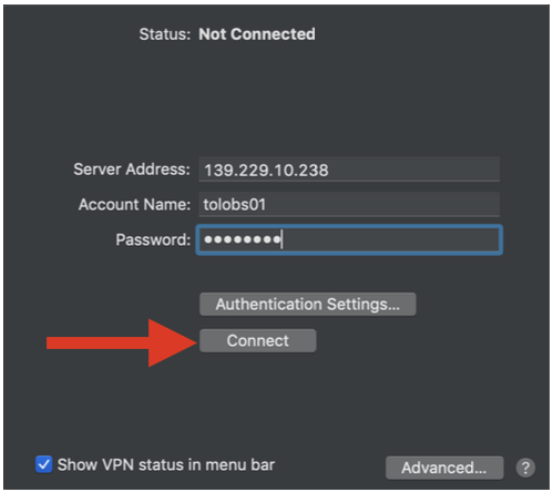
- Fill in the server IP address and the account info (XAuth username and Xauth password). Then, click on Authentication settings



- Fill in the Group ID name and secret (IPSec ID and IPSec secret). Click OK



- Connect. The system may ask you again for the account password (Xauth password)



Original Rough Notes

YSE PROPID 2021A-0275
DEBASS PROPID 2020B-0053

If shit hits fan Armins Number is 443 794 4838, +56989675053 Alfredo

Night logs are kept here
https://docs.google.com/spreadsheets/d/1hW_tJTE4NVdnA8qV8kfF4C0lvVeYb1eVnopzQOMGuS8/edit?usp=sharing

Useful commands
Always center?
load expnum S12
bigload
qcInv

Kentools
Observer
standards

ALWAYS RUN center (in the kentools prompt) to check pointing!

http://rasicam.ctio.noao.edu/RASICAMWebService/static/RASICAMwebService.html
http://139.229.13.3/
http://139.229.13.4/

1. VPN Instructions (see below) - password for pdf is decam-help
2. http://system1.ctio.noao.edu:7001/apps/
    a. User: DECamObserver
    b. Pass: the propid
3. Download VNC Viewer
    a. 139.229.14.42:7
    b. vnc4observer2
4. inv command to get expnums
5. seeingall shows last image path /home4/images/fits/
6. With vpn open you can run the following in terminal
    a. scp -r DECamObserver@observer2.ctio.noao.edu:/home4/images/fits/
    b. Or you can ssh login and run “observer” and then you have access to run the kentools, inv, and seeingall commands
    c. Password is B1anc_04m

To check seeing:
In ssh login do
> godb
> qcInv

To check processing of an image
> psc 24
(last 2 numbers of expnum)

Monitor the sun altitude. Twilight starts at -18deg and observing stops at -11 deg
http://139.229.13.222/web/CTIO/environ_dimm2.php
http://139.229.13.222/web/CTIO/ctio_site_monitoring.php

End of Night
Always report the inv and qcInv outputs to the collaboration here:
NEW SPREADSHEET

CTIO end of night stuff
http://www.ctio.noao.edu/noao/content/End-Night-2

A bunch of links are here

http://www.ctio.noao.edu/noao/node/29

Notes from March 18
Start with people on the mountain doing the pointing

load (last 3 digits of expnum) (CCD)

pointing -f des -f bliss --refresh &

http://www.ctio.noao.edu/noao/content/Horizon-Limits

At end of the night

qcInvPrint

Go to local computer decat_pointings and make a new folder in 2021A for the current date and grab the file

scp DECamObserver@observer2.ctio.noao.edu:/user/DECamObserver/20210318.qcinv .

Password is B1anc_04m

Every time vsub is turned off you need to add two" zeros" to the queue and do that first after turning back on.

http://139.229.13.4/view/viewer_index.shtml?id=777
http://139.229.13.3/

https://www.eso.org/gen-fac/pubs/astclim/forecast/meteo/CIRA/