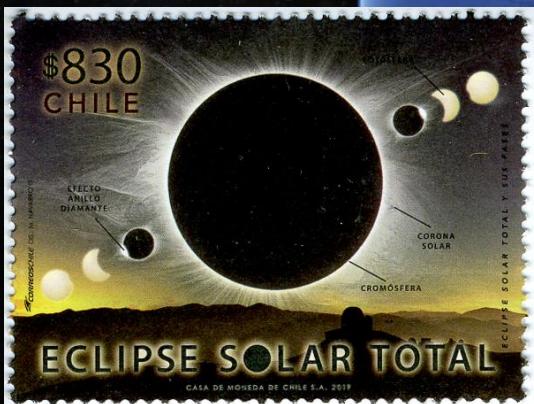
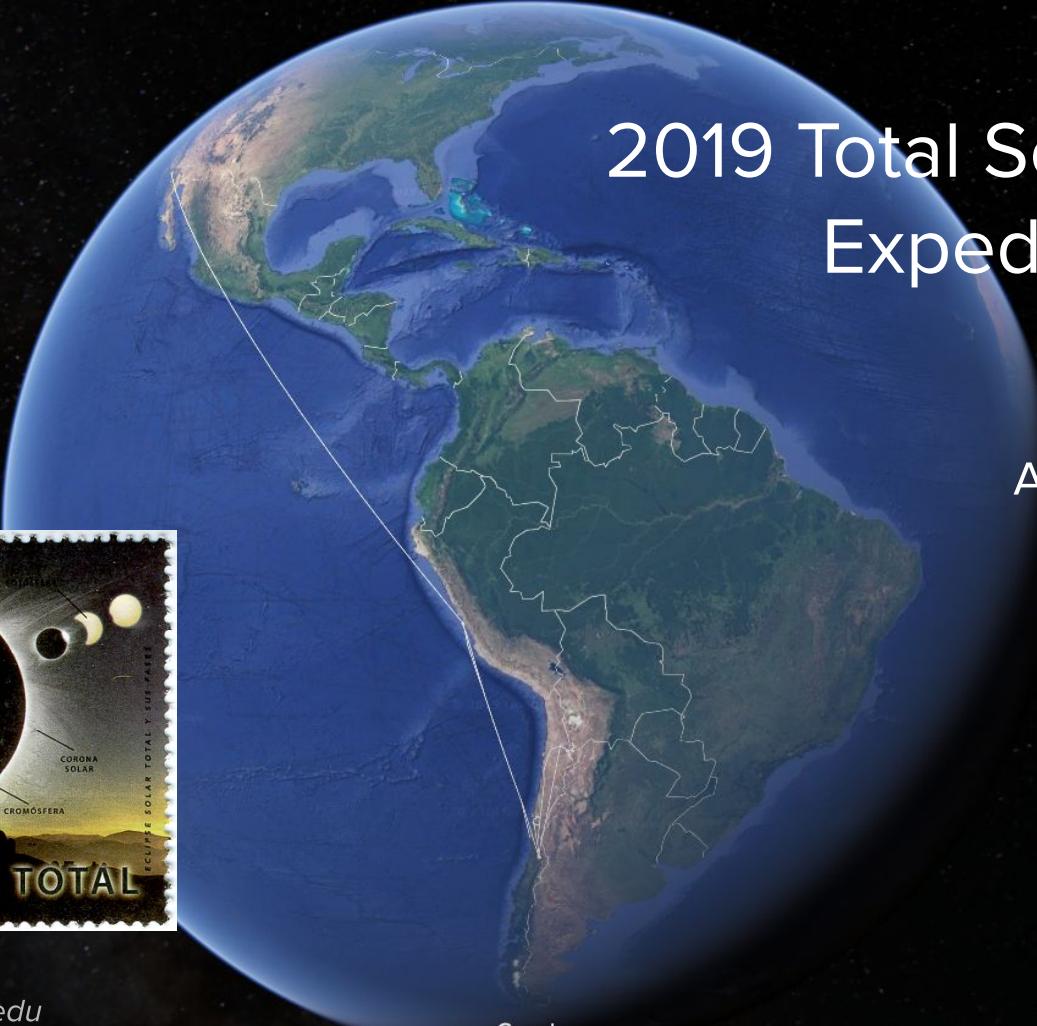


2019 Total Solar Eclipse Expedition (Chile)

D. Kodama
AISIG -- 7 Aug. 2019

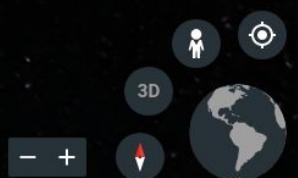


D. Kodama
kodama@alumni.caltech.edu



Google

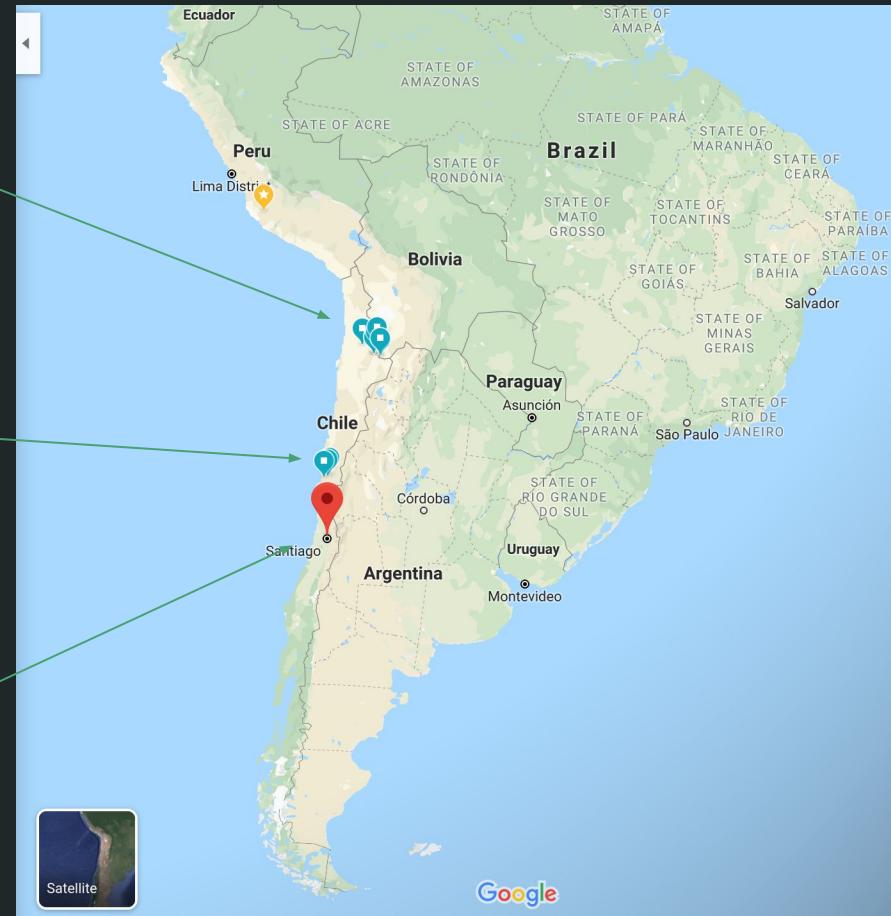
Data SIO, NOAA, U.S. Navy, NGA, GEBCO IBCAO INEGI Landsat / Copernicus PGC/NASA U.S. Geological Survey Camera : 15,416 km 2°39'58"N 143°08'17"W 100%



San Pedro de Atacama, radio
observatories

La Serena, optical
observatories, eclipse viewing

Santiago



San Pedro de Atacama, radio
observatories (~22.9 S)

La Serena, optical
observatories, eclipse viewing
(~30.0 S)

Santiago
(~33.4 S)



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First stop - Santiago (via Lima, Peru)

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OAN (National Astronomy Observatory) in Santiago

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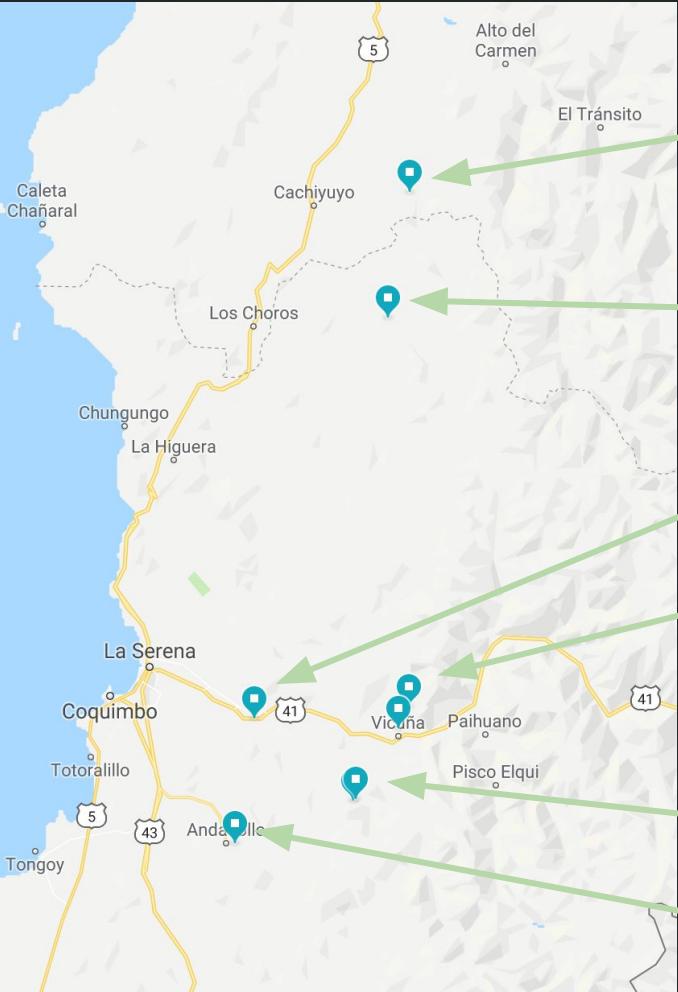


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Las Campanas Observatory

La Silla Observatory

Observatorio Cerro Mayu

Mamalluca Observatory

La Serena / Elqui Valley

Cerro Tololo Observatory

Collowara Tourism Observatory



Dawn in the Andes -- En route to La Silla Observatory

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La Silla European Southern Observatory (ESO)



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Kodama © 2019 • astrocamera.net



Kodama © 2019 • astrocamera.net

ESO New Technology Telescope (NTT) -- Alt-Az 3.58-metre Ritchey-Chretien

La Silla observatories are at ~2400 meters
(~7800 ft.)

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ESO 3.6 meter Cassegrain scope

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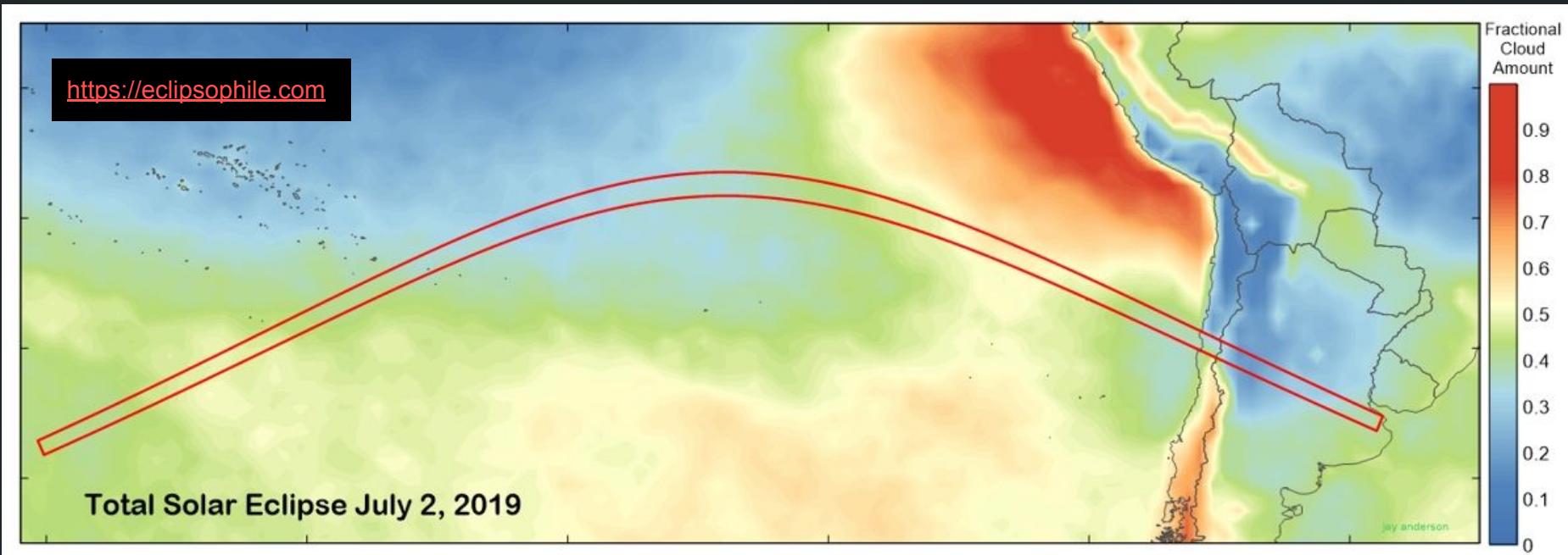


Worrisome but colorful clouds plus a jet contrail and shadow on low clouds.

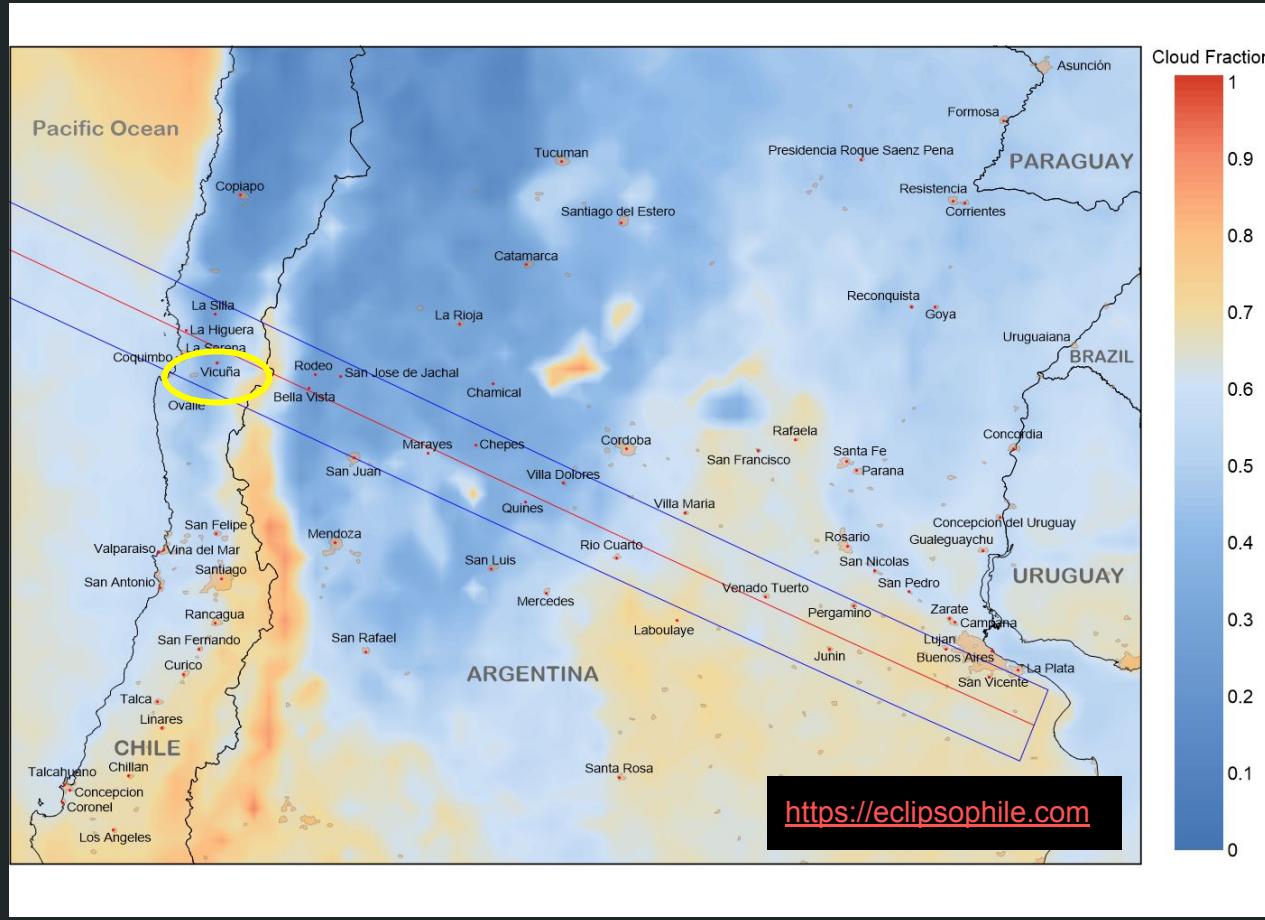


Kodama © 2019 • astrocamera.net

In the distance... Las Campanas Observatory, operated by
the Carnegie Observatories (headquarters in Pasadena)

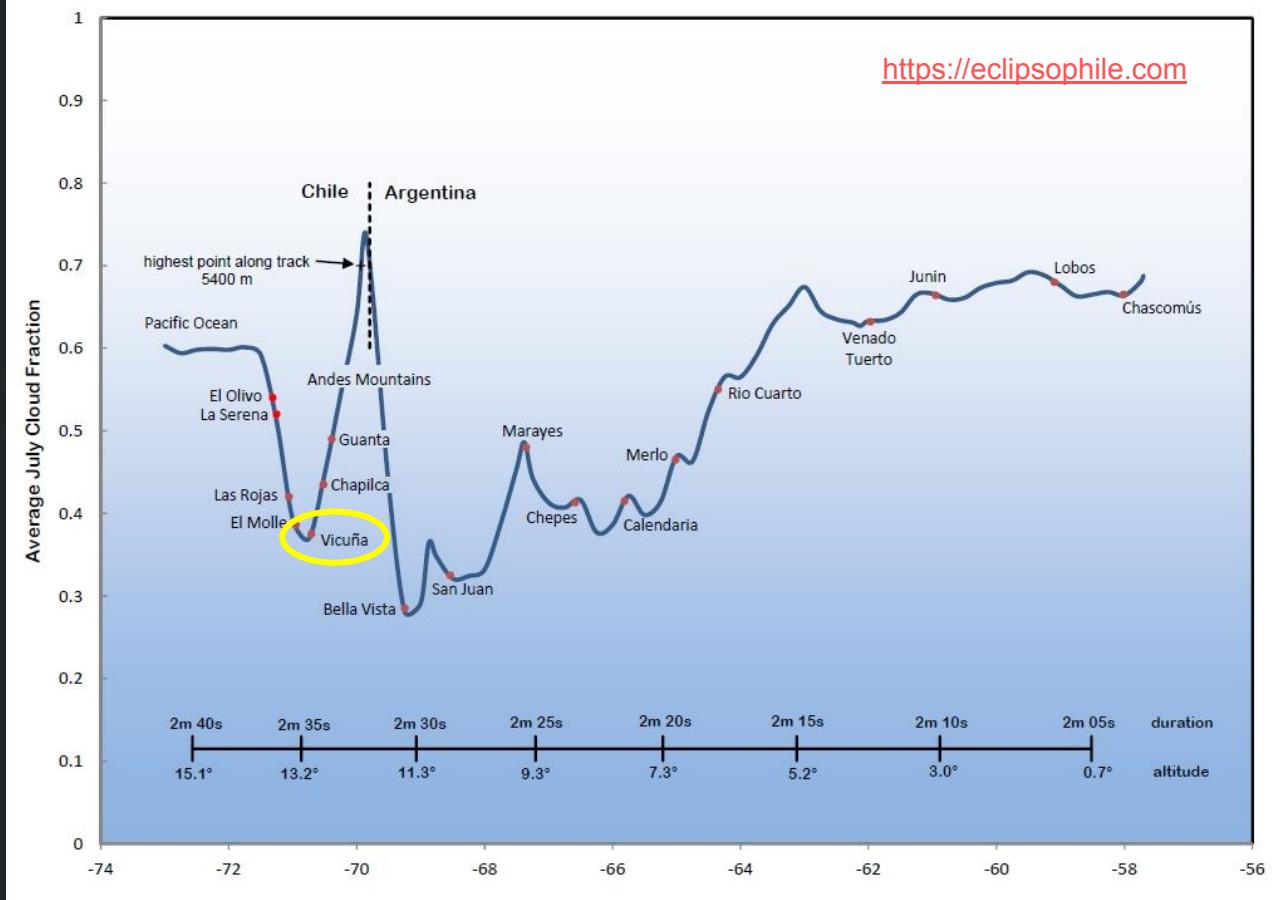


Cloud cover prediction for eclipse (blue is good).



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<https://eclipsophile.com>



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Observing location: Mamalluca Observatory

Nearby preparations for Vicuna's expected eclipse crowd.



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2 July 2019 -- Mamalluca Observatory Eclipse Viewing Site



created with PTGui panorama stitching software

Mamalluca Observatory eclipse viewing site interactive 360x180 degree panorama:
<http://media.astrocamera.net/2019/20190702-EclipseSite-2/index.htm>

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama



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2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

- Date: 2 July 2019
- 10-minute intervals
- Nikon D600 / Sigma 12-24mm @ 24mm
- 1/60 sec. / f/5.6
- Baader Solar Film



Kodama © 2019 • astrocamera.net

Partial Phase Activities ... Pinhole projections



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Pinhole images attract an audience.



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Observation area for
visual observers

Projection telescope

Pinhole pattern

Skywatcher tracker



Celestron 30mm (15x) Mini Scope used for projected view of the sun. This is essentially half of a pair of binoculars.



Front/back views of the pinhole pattern. The lettering holes were done with a $1/16"$ (1.59mm) craft punch. The smaller holes were done with a pushpin (1.13 mm dia.)



Telescopic setup included a 4" Borg refractor (100ED) mounted on a modified (non-Goto) Losmandy GM8 mount on a custom wooden tripod. Also attached is a Hutech Hinode solar autoguider which corrects tracking due to any misalignment of the mount's polar axis.

Counterweights are two 50,000 mAh lithium battery packs. A single pack is capable of running the mount, autoguider, and cameras all day (and night).



The Losmandy GM8 used was a late '90's non-Goto mount.

The standard GM8 dovetail saddle and plate were replaced with a light aluminum plate bolted directly to the top of the mount.

Except for the mount "cup", the wooden tripod components were made from standard lumber and plywood.



This shows the standard Losmandy components which were replaced. Two 50,000 mAh battery packs replaced the counterweight bar and weight.

Modified Losmandy GM8 Setup

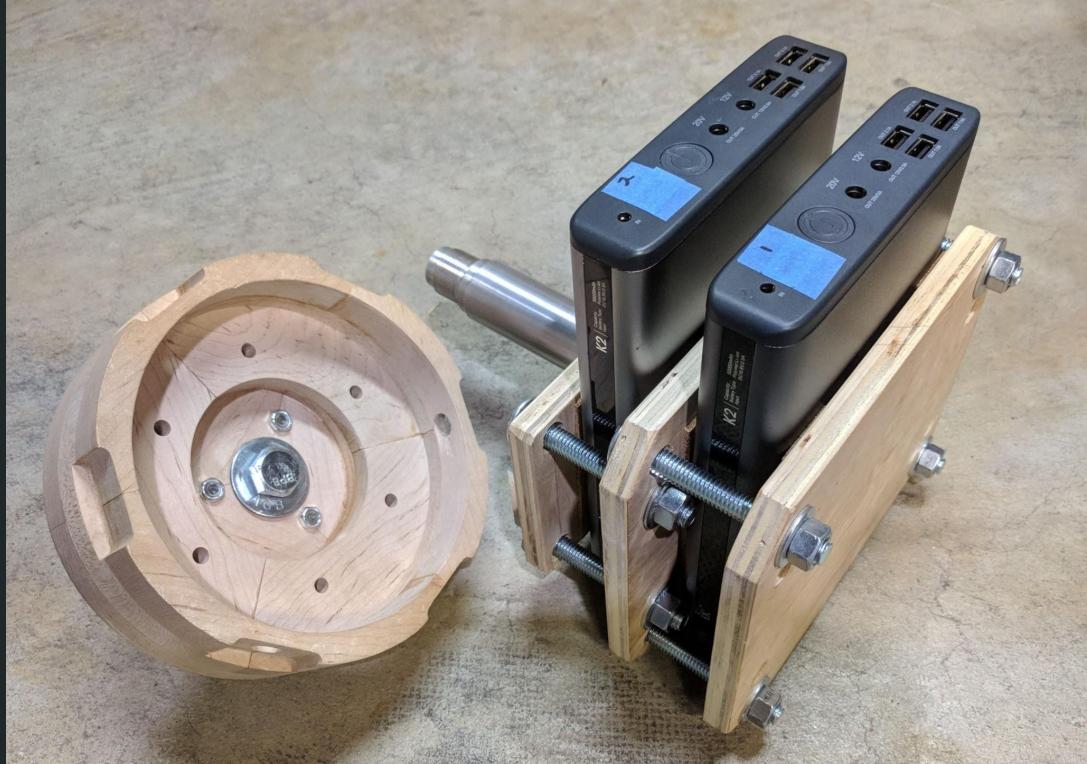


Tripod components...
Leg segments are short
enough (22") to fit into a
medium-sized suitcase.

Losmandy mount “cup”
designed and NC milled
out of maple by Jim
Windlinger.



Losmandy GM8 in
(Harbor Freight)
Apache case



Losmandy mount adapter & battery counterweights

1st Contact

- Nikon D850 @ ISO200
- Borg 100ED / 0.85x focal reducer
- 1/8000 sec.
- Losmandy GM-8
- Hutech Hinode Solar Guider

No sunspots!



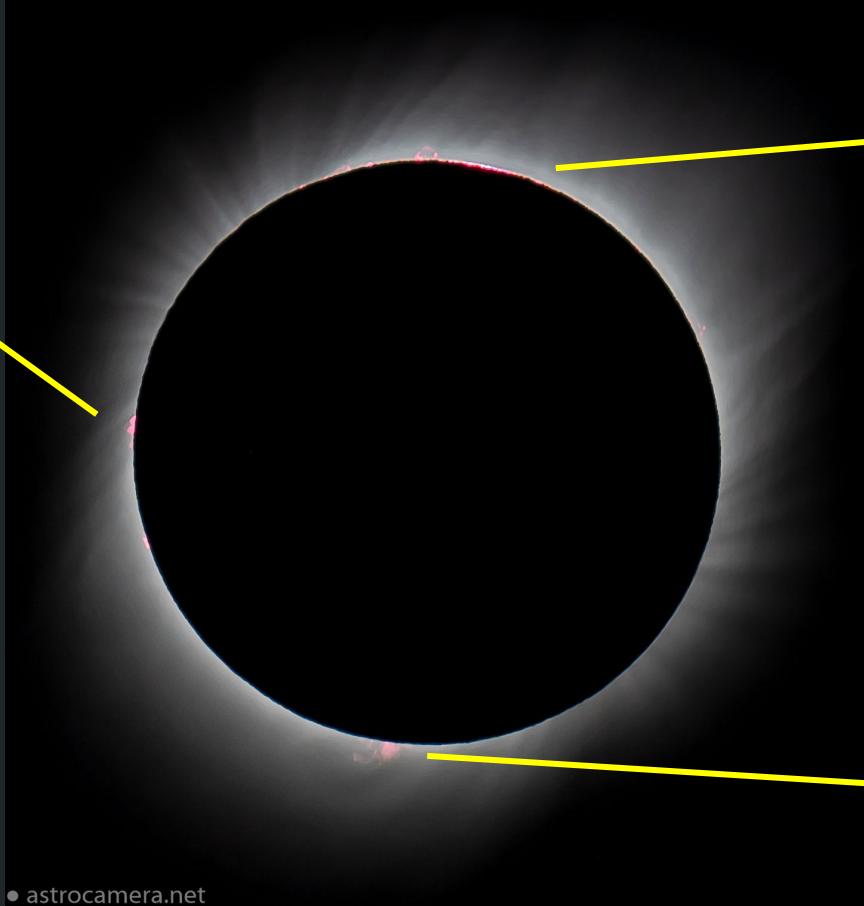
2nd Contact

- Nikon D850 @ ISO200
- Borg 100ED / 0.85x focal reducer
- 1/800 sec.
- Losmandy GM-8
- Hutech Hinode Solar Guider

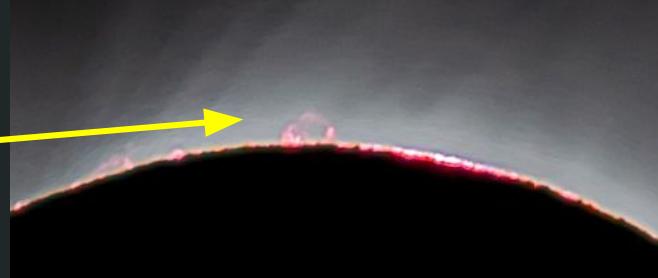


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• astrocamera.net



Chromosphere and inner
corona composite --
combination of 2nd and 3rd
contact images.

Outer Corona

- Nikon D850 @ ISO200
- Borg 100ED / 0.85x focal reducer
- Thousand Oaks Solar Filter
- 1/2000 sec. - 2 sec. (composite)
- Losmandy GM-8
- Hutech Hinode Solar Guider

[Under Construction]

Eclipsed Sunset

- Nikon D850 @ ISO200
- Borg 100ED / 0.85x focal reducer
- Thousand Oaks Solar Filter
- 1/2000 sec.
- Losmandy GM-8
- Hutech Hinode Solar Guider



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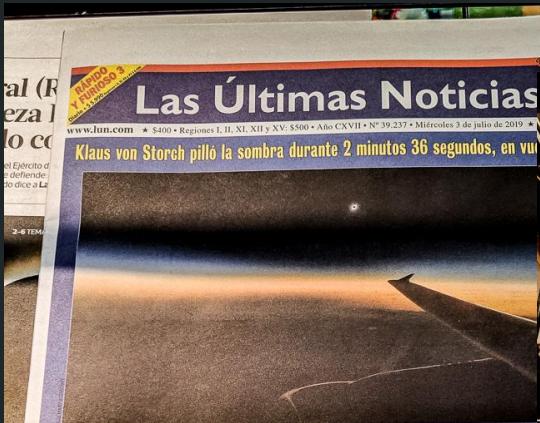
Final Pinhole Images



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The eclipse was a hit in Chile!



Piloto que siguió la sombra del eclipse: 850 km/h es muy difícil

Copa América: Gala le alegró el día a Isla, en Porto Alegre

Tome nota: 17 ojos que faltan espec

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14-15 NACIONAL
General (R) Humberto Oviedo: "La jueza Rutherford ha actuado con parcialidad"
Comandante en jefe del Ejército de 2014 a 2018, procesado por la megafraude en vista por malversación de \$ 4.500 millones, se defiende: "En mi mandato los gastos reservados se emplearon en los fines que determina la ley". Oviedo dice a **La Tercera** que "mi patrimonio es fruto de 42 años de carrera militar".
2-6 TEMAS DE HOY

10 POLÍTICA
Cartas presidenciales expondrán en cita oficialista de alcaldes

20-21 DEPORTES
Brasil elimina a Argentina y espera en la final a ganador de Chile-Perú

3 PULSO
Inversión de proyectos en trámite ambiental sube 54% a junio

13 NACIONAL
Supremo inicia periodo de remoción de jueces Rancagua

9 EDITORIAL ECLIPSE Y ENTIUSIASMO POR LA CIENCIA - 9 CORREO

Hoy juega La Roja
Chile vs Perú/20:30 hrs.
Brasil/Transmite TVN y Canal 13.

Santander

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DE SERVICIOS → Extra hoy todos los mañanitas
SE ARRIENDA
TODOS LOS DÍAS PUZZLE GIGANTE
EL OTRO FENÓMENO APARECE HOY... CHILE BUSCA SU TERCERA FINAL / DEP
A LAS 20:30 HRS. CHILE PERÚ
A la chilena máscara con cartón y escenarios improvisados
En modo eclipse: Piñera y Cubillos se tomaron La Silla
No vino Iron Man, pero si Bill Gates: atendió por 18 palitos

La Cuarta DE TODOS

MIÉRCOLES 3 julio 2019 / www.lacuarta.com

QUEDAMOS LOCOS

Todo Chile y el mundo siguió con sus respectivos lentes el paso del eclipse. Aplausos, anécdotas y harts memes iluminaron la jornada. /4 a.g

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Star party at
Touristic
Observatory
Collowara near
La Serena



2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

29 June 2019 -Southern Skies



Click for full screen

Keys:

- [shift] : zoom in
- [ctrl] : zoom out

Mouse:

- Zoom with scroll wheel or right button + drag up/down
- Pan with left button + drag

360 x 180 interactive panorama:

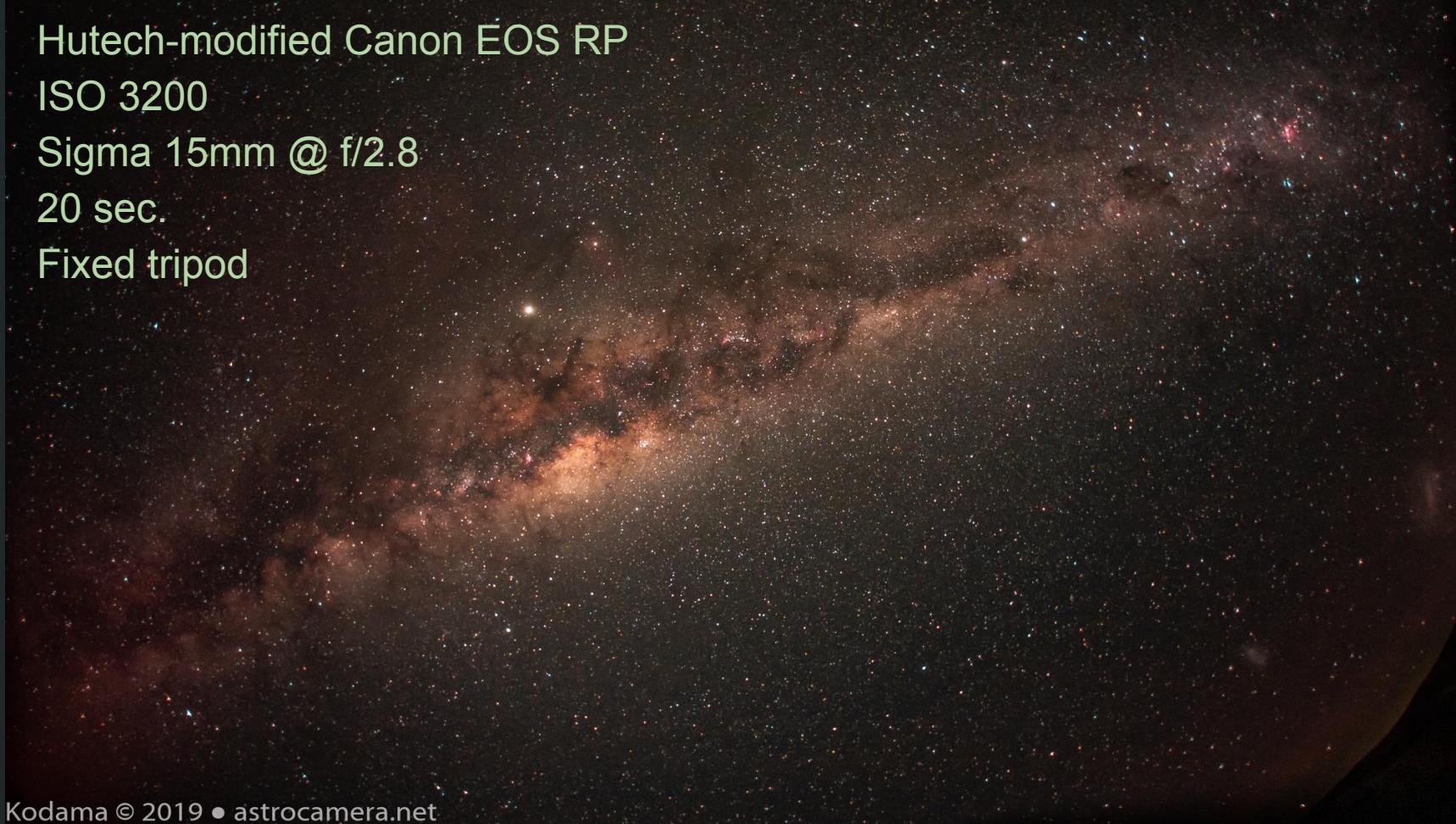
<http://media.astrocamera.net/2019/20190629-SouthernSkiesFromObsCollowara-2/index.htm>



Kodama © 2019 • astrocamera.net

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

- Hutech-modified Canon EOS RP
- ISO 3200
- Sigma 15mm @ f/2.8
- 20 sec.
- Fixed tripod



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Cerro Mayu Observatory

Kodama © 2019 • astrocamera.net

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

Cerro Mayu Observatory

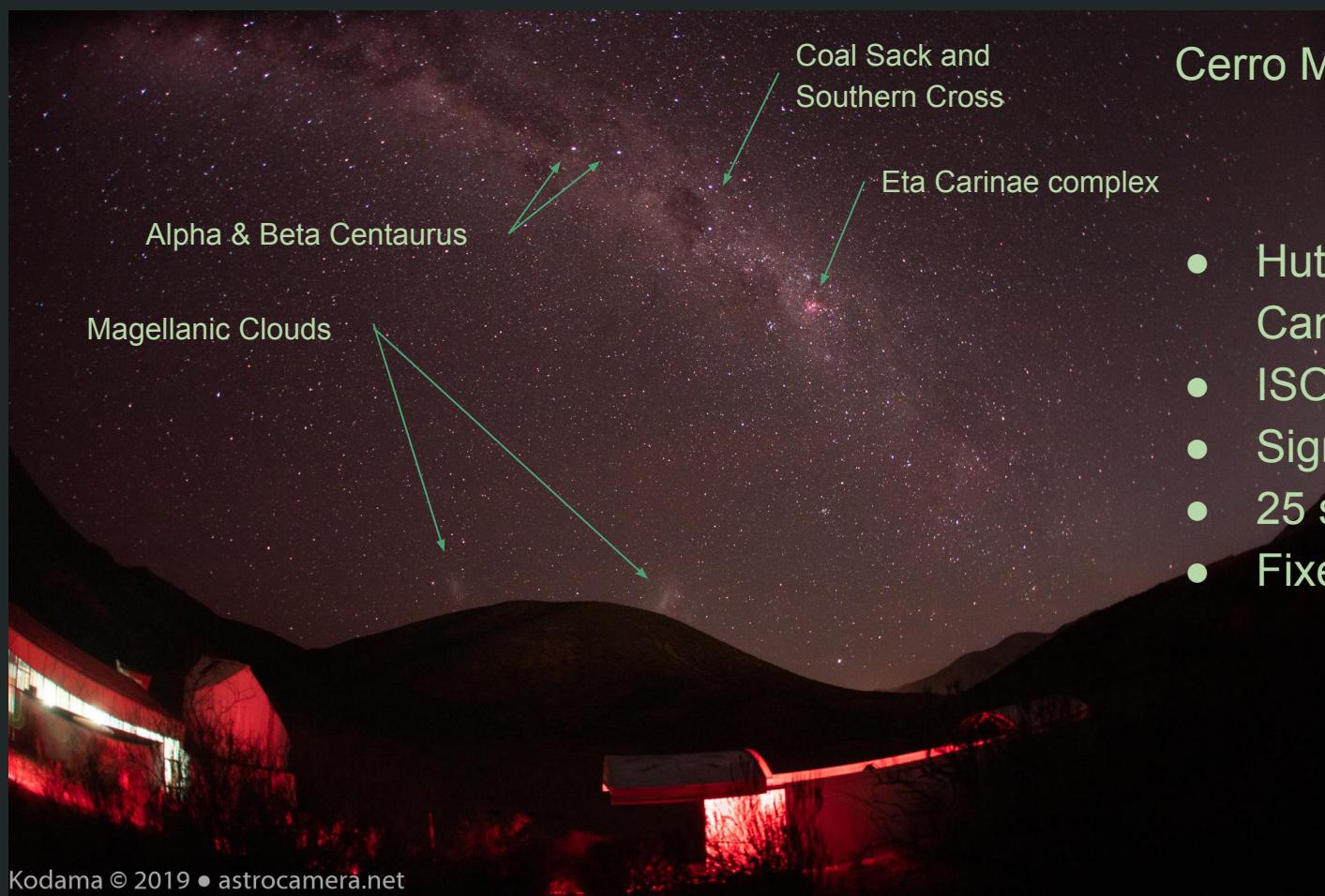
- Hutech-modified Canon EOS RP
- ISO 1600
- Sigma 15mm @ f/2.8
- 25 sec.
- Fixed tripod

Alpha & Beta Centaurus

Coal Sack and
Southern Cross

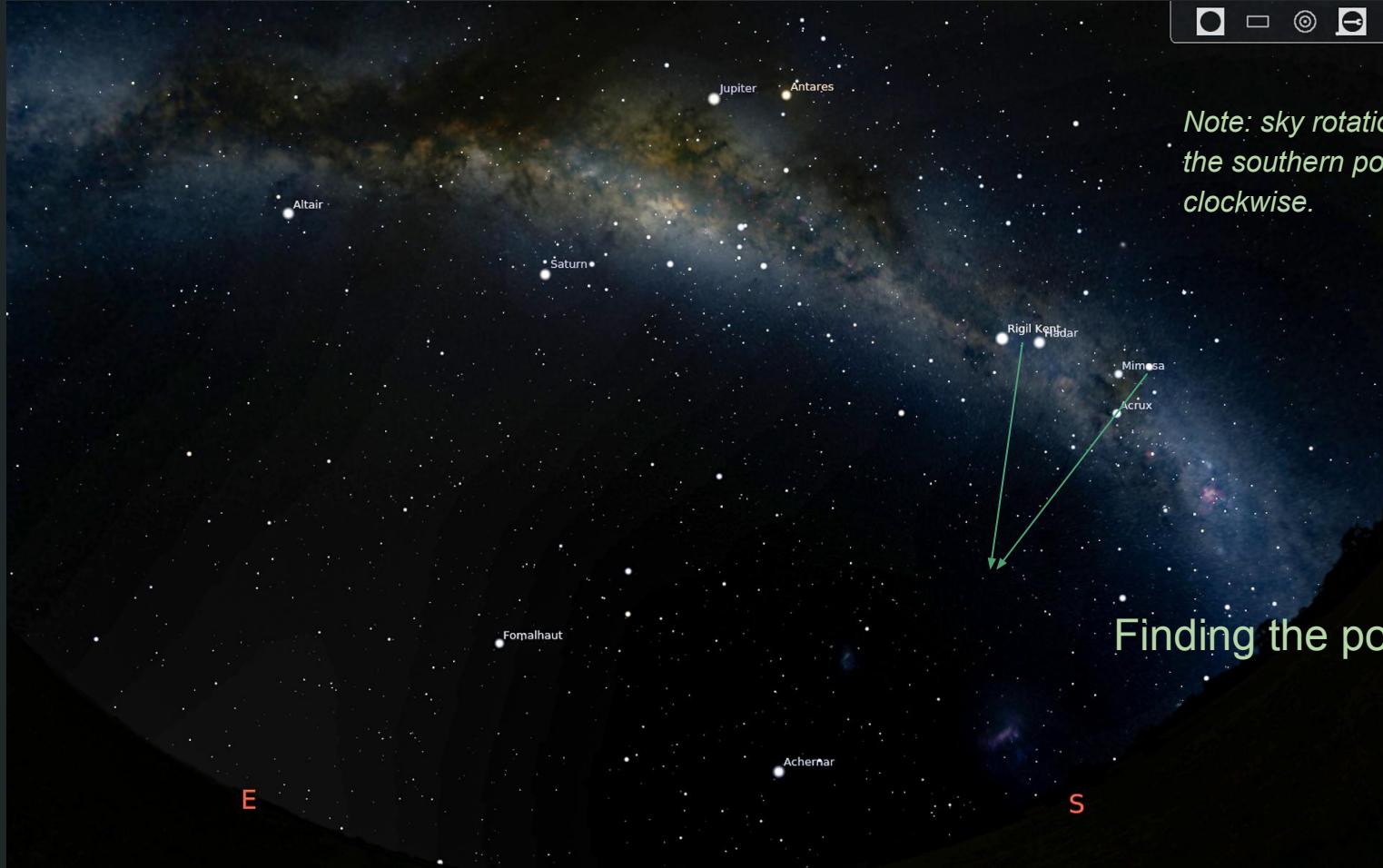
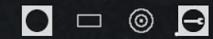
Magellanic Clouds

Eta Carinae complex





2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama



Note: sky rotation around
the southern pole is
clockwise.

Finding the pole

San Pedro de Atacama, radio
observatories

La Serena, optical
observatories, eclipse viewing

Santiago



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San Pedro de Atacama



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Rush hour in San Pedro de Atacama

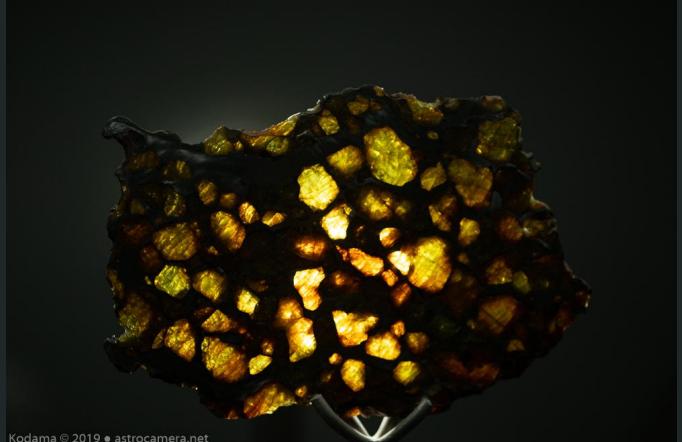


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A visit to the San Pedro Meteorite Museum



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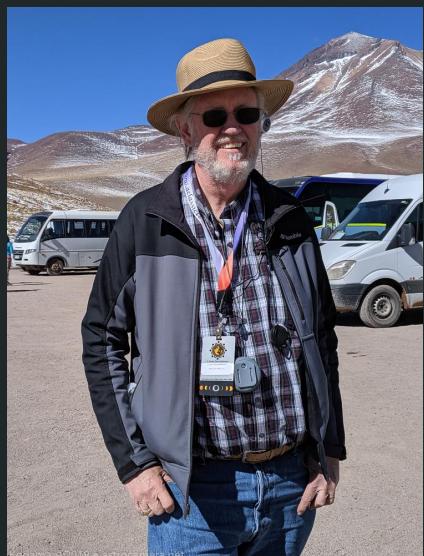
Valle de la Luna



2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama



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Kodama © 2019 • astrocamera.net



Miscanti Lake -
Elevation: 4140
meters (13,583 ft.)

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Simons Observatory / Array

Atacama Lodge, San Pedro de Atacama

Atacama Large Millimeter Array (ALMA)



Observing field at the Atacama Lodge. The Lodge was hosting numerous “star tours” in the wake of the solar eclipse.



Setting up for the first night at the Atacama Lodge outside San Pedro de Atacama (2409 meters / 7900 ft.).

The prominent symmetrical volcanic cone in the background is Licancabur which is on the border between Chile and Bolivia. The top of the cone is 5916 meters (19,409 ft.).

6 July 2019

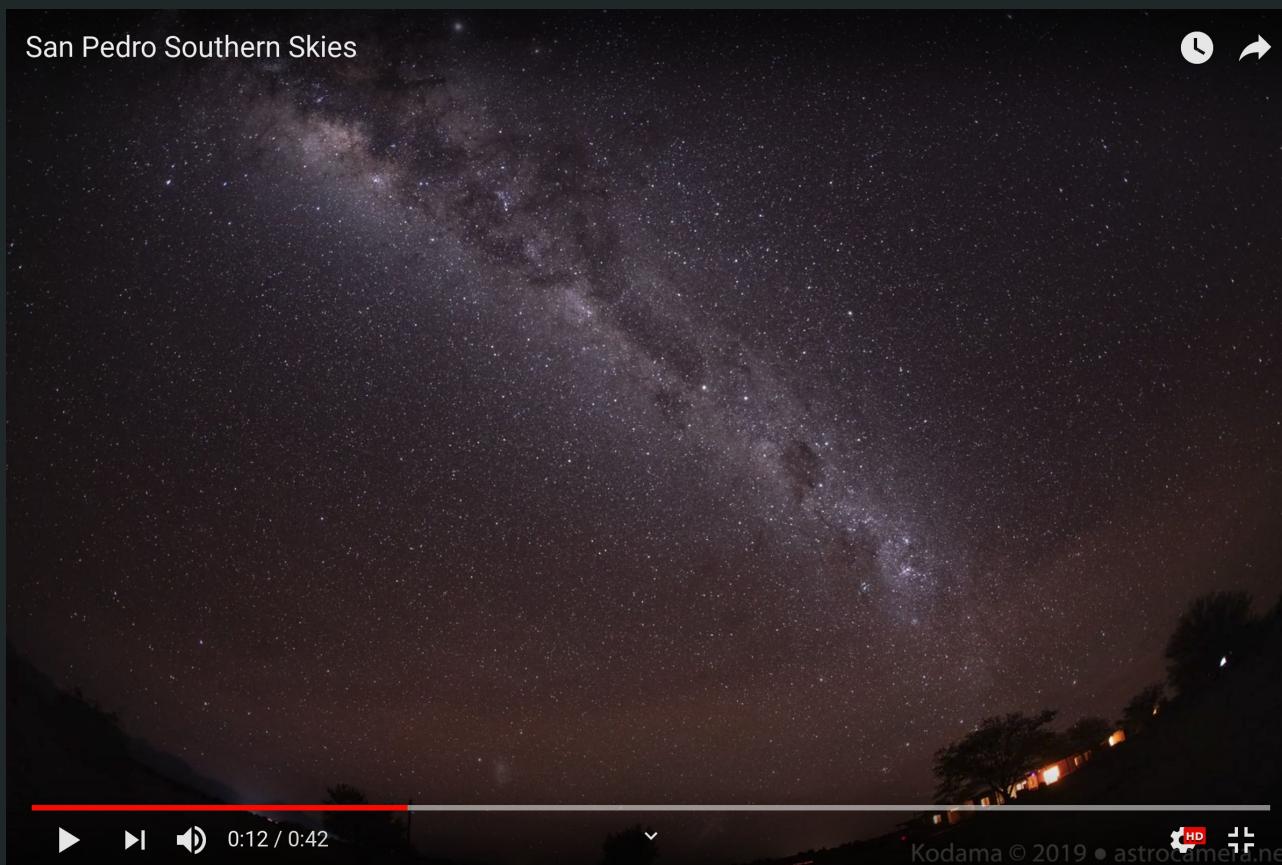


Sunset setup at the Atacama Lodge

<http://media.astrocamera.net/2019/20190706-p3-AtacamaLodge1/index.htm>

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San Pedro Southern Skies



0:12 / 0:42



Kodama © 2019 • astrocamera.net

<https://www.youtube.com/watch?v=a3jK8DqUaZ0&feature=youtu.be>

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Eastward view from
the Atacama Lodge
under moonlight

- Nikon D850
- ISO 1600
- Sigma 15mm @ f/2.8
- 20 sec.
- Fixed tripod



Kodama © 2019 • astrocamera.net

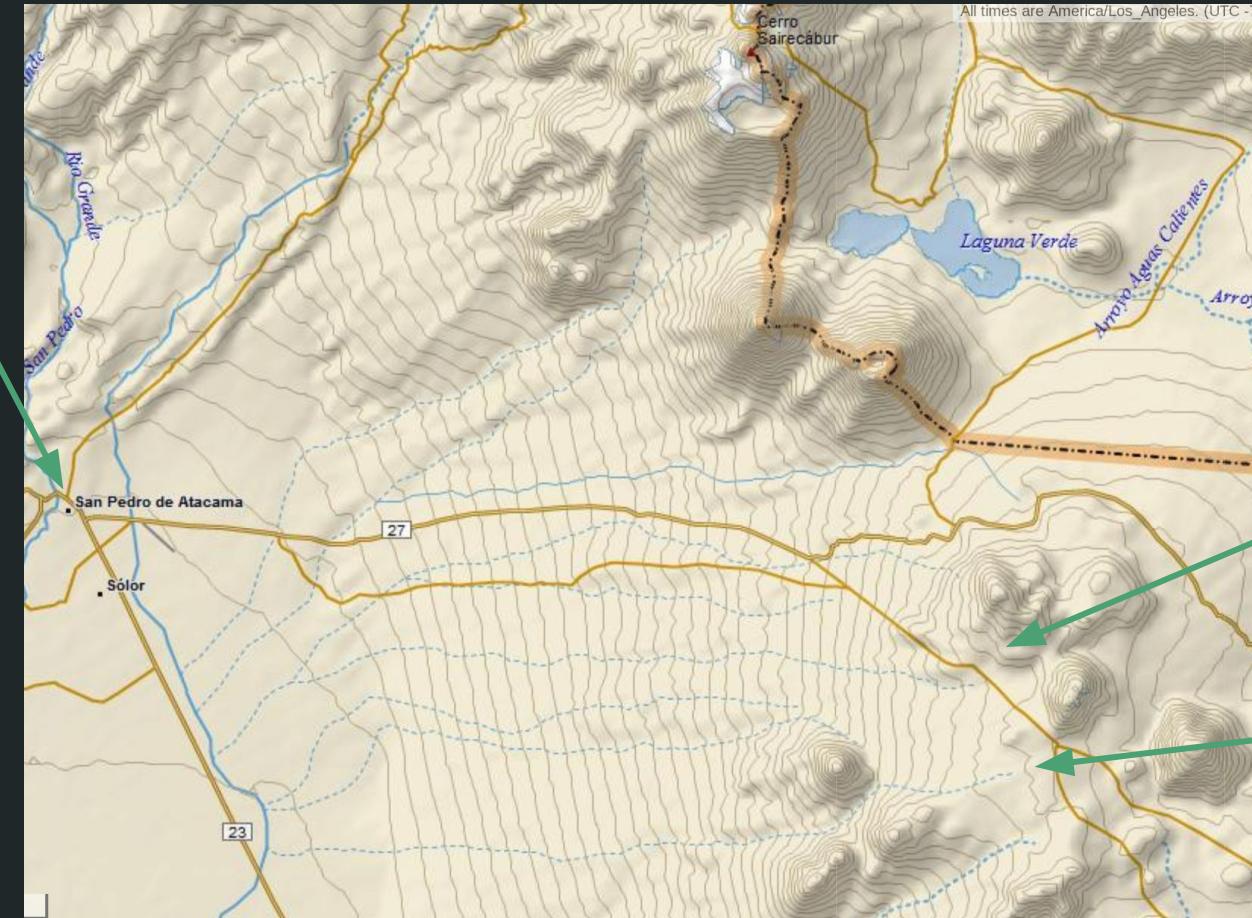
2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

Communications:

- Cell phone on Google Fi
- Biolite battery/solar charger
- Garmin InReach Mini (GPS, Iridium satellite 2-way texting)



San Pedro de
Atacama
... ~9000 ft.
lower in
elevation than
the high
altitude
observatories



Simons Observatory Area Visit

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama



Kodama © 2019 • astrocamera.net

Highway 27 to the borders with Bolivia and Argentina

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ALMA

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama



Simons Observatory area

2019 Total Solar Eclipse Expedition (Chile) -- AISIG: 7 Aug 2019 -- D. Kodama

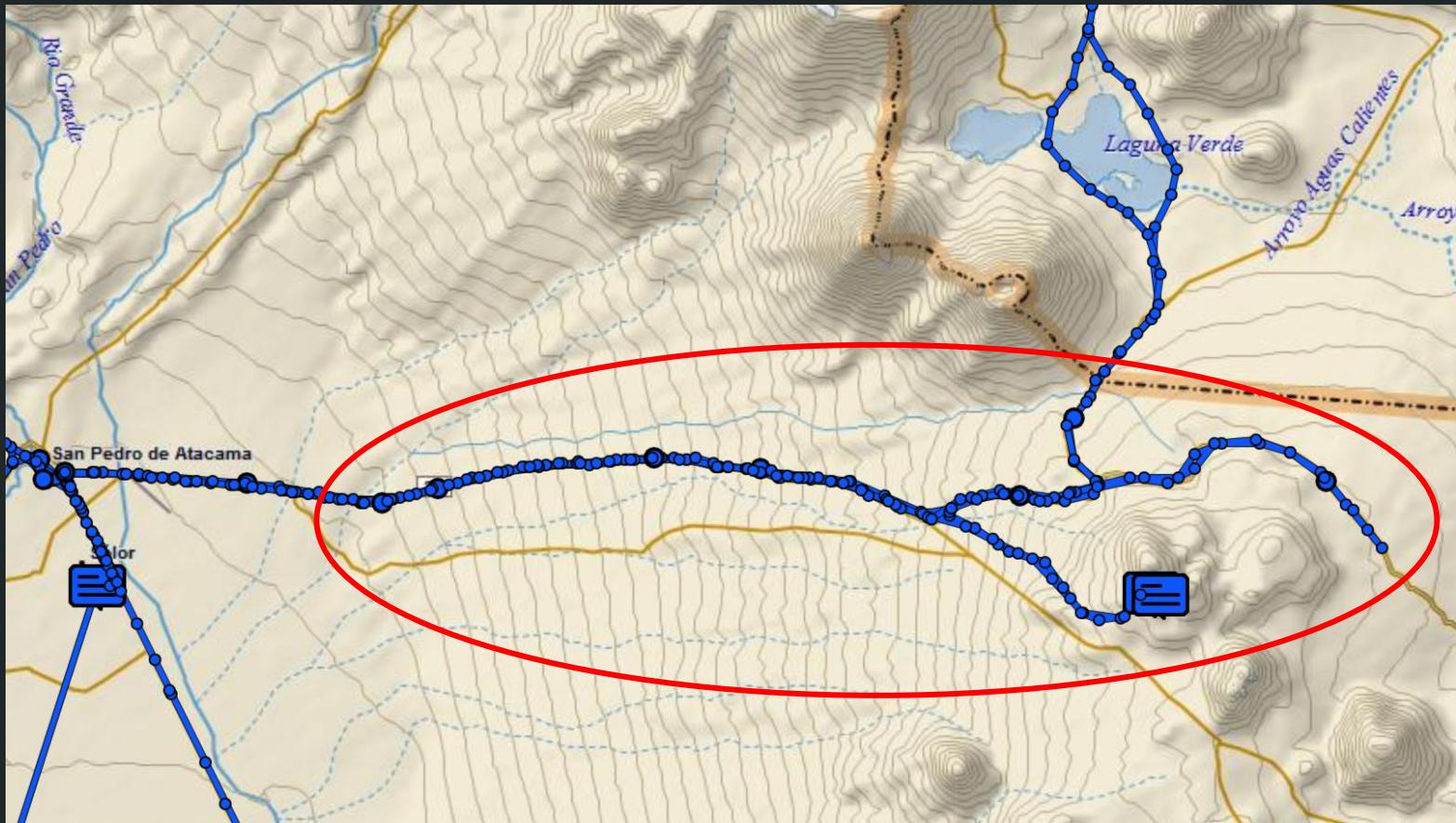


Simons
Observatory
complex under
moonlight.



<http://media.astrocamera.net/2019/SimonsObs-7/index.htm>

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A little glitch in plans...

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Highway 27 to the borders with Bolivia and Argentina



Missed this!



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Heading over the border into Bolivia for the day...

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Photo-bombed
by the Moon!





While heading back to
Santiago...

Aconcagua -- 6961 meters
(22,837 ft.) -- tallest peak
outside Asia.

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Back to Santiago
for a few days



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Heading home...



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