

Day 0 Chilean Eclipse

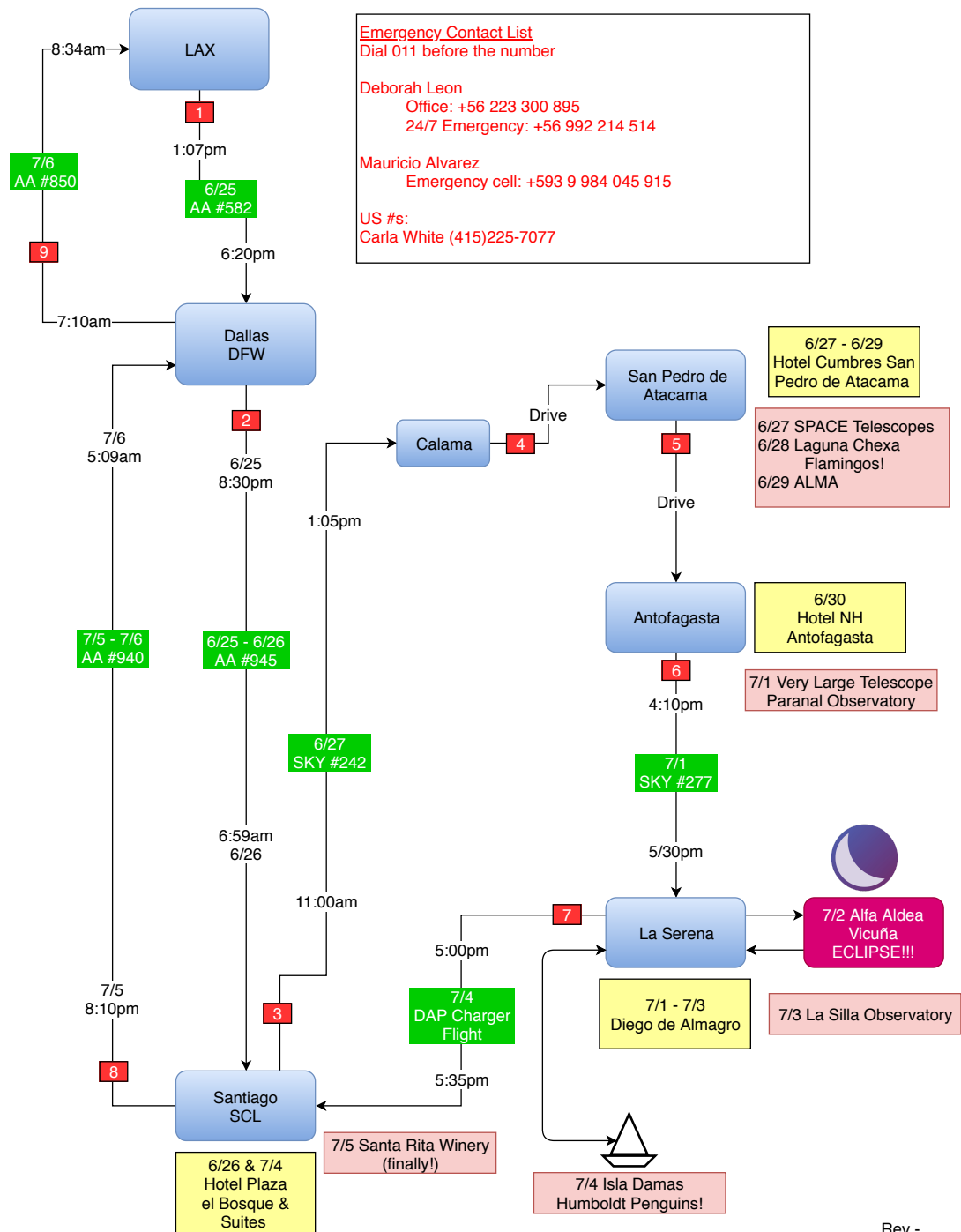
Hey everyone -

Steve and I are off on another one of our adventures. This is your initial warning message giving you the unique, guilt-free opportunity to opt out of our travelogue. Just say the word and I'll spare you from our shenanigans.

For the rest of you who for some reason think these letters are entertaining in some way, here's this year's trip. We're flying to Santiago, Chile where we'll be meeting up with a UCLA alumni tour group. The plan is to catch our third total solar eclipse on July 2nd in Vicuña outside of La Serena. The tour group comes with its very own UCLA astrophysicist to guide us.

We'll be seeing several telescopes and observatories, including ALMA, which is one of the 6 sites that helped take the photo I'm sure you saw of a black hole, published in April of this year. (If you missed it, here's one of the articles about the photo: <https://www.space.com/first-black-hole-photo-science-team-meets-congress.html>)

If you want to follow the bouncing ball that will be our trip, here's one of my famous diagrams!



Rev -
6/22/2019

And I'll leave you with a photo of us a full three hours before our flight at the terminal at LAX:



Allison & Steve

Chile Day 1

The first 24 hours of our trip were basically non-stop flying. We had a flight out of Los Angeles at 1pm so being good international fliers, we planned on leaving the house 3 hours beforehand, but our driver got there 15 min early, so we were at the airport seated after TSA check a full 2.5 hours before our flight. Which wasn't international, it was to Dallas.

Ok, so that made it stressless though, right? Then we landed in Dallas with a comfortable 1.5 hours between flights ... but our flight was delayed 1.5 hours. Finally we were able to get on the plane for our NINE HOUR flight. Did you know the middle of Chile is SUPER far away??? Ok, you probably knew that. Those nine hours were from 10:30 at night till 5:30 in the morning. Which was 7:30 am. Or something like that, I was pretty bleary by that time.

Because our flight was 1.5 hours late, that meant our luggage would come out 40 minutes later than expected. We don't understand that either, but we think it has to do with the time change, the currency exchange, and the fact that we're below the equator so everything plays into the calculation.

Here's a shot of us when we were still bright eyed and bushy tailed. We are on the new Boeing Dreamliner which was pretty cool! You would have thought we wouldn't have to share a seat though.



Flying into Santiago we got our first view of the Andes:



This trip is run by the UCLA alumni organization (my alma mater for my Master's and Steve's Executive MBA). We learned about it through our friends Sue Baumgarten and David Toleroth who went on one 2 years ago to see the Oregon eclipse. Unbeknownst to us, this alumni group goes all over the world for all kinds of cool stuff. Fun to be with smart people.

The only problem with intellectuals is the tour part is about history and museums and such. We stopped at various locations looking at cool old buildings and hearing the history of all the different economic changes in Chile's history depending on the politics of the day. The presidents had long, interesting names which I'm betting the other people on the tour could recall and tell you all about.

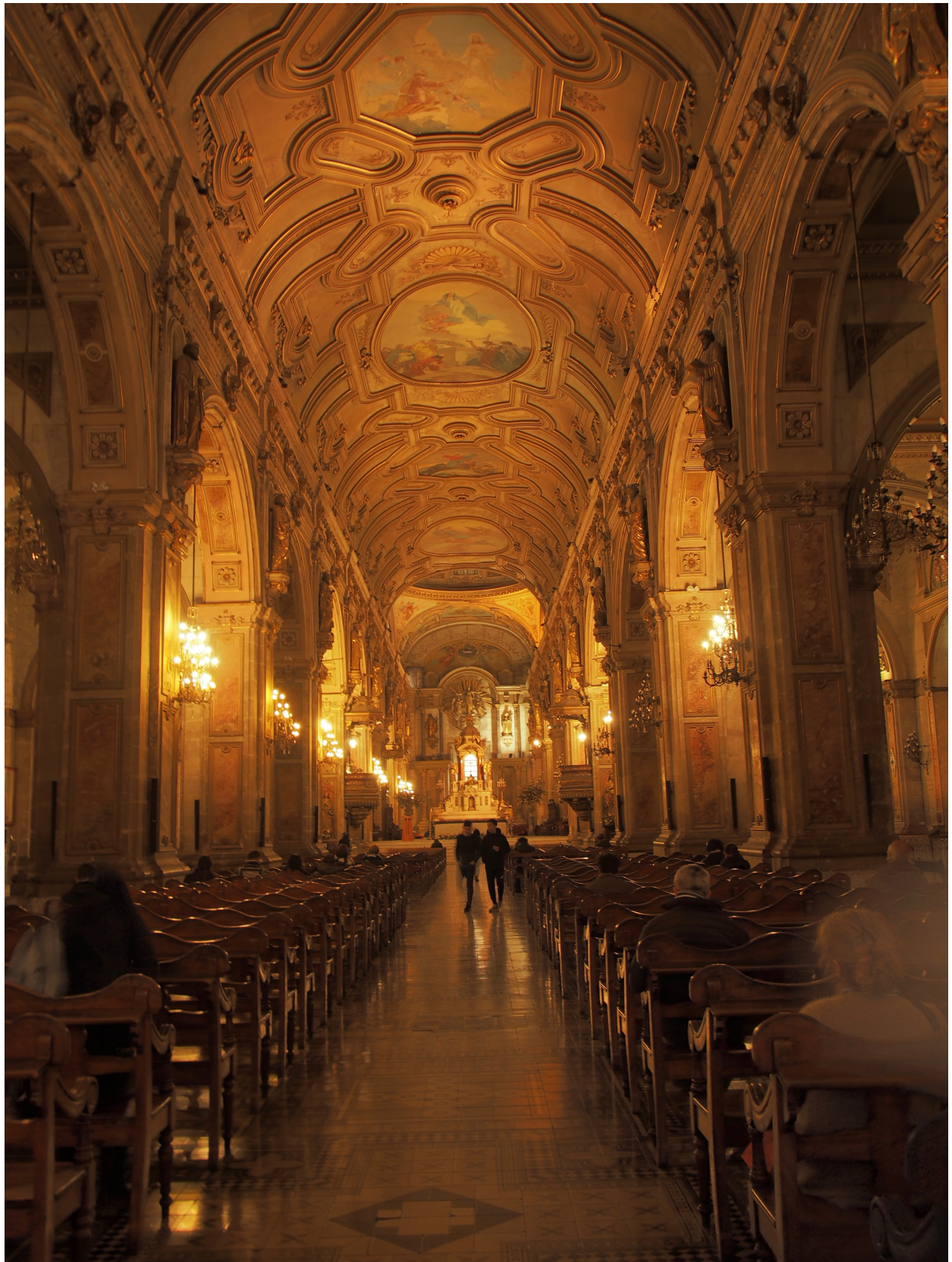
I remember there was a story about an uprising that included the military and a fire in a building and maybe it was 1972? The cool part was there was a bullet hole from that event in a statue and I got a closeup of it.



The tour guide referred to "the Indians". I queried him on that term and it took a while for he and I to come to an understanding. By Indians, he meant indigenous people. I thought it was interesting that in South America they use the same term we used to use in the US. In any case, they have a super weird indigenous people statue in this square that had something to do with war.



Saw a really beautiful church in the same square. I actually tried to find the name of it but failed.



They had some of those street artist types that paint themselves all over and sit real still so they look like statues. All I could think of was, "How exactly do you decide to choose this as a career?"



I hope that guy on the phone is calling emergency services...



We went to a Pre-Columbian museum which was pretty cool (that part was only 30 minutes which is about my attention span. We saw what they claimed were the oldest mummies in the world!

Unfortunately, they were baby mummies. Since that's sad and depressing I'll send you this photo instead, also taken at that museum:



Wifi is super dodgy at the hotel so I'm going to have to cut this incredibly detailed explanation of the rich history and culture of the entire country of Chile by sending you a selfie. Be honest, you were waiting for that, right?



(Btw, that building behind us is the one that burned up in a hail of gunfire by police and military in 1972...)

Allison & Steve

Chile Day 2 - Flying and Atacama Desert

You probably think I'm a slacker that I fell off the wagon on writing my emails on day 2. But just this once, that's not what happened. This tour has NO DOWN TIME! On Day 2 they gave us a wake up call at 6am and we were on the run absolutely non-stop until dinner...which was at 10:30pm. It was crazy! In Day 3 I may explain the mutiny I created that allowed me to even write this letter.

Before we leave Santiago there was one thing I forgot to mention. The smog was terrible there. The guide addressed it head on and explained what they're trying to do to fix it. Then he said, "It's as bad as Los Angeles." I didn't have the heart to tell him that it was as bad as LA ... in the 1980s. Today LA's air is so much cleaner, you can't even SEE it most of the time.

Ok moving on. We flew out of Santiago north to Calama, and then took a bus ride into San Pedro, in the Atacama Desert.

I know I try to keep these letters as fact-free as possible, but from time to time I have to shake things up. The Atacama Desert is the driest place on earth. They once went 173 months without any rain at all. Average rainfall is 5-15mm of rain. That's 0.2-0.6 inches of rain (in Freedom Units as Maryanne would say.) when it rains 15mm they say it causes huge and problematic floods where roofs of buildings cave in!

San Pedro is a hoppin' mining town where we stopped for a surprisingly lovely lunch. Here's Christel, our troop leader directing traffic at city center.



But the Hotel Cumbres is absolutely stunning. Here's Steve's obligatory and yet slightly creepy "I just got in the new hotel room so I must pose" photo:



The evening's entertainment was absolutely amazing. We went to the San Pedro de Atacama Celestial Explorations (SPACE), a privately-owned complex of telescopes, complete with their own astronomer. The telescopes were cool but my favorite part was staring up at the best star view in the night sky we've ever seen in our lives while the astronomer pointed out constellations and Magellan Clouds and nebulas and such.

I got a pretty good shot with my big-girl camera of the Milky Way. It's not perfect but on the one better shot I did get, that darned astronomer shined his green laser right through it!



The night sky is so amazing here because we're at high altitude but also with really low humidity. I'd quote a number like 5% but that would violate my fact rule twice in one letter and we can't have that.

It was also REEEAAALLLYYYYYY cold. We had on long underwear AND three layers plus down jackets, hats and gloves, and all of us decided that our 2nd favorite thing was when they took us inside for hot chocolate and the astronomer continued to tell us cool astronomy-type stuff.

Stay tuned for Day 3,

Allison & Steve

Chile Day 3 - Flamingos and Lakes

Wait, what? Flamingos in the Atacama Desert? We met a (really obnoxious) guy at the Dallas airport who said he lives in Chile several months out of the year and he told me there were NO flamingos in Chile.







Luckily nobody told these flamingos they weren't here. They are in the Laguna Chaxa, 38 miles from the lovely town of San Pedro that I showed you in the last missive. It was very stark there as you can see, and yet had a beauty to it with the Andes and other mountains surrounding us.



The area is actually part of some giant salt flat, the name of which I should probably remember because the guide said it about 238 times today. Not to sneak in too many facts here, but our guide said this is the third largest salt flat in the world.



But I got ahead of myself. Steve captured the sunrise at the Hotel Cumbres (told you they get us up early!)



And then he made me take a picture of him riding a llama.



After the flamingos we drove (forever) to get to the Atacama Lakes. Yeah, a lagoon AND lakes, in the driest place in the world.

The drive was pretty spectacular with a couple of stops along the way to view herds of Vicuñas along the roadside. They are protected here so fairly fearless.



The Atacama Lakes are at an altitude of 13,000 feet! And if we thought we were cold watching the Milky Way, we found a new definition of cold. Luckily it was also windy.

Get this, the lakes are salty. Didn't catch why that was though. There's Laguna Miscante which is the big lagoon. I knew I was supposed to take a photo of it because of this:



Oh yeah, that's snow.

You can see the former volcano behind the lake with its top blown off.



And Laguna Meñiques which was equally freezing cold. Well, NOT freezing because it's got salt in it, remember? Try to keep up, ok?



On our drive back down the Vicuñas got even closer.

Chile Day 4 - ALMA Telescopes + Moon Valley + Sunset

Let me start by apologizing profusely for NOT bcc'ing everyone on the last letter. I hate it when people do that. I will hang my head in shame for eternity. With that out of the way...

The theme of this trip appears to be:

- Wake up really early
- 45 minute bus ride
- See amazing thing - rush rush rush to bus
- 45 minute bus ride
- Leisurely lunch, realize we've taken too long - so rush rush rush to bus
- 45 minute bus ride
- See amazing thing - rush rush rush to bus
- 45 minute bus ride back to hotel
- Really late dinner
- Crash

Each amazing thing is AMAZING but it's kind of exhausting, partially because amazing things are so far apart.

ANYWAY, this was the most amazing day of the trip so far. Warning - there will be many actual facts in this bit. I'm sure I'll get some of them wrong though, if that comforts you in some way.

Part 1 - ALMA

On this day, we got to see the ALMA telescopes. ALMA is the Atacama Large Millimeter/submillimeter Array. ALMA is 66 separate radio telescopes (dishes), most of which are 12m in diameter, with some 7m in diameter. Radio telescopes are different from optical telescopes. They can't see color as an optical telescope can, but they can see through dust in the galaxies to get high resolution images at quite long distances.

Nerd point here - by combining lots of large radio telescopes a distance apart, the signals they receive can be combined together (using math, kids!) to make one giant aperture. Much more practical than trying to build one giant telescope. At ALMA, the telescopes are as far as 10 miles apart!

ALMA is one of the six arrays of radio telescopes that took the picture of the Black Hole that you probably saw (If you haven't, here's a link to it: <https://www.space.com/first-black-hole-photo-by-event-horizon-telescope.html>)

The Atacama desert is the best place on earth for this effort for several reasons. Moisture is the worst thing for telescopes (optical and radio). The Atacama desert is THE driest place on earth. The second thing that helps a telescope produce better images is to put them at as high of an altitude as possible so that there's as little atmospheric distortion as possible. Luckily, Atacama has a lovely mountain in Chajmantor with a plateau at 16,500 feet that's wide enough to sprinkle with telescopes. Finally, Chile would agree to let this be built on their mountain.

This is a joint collaboration between the United States, Canada, Japan, Southern Observatory countries in Europe, South Korea, Taiwan, and of course Chile. This is amazing in and of itself that all of these countries agreed together to build this amazing tool for us to try to understand the origins of our universe.

I'll tell you more in a bit but it's probably time to put some pictures in because I see quite a few of you have fallen asleep way there in the back.

We got up early, rushed to the bus and drove 45 minutes (yes, it's always 45 minutes) to the base camp at 12,000 feet altitude where we had to go through a medical test to be allowed to go onward! Going to 16,500 feet is actually fairly dangerous and they took every precaution. They took our blood pressure and tested our blood oxygen level, and two of our group sadly did not pass the test. I got

an 81% on blood oxygen (the limit is 80%), so I was already affected by the fact that we were at 12,000 feet when tested.

Then they issued us our very own oxygen canisters!



We drove another 45 minutes (I'm not joking) and we arrived at the top. The first thing they showed us was the telescope transporter. Now that sounds really boring but it was REALLY cool. They do a lot of maintenance up on top, but if a major overhaul or upgrade is required, they have to drag the telescope all the way down to base camp. The telescope has a receiver in it that has to be maintained at 4 degrees Kelvin (4 above absolute zero.) It can't be tilted in any way, so this specialized transporter had to be designed, and it takes about 6 hours to get each telescope down the hill.



Steve even got to drive! Not really but in his mind he did...



We took altitude sickness pills and we puffed away like crazy on our oxygen tanks, but most of us were quite light-headed and felt kind of thick if you know what I mean. I forgot to mention that they shipped a nurse along with us! She retested me and i was proud that I'd gotten my blood oxygen up from 81 to 85%. For reference, 2 days before we left I was at the doctor and at sea level my oxygen level was 93%.

I also forgot to mention that it was STUPID cold up there! It wasn't as bad as they'd predicted, but it was 26F with windchill bringing it down to -6F. They wouldn't let us stay outside the bus for very long at all because of the temperatures (and the altitude of course).

We did get out long enough to walk around the central cluster of telescopes. These are the itty bitty 7m antennas by the way. So. Freaking. Cool.



And of course a selfie for context:



When we started planning this trip, I was really looking forward to how much Steve would enjoy it. I think this picture says it all:



We had a tour of the room where the astronomers work to keep the telescopes functioning and learned a lot about the facility. Turns out that to get observation time on these telescopes, you simply submit a paper and a review board picks the lucky winners, and it DOESN'T COST A DIME!" They only accept papers from countries that paid for the facility, and the number accepted is proportional to the money spent by that country. The US contributed 33% of the total cost, so we get lots through, and they accept about 1 in 7 from us. We were quite chuffed that we were such a big part of that. The tour guide kept saying, "keep paying your taxes!"

Here's another really cool thing. For the first year after the observations, the astronomer has exclusive access to the data. But after that first year, all that data is made freely available to everyone on earth. I thought that was really awesome.

Sadly we had to rush rush rush to the bus to go to lunch to rush rush rush to the bus to the hotel to have a quick face wash and then rush rush rush to the bus to our next amazing adventure.

Part 2 - Moon Valley

We drove 45 minutes (again, not joking) to a place formed by the tectonic plates shifting and volcanos and such. There were a lot more words of explanation but it wasn't about telescopes so I didn't pay attention. Oh, there was something about gem salt.

It was really cool looking though!





Steve liked the shadows so here's his selfie:



Part 3 - Sunset

But we weren't allowed to enjoy it very long because we had to rush rush rush for the bus! I was really annoyed by all this darn rushing. They told us we had to hurry because we were trying to catch the sunset. We were baffled as they drove us out of the Moon Valley. We thought we'd see the sunset on the amazing rock formations.

After a shockingly short 15 minute drive out into the middle of nowhere, we hung a u-turn to find this:



There were other people with us but we rushed the table first! They had cheese and nuts and some interesting fruit juice (which I did not

try) and Carménère wine which is the local, fabulous red wine which I DID try. The night before we went up to ALMA we were told NO DRINKING! Hence the rushing of the table.

We sipped wine and watched the sunset on the volcanic mountains:



I told you we were in the middle of nowhere:



I zoomed in on one of the volcanoes (named Chajmantor) in that picture because a woman I was chatting with pointed out a little white dot to the left of it, on a plateau. It was one of the ALMA telescopes!



Can't see it? How about in this cropped version:



Whew! What a day, Maybe it was worth all that rushing...

Steve & Allison



I mentioned a mutiny. They rearranged the schedule so that the bus could take us back into San Pedro to, get this... go shopping. I convinced them to drop everyone else off and then have the bus take Steve and me back to the hotel so I could write you this very letter (and catch up on Day 2). About a half dozen people said, "Me too! I wanna go back!" I don't think they wrote you a letter though.

Tonight we have a lecture on intelligent life in the universe by our resident UCLA astrophysicist Jean-Luc Margo at 7:30pm (it WAS supposed to be 6:30, but SHOPPING). Then dinner isn't until 8:30 (because, SHOPPING).

I'll be fine, I had a nap too in the mutiny hours.

I'll leave you with a selfie that we think illustrates how cold we were. Our teeth hurt from smiling into the wind!



Allison & Steve

Chile Day 5 - Longest Bus Ride + ~Leisure

You're probably exhausted from yesterday's missive, so I have good news for you. On Day 5 we rode a bus, walked around a bit, and had dinner and went to bed. You really don't need to read the rest of this but I'll manage to drag it out for a few more paragraphs if you're interested.

Of course our day started with bags packed outside our room at 6:30am and we grabbed a quick bite for breakfast and we were on the road again.

This bus trip was 4.5 hours long, so 10 Chilean-bus units. Or something like that. We drove from the oasis of San Pedro in Atacama all the way to the coast to the city of Antofagasta.

I remember being amazed that the desert in the west of the US is actually quite interesting. That's not really so with the Atacama Desert. It's just miles and miles and miles of absolute nothing. I guess that's what happens when you have such little rainfall.

As we rode this interminable distance (in a super comfy bus), our guide Sina told us about how the mineral saltpeter was mined in the area, and all the trouble that ensued as a result. For some reason I missed in the explanation, Peru and Brazil taxed the people of Chile for the mining of saltpeter, which didn't sit well with the Chileans. There was a pact to not raise the taxes any more, but a new guy took over in Brazil and raised them anyway.

And that started the Saltpeter war, which has a real name that escapes me, but around here they call it the Saltpeter war. Aren't you glad I remembered those valuable facts for you?

They also mine copper and lithium. I believe they said they have the most lithium mining in the world, so you're probably reading this on a device that has a battery that most likely came from the Atacama Desert.

We drove past one of the open pit mines. That little black thing on top is a truck!



Here's a satellite view of this monstrosity in the above picture:

10:48

3G



3D

Search for a place or address

These are both boring, stupid pictures and that was THE most interesting thing that we saw in 4.5 hours.

Now on to Antofogasta. I was told by someone (a tour guide maybe, they do talk a lot) that Antofogasta is the wealthiest city in all of Chile because it's where all of the mining money goes. As we develop our story, you'll find that hard to believe.

We had about an hour or two where we were allowed to roam freely (first time on the trip), so Steve, our new friend Jerry and I took off on our own to explore. I'd like to say that it was a lovely city, but it really wasn't. The ocean was a dreadful foamy brown color, and smelled pretty much as it looked.



But we found this really cool crane:



And we're pretty sure it's not in use - these are Cormorants nesting in it!



Steve and Jerry walking through one of the *nicer* parts of town:



Steve thought this dog was funny:

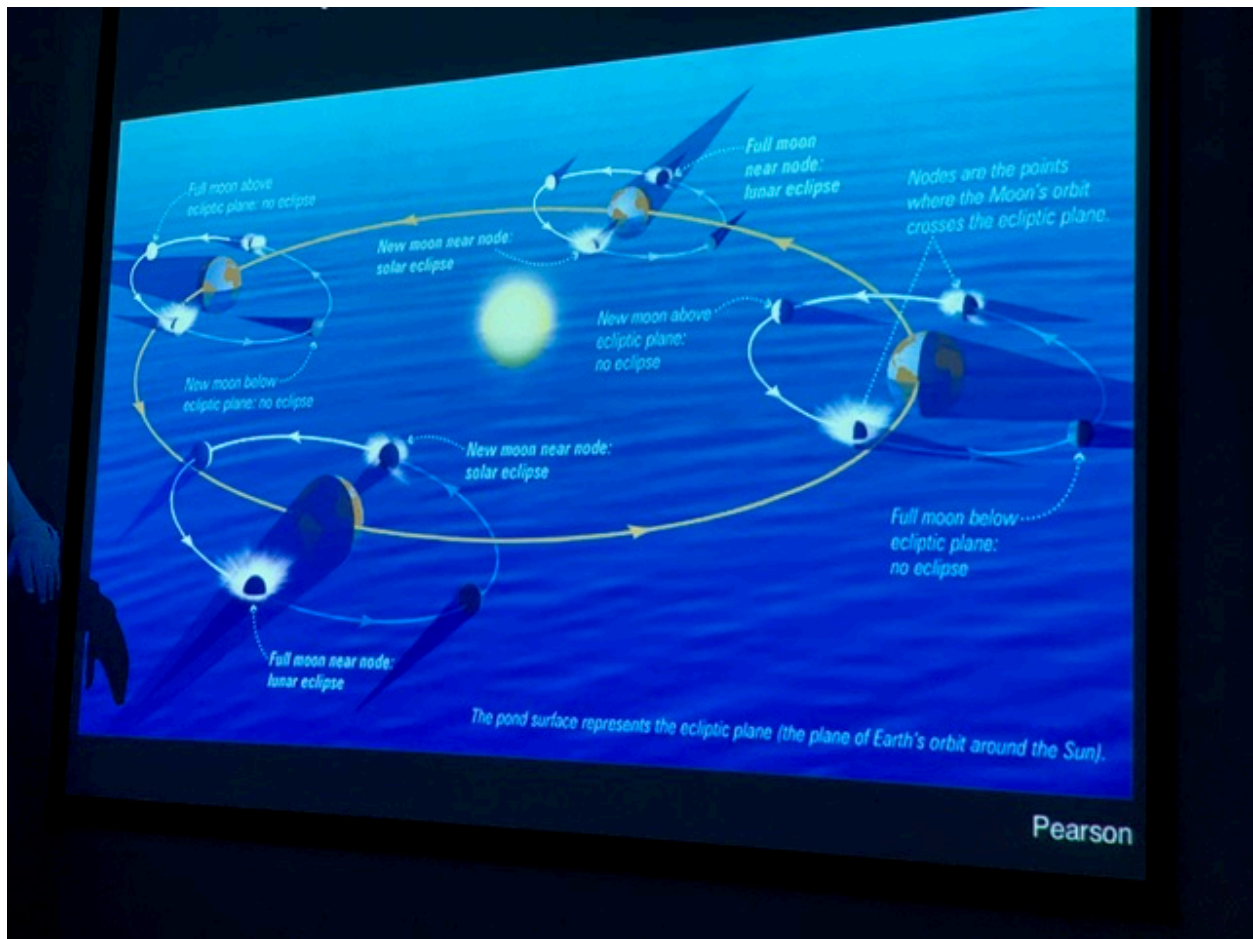


I thought this car had the best sticker ever:

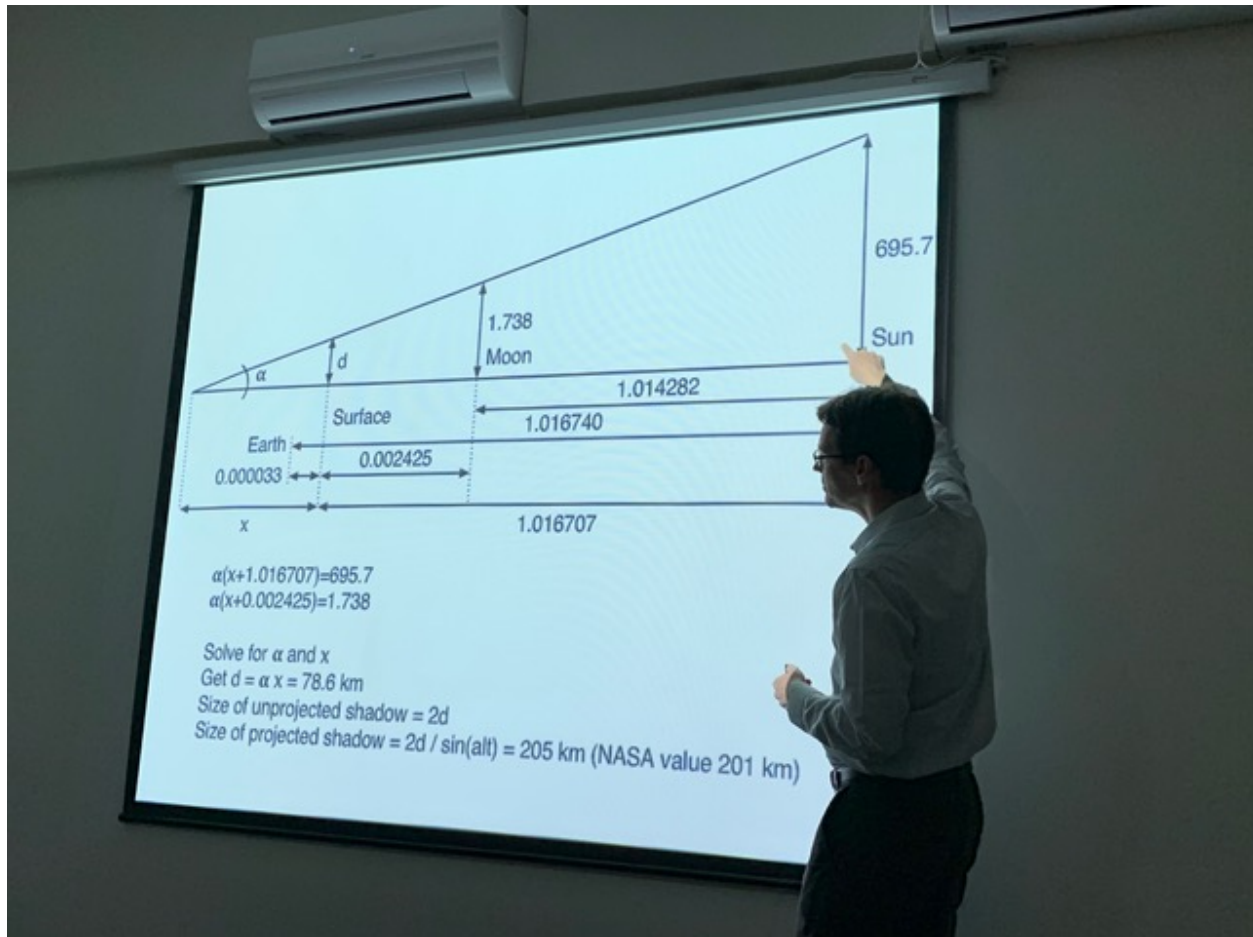


We happened to have our only free time in Chile on a Sunday, so all shops were closed. We tried to do some reconnaissance on where to have dinner later (we were going to be free for dinner later too!) Jerry has been taking Spanish lessons, so he would poke his head in to restaurants asking how late they were open and the latest any of them were open was 5pm. As my French friend Pat says, "Le sigh."

The best part of the day was when we had a one-hour lecture by our resident astrophysicist, Jean-Luc Margot. He explained the solar eclipse and how it occurs. Dean will enjoy the source of this graphic:



He even went through the geometry on how to calculate the speed that the eclipse would travel across the earth. Geometry is my favorite math!

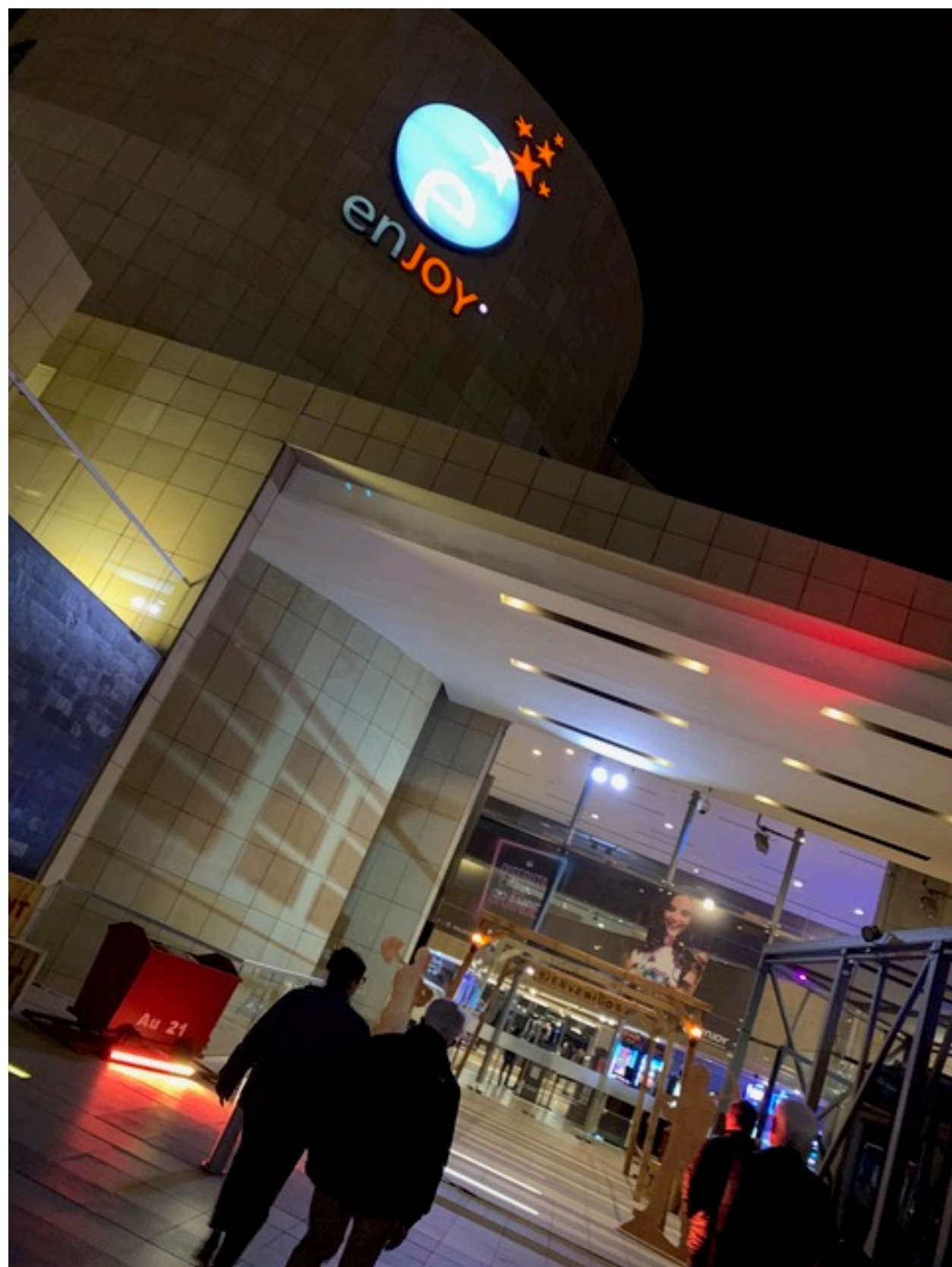


I was worried before the trip that the lectures would be way over my head, but Jean-Luc explains things in really simple terms without talking down to us. I told him I wanted more lectures!

After the lecture we were free to go to dinner, but the only option was to go to the Casino for dinner. At least they were open. They had three restaurants, one of which was supposed to be quite good.

Eight of us took off on foot to walk to the casino, a mild half-mile stroll. This was the most exercise any of us have gotten in the last five days! I told our crew I'd eat anywhere but a buffet - I'm soooo over buffet food!

We got to the casino and two of the three restaurants were closed. Guess which one was open?



The buffet was as dreadful as you could hope for, everything congealed and luke warm. But the conversation was fantastic! We talked about telescopes and book recommendations, and even podcast recommendations. And no, it wasn't me foisting my card on everyone (although I may have given out one or two). Mostly it was other people telling us about cool shows they listen to.

One of the great things about this tour is we're surrounded by brilliant people. Since the trip is part of the UCLA Alumni Association, everyone here is highly educated, but in all different areas. This has made the conversations stimulating and interesting.

Believe it or not, that's the whole day. Not as much rushing, a non-standard bus ride, a great lecture, bad food and great conversation. Tomorrow will be more interesting!

It was so uneventful we didn't take a selfie. Can you *imagine*? So here's a parting one from the Moon Valley from day 4 to hold you over till tomorrow:



I promise tomorrow I'll try to be more interesting!

Allison & Steve

Day 6 - Chile - Very Large Telescope at Paranal

Today was a great day for science. We had to pack our luggage up by 5:30, and we were back on the bus in Antofagasta by 6:30.

We got to go to the European Space Observatory at Cerro Paranal. ESO is a consortium of 16 European countries. It really strikes me what amazing things we as humans can do when we cooperate with each other.

ESO is home to four 8.2m optical telescopes, which when combined using interferometry creates what they call the Very Large Telescope, or VLT. Sure is a creative name, don't you think? Turns out they've only combined them twice, but they still use the name.

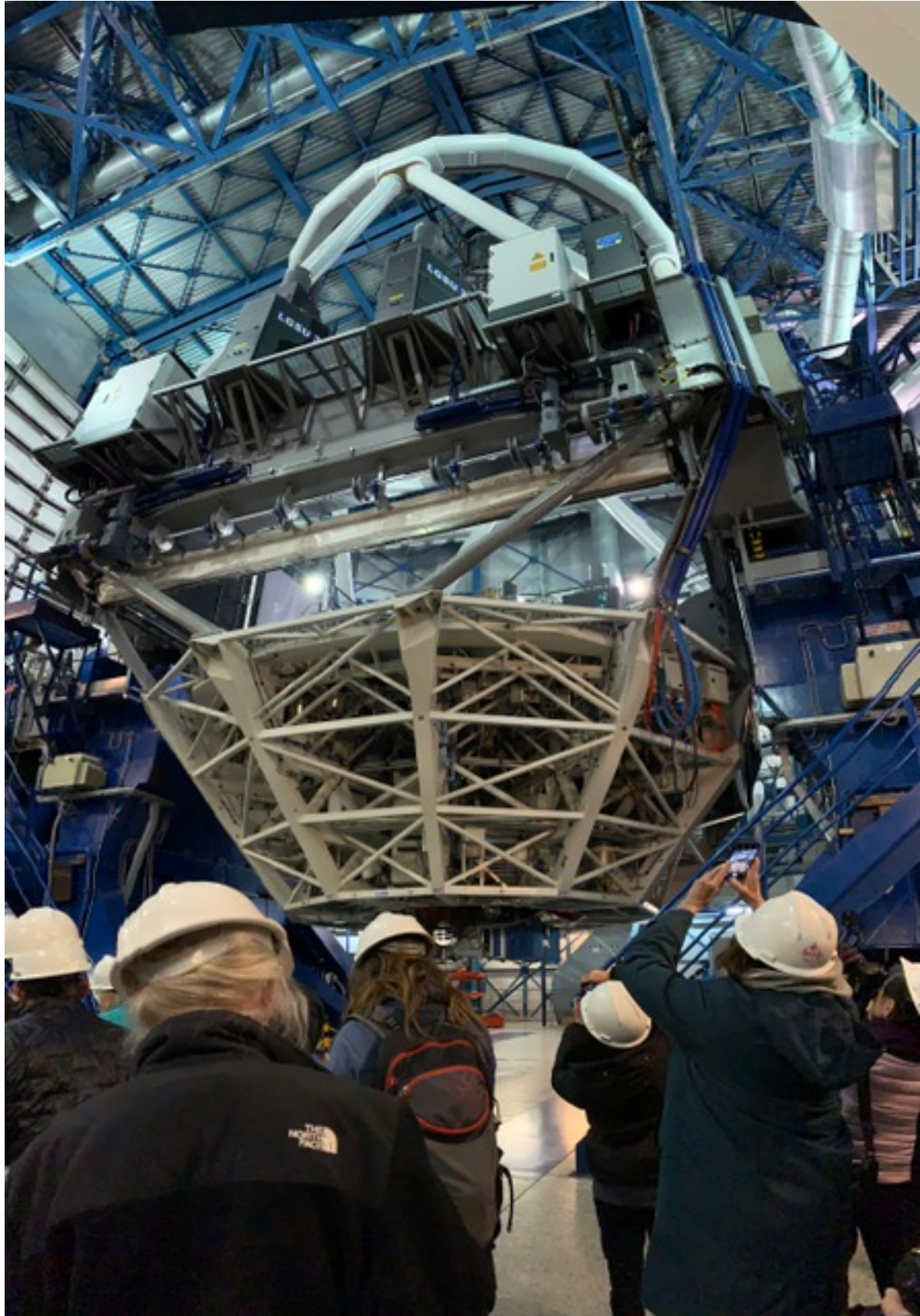
Paranal is at a measly 8645-foot elevation, which is nothing for us now. Heck, you didn't even need oxygen to get up there! The good news is we got to wear hard hats. I think we look like real geniuses in them.



We were disappointed at arrival to learn that there were terrific wind gusts and that it would be far too dangerous to spend time outside seeing the exterior of the telescopes. But it turned out that all the good stuff is on the inside.

We were divided into two groups with two different ESO tour guides. We knew we'd picked the wrong guide when she announced that she didn't speak English. Argh. Our regular tour guide, Sina (the one from the bus) started translating for her, and it was really really bad. Luckily our UCLA troop leader was in our group and she was having nothing of this, so she combined the two groups. Boy were we glad of that! I talked to Sina on the side and she said that our ESO tour guide didn't even understand the telescopes when she was speaking in Spanish!

The telescope we saw (VLT) was really really cool, especially for me. In my early career as a mechanical engineer, I worked on gimballed optical devices, and the telescope was one giant gimballed set of mirrors. At the bottom is the 8.2m, aluminum-coated parabolic mirror. That mirror weighs 25 TONS!



They have to remove the mirror and cart it down to base camp every 18 months to be recoated with aluminum. I've been searching on line to see if I could find a time lapse of how the heck they remove that mirror. I cannot imagine how stressful that must be!

Speaking of stress, the country of Chile is very earthquake prone. Sina said they don't even roll over in bed for anything less than a 7.0. Someone in our group asked about how the telescope handles earthquakes and they said it can withstand an 8.0 earthquake centered in Antofagasta!

You can see in this photo the 8.2m convex mirror at the very bottom and the small concave mirror at the very top:



There's so many nerdy details I want to tell you about, like how this parabolic mirror reflects to the secondary mirror and all the actuators that take out distortion, and the angles of rotation of the gimbals and how cool the door mechanisms were...but I fear I would lose the last few of you still reading if I did.

But I will tell you about one more cool thing. To cleanse your palate first, how about showing how important those hard hats were?



The problem with telescopes on the ground is that they have to look through the atmosphere. That's why we launched the amazing Hubble telescope up into space. The imagery from Hubble was an enormous leap forward in science as a result.

With the VLT, they have figured out a way to remove the distortion caused by the atmosphere. They shoot a laser up into space, and reflect it off of the ionized sodium layer in the atmosphere. They can measure how much the reflected laser light is distorted, and then they use adaptive optics to remove that same distortion from the star light received by the big mirror. By doing this, they are now getting imagery *from the ground* that's as good as what Hubble provides from space. Ok, nerdy bit done.

They let us see the residences where visiting and local astronomers live. We thought that sounded like something dumb to see, but check it out:



On the roof of the inside of the dome, you can see some curtains hanging. This is a covering, not to keep out the sun, but rather to cover the dome at night so the interior light doesn't get out and disturb the telescope. Isn't that crazy?

Also, if you've seen the 007 movie Quantum of Solace (I'm sure Ron has) this very dome and one facing side of the residences was in that movie because it looks so futuristic.

After we left the observatory, we were whisked to the airport where we flew to the lovely seaside city of La Serena. We didn't arrive till

around 8pm, had a group dinner (which was the best meal we've had so far, by the way) and went to bed.



But we went to bed so early because TOMORROW IS ECLIPSE DAY!!!!
We have to get up at 4:30am because it's a 1-hour drive and the eclipse is at 4:39 pm. Yes, 12 hours planned to make SURE we get there and settled.

I'll leave you with a selfie of us drinking fine Chilean beer at the airport:



Allison & Steve

Day 7 - Chile - Eclipse Day!

This day will be difficult to describe in its amazingness. Pretty much take the 4.5 hour bus ride day and think of the opposite of that.

As I mentioned we got up at 4:30am to leave at 5:30 to make what should be a one-hour drive. The original plan was to leave much later but not one single one of us (even me) thought going earlier was a bad idea.

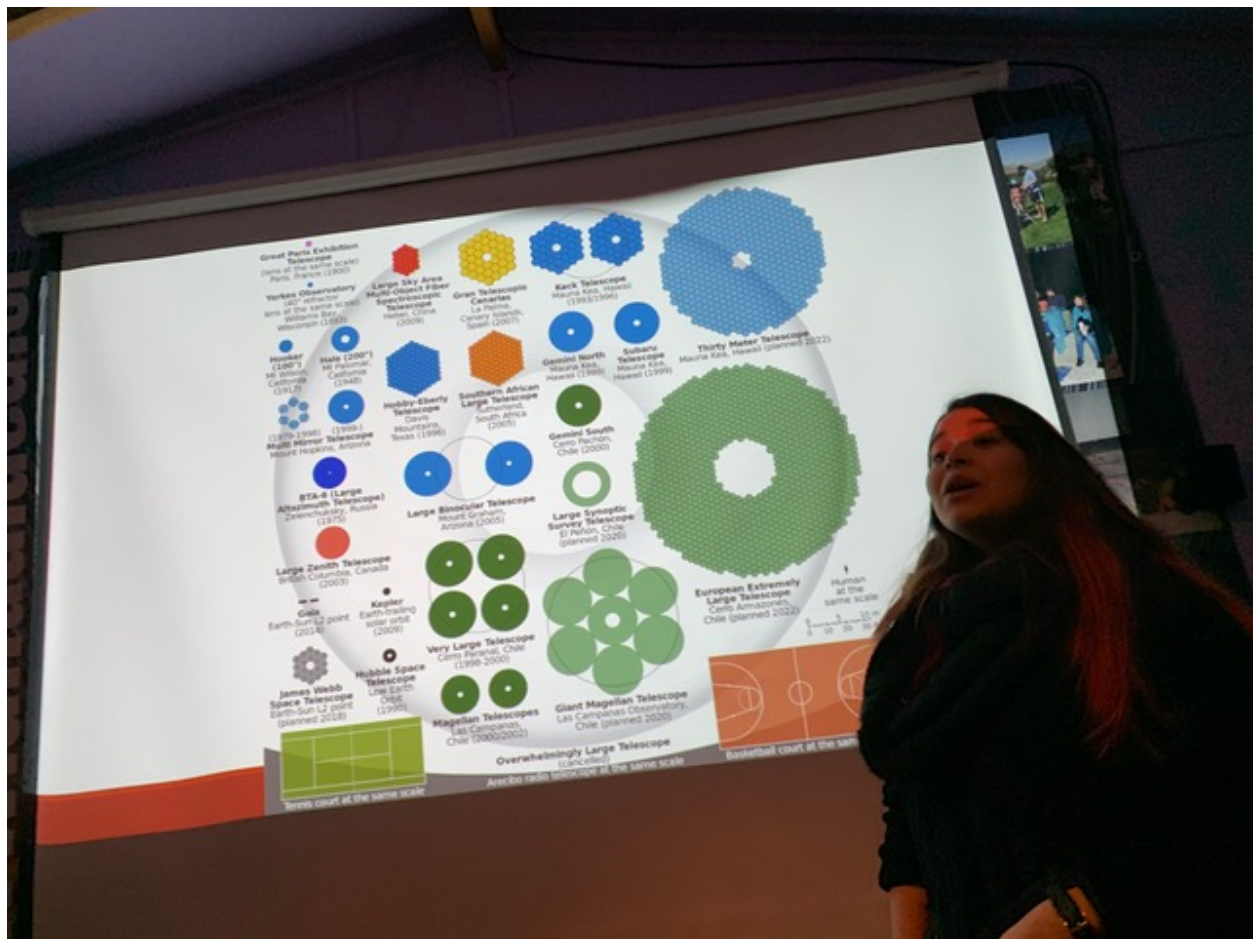
We left La Serena by the ocean and traveled to a town called Vicuña (named after the pretty camelid we showed you from our trip to the Atacamic Lakes.) In Vincuña, there's an area called Centro Astronomica Alfa Aldeal which is dedicated to astronomy. Upon arrival, we had a chilly walk through vineyards to our reserved location for the viewing. We were all badgering the guide about whether there would be adequate facilities, but we needn't have worried. Here's the tent they had set up for us for lunch and dinner and staying out of the sun before the eclipse:



I know, I look like a crack addict wearing sunglasses when no one else is but it was really bright in there.

So we were really roughing it. I think I've mentioned that we're traveling as part of a UCLA alumni tour group. There are also groups from Yale, Berkeley, Harvard, Cal Tech, Princeton, and the Smithsonian. It's interesting to have this many smart people all gathered together. Waiting in line for a bathroom you're guaranteed to have a stimulating conversation with your fellow travelers.

While we were hanging around, they treated us to a lecture by an astronomer, describing all of the different telescopes in the world. She explained why they were created, the science they were working on and then showed us a great graphic of how they compared in size:



I know this sounds goofy, but the lectures have been one of my favorite parts of the trip!

Our group formed a knitting circle and I felt left out with my measly cross stitch. It's not that I *can't* knit with the best of them, but I never liked circular knitting needles. It's sort of like snowboarders vs. skiers.



I like this picture of our personal astronomer, Jean-Luc in his happy place getting ready for the eclipse:



We arrived a good 7 hours before the eclipse was to begin. Eclipses are defined by five specific events. First Contact is when the moon just starts to “touch” the edge of the sun. The sun is 400 times larger than the moon and also 400 times farther away, which is why the moon fits right over the sun during a total solar eclipse. But those 400s aren’t exact (the moon usually appears slightly larger), so there is a length of time the sun appears totally eclipsed, rather than just an instantaneous effect.

Second contact is when totality starts, so it's now safe to remove protective eyewear.

Second contact has a very dramatic entrance; it creates what's called the diamond ring. There's a ring with a brilliant flash of light in one corner as the eclipse enters totality followed by darkness. Third contact has the same diamond ring effect which is very tempting to keep looking at (I did for probably longer than I should!) and you're back to protective eyewear. Fourth contact is like first contact, it's the end of the eclipse.

When we saw our first eclipse on a ship in the middle of the Pacific between Australia and New Caledonia, I spent the entire time fussing with my camera trying to get a good shot (using a crappy plastic filter). I didn't get a good shot AND I completely missed the mystical effect on the psyche that a total eclipse can elicit. When we saw the second one in Oregon, I didn't take a single picture and the impact on me was huge.

I purposely did not buy a good solar filter for my camera this time so I'd be forced to enjoy it. However, right before totality a guy showed me a chart he'd downloaded from the internet that showed for a specific aperture and ISO setting, the length of time to keep the shutter open to capture the eclipse at totality.

Before totality, I dialed in the numbers on my camera, planning to maybe drop the camera onto a tripod to take the photo if I felt the urge. I had the tripod set up already using the compass and level

app on my phone so the camera would point in the right direction at totality.

Totality for us was 2 minutes and 25 seconds long but it still seemed to go by in an instant. After some hugging and tearing up with fellow travelers, I thought, "What the heck, why not try to take the photo hand held?" My first shot was way too dark (ISO 200, f/22, 1/200 for my camera nerd friends.) I quickly made two massive changes to the values, widening the aperture to f/7.1 and slowing the shutter to 1/20th of a second, which is the longest I figured I MIGHT be able to hand hold the camera.

And I got the shot of a lifetime:



I told everyone I'm throwing away my camera now because I'll never top that one.

Oddly, once third contact is complete and the eclipse starts to wane, it's not terribly interesting. The anticipation of the eclipse makes the entrance fantastic but once totality is over, it's not that exciting.

But for the eclipse from Vicuña, as the eclipse waned, the sun also set over the mountains. It was a super bonus prize to an eclipse sunset, making it even more special. I realized I could run back and see the last of the sunset again. And run back farther and see it again! Steve suggested I just keep running...

Here's a wide angle shot Steve took during totality showing the mountains.



Steve set up his video camera (with a solar filter) to capture a zoomed-up version of the eclipse as it passed through 2nd contact, totality and 3rd contact, and he recorded a wide-angle shot of the audience with his GoPro to capture the audience reaction. He'll combine those two videos into a time-lapse when we get home and we'll be sure to send along a link to his masterpiece when it's finished. The 2015 MacBook he carried with him might just not be up to the project!

It was a magical day with brilliant people who enhanced the experience. If you ever get a chance to see a total eclipse, do it.



Allison & Steve

Day 8 - Chile - Beach in Coquimbo & La Silla Observatory

After the excitement of the eclipse and a four hour drive back to La Serena (normally 1 hour), we collapsed in our hotels at 11pm. Our taskmaster Christel gave us a late lie in, so we didn't have to be ready for the bus till 9:30am. It was GLORIOUS!

That meant our first adventure was actually lunch. We left La Serena to drive up the coast to a small fishing village called Coquimbo where they actually let us wander around on the beach. I'm happiest when I'm near or in water.

In this photo of the beach by Steve, I'd like to point out something. The surf when it pulled out would make this really great noise as it rattled all the rocks. I bring it up because Steve very helpfully would point at the rocks each time so that I knew where to listen.



And there were actually vultures on the beach. I crept closer and closer to them until most of them took flight.



We ate at a restaurant overlooking the ocean, but for the first time on this tour, things did not go smoothly. The restaurant was unprepared to feed 35 people at once, and before Steve and I were even served, our local guide, Mauricio, started telling us we were late for the next adventure. We had ordered beef, but they quickly dropped some fish dish in front of us and told us we had 2-3 minutes to eat!

The fish was fantastic, and we managed to throw a few French fries down too. But get this - the fish was actually EEL! I don't know how big this eel was, but it was served as a steak about 4 inches across. I didn't know I liked eel but I loved it.

After "lunch" we rush rush rushed to the bus and drove about an hour and a half more up to the La Silla Observatory, again run by the European Space Organization, or ESO. These were not the most

impressive telescopes we'd seen on the trip but they were interesting in their own right.

We started at the 3.6m optical telescope. Guess what they named it? "3.6m". Makes Very Large Telescope sound like a very creative name! The guide told us all kinds of things about it, but later that night our resident Astronomer, Jean-Luc told us that most of what she said was wrong.

He did tell us that this telescope is special because it was the first to use active optics, which is the little actuators that push on the primary mirror from below to remove distortions. That capability is an important part of the bigger telescopes we've seen, like the Very Large Telescope (VLT) at Paranal.



The 3.6m telescope had an unusual gimbal system. Instead of azimuth and elevation as nature intended, the 3.6m used an ascension/declination gimbal system. I had trouble wrapping my head around it to figure out how it worked.

A selfie to add scale:



After that nearly fact-free tour, we moved on to the NTT. Get this, NTT stands for New Technology Telescope. How long was that a good name? At least the NTT had an azimuth/elevation gimbal so I felt good about that.

When we saw the VLT, we spent all our time looking at the big mirror and the reflecting mirror and the gimbal. But at NTT we got to actually see the instruments on either side of the telescope where the data is actually collected. EFOSC gathered data in the visible light spectrum, while SOFI collected infrared energy for analysis.

Here's the lovely EFOSC:



A big highlight for Steve and me on the tour of La Silla was that we met two more astronomers. When we were at ALMA, we had a short briefing by a radio astronomer named Ruben Herrero Illana, and he

turned out to be on the same tour with us at La Silla. And even better, his girlfriend Zaira Berdiñas, an optical astronomer was there as well. Steve and I basically glued ourselves to them so we could ask more questions.

Zaira worked with the 3.6m telescope and knew everything about it. Steve pestered Reuben about some pressing questions he's had about Dark Matter. It was glorious nerdy fun for both of us, and Zaira and Reuben actually seemed to enjoy us. I'm not joking, every once in a while they'd spin around in their seats on the bus to tell us some new fun fact.



Check out the Astronomy Picture of the Day for July 5th - it's of the eclipse, taken at the very spot where Steve and I were in this photo!
<https://apod.nasa.gov/apod/ap190705.html>

As we left Lasilla the lighting was just spectacular:



We were super late getting back to the hotel, but no rest for the wicked. We shoveled down a quick dinner and then had another awesome lecture by Jean-Luc Margot. This time he told us about the astronomical work of ancient civilizations. After seeing so many cool things people did basically with stone tools, I left the lecture feeling like I hadn't even tried to discover something even with the tools available to me.

We'll leave you with a selfie of us with Lasilla Observatory in the background:



Allison & Steve

Day 9 - Chile - Boat Ride to Isla Damas & Isla Choros then Back to Santiago

Day 9 started out as many others, with a 5:30am wake up call. There was no celebration of US independence, but Steve and I showed the patriotic colors starting at breakfast:



We took off early on a bus ride (you're shocked it's a bus ride, right?) for an hour and a half to a fishing village called Punta Choros in Coquimbo. From there, they convinced some of us to get in very small fishing boats (with seats) and travel across the ocean in very high seas to the Isla Choros and Isla Damas.

The ocean certainly looks calm enough to go out in a 14-foot fishing boat, am I right?



It took about 45 minutes to get out to the islands.

We saw red-footed cormorants. They're no blue-footed Boobies but they were still pretty cool:



We saw pelicans:



And a pod of teenage seal lions frolicking in the ocean. They actually came toward us when the guide whistled at them:



While Big Daddy sea lion hung out with four of his wives:



And some sea otters trying desperately to sit on a rock for lunch (they kept getting swept off!) This one is for Diane and Bill:



(I would like to pat myself on the back for this shot. 300mm equivalent zoom taken out of a tiny boat clearly rolling in the ocean like crazy!

The hope was to see the Humboldt Penguins. We found just one. This photo was taken with a 300mm equivalent lens (a very big zoom) and I cropped the daylight out of it so you could actually see that it's a penguin. This penguin was at the top of a cliff at least a couple hundred feet above the water ... proving categorically that penguins can fly.



The boat ride out was quite rough and a few people on board were trepidatious, but I thought that it was absolutely fantastic, and I got at least one new friend to catch my enthusiasm. Evidently she's not normally adventurous, so she had me record her laughing as we rode up and down the swells for her daughters, ending with, "If I don't make it back, I love you both!"

Steve captured this shot that he calls "Allison in her happy place":



When we got back (and those who were soaked by the waves had changed pants and socks) we had a lovely lunch of abalone and a local fish called Pippin. Even I liked it!

We sat with a couple we hadn't really gotten to know that well yet, Steve and Sarah. In conversation we discovered that they live across the street from our dear friend Lori Tonder!



I'm excited because Sarah has a "Crafts and Chat" thing at her house every Friday afternoon where people knit, do other crafts and even edit photos all while chatting. Sarah has a way of knitting with circular needles that I want to learn so I'm going to give it a try.

I know you don't know these people but we find our astronomer Jean-Luc and his wife Sabina absolutely enchanting and their

interactions delightful. Here they are in a spontaneous moment of joy during lunch:



After lunch we drove back to La Serena and jumped on a charter flight back to Santiago.



Steve found this sign at the airport that, for some reason, he thought was hilarious. He insisted that it be included in this travelogue installment:



Our plane was supposed to leave at 5pm but was pushed back to 6:30pm, which caused some havoc. We were supposed to have a free night to go out to dinner anywhere we wanted, and many

people (including us) made dinner reservations in Santiago. Traffic was bad, so we kept having our guide Mauricio push our reservations back and back and back.

By the time we got to the hotel, it was 9pm. I suggested we abandon dinner out and everyone in our little party agreed. Instead we went to the bar and ordered Tanqueray and Tonics, and then a couple bottles of wine, and then French fries, and then empanadas. It was fabulous.

At the end of the evening, Steve decided to cover the check. There were, as expected, many protests, but my favorite was what our new friend Hazel said. She protested, "Now I'll have to buy you a present. And I have TERRIBLE taste!"

The two people we've probably spent the most time with on the trip are Jay and Linda. Probably because Linda's favorite drink is Tanqueray on the rocks. My favorite crack of Jay's came into play when I was talking about the virtues of reading on a Kindle. I explained that if you don't know a word, you can press and hold on it and the dictionary definition will pop up. Jay said, "I try to do that on paper books." I asked, "Does it work?" And he said, "Not yet!"



Allison & Steve

Day 10 - Chile - Santa Rita Winery

Today was a glorious last day in Chile.

We were surprised that our prison guard Mauricio decided that we wouldn't have to depart the hotel until 9am! We hopped in our trusty bus and drove from Santiago to the Maipo Valley to visit the Santa Rita Winery.

When I drew the diagram of the trip (you HAVE been following along I assume?) I remember being super excited to see a vineyard tour on the agenda.

The grounds of the vineyard were spectacular in the late morning light. The main house was built in 1790 by Doña Paula Jaraquemada. During the war for independence against the Spaniards, she hid 120 soldiers at a risk to her property and her life. They named their Sauvignon Blanc 120 Reserva Especial in honor of the soldiers saved.



In 1880 somebody bought the property (I probably should have remembered who, but the fact count is already unusually high in this report) and turned the property into a vineyard.



We were taken into a vast cellar where there were oak casks as far as the eye could see. Our guide explained that the oak casks come from California and France, and are first used for their premium wines and then get passed down to be used for making their reserve and lower wines.



You'll notice in this picture that there's a set of columns that are white. They were destroyed in a huge earthquake a few years ago and replaced. Now this particular area is a Chilean historical site so they're not allowed to use it to age wine. The endless rows of casks were empty, for display only.

The oldest wines they still have laid down are from the 1980s and they're still tasting them or quality control.



Nolan would have loved the bottling line. Steve took a bunch of videos for him so he could study it. Might need a road trip at some point. They bottle 250,000 bottles a DAY here!



After seeing how it was made we had a lovely wine tasting outside.



For those curious about the wines, we had the 120 Sauvignon Blanc, their Secret Reserve Cabernet Sauvignon (because *Secret Reserve* must be better), and the wine for which the whole of Chile is famous, their Casa Real Carménère. I'm not a huge Sauv Blanc fan but It was actually lovely, and the Cab was quite nice. But the Carménère was outstanding. Our checked baggage might have been discovered to be overweight upon arrival at our flight check in.

Here's an artsy fartsy picture of a wine glass:



On the trip we had an 84-year old woman named Sheila I wanted to tell you about. At her age, she had a bit of trouble doing things like carrying her own bags up and down the stairs in the bus, and walking long distances. But she was so absolutely delightful that everyone took turns helping her.

One day she spent about 6 hours alone on the bus. When we got back, she didn't complain, wanted to hear about everything we did and was very excited for all of us. Steve and I talked about how we want to be like Sheila when we grow up.

Here's me and our friend new friend Lena chumming up with Sheila. Isn't she fabulous?



After the wine tasting we had the best meal of the entire trip. We drove back to the hotel, packed and were whisked to the airport for our late night departure home.

I'll do one final letter to give some overall thoughts and impressions from the trip, but until then, we'll leave you with a pic from the garden at Santa Rita.



Allison & Steve

Finale - Chile Trip Observations

We survived the 9 hour flight from Santiago to Dallas and even made our connecting flight to Los Angeles. It's great to be home and to sleep in our own bed. I wanted to give you some of the impressions/ observations Steve and I noticed about Chile and about traveling with the UCLA Alumni group on this kind of tour.

UCLA Alumni Tour

We talked quite a bit with the UCLA representative, Christel and she said that she thinks the sweet spot for this kind of tour is for people in their late 60s to 70s. She felt (and we did as well) that we should do more physically challenging tours while we still can, since we're in our early 60s. The four people in their mid-80s struggled quite a bit with the level of activity. I average around 18,000 steps a day, but on the trip it was only around 6-8000 steps per day.

However, when we found out that she's doing a tour on a small ship around Iceland and bringing noted UCLA astronomer Andrea Ghez on the trip, we signed up immediately! Dr. Ghez discovered a black hole, so how could we resist the chance to hear from her?

I can highly recommend going on a college alumni trip because ANYBODY you sit next to at lunch is intelligent, well-educated, and open minded. People who travel like this simply don't live in their own US-centric bubble. We had doctors, lawyers, dentists and even engineers on this trip. So many brilliant people to widen your knowledge.

All but 3 of our 34 people on the trip used iPhones. I thought that was very surprising. There were two "kids" in the group (in their 30s) who used Android and were quick to say it was because of cost. I'm not used to it being so swayed in one direction as this. Oddly, a lot of the people had never seen a Kindle before. I became a walking advertisement for e-readers, explaining how they're better to read

on than an iPad, and weigh less than “real” books. Again surprising that many hadn’t seen one before.

On to the Chile-specific observations:

South Americans, based on our experiences in Peru, Ecuador and Chile, are very frugal with their paper products. A dinner napkin is exactly what we in the US would call a cocktail napkin. You should have seen how excited we were the first time we had two-ply toilet paper again!



There are no washcloths in Chile. None. Not at any hotel. Maybe we’re old school, but when you’ve got 5 minutes to freshen up between a long, dusty day in the desert and dinner and a lecture, how do you wash your face? The good news is that their hand towels are the size a bathmat...

When you order a mixed drink in Chile, you get a ridiculous amount of alcohol. In more than one place, we ordered Tanqueray and tonic. In all cases, they poured us a 12 oz glass about 3/4ths full of gin with maybe 2 little ice cubes and then handed us each a very large bottle of tonic. Not sure where that tonic was supposed to fit. You definitely do not need to order a second drink.



Chile has lots of dogs. For the most part, they're not on leashes, but they have owners. They wander around on their own, hang out in front of shops, and are friendly to strangers. They're not the cleanest, most well-groomed dogs I've ever met, but they're quite well behaved.



I wouldn't go to Chile for the food. Santiago was pretty good, and the Santa Rita Winery lunch was spectacular, but everything in the Atacama Desert was very plain. Plain rice with nothing on it, a slab of beef with little seasoning, salads that were something shredded to the point you couldn't pick up the pieces. Dressing is a bottle of oil on the table and some lemon juice on the side. Did not blow my dress up.

Most people in Chile don't speak English. Since I speak no foreign languages, I'm not mocking them, but if you don't have a guide and you don't speak Spanish it will be pretty rough for you. I used Google Translate (free app for Android and iOS) to look up phrases, and have my phone speak in Spanish for me. I also used the camera feature in Google Translate to look at menus in restaurants so I could see what I was ordering. Pretty cool tool.

Don't worry about what you're going to wear in Chile on this kind of trip, because nobody cares. There were no fashionable nights out, and mostly we worried about how many layers we could put on to stay warm. That could have to do with the fact that we went in Winter? There was one person who was always fashionably dressed and that was Sheila, our 84-year old matriarch.



Before you go on the trip, have your friend Diane buy you a plastic bag made to cover your big-girl camera but leave the front of the lens exposed for when you go in a stupid small boat into high seas. I wouldn't have been able to get penguins and otters and cormorants and sea lions if it weren't for Diane. Also, let it fly off in the wind right as you get out of the boat and then buy another one. While you're at it, buy another lens cap because you lost it on the trip too. For the 8th time.

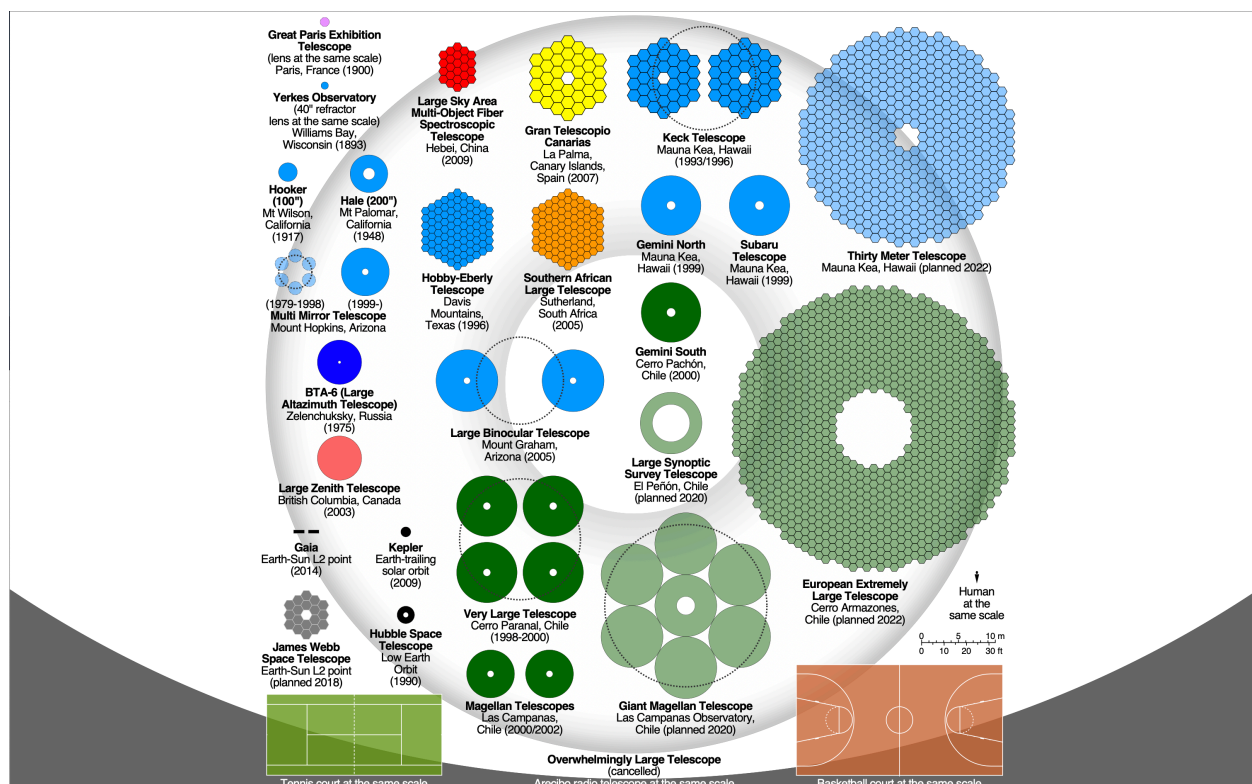


As much as Steve pays attention to Astronomy he (and I) were surprised at how many large telescopes there are in Chile. They explained that they have three reasons for this:

- They have the driest place in the world with the Atacama Desert, and moisture in the air is the worst thing for getting good data from telescopes
- They have some really high mountains, like Cerro Chajnantor where the ALMA Observatory is located

- Chile LETS people put telescopes there. Unlike some areas of the world where political interests discourage this kind of development, Chile likes the telescopes. By donating their land, they get to do the research too, but other countries fund the building.

Here's a fabulous graphic showing all of the large optical and radio telescopes across the world, all drawn to scale. You can see that several of the bigger telescopes that exist today or are planned are in Chile. (For a fun resolution version of this go to https://upload.wikimedia.org/wikipedia/commons/c/c5/Comparison_optical_telescope_primary_mirrors.svg)



On the iPhone (and I'm sure on Android as well), they have something called predictive text. For example, if you type "Happy" it might suggest "Birthday". It learns to predict based on what you type often. On this trip, towards the end, I typed "large" and predictive text suggested "telescope". Isn't that awesome?

Buy gloves that allow you to use a touch screen before you go (if you go in winter). When we went to see ALMA and it was bitterly cold, I was in pretty good shape because I was taking photos with my big girl camera which allows me to keep my gloves on. Steve, on the other hand was taking iPhone photos and 360 photos so he had to take his gloves off to take photos. His hands were so cold that he couldn't hold the 360 camera and it fell to the ground!

Luckily it came out unscathed but it was a close call. Here's a link to a 360 degree photo of the two of us with the amazing ALMA 7m telescopes and the desolation of the plateau around us:

<https://theta360.com/s/dWC8qqusa3OKq9CZ3jkwqQZNo>

I think you might enjoy this as well. Steve produced a fantastic (and short) time-lapse video of the total eclipse on July 2nd from Vicuña, Chile:

<https://www.youtube.com/watch?v=9AoY4iUvJcs>



Thanks for following along on our adventure; maybe we'll chat with you from Iceland next year!

Allison & Steve