

Take a highway to heaven:
the Atacama Desert delivers
one of Earth's most dazzling
views of the cosmos



The background of the entire page is a composite image. The top half shows a dark, star-filled night sky. The bottom half shows a desert landscape at dusk or dawn, with reddish-brown hills and sparse vegetation. The title 'Stargazing in the Atacama Desert' is overlaid on the sky portion in large, white, sans-serif font.

Stargazing in the Atacama Desert

Becca Marsh tours Chile's high Atacama Desert – home to some of the darkest skies and most advanced astronomical observatories on the planet – and discovers a stargazing destination like no other

We had been driving for most of the day across the rugged terrain of the Atacama to reach our wild camp

spot for the night. Shades of rusty orange coated the landscape. Volcanoes loomed among the jagged peaks that protruded from the horizon. As the Sun started to set and a pink hue flooded the sky, the dazzling stars started to reveal themselves. I couldn't imagine the beauty I was about to witness.

I was fortunate to visit the Atacama earlier this year and was welcomed with some of the best skies I have ever seen. After three weeks of traversing the Moon-like terrain, I found that the best places for stargazing were in the true heart of the Atacama region.

The Atacama Desert isn't merely great for stargazing, it's renowned as one of the finest places in the world for it.

Witnessing some of the darkest skies on Earth from here is a truly unforgettable experience. Several factors combine to make it astronomically ideal: its high altitude, its geographical location and its cold temperatures create the near-perfect conditions for observing the sparkling skies above.

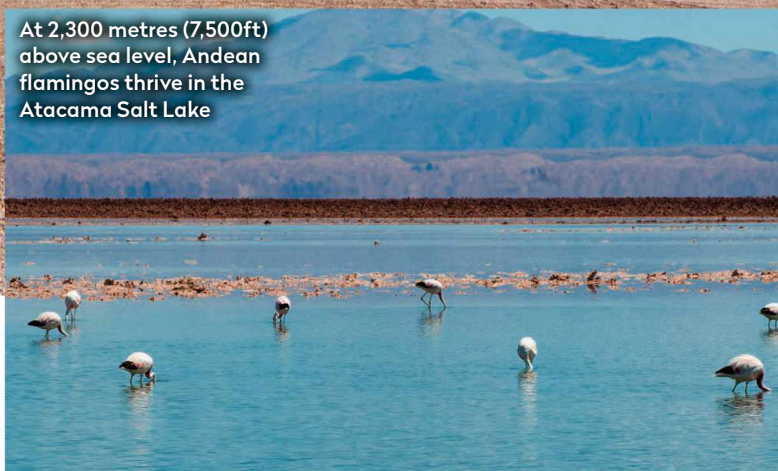
Situated in the Southern Hemisphere in the north of Chile, the Atacama is the driest non-polar desert in the world. It formed between the towering Andes mountain range and the smaller mountains that hug Chile's northern coastline, the Chilean Coastal Range. These coastal peaks block clouds from the Pacific, while the Andes stop moisture from the Amazon basin – together shaping the desert's extreme aridity over time.

With less than 30mm of rain per year, the region has become one of the driest places on Earth. The area's unique ►

From snow-capped volcanoes to shimmering salt flats, the Atacama is a tapestry of contrasts



At 2,300 metres (7,500ft) above sea level, Andean flamingos thrive in the Atacama Salt Lake



► geography was a surprise to me, as I had never experienced a landscape like it before. I had visited this region before, but I followed the coastal route, visiting the small fishing villages and sampling the day's catch. Inland from the Chilean Coastal Range, the experience is something entirely different.

A landscape full of surprises

The stark contrast between Chile's coast and the high desert is incredible and difficult to imagine until you're there. Salt-crusted flats and golden canyons adorned the roads as we wound through the Mars-like terrain. Following the tourist route known as Ruta del Desierto, we passed a variety of scenes: pink flamingos paddling on the shores of the Salar de Atacama (Atacama Salt Lake), and vicuna (relatives of the llama) springing like deer through the yellow brush that lay like a blanket across the desert floor. The Atacama isn't your typical desert with golden dunes rolling endlessly to the horizon; it presents a diversity of colours, textures, flora and fauna.

Altitude plays a significant role in this dramatic change in scenery, as the Atacama spans from sea level to remarkable heights – making some regions better suited to stargazing than others. Many locations are above 6,000 metres (19,500ft), the highest point being the dormant volcano Ojos del Salado, which reaches an altitude of 6,893 metres (22,615ft). Air is less dense at such altitudes, meaning there is less distortion when looking up at the stars.

However, stargazing in the Atacama isn't without its challenges. The altitude can be dizzying, especially if you head up to high-elevation spots like the Chajnantor plateau, home to the Atacama Large Millimeter/Submillimeter Array (ALMA). Most visitors will stay around 2,400 metres (7,800ft) during their adventures and, to help ease the effects of altitude, only take day trips to surrounding



attractions at higher elevations. But it's worth it for the night skies; indeed, even at lower elevations, you'll notice a difference in the clarity of the sky compared to being at sea level.

Although the region is a harsh environment for those who live there, the Atacama's geography and high elevation ensure an exceptionally high chance

▲ Relatives of the llama, vicuna roam the yellow, brush-covered high plains

"The Atacama spans from sea level to remarkable heights... but even at lower elevations, you'll notice the clarity of the sky"

Ready for an Atacama adventure?

What to consider before a stargazing trip to Earth's darkest skies

With high temperatures during the day which quickly drop at night, the Atacama region can be challenging to navigate as a first-time visitor. You'll likely start at the town of San Pedro de Atacama, the epicentre for stargazing in the Atacama Desert, and the place from which several tours operate. Many tours take you out of town and some even to the ALMA telescope. Generally, tours operate at night, with guides that bring a selection of telescopes along and point out constellations, planets and more to observe.

It's less common to find overnight tours, but there are several glamping sites that are well located for this. Look for local guides and tour operators based in San Pedro de Atacama.

Warm layers, thermals, plenty of water, a good jacket and suitable footwear are highly recommended. For my trip, I invested in merino base layers, a good down jacket and a windbreaker to cope with the extremes.

The Atacama varies in altitude, but for the best stargazing, you'll likely be above 2,000 metres (6,500ft), so it's a good idea to acclimatise beforehand or consider taking altitude-sickness

medication to make your experience more enjoyable.

The summer months, December to March, are peak times for tourists, but as winter approaches, the days get shorter

and colder, and the area becomes quieter. A good time to visit is April, the shoulder season – it's free from mass tourism and the colder evenings bring fresh skies.



▲ Pristine skies at Chajnantor plateau let ALMA's dishes tune in to the Universe's faintest signals

of clear night skies. The absence of moisture means cloud formations are rare. This, combined with its remoteness and near-total lack of light pollution from cities and other urban areas, creates ideal conditions for observing the night sky with the naked eye. The region is considered to have the cleanest skies in the entire Southern Hemisphere, with almost 300 clear nights a year. Altogether, thanks to its unique position between the coastal range and the Andes peaks, the Atacama offers conditions that have

drawn astronomers for decades to study our Universe and test equipment destined for space expeditions.

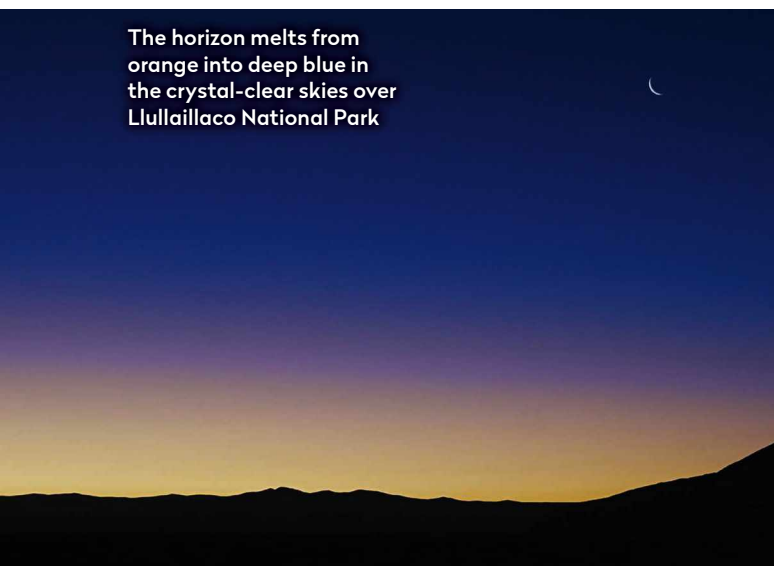
Thanks to its near-perfect night skies, the Atacama is home to several international telescopes and is one of the few locations on Earth to reach the darkest sky reading of 1 on the Bortle scale. The European Organisation for Astronomical Research in the Southern Hemisphere (also known as ESO) has used the Atacama as a base for its Southern Hemisphere telescopes since the 1960s, and continues to invest in new astronomy facilities, such as the Extremely Large Telescope (ELT), due to see first light in 2029.

Dark skies, deep science

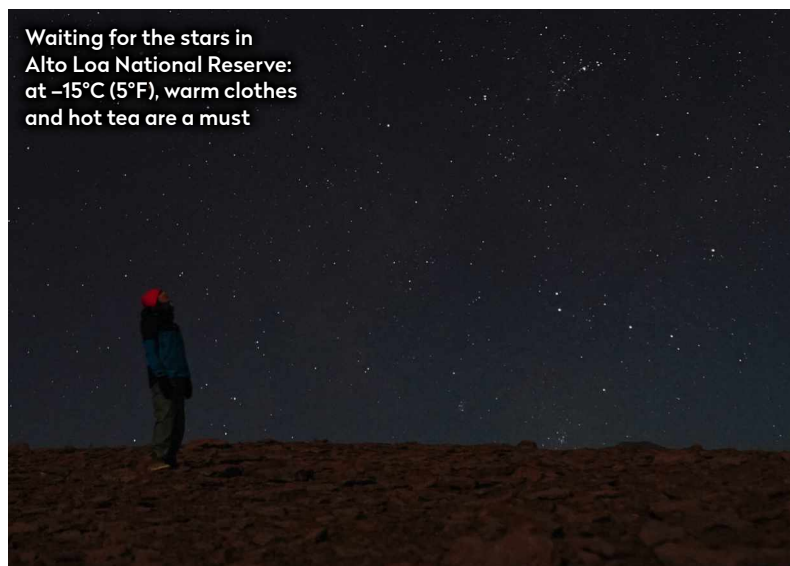
ESO is comprised of 16 member states and operates several astronomical observatories in Chile's Atacama region; as well as ALMA, there's La Silla, Paranal and Chajnantor. Each site hosts telescopes that observe the night sky across a range of wavelengths. ALMA, for instance, is a network of 66 high-precision, interlinked radio dishes forming an interferometer. It's one of the most sensitive facilities for studying alien worlds forming around distant stars, and – as a key part of the global network that together makes up the Event Horizon Telescope – contributes to the direct imaging of black holes. ►



Becca's group set up camp on Pajonales' saline plains, just in time to see the Milky Way scroll into view



The horizon melts from orange into deep blue in the crystal-clear skies over Lullaillaco National Park



Waiting for the stars in Alto Loa National Reserve: at -15°C (5°F), warm clothes and hot tea are a must

► But astronomers don't come here just for the stars. In addition to world-class observatories, the Atacama is home to the 'Valley of the Moon' and 'Mars Valley', areas near San Pedro de Atacama that have been used to test space technology. It felt like I was on another planet as I drove through these regions. I could see the heat creating mirages in front of me as red dust kicked off the ground. Small pockmarks on the surface resembled images I had seen of the Moon, so it was no surprise to learn that this part of the desert had been used by NASA to test rover prototypes such as K-REX2 (shown right).

Simply wondrous

However, you don't need the multi-million-dollar equipment of a space agency to successfully stargaze in the Atacama. In fact, you really don't need much equipment at all to enjoy a night under the stars. From San Pedro de Atacama, you can drive along the Ruta del Desierto and visit many places



NASA tested its autonomous rover in the Atacama's 'Mars Valley' in 2019

far from cities and light pollution, offering a truly wild landscape to set up camp. The beauty of the Atacama is that anyone can engage with the night sky: you will see something if you are an amateur looking to learn from a guide, or a hobbyist heading

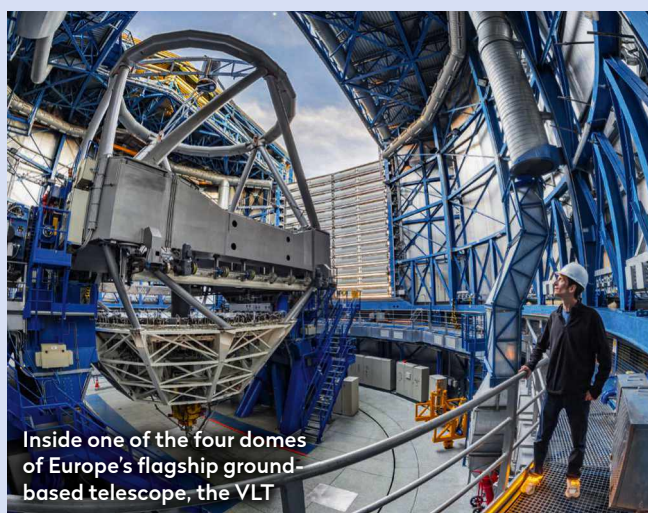
One BIG destination: visiting the VLT

Take a tour of the world-famous Very Large Telescope

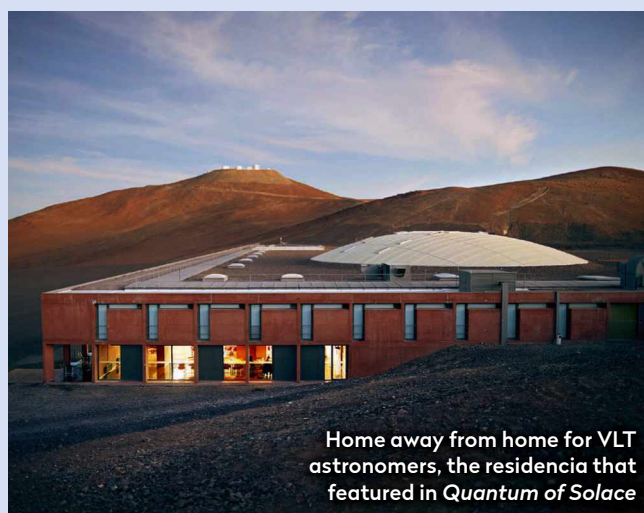
The VLT (Very Large Telescope), comprising four 8.2-metre-diameter telescopes constructed in the 1990s, is one of ESO's most famous instruments in the Atacama Desert. Located near the coast, 120km (75 miles) south of the port city of Antofagasta and a four-hour drive from San Pedro de Atacama, it's among the world's most advanced visible-light observatories.

Visiting the VLT is free, with tours kicking off with a brief overview of the Paranal site. From the base of the telescopes, you're introduced to the area and can admire views of the Andes to the east before entering one of the domes. The tour concludes with a quick stop at the astronomers' residence, made famous as a location in the James Bond film *Quantum of Solace*.

Tours last between two and three hours. It's worth noting that public visits are only available on weekends and during the day, as astronomers use the telescopes at night. There are two daily time slots for visits, and bookings for the Paranal Observatory can be made via the ESO website at www.eso.org/public/about-eso/visitors/paranal.



Inside one of the four domes of Europe's flagship ground-based telescope, the VLT



Home away from home for VLT astronomers, the residencia that featured in *Quantum of Solace*

► You don't need fancy equipment – just wrap up warm and get ready for the Atacama to reveal our Universe



Accredited travel writer **Becca Marsh** explores the natural world and culture, with a passion for overland adventures and sharing her experiences



out into the wilderness with a stargazing app and a pair of binoculars. All you need is patience, a keen eye and some warm layers!

One of my favourite wild camp spots for stargazing was Salar de Maricunga, just off Chile's Route 31. The altitude is higher here, just below 4,000 metres

(13,000ft) and, in April, extremely cold – so it pays to be prepared.

On my visit, the Sun set around 7pm, so I sat down in my dusty camping chair and waited for the show to begin. As a keen photographer, I had my camera, tripod and a simple pair of binoculars, and I was set. I sat around the camp with my fellow camp-mates, and we passed the binoculars around, pointing out constellations we recognised.

A cold shiver came over me as I set up my camera, ready to capture the clear night sky. I looked up and was overwhelmed by the colours; hues of purple and blue danced in front of me. It was as if a light switch had been turned on.

The sky deepened from sunset to a bold dark blue, and stars began to appear. Then the Milky Way revealed itself, stretching from one horizon to the other like a pathway that was paved with starlight. I've seen it before, but only very faintly – never like this. Every thread of cosmic dust, every star cluster, was visible, glowing in high definition.

I was so mesmerised, I had forgotten about the cold, and before I knew it, I couldn't feel my toes. But it was 100 per cent worth it – a small price to pay for such a reward. It still amazes me how this place came to be, and that by chance natural geography has created one of the most perfect locations on Earth for exploring the cosmos. 🌌