



<p><b>ESOcast Episode 33: Under Chilean Skies</b></p>	
<p><b>00:00</b>  <b>[Visuals start]</b></p> <p><b>[Narrator]</b>  1. Cloudy skies may be nice from an artistic point of view, but clouds are an astronomer's nightmare.</p> <p>And while illuminated cities are a night-time beacon of modern civilisation, bright night skies are also a no-go zone for world-class astronomical observations.</p> <p>So, in the pursuit of pristine skies, ESO, the European Southern Observatory operates its telescopes far beyond Europe, in the remote and arid landscape of the Atacama Desert in Chile.</p>	<p><b>Images:</b></p> <p>Night timelapse of cloudy sky (C. Malin)</p> <p>Night timelapse with bright city seen at a distance (C. Malin)</p> <p>Google Earth view: Atacama desert seen from space, zoom-in to ESO sites</p>
<p><b>00:41</b>  <b>ESOcast intro</b>  2. This is the ESOcast! Cutting-edge science and life behind the scenes at ESO, the European Southern Observatory. Exploring the ultimate frontier with our host Dr J, aka Dr Joe Liske.</p>	<p>ESOcast introduction</p>
<p><b>01:01</b>  <b>[Dr J]</b>  3. A top-class site for astronomical observations must meet several criteria. To begin with, of course, you need a sky that is free of clouds pretty much all year round. But in addition to that, you also need excellent atmospheric conditions, as well as very dry air with as little water vapour content as possible. And this is exactly the kind of environment that you find in the Atacama Desert in Chile.</p>	<p>Dr J in virtual studio  Background images: Night time lapse</p>
<p><b>01:30</b>  <b>[Narrator]</b>  4. The Chilean Coast Range. Here, the cold offshore Humboldt current creates a coastal inversion layer of cool air, which prevents rain clouds from developing. Often, a layer of fog is created, which rapidly disperses in the foothills above the desert.</p> <p>A view from the Paranal Observatory towards the Pacific Ocean clearly shows the top of the cloud layer.</p>	<p>Chilean coastal range</p> <p>Coastal clouds gathering at the foothills.</p> <p>Pacific seen from Paranal</p>

<p>In addition to the coastal inversion layer, a region of high pressure in the south-eastern Pacific Ocean creates circulating winds, forming an anticyclone, which helps to keep the climate of the Atacama dry.</p>	<p>Time lapse of desert</p>
<p><b>02:24</b> [Narrator] 5. The Andes lie to the east, acting as a natural barrier for clouds coming from this direction — so all the possible paths for moisture to reach the Atacama Desert are literally blocked. This results in extremely dry air and clear blue skies. Ideal conditions for astronomical observations.</p>	<p>Animation showing Andes mountains serving as a cloud trap</p>
<p><b>02:48</b> [Dr J] 6. But we're not done yet with our checklist of ideal observing conditions. In addition to cloudless and dry skies, astronomers need dark sites and unpolluted air in order to make the best observations.</p>	<p>Dr J in virtual studio Background images: night time lapse</p>
<p><b>03:06</b> [Narrator] 7. In most places, the world at night is far from being a dark place and the light pollution caused by modern civilisation can easily be spotted.</p> <p>However, light pollution hinders astronomical observations, as it brightens the night sky and makes faint celestial objects undetectable.</p> <p>Only in places that are far from any cities — like some regions in the Atacama Desert — is the night sky pitch-black. Furthermore, because Chile's cities are relatively far apart, the air in the Atacama Desert is almost completely free of pollutants and is <i>extraordinarily</i> transparent.</p>	<p>World at night (M . Kornmesser)?</p> <p>Night timelapse (C. Malin)</p> <p>Atacama desert</p>
<p><b>03:56</b> [Dr J] 8. Now, astronomical observations are disturbed by the turbulent motions of pockets of air in the atmosphere. Essentially this turbulence blurs our images of the night sky. In addition, the atmosphere also absorbs and scatters light.</p> <p>In order to minimise these effects an observatory should be located in an area with a calm atmosphere above it <i>and</i> on top of a high mountain, in order to reduce the amount of atmosphere between your telescope and the stars.</p> <p>Once again, the high-altitude of Atacama Desert fits this description perfectly.</p>	<p>Dr J in virtual studio Background images: night time lapse or Atacama desert</p>

<p><b>04:32</b>  <b>[Narrator]</b>  9. The Atacama Desert offers many sites at high altitude, ranging from extended plateaux in the Altiplano highlands to high mountain tops close to the Pacific Coast.</p> <p>The Chajnantor plateau, at an altitude of 5000 metres, offers ideal conditions for observing in the millimetre and submillimetre wavelength domain. This is where ESO, together with its partners, has chosen to construct the Atacama Large Millimeter/submillimeter Array, or ALMA for short. At such high altitudes there is very little water vapour in the air and the disturbing effects of the atmosphere are kept to a minimum.</p> <p>Cerro Paranal is an isolated mountain top in the Atacama Desert, only 12 kilometres inland from the Pacific Coast. This is the home of ESO's Very Large Telescope, which makes good use of Cerro Paranal's approximately 320 cloud-free nights each year.</p> <p>Further inland, within sight of Paranal, another mountain has been identified as an ideal place to conduct astronomical observations: Cerro Armazones. This will be the future site of ESO's Extremely Large Telescope, or the E-ELT, for short.</p>	<p>Atacama Desert</p> <p>Map with Chajnantor, Paranal, La Silla marked</p> <p>Chajnantor plain</p> <p>Antennas at Chajnantor</p> <p>Cerro Paranal, distant view</p> <p>Cerro Armazones</p>
<p><b>06:20</b>  <b>[Dr J]</b>  10. The Mars-like landscape of the Atacama Desert is really a wonderful gift of nature. Its unique climate makes it a first-class location for ESO's powerful telescopes so that night after night ESO's astronomers can observe the crystal clear skies.</p> <p>This is Dr J signing off for the ESOcast. Join me again next time for another cosmic adventure.</p>	<p>Dr J in virtual studio  Background images: Atacama desert</p>
<p><b>06:44</b>  <b>[Outro]</b></p>	<p>ESOcast is produced by ESO, the European Southern Observatory.</p> <p><i>ESO, the European Southern Observatory, is the pre-eminent intergovernmental science and technology organisation in astronomy designing, constructing and operating the world's most advanced ground-based telescopes.</i></p>

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