Key words: Airglow, La Silla, VLT

ESOcast Episode 78: Airglow	
00:00 **[Visuals start]** 1. ESO's La Silla Observatory on a moonless night, deep in the Atacama Desert of Chile. It should be very dark — but strange green and red colours can be seen to shimmer in the sky. What are these mysterious glows? And why do they seem to be getting more frequent?	**00:00** **[Visuals start]** La Silla observatory with airglow
00:25 **ESOcast intro** 2. This is the ESOcast! Cutting-edge science and life behind the scenes at ESO, the European Southern Observatory.	**00:00** ESOcast introduction
00:45 **[Narrator]** 3. The Sun is constantly showering the Earth's atmosphere with radiation at many different wavelengths. Solar ultraviolet light destroys oxygen and nitrogen molecules during the daytime and this triggers a chain of complex chemical reactions. As a result new molecules like ozone are created.	Animated sun Animation of UV light destroying oxygen and nitrogen, forming ozone.
01:14 **[Narrator]** 4. When night falls, some of these molecules take part in further reactions and collisions, causing them to radiate light. This process is known as chemiluminescence. The result is seen in the night sky as an eerie glimmer — an effect called airglow.	Animation of chemiluminescence
01:40	

[Narrator] 5. To the naked eye, the colours of this airglow are invisible but sensitive wide-angle photographs show the fine green or reddish tinges of this phenomenon. Sometimes, airglow appears to be just a faint tinge of colour on the horizon but it also can be a menagerie of changing colourful shapes.	Airglow at Paranal
02:04 **[Narrator]** 6. The green layer of airglow lies about 100 kilometres above the ground. Here it is seen from the International Space Station. But there is also a much fainter reddish tint of luminescent air at altitudes of 150 to 300 kilometres.	ISS footage showing airglow Computer animation
02:26 **[Narrator]** 7. The extent, colour and brightness of the airglow vary with time and place and are influenced by many different factors. For example, the red glow tends to be brightest at the start of the night. And around midnight and later, it can be very weak. And Cerro Paranal, home of the VLT, happens to be located below what is known as the South Atlantic Anomaly. Here, the Earth's protective magnetic field, which prevents particles from reaching the surface, is reduced and more particles from the Sun hit the atmosphere. This can lead to brighter airglow.	Airglow at Paranal Animation of the South Atlantic Anomaly
03:15 **[Narrator]** 8. Airglow can also appear in strange formations called gravity waves. They are formed by alternating air pressure layers that can grow with height as the air thins.	Gravity waves at Paranal
03:30 **[Narrator]** 9. We understand what causes airglow, but why are we seeing more and more of it in photos taken at ESO sites in Chile over the past five years? Has airglow become more common? Could it be caused by some global	Images showing airglow

change in weather patterns? The answer is not clear. The recent rapid development of digital cameras seems to play a role, allowing fainter details to be picked up in the night sky more often. But identical cameras have revealed dramatically different skies just weeks apart. Since airglow is triggered by ultraviolet radiation emitted from the Sun, changes in solar activity can have a big impact on the brightness of the airglow. The Sun cycles through periods of low and high activity every 11 years and was active in recent years. This, it seems, is the main reason for the recent increase in airglow. The most recent cycle of high solar activity, coinciding with more sensitive digital photography, has provided our first detailed look at this strange phenomenon.	Photographers with equipment Animation of Earth from space Animation of the Sun Images showing airglow
04:52 **[Narrator]** 10. Airglow can be beautiful and photogenic, but it also affects scientific observations. Certain kinds of airglow give rise to background patterns in near-infrared images from the VISTA telescope as the airglow structures move in between exposures. One way or another, it's a feature of the celestial display over the ESO sites. Even in one of the darkest places on the planet, the sky is never completely dark!	Various timelapses of airglow from ESO sites VISTA telescope Various timelapses of airglow from ESO sites
05:32 **[Outro]**	ESOcast is produced by ESO, the European Southern Observatory. *ESO builds and operates a suite of the world's most advanced ground-based astronomical telescopes.*