

2022



**ORGANIZED JOINTLY BY:**



**=** Federal Ministry  
Republic of Austria  
European and International  
Affairs

**=** Federal Ministry  
Republic of Austria  
Climate Action, Environment,  
Energy, Mobility,  
Innovation and Technology

Protection of the Night  
Skies as common  
heritage of humanity:

# The Time Is Almost Over





# Dozens of Thousands

or even hundred of thousands of  
satellites in orbit and other  
unsustainable forms of proliferation  
of space activities would.



# Everely Compromise The Viability

of ground-based astronomical observation,  
both optical and radio with multiple negative  
impacts on science, space knowledge,  
industry, tourism and other related areas.



**Optical**  
Astronomy



**Radio**  
Astronomy



**Tourism**  
Astronomy



A man in a dark jacket and blue jeans sits on a reddish-brown rock, looking up at a vast night sky filled with stars and the Milky Way galaxy. The scene is illuminated by a soft light, possibly from a low sun or moon, creating a contemplative atmosphere.

# AFFECT ANCESTRAL

*worldviews and other cultural and aesthetic values.*

# REDUCE THE NATURAL DARKNESS OF THE NIGHT SKY

by space debris and satellite constellations to global scales, with serious effects on biomes ecosystems and species, just when we need to restore nature to combat climate change.

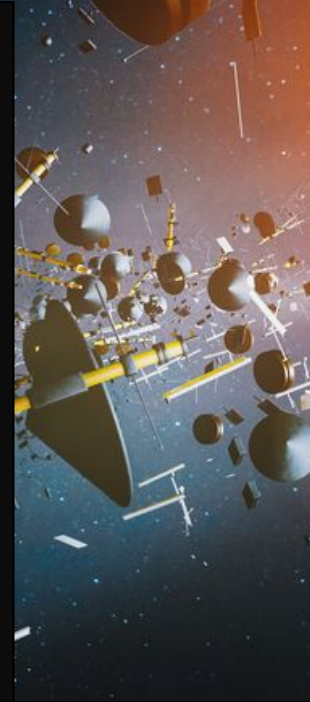


# REDUCE THE DARKNES



of the night sky affecting the human health by altering the circadian rhythms.





# PROVOKE

pollution by heavy elements such as aluminium in the earth's atmosphere that could weaken the ozone layer.

# INCREASE

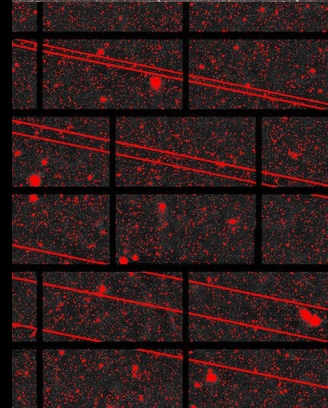
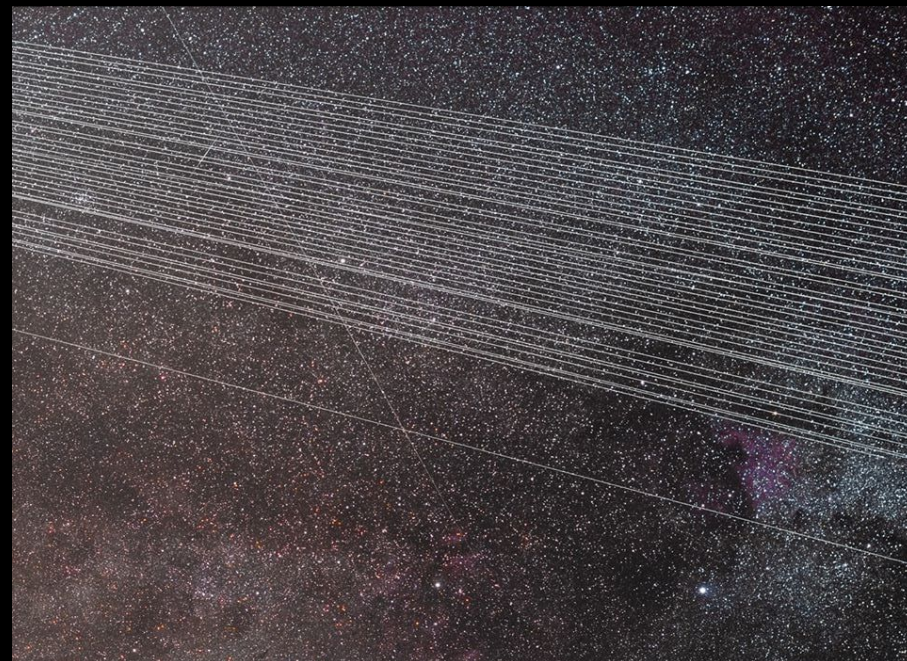
the chances of collisions between satellites or their destruction in war scenarios.





# OPTICAL ASTRONOMY

Satellite constellations in low earth orbit are a concern due to their bright appearance and sheer numbers, with planned or filled applications of over 430,000 (see <https://planet4589.org/space/con/conl>).







For ultra-wide field telescopes using long exposures the likelihood of a satellite trail passing through the images dramatically increases. It is estimated that approx 20% to 40% of the images obtained by the LSST survey on the new Vera Rubin observatory will contain at least one satellite trail.





Optical Astronomy

# MITIGATE

To help mitigate the impact of satellite constellations in LEO, requires both astronomers and satellite operators to work together.

Satellite operators should take into account the reflective brightness of their satellites in the design and prototype construction phase and takes measures to reduce the amount of sunlight reflected by the satellite towards the Earth's surface.

This can be accomplished by noval design features and materials, as well as flight and attitude mechanics, to reduce the cross-sectional reflection area of the craft.



A photograph of an astronomical observatory building, likely the Very Large Telescope (VLT) at Paranal Observatory, situated on a rocky, elevated terrain. The building is a large, multi-story structure with a complex, angular design. The sky is overcast with grey clouds. In the foreground, a paved road curves through the rocky landscape. A speed limit sign with the number '20' is visible in the lower right corner.

Optical Astronomy

# MITIGATE

With sufficient planning, the astronomy community and observatories may partially mitigate the impacts of satellite constellations but this requires the satellite operators to maintain transparency and providing important data (which is currently not shared due to Non-Disclosure Agreements), in a timely manner such as spacecraft design, brightness data, mission designs and orbital profiles, attitude control, and precise predicted and real-time orbital trajectories.

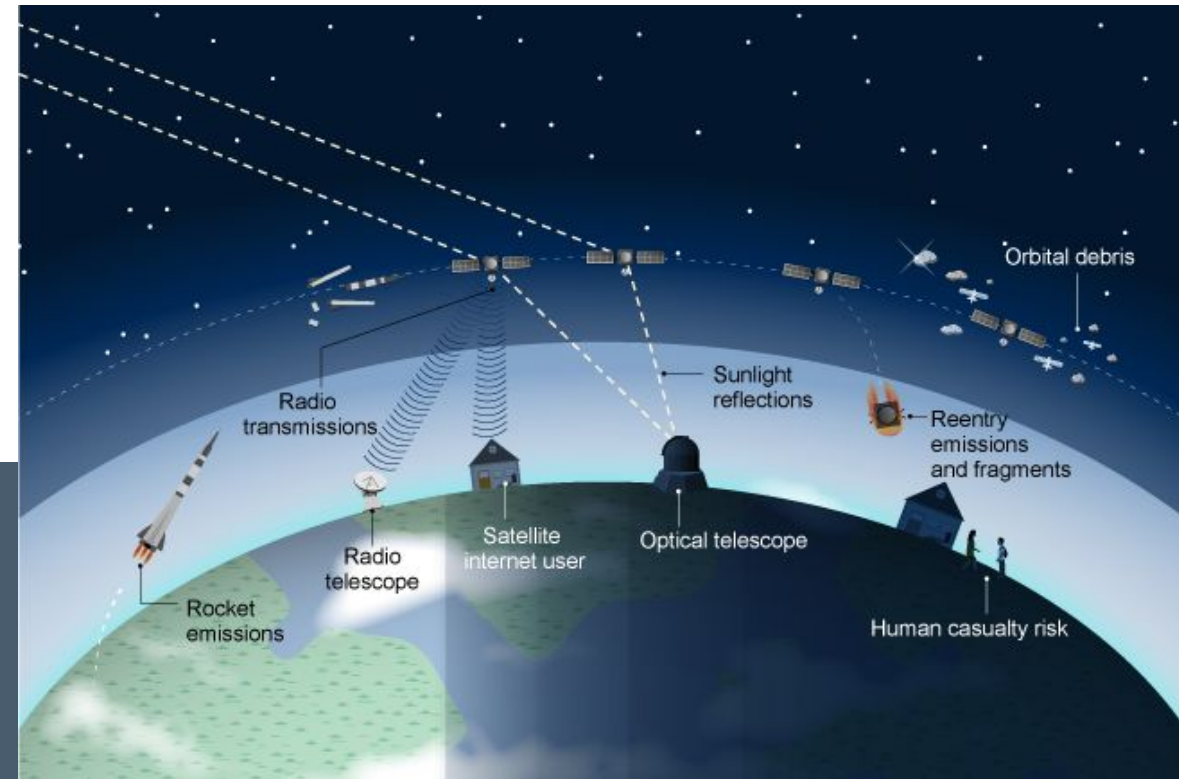
Optical Astronomy

# MITIGATE

Both national and international regulations can also play an important role in protecting our dark and quiet skies from satellite interference.

The recent report by the U.S. Government Accountability Office (USGAO:<https://www.gao.gov/products/gao-23-105005>) found that the FCC should re-evaluate its environmental review process for large constellations of satellites.

There is growing concern about large constellations of satellites and their impact to the environment, not just from an astronomical prospective, but also in terms of orbital debris which threaten the long term sustainability of outer space and contaminants released into Earth's upper atmosphere, via exhaust fumes and 'burning up' defunct satellites (see <https://www.nature.com/articles/s41598-021-89909-7>).





**International coordination with Bolivia and Argentina to complete the protection circles of the Limited Service Permit.**

**Requested technical aspects in radio transmission: frequencies, bandwidth, harmonics, downward power, beam size on the ground, pointing angle, LTEs, signal polarization, etc.**

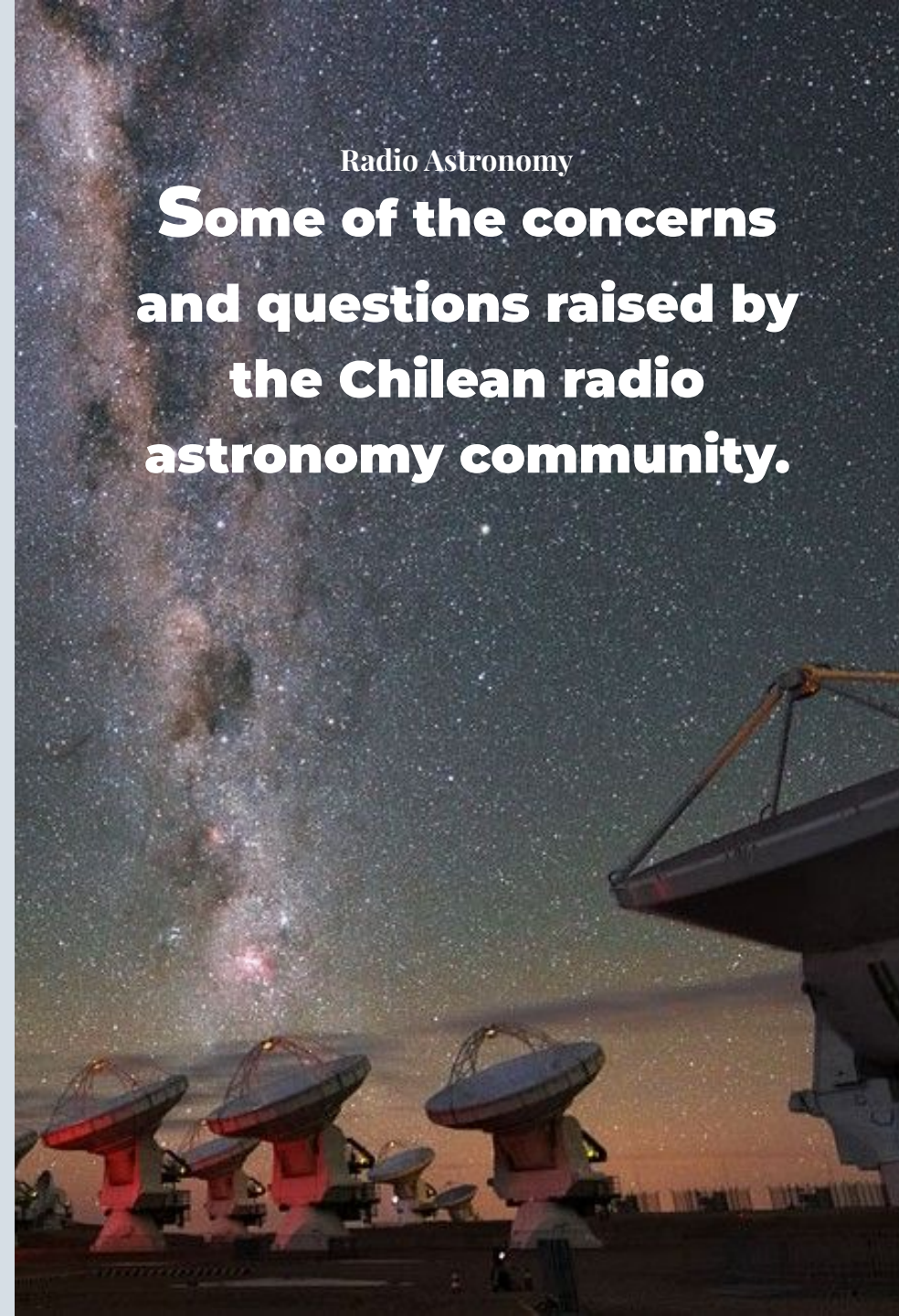
**Establishment and enforcement of radio quiet zones, and should radio emissions from satellites be turned off when passing these zones.**

**01.**

Radio Astronomy  
**Some of the concerns and questions raised by the Chilean radio astronomy community.**

**02.**

**03.**





# The proposal

Therefore, developing an international regulatory framework which requires national authorities to request environmental impact assessments before granting licences of satellite constellations, will help make operators assess and where necessary mitigate, the impacts of newly proposed constellations.

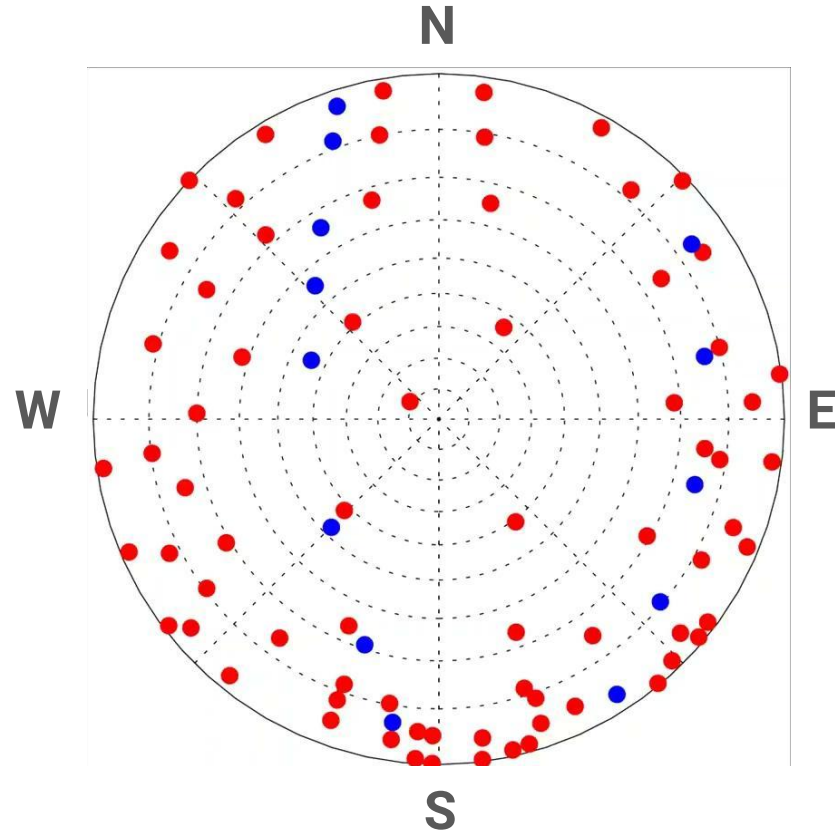
There is a limit in the number of satellites that can operate in Earth orbit without irreversibly affecting ground-based astronomical science. This limit must be established and agreed in the international community soon.

Chile agrees to promote the Conference Room Paper that will be presented to the next STSC proposing the creation of an Expert Group on D&Q\_S



# Starlink Oneweb

The slide shows an animation of the number of visible, (above the horizon) Starlink (red) and Oneweb (blue), satellites visible from the site of the currently being constructed ESO 40m ELT on 17th January 2022. At the time only 2,500 Starlink and Oneweb satellites had been launched.



UTC 00:04:30