

# Issues in the New Space Age

Andy Lawrence  
National Astronomy Meeting  
“Bath” July 23rd 2021

Bigger than the stripes

Three tracks

Engagement

Awareness

Politics

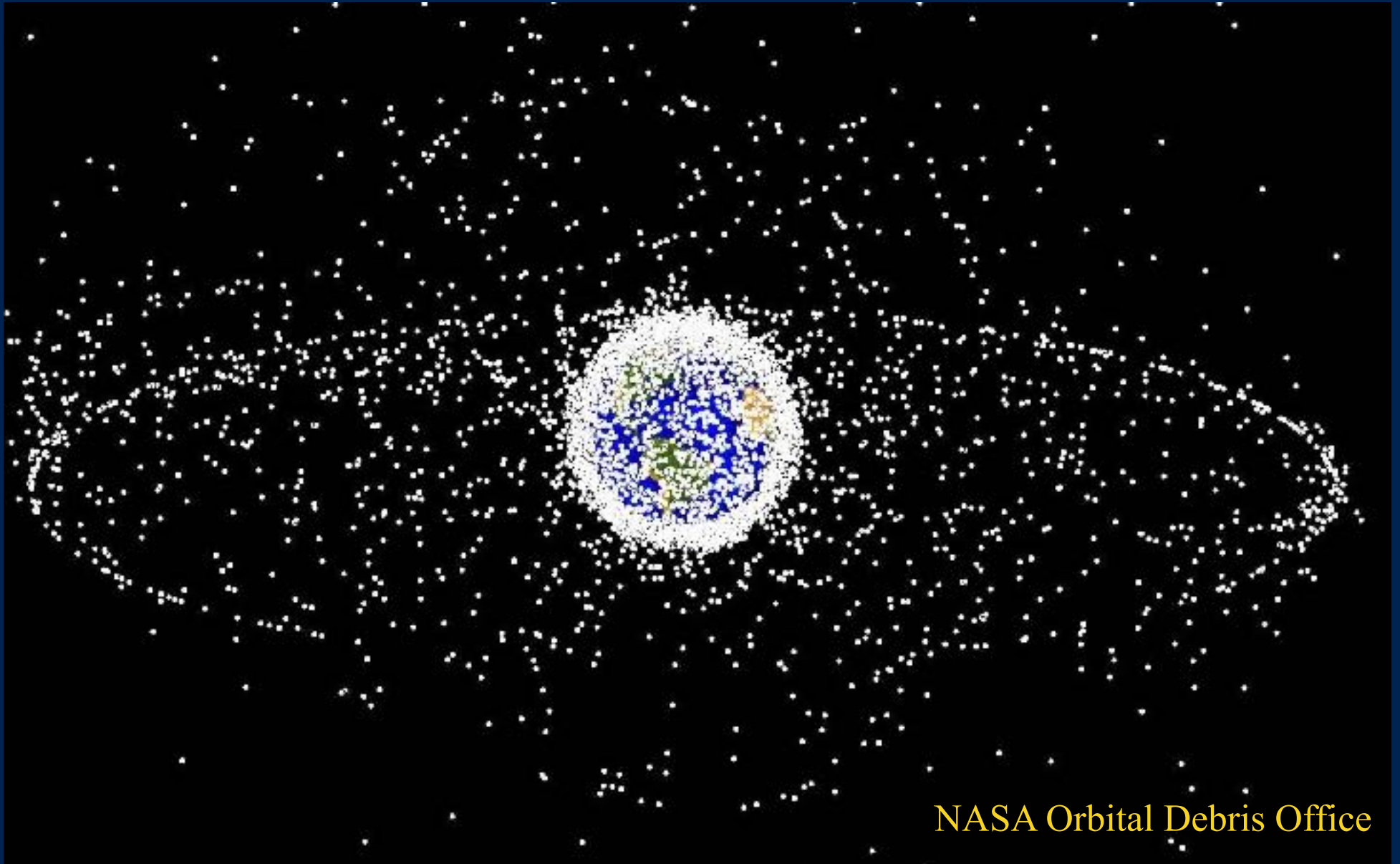


Stripey images  
versus  
internet access?

*we lose*



# Debris threatens sustainability of *all* space activity



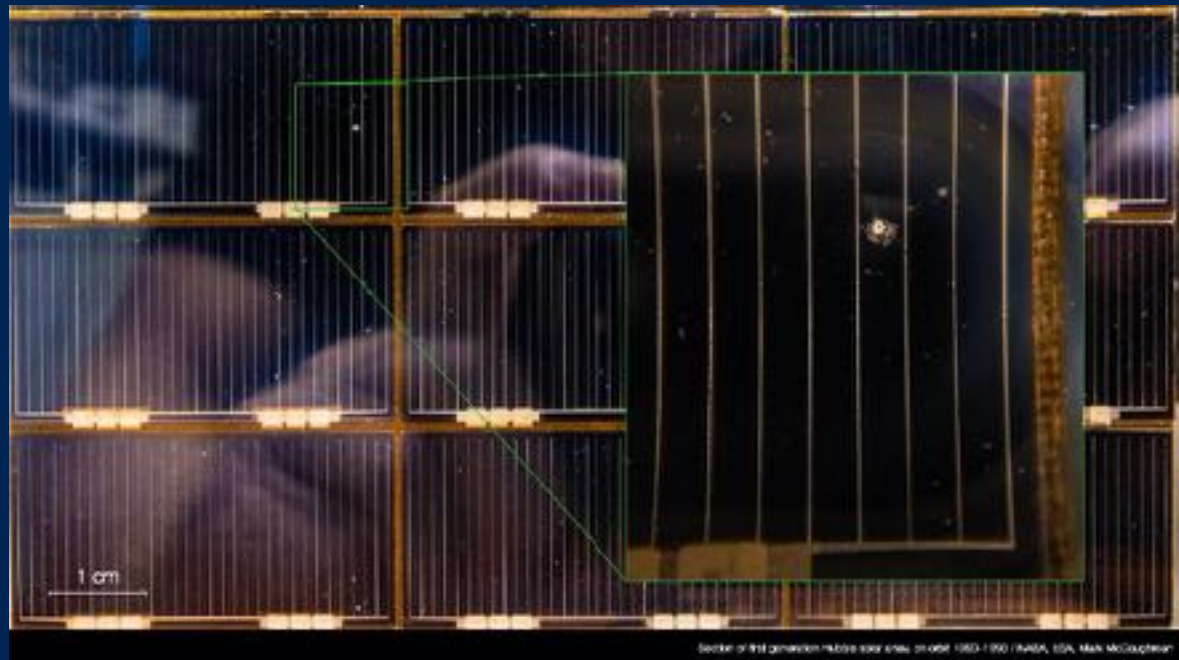
NASA Orbital Debris Office

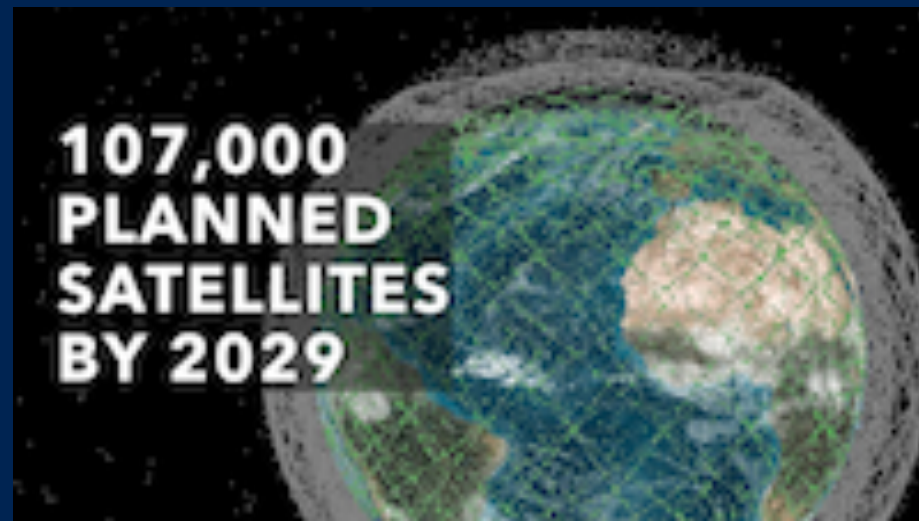


liability issues will increase



dry run for  
Moon and asteroid  
mining issues...





## Why so many?

National Tensions: duplication

Capturing market: commercial duplication

Positioning before regulation

Likely future LEO carrying capacity

# LEO bubble will burst?



but when...?



image credit: StartRocket



LEO Advertising?



# Track-1 Engagement

# GNOSIS

## THE GLOBAL NETWORK ON SUSTAINABILITY IN SPACE

We bring together **scientists** and **industry** to understand and solve problems related to the ever growing problem of **space debris** and the challenges of safeguarding spacecraft set to launch into this environment.



Science and  
Technology  
Facilities Council



[MORE DETAILS](#)

12-16 July 2021 | An Online Workshop

# SATCON2

## Toward the Implementation of Mitigations to Minimize the Impact of Satellite Constellations on Astronomy

**Co-chairs:**

Jeffrey Hall (Lowell Observatory)  
Constance Walker (NSF's NOIRLab)



SATCON2 is funded by the NSF and hosted by the NSF's NOIRLab and the AAS.

**[noirlab.edu/satcon2](http://noirlab.edu/satcon2)**

The background image shows the Double Star Asteroid Cygnus and was taken on 24 December 2015. Two sets of ten 15-second exposures recorded Starlink satellites moving across the field. Credit: B. Chaffin, University of Maryland, Baltimore, and the Starlink Team.





## IAU Launches Call for Proposals for New Centre for the Protection of the Dark Sky from Satellite Constellation Interference

[Click to Enlarge](#)

[Note: this call was updated 23 June 2021]

The International Astronomical Union (IAU) invites proposals for the establishment of an IAU Centre for the Protection of the Dark Sky from Satellite Constellation Interference that will focus on mitigation of optical (i.e., visible and infrared) light interference by satellite constellations. The centre will foster the development of tools and procedures that can mitigate the impact of satellite constellations on optical astronomy, and work with the space companies and industries to discuss and converge on mitigations. Interested institutes or organisations are invited, individually or in partnerships, to submit proposals to host the centre.

see Connie Walker talk

- Changing albedo
- Predicting glints
- Orbit height recommendations
- Planned lifetimes
- Publishing orbits
- Radio beam re-direction
- Software correction

All costs MONEY

# Track-2 Awareness



# LOSING THE SKY

Andy Lawrence

Foreword  
by Dr Brian May

Andy Lawrence

Astronomy and other stuff



HOME RESEARCH OUTPUT TEACHING OUTREACH LOSING THE SKY

## Losing The Sky: Event

A live public discussion took place on June 15th 19:30 BST, bringing together forty international experts including Andy Lawrence, Brian Eno, Catherine Heymans and many others. What are the real issues, and what should we do? For information on the associated book, click [here](#). For what you can do to help, click [here](#). A recording of the event is on the [YouTube channel of the Astronomical Society of Edinburgh](#). Here is a [transcript of the Zoom chat](#) between the participants. The video is also embedded below



*Recording of the event*

Connecting the world sounds great: very few people would argue with that, and what new space companies have been doing is visionary and exciting. However, experts around the world are becoming increasingly anxious about where the New Space Race is

**Sun** THE SUN, A MINDWAVE COMPANY

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Tech & Science

## SAVE OUR SKIES Astronomers fear growing number of satellites will spoil space as Elon Musk to send thousands into orbit

Sam Kerton  
11:20, 5 Jun 2021 | Updated 11:35, 5 Jun 2021

Share

STARGLAZERS have launched a bid to clean up the first frontier.

Astronomers fear the explosion of satellites being blasted into orbit to super-charge the internet will spoil space.

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## We could see as many satellites as stars in our sky by 2030 thanks to space junk, astronomers warn

SCIENCE | ENVIRONMENT | SPACE | Tuesday 15 June 2021 5:14pm



Within a decade, we could be seeing as many satellites as stars in our night sky.  
*Credit: Sam Baruh/istock*

Within a decade, we could be seeing as many satellites as stars in our night sky, thanks to all the "space junk" that is being launched into the Earth's orbit, astronomers have warned.

The 2019, there were about 2,000 satellites orbiting the Earth. The number today is double that, and in 10 years, that number could shoot up to 100,000, according to Andy Lawrence, deputy professor for astronomy at the University of Edinburgh.

**BBC** A Dachgach Naidheachdan Spòrs A


## Fàilte gu BBC ALBA



### Seinneadair Yoik a' dìon rèin-fhiadh ann an Dùthaich nan Sàmi

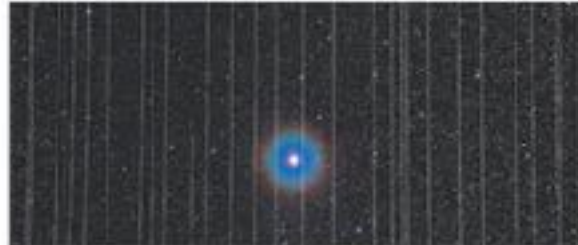
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**Science**



## Brian Eno calls for space to be better protected – like Antarctica is

He is concerned about plans to send 100,000 satellites into low-Earth orbit in less than a decade



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A STORY FROM THE FUTURE

LIBRA

8/9 September 2021 - MIRAMARE CASTLE [Trieste, Italy]

12 September 2021 - GRADISCA FORTRESS [Gradisca d'Isonzo, Italy]

Roberto Trotta  
Trieste

Sept 8th





# Max Alexander

## *Waste In Space*

exhibition 2022  
National and  
International venues





Max Alexander

Joanne Wheeler

Andy Lawrence

... and hopefully  
many backers..

Date? Feb 10th

Irridium-Kosmos collision

Date? Jan 27th

Outer Space Treaty signing

# Track-3 Politics



# JASON report quotes:

Space is largely unregulated and satellites  
do not obey national borders

While launchers from the US are regulated by  
the Federal Aviation Administration (FAA),  
their payloads are not.

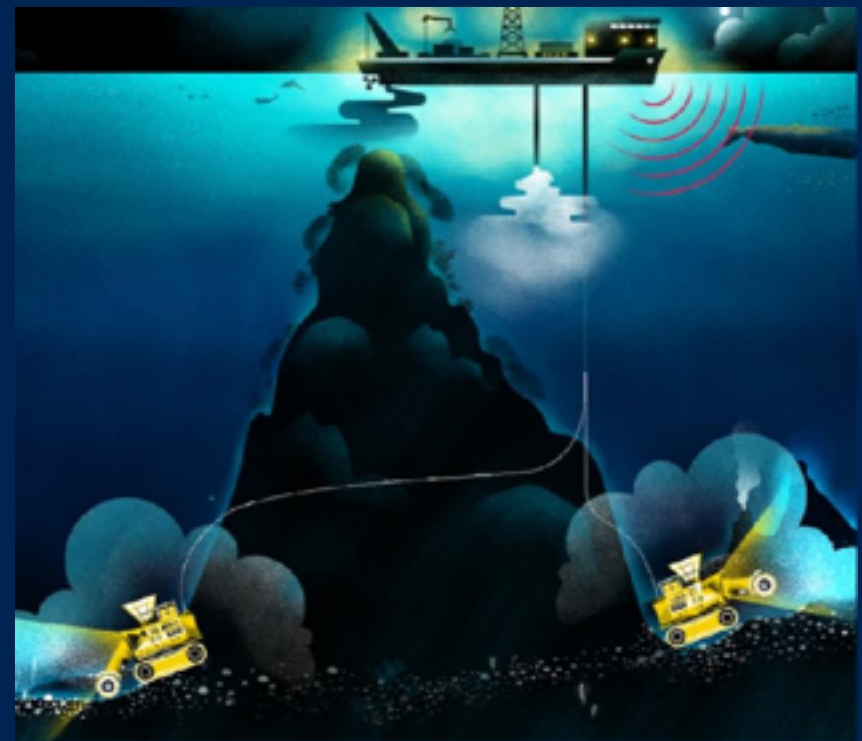
A company who wanted to launch a dump  
truck full of sand into the same orbit as the  
International Space Station would have no  
formal barriers to doing so in many  
countries around the world.

# Regulation scorecard

Broad Principles	✓	Outer Space Treaty
Competence to launch	✓	in most countries..
Use of radio spectrum	✓	ITU
GSO interference	✓	
Liability	—	“diplomatic channels”
Minimising Debris	—	non-binding guidelines
LEO advertising	— ✗	in some countries..
Atmospheric Pollution	✗	
Sky Pollution	✗	see Viasat court case
LEO interference	✗	



regulatory  
shake-up  
will come?



**WE CALL ON GOVERNMENTS TO  
SUPPORT A GLOBAL MORATORIUM ON  
DEEP SEABED MINING**

**BMW  
GROUP**

**SAMSUNG**  
SAMSUNG SDI

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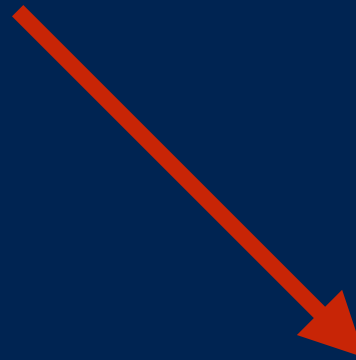
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Open letter  
calling for  
pause  
on launches?



**FIN**