



**USING POCKETQUBES TO IMAGE EARTH
FROM SPACE AT NIGHT**

Caius Reza - Head of Business & Marketing - Alba Orbital

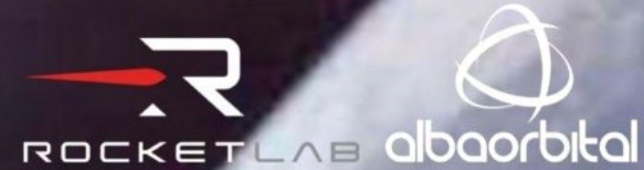
Agenda

- Introduction to Alba Orbital
- What are PocketQubes?
- Alba's 'Night-lights' EO constellation
- Applications of night-time satellite data
- Questions

Alba Orbital

Democratising Access to Space

- Founded in 2012 in Glasgow, Scotland
- World leading PQ Rideshare broker
- Delivered 41+ PQs to orbit across 7 flights with SpaceX & Rocket Lab
- Y Combinator Backed (\$3.4m seed round)
- Building EO Constellations
- Vertically integrated company providing end-to-end space services



What are PocketQubes?

PocketQubes are miniature ('pico') satellites, providing a cost-effective and accessible means of space exploration and research.

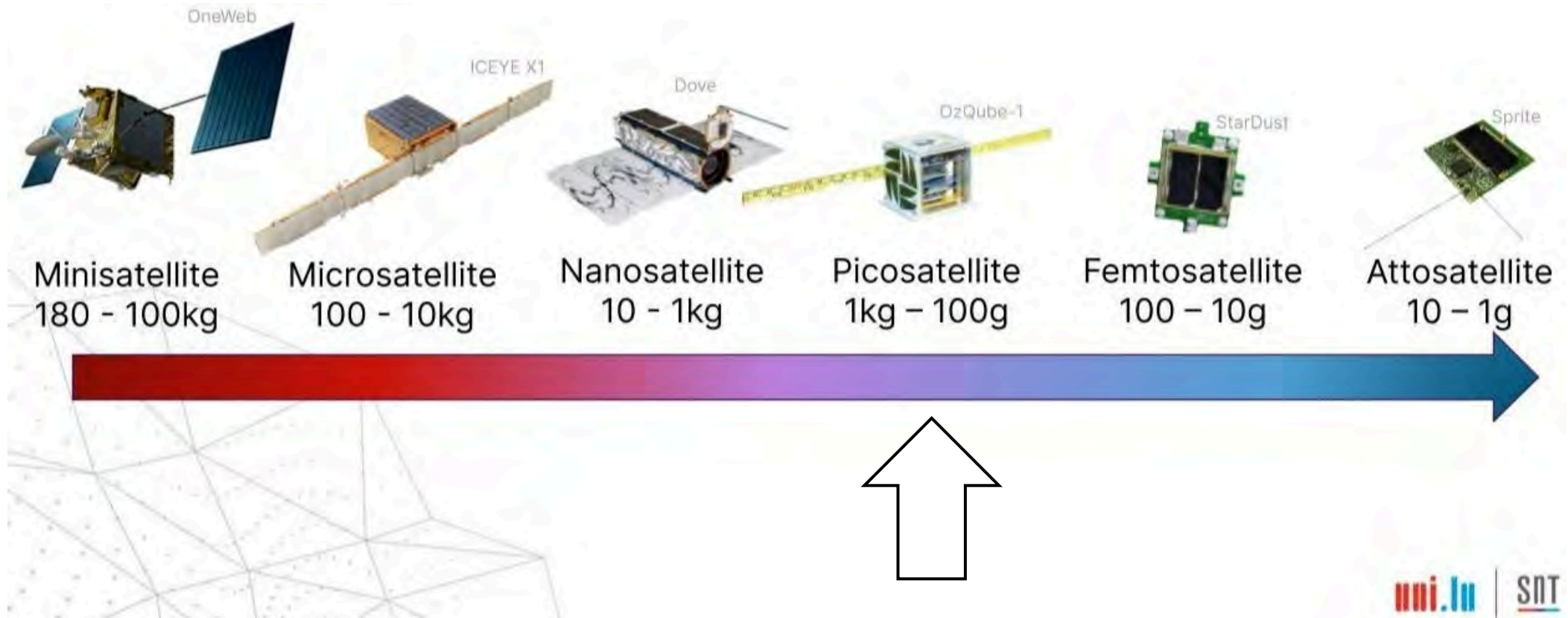
These tiny satellites are based on the CubeSat form factor but are even smaller typically measuring just 5x5x5 centimetres (1P)

Proposed in 2009 by professor Robert J. Twiggs while working with Morehead State University as a solution to rising costs of cubesat launches



Moore's law in space

Shrinking technologies promotes greater accessibility to space and novel applications

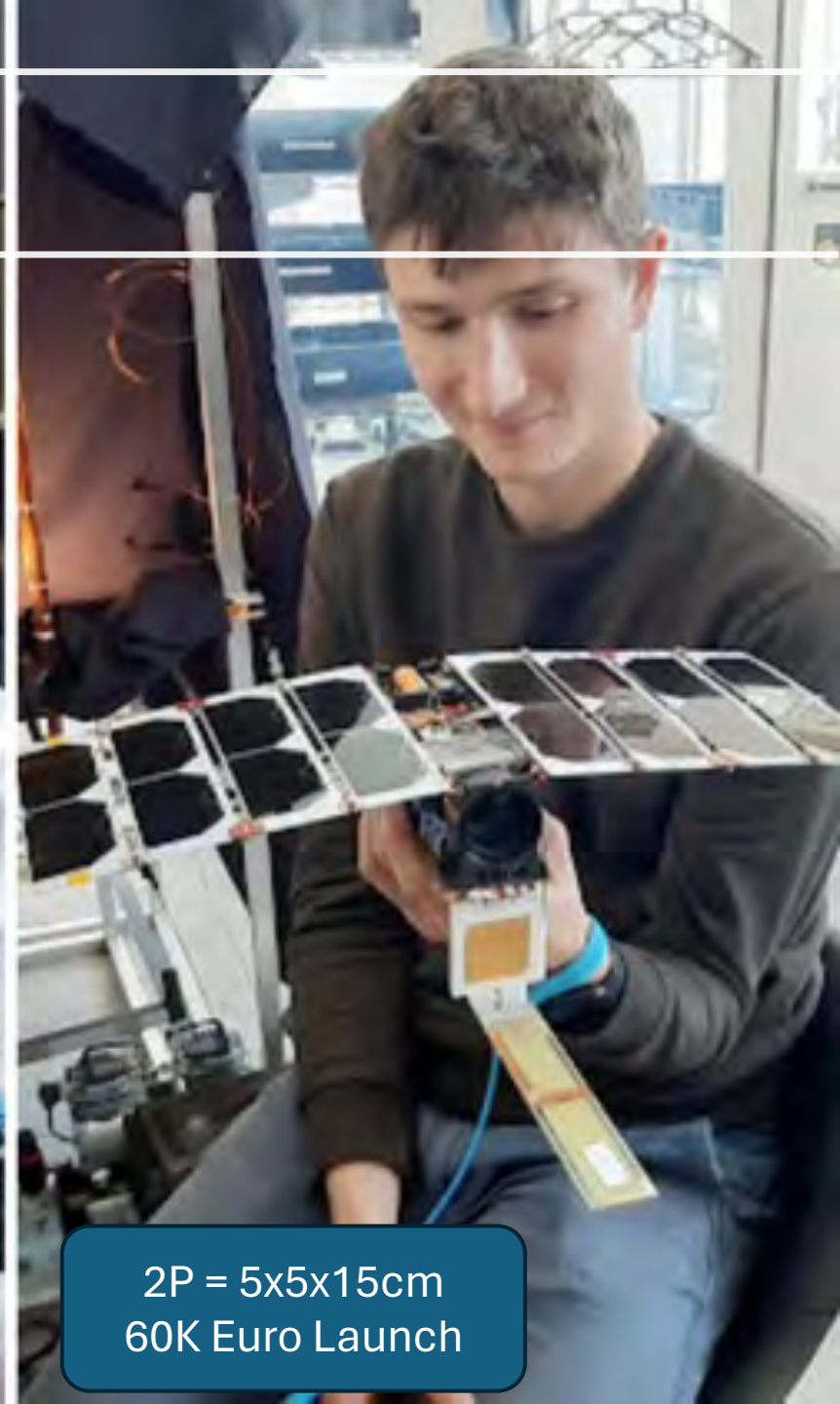




1P = 5x5x5cm
25K Euro Launch



2P = 5x5x10cm
40K Euro Launch



2P = 5x5x15cm
60K Euro Launch

PocketQubes: What are they capable of?



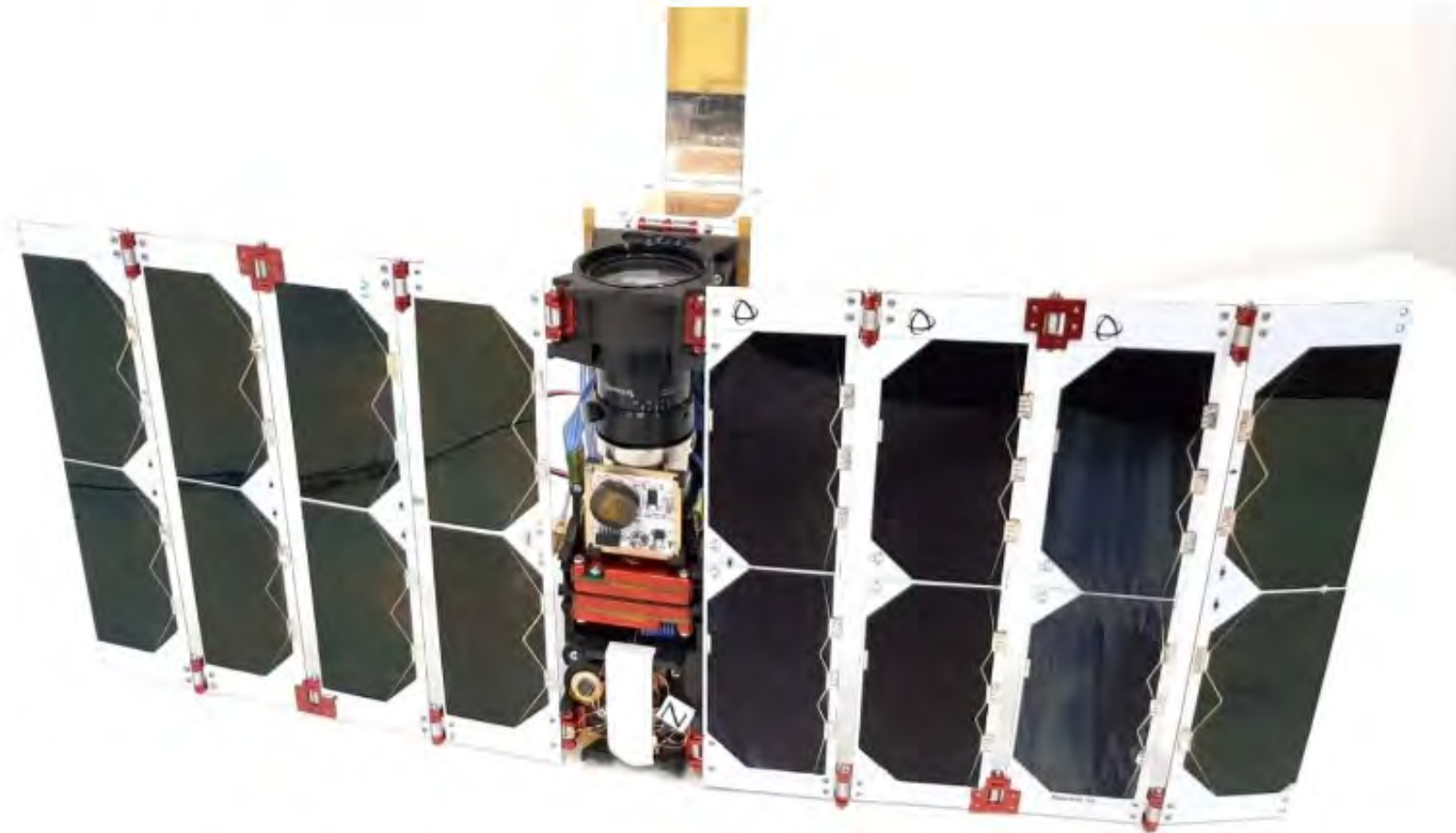
Despite their small size, PocketQubes can carry out a wide range of missions, from **Earth observation** and **environmental monitoring** to **communications** and **scientific research**.

The satellites pictured above joined us on our maiden flight in 2019. From Left to Right their missions were: **In-Orbit Demonstration** for Thermal materials, **Internet of Things (IoT)**, **Pollution Monitoring**, and **Weather monitoring**.

Alba Orbital's mission to image the Earth every 15 minutes brings in \$3.4M seed round

Devin Coldewey @techcrunch / 9:36 PM GMT+1 • May 13, 2021

 Comment



Alba Orbital's **Nightlight constellation**

First demo EO satellites flown in January 2022

Constellation of satellites dedicated to providing high resolution images of the earth at night.

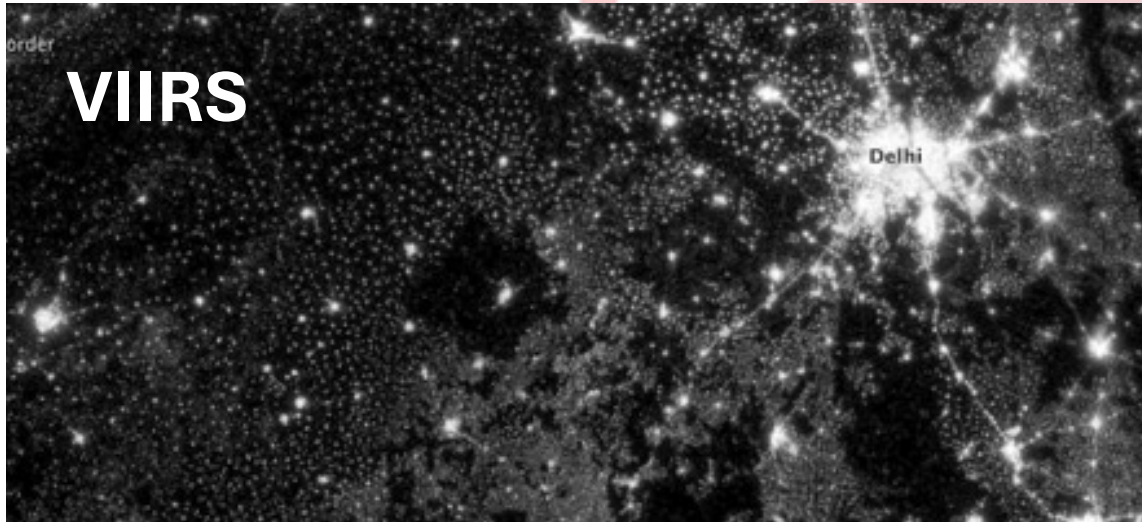
12-15 satellites dedicated to monitoring Artificial Light at Night (ALAN)

Features:

- GSD: 24m
- Bands: RGB
- Swath: 62km x 48km



Comparison To Existing Products



	Spatial Resolution	Availability	Spectral Response
VIIRS	750 m/pixel	Nightly	500-850nm (misses blue LED lights)
ISS	30 m/pixel	Periodically	400-650nm
Alba Orbital	24 m/pixel	Nightly	400-650nm

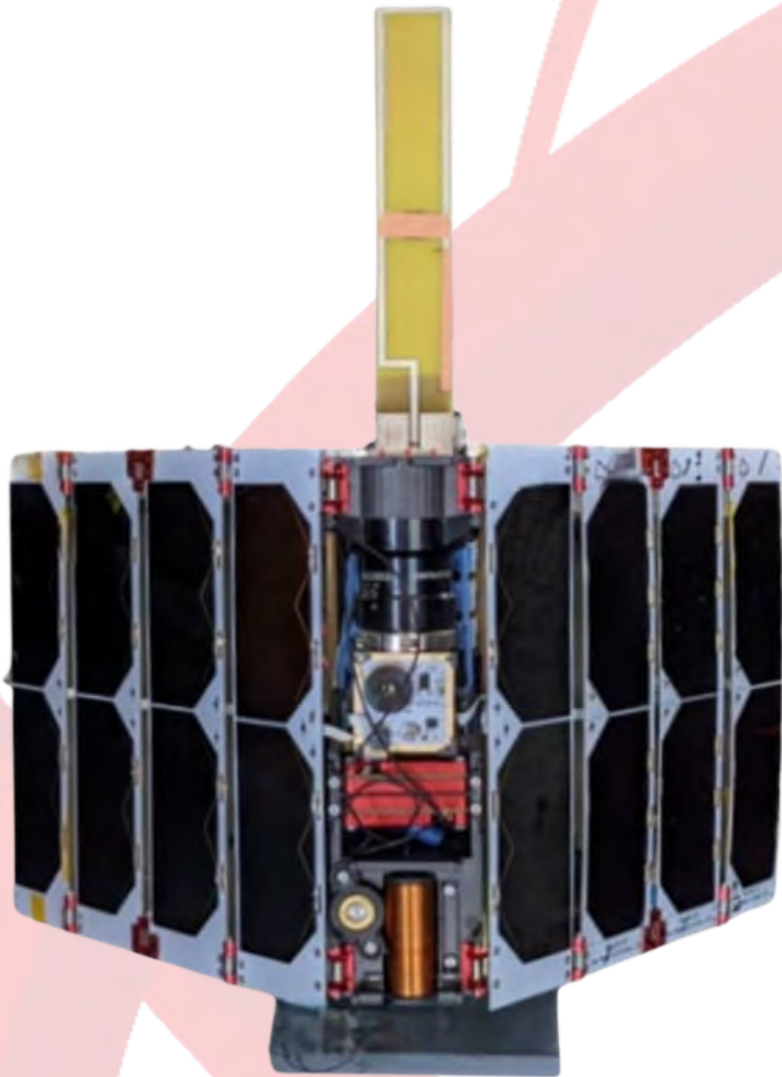
The Hardware: Optical Payload Proof of Concept

Our Unicorn-2 platform is the smallest ever EO satellite with active attitude control

Unicorn 2 is equipped with:

- 20W of solar power
- A full ADCS system
- High speed S-band radio

Unicorn-2 is the backbone of our constellation



Why are we imaging the earth at night?

Night lights data represents a **unique and powerful** source of information.

Provides valuable insights into various aspects of **human activity, urban development, economic vitality,** and **environmental changes** across different regions of the world.



Applications: *Dark sky and Wildlife Preservation*

Customer: *National Park Service (USA)*

Primary interest is monitoring light pollution levels to mitigate negative impacts of skyglow

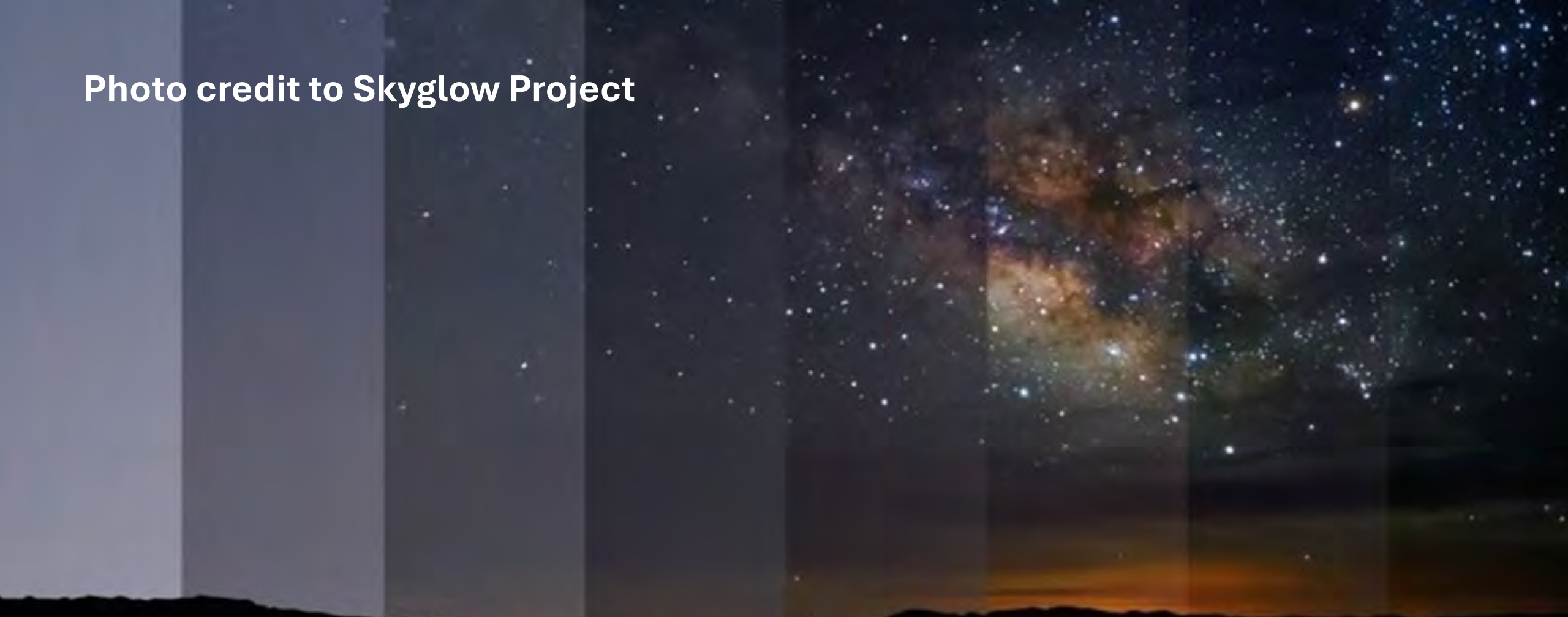
Skyglow adversely affects the study of astronomy by:

- limiting visibility
- reducing contrast and resolution
- impairing observational techniques
- constraining observing programs

Ultimately this impacts Astro-tourism in NPS's national dark sky parks.



Photo credit to Skyglow Project



- 8/9 City/Inner City Sky
- 7 City/Suburbia Transition
- 6 Bright Suburban Sky
- 5 Suburban Sky
- 4 Suburban/Rural Transition
- 3 Rural Sky
- 2 Dark-Sky Site
- 1 Excellent Dark-Sky Site

Applications: *Dark sky and Wildlife Preservation*

Customer: National Park Service (USA)

Another NPS interest in Night lights is Wildlife Preservation

ALAN can adversely impact wildlife in several ways:

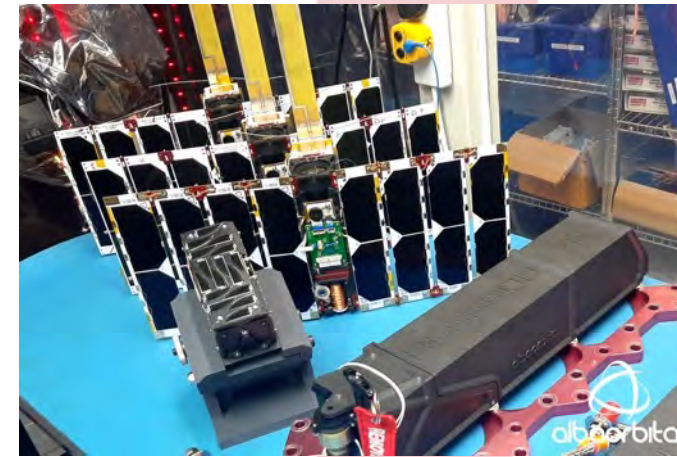
- Disruption of Natural Behaviour
- Disorientation and Navigation Errors
- Habitat Fragmentation and Isolation
- Altered Predator-Prey Dynamics
- Disruption of Reproductive Behaviour



Applications: *Insurance & Catastrophe Response*

Customer: McKenzie Intelligence Services (MIS)

- MIS helps accelerate disaster relief and economic recovery for insurers.
- Provides estimates of losses from insured events to assist insurers with the aggregation of exposure data and post claims loss analysis.
- Processes satellite imagery and other data sources such as drones and on the ground “human intelligence” with machine-learning algorithms via their Global Events Observer (GEO) platform.

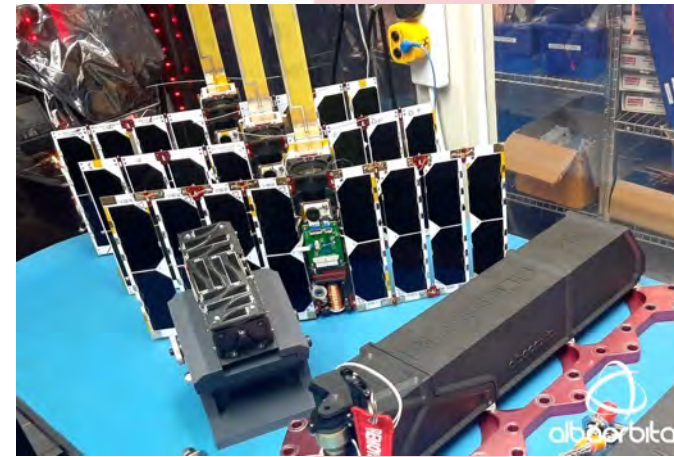


Applications: *Insurance & Catastrophe Response*

Customer: McKenzie Intelligence Services (MIS)

MIS plans to provide insights using night lights data for Property-casualty insurance market

‘Alba Orbital's high-resolution night-time imagery will support us in providing high-fidelity analysis of global perils... during future incidents similar to the Texas freeze which caused \$15bn in insured losses, we will be able to rapidly identify those properties without power and therefore most susceptible to internal damage’ - Forbes McKenzie, CEO (MIS)



TEXAS FREEZE, FEB 2021

The Texas black freeze, which occurred in February 2021 and resulted in widespread power outages and property damage due to freezing temperatures serves as an example of how night lights data can inform insurance risk assessment and response strategies:

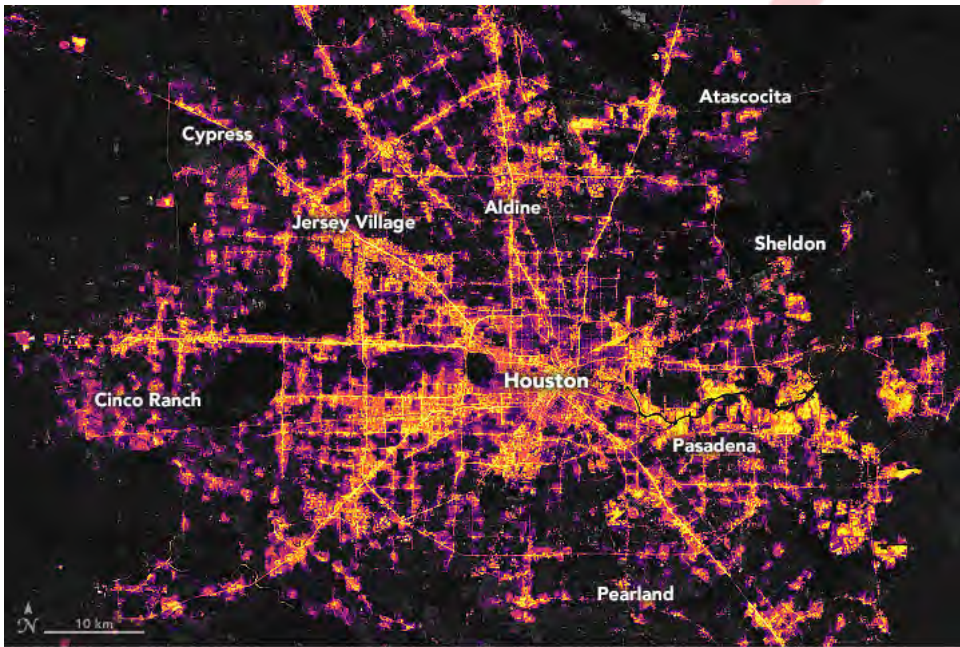
Disaster Impact Assessment

Infrastructure Vulnerability Analysis

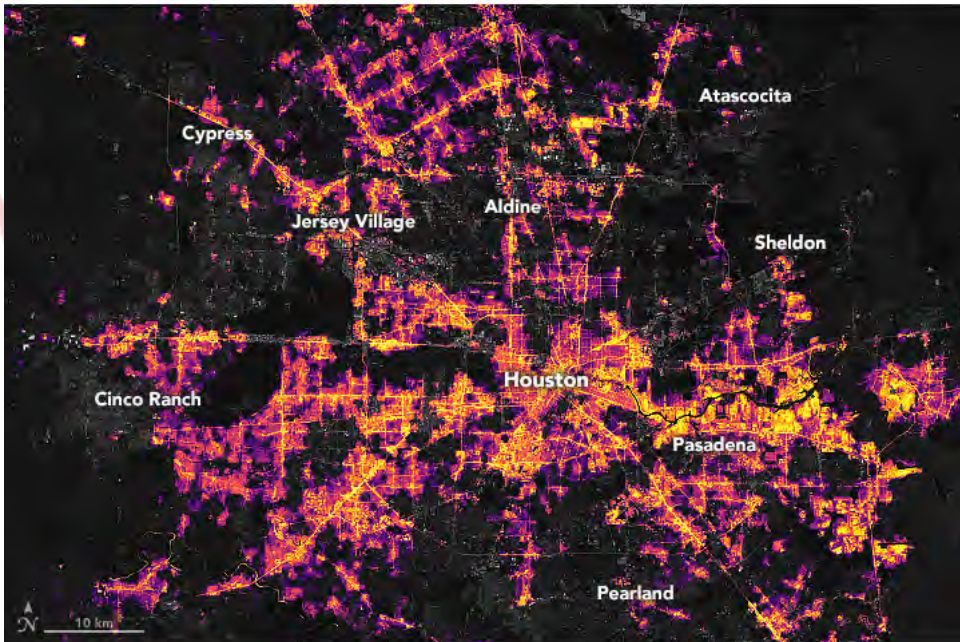
Business Interruption Coverage

Risk Modeling and Underwriting

Disaster Response and Recovery



February 7, 2021



February 16, 2021

CONTACT



Caius Reza, Head of Business & Marketing at Alba Orbital

caius.reza@albaorbital.com

+44 7496 325283

www.albaorbital.com