

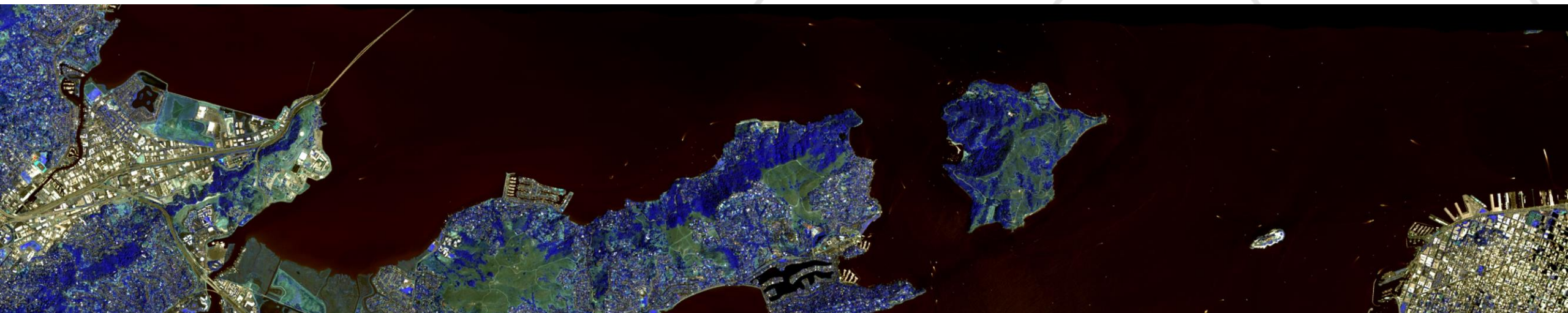
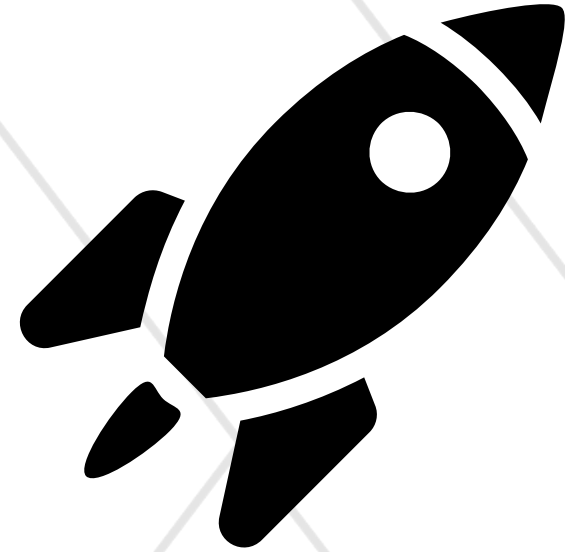
Hyperspectral imaging offerings on Stratospheric and Space Platforms.

Trond Løke - CEO

04.03.2024

Agenda

- Short intro to NEO and HySpex
- Stratospheric activities
- Space activities
- Data quality



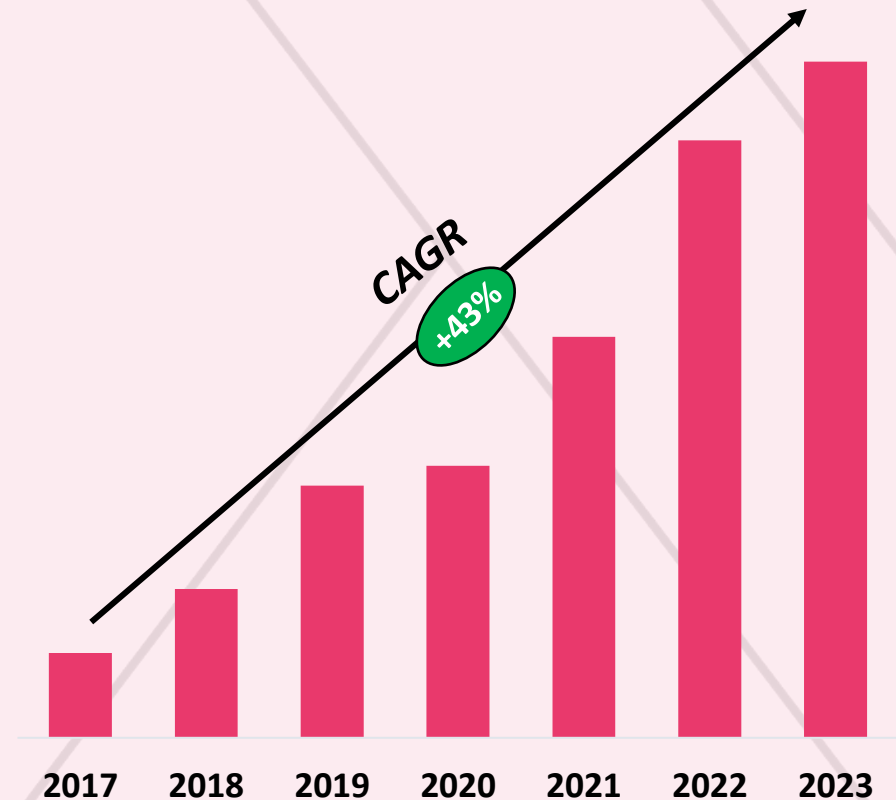
NEO is a fast-growing tech company with heavy R&D focus

Company overview

- **Founded in 1985** as a spin-off from Norwegian Defense Research Establishment (FFI)
- Does **research in electro optics** with the objective to develop **state of the art products** for an international market
- Delivers **state-of-the-art hyperspectral cameras** for a wide range of applications through HySpex
- **Headquarters in Oslo** with sales office in the U.S and subsidiary company in Sweden
- Currently **~60 employees**, half of which work in **R&D**
- Been on the **top 50 list of fastest growing tech companies** in Norway several years
- Owned by a non-profit foundation with a vision of supporting **art and physics**



CAGR from commercial activities 2017-2023

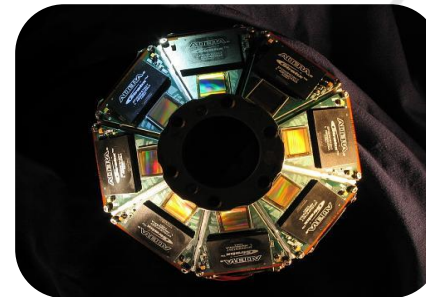
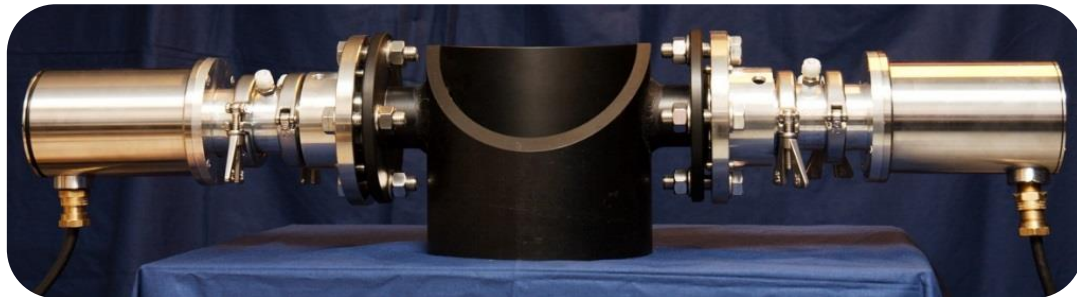
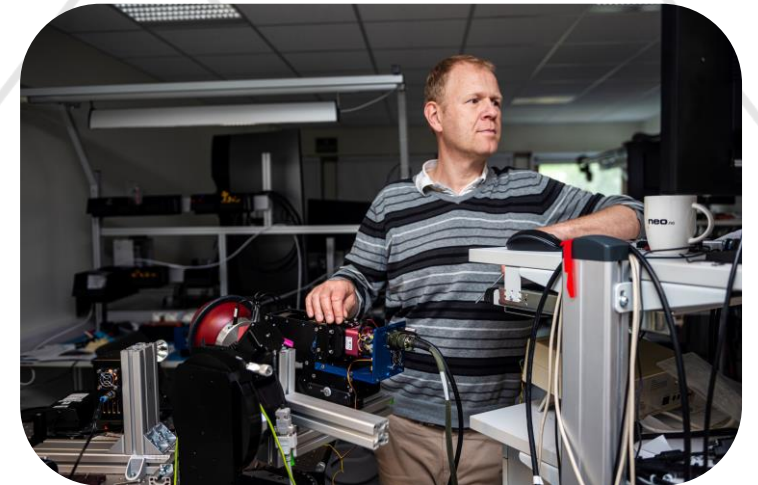


Our R&D projects are characterized by advanced technology and international collaboration

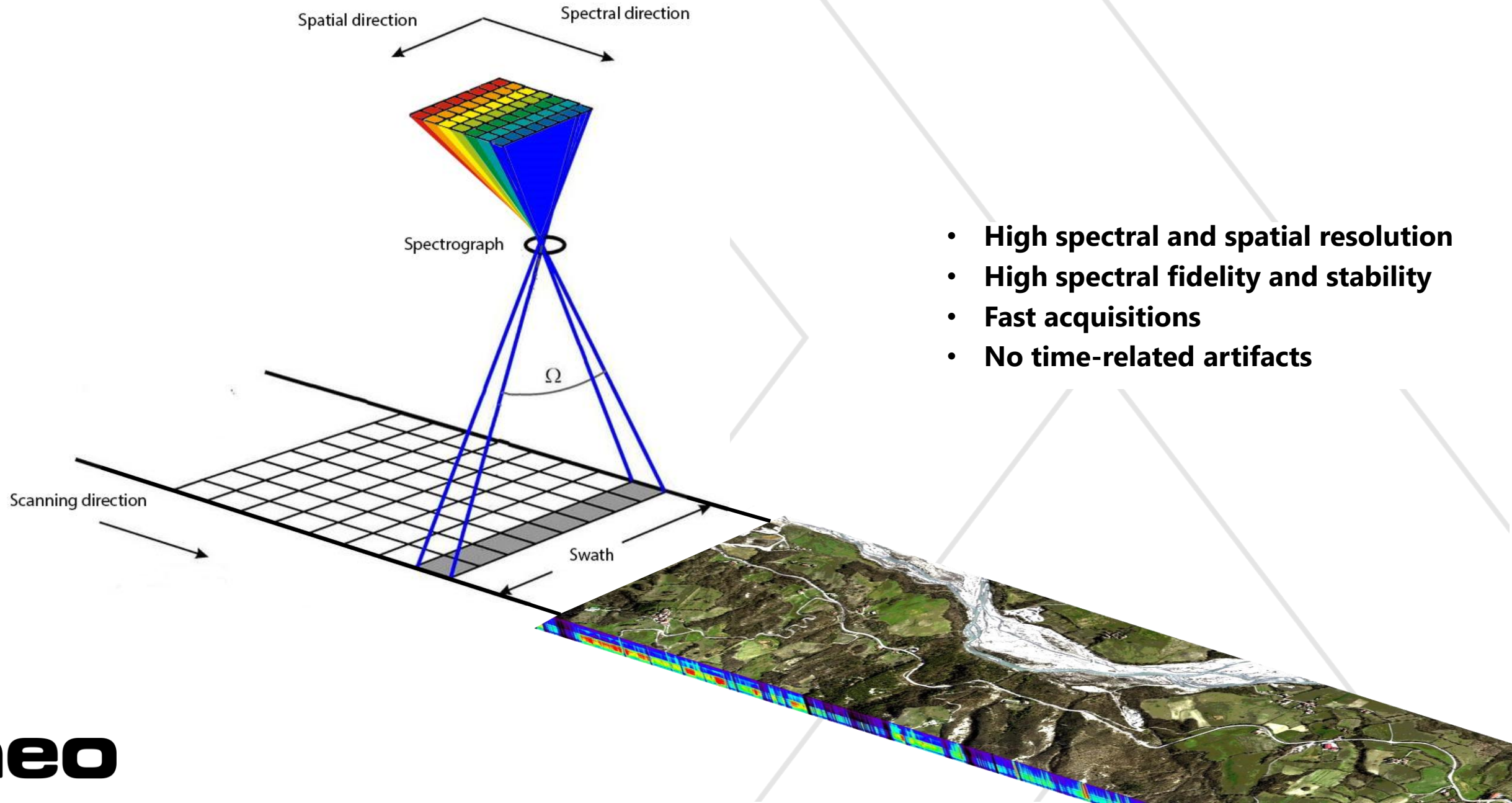
We are an attractive SME for collaborating on **EU and international R&D projects**

We have a long history of working on prestigious **R&D projects with key players** in the world of photonics

We have **all resources internally** to design, develop and produce all our electro optical products



Pushbroom architecture



- **High spectral and spatial resolution**
- **High spectral fidelity and stability**
- **Fast acquisitions**
- **No time-related artifacts**

Multi-scale hyperspectral offerings from HySpex

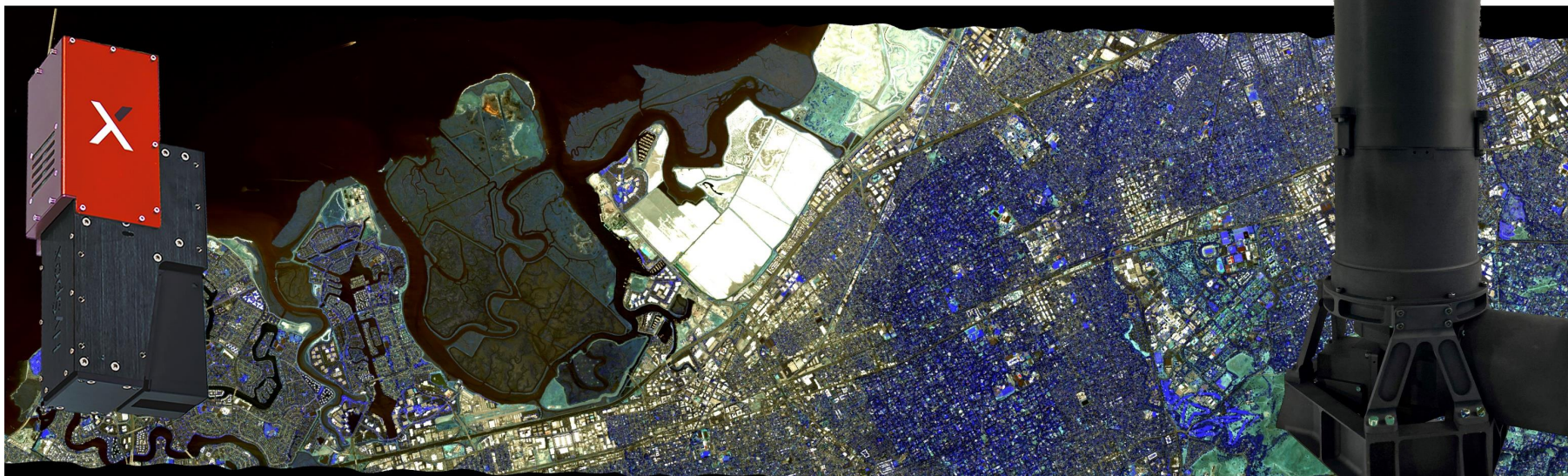




Stratospheric



Satellite



neo

HySpex
by neo

Hyperspectral applications – Airborne – Stratospheric platforms

Special version of the following cameras are as a stratospheric system:

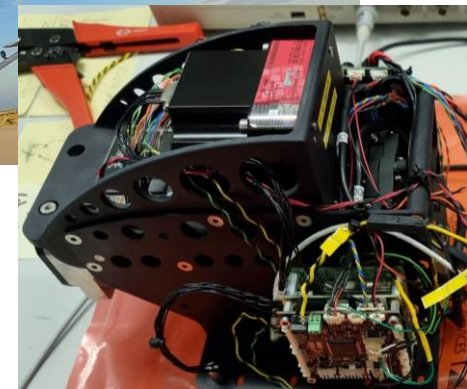
- Mjolnir V-1240, S-620 and VS-620
- Classical VNIR-1800, SWIR-384 and SWIR-640



NASAs ER-2 platform



SWIFT Hale platform



Hyperspectral applications – Airborne – Stratospheric platforms



SCEYE-High Altitude Stratospheric Platforms



neo space

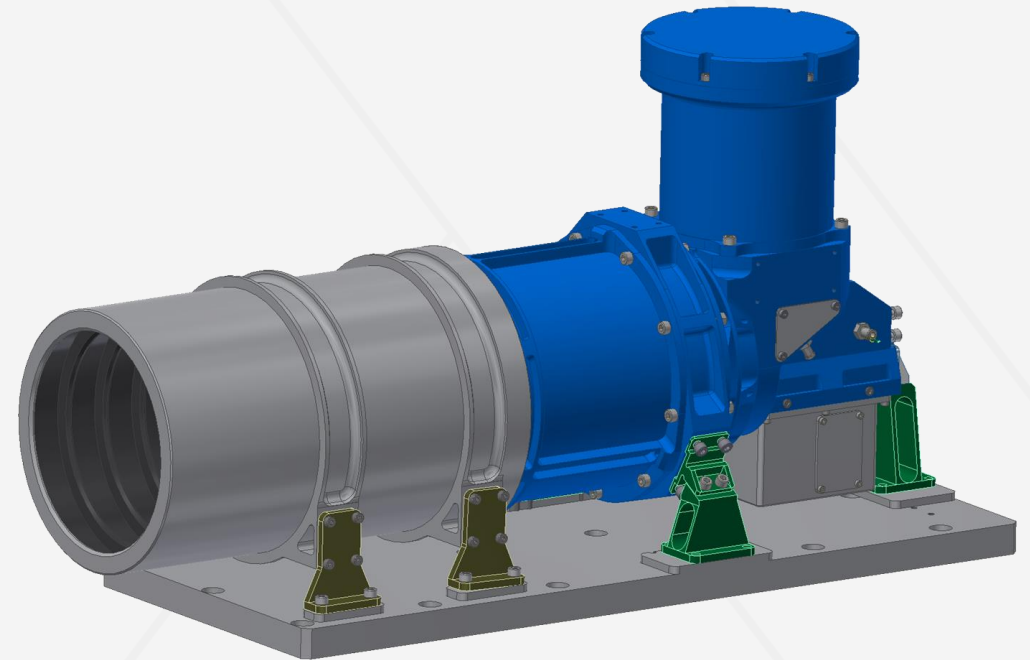


Current & future space activities in NEO

List of our largest space activities

- **Hypernor** – *Hyperspectral camera for ESA In-Orbit Demonstration*
- **Support funding (Norwegian Space Agency)** – *Methane detection & HySpex on the moon*
- **HYPER-IP (EDA funded)** – *Hyperspectral cameras on satellite platforms for defense applications*
- **First commercial space contract signed in 2023** with planned launch in 2025
- And more to come/confidential!

CAD model of the Hypernor instrument



HYPERNOR, Project Goals (ESA IOD)

The project goals can be summarized as follows:

Develop a low cost, low weight, low volume, hyperspectral imager (HSI) with competitive performance (most importantly in terms of GSD) within a small system.

Substantiate the instrument performance with an end-to-end data simulation analysis based on best-guess parameters.

Clarification of project goals:

- The size and mass of the HSI shall be compatible with a microsatellite of less than 50 kg total mass (platform + payload). Payload mass shall be less than 20 kg.
- The use of well-known optical components that have been known for a long time and can be obtained from many different manufacturers will ensure the low cost goal and also a low risk development approach.

HYPERNOR, HSI

Modes	Single slit	Dual slit SNR	Dual slit GSD
GSD @ 500 km [m]	9	9	4.5
Pixel count (cross-track)	640	640	1280
Swath @ 500km [km]	5.8		
#Spectral channels	36		
Spectral range [nm]	950 – 2500		
Keystone [pixels]	0.01	0.01	0.02
Smile [channels]	0.01	0.1	0.1
MTF @ Nyquist frequency	>0.21	>0.21	0
SNR @ 40° Sun elevation and 100% reflectance	98 – 226	139 – 320	69 – 159
SNR @ 40° Sun elevation and 20% reflectance and	44 – 101	62 – 141	31 – 71
Size [mm]	~360 x 312 x 193		
Mass (incl. 20% margin) [kg]	6.6		



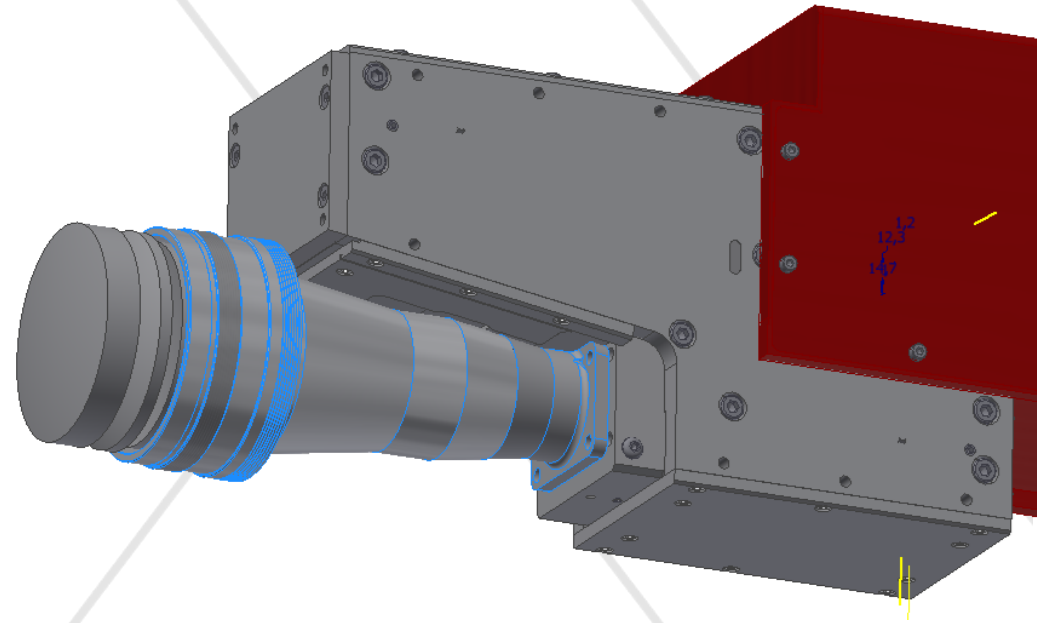
neo

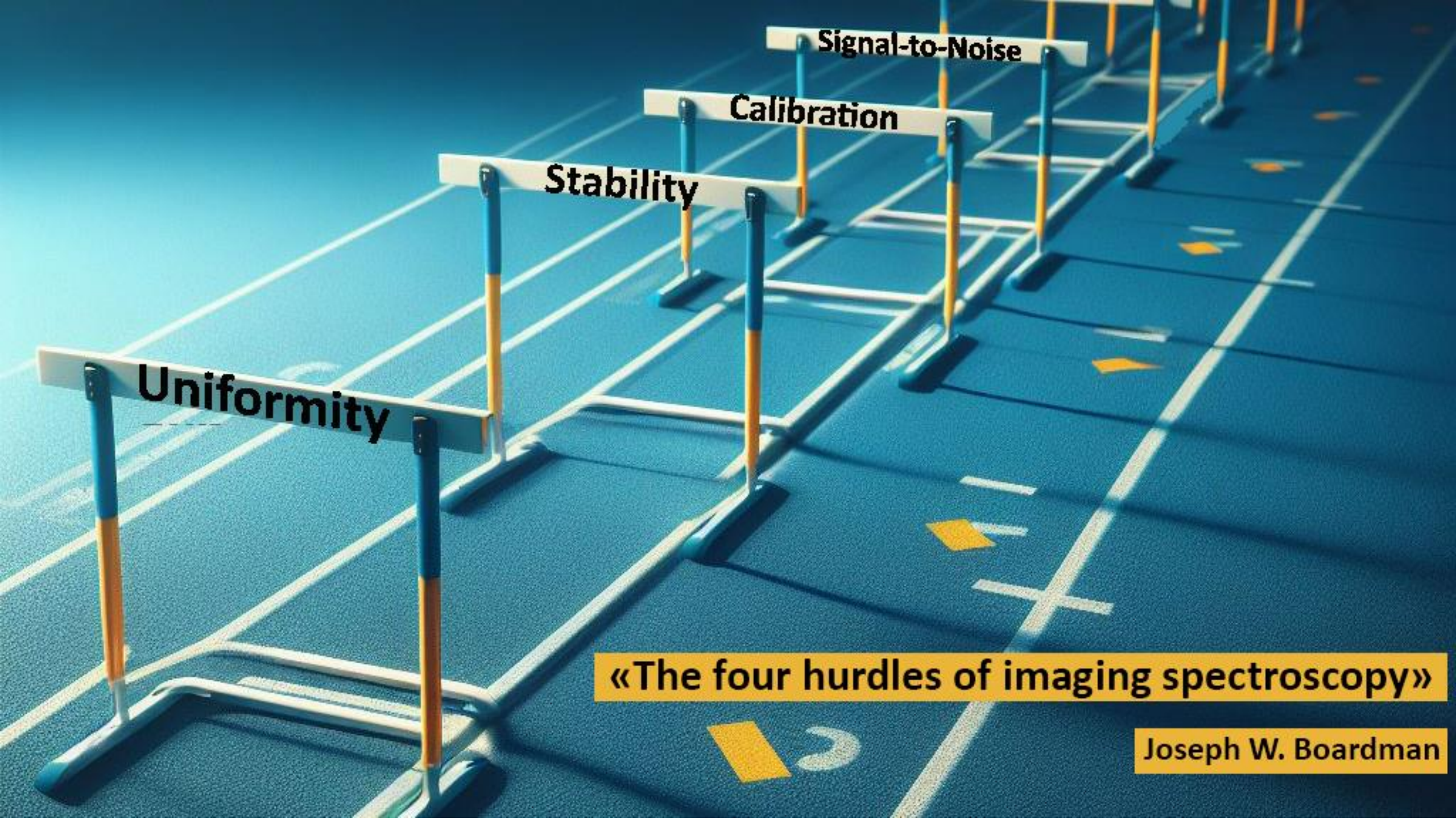
Estimated Launch in 2027

HySpex
by neo

Customizing our COTS for space

- We have several active projects /developments:
 - Customized SWIR-640 with FOV reducer (and more) for methane detection
 - Customized SWIR-640 with space grade detector (950nm-1700nm) – Launch in 2025
 - Customized VNIR-1800 with FOV reducer
 - Customizing Classic HySpex system for the moon





Uniformity

Stability

Calibration

Signal-to-Noise

«The four hurdles of imaging spectroscopy»

Joseph W. Boardman



Stratospheric



Satellite



Questions?