



STRATOSPHERIC PLATFORMS

EPIC Online Technology Meeting on Environmental Monitoring



César Martínez
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business
incubation
centre
Madrid Region



smartHAPS participates in the
ESA BIC Madrid Region

BACKGROUND

- 55.3% of the World population live in cities
- There are 548 cities of >1 million people
- 80% of global GDP generated in cities
- Urban areas will multiply x3 by 2030



PROBLEM / OPPORTUNITY

- Cities generate 75% of global greenhouse gas (GHG) emissions
- Urban pollution causes 8.8 million deaths / year
- >50% of traffic accidents deaths occur in urban areas
- 59% of cities are at high risk of a natural disaster
- 289 cities are at high exposure to two or more natural disasters



PROBLEM / OPPORTUNITY

Cities concentrate a rising demand for remote sensing with very high spatial, spectral and temporal resolutions in relatively small Areas of Interest (20x20 km).

- Tracking highly dynamic processes (e.g. hourly, daily, repetition cycles)
- Monitoring in near-real time with very low latency
- Detection of small size changes (e.g. waste discharges, pollution plumes, accidents)



HAPS CONCEPT

(High Altitude Pseudo-Satellites or High Altitude Platforms Systems)

- Aerial vehicle able to **emulate satellite** performances:
 - Enough altitude to cover an area of interest (AOI)
 - Enough endurance to provide long-term services
- **Stratospheric** operation:
 - 20 Km (typical value)
 - Minimum wind speed
- Powered by **solar energy**
- *Operating from a quasi fixed position*
- *Recovered for maintenance and upgrades*
- Can provide **complementary services** to satellites

Lighter Than Air (LTA)

Airships (Helium)



Heavier Than Air (HTA)

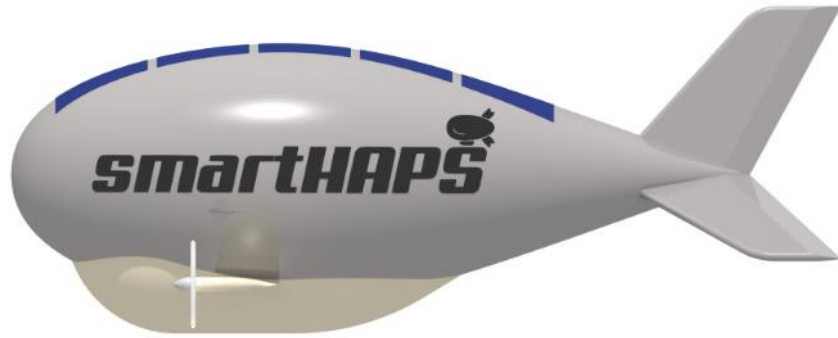
Light aircrafts



VALUE PROPOSITION

High Altitude Platforms are best fit to cover this demand:

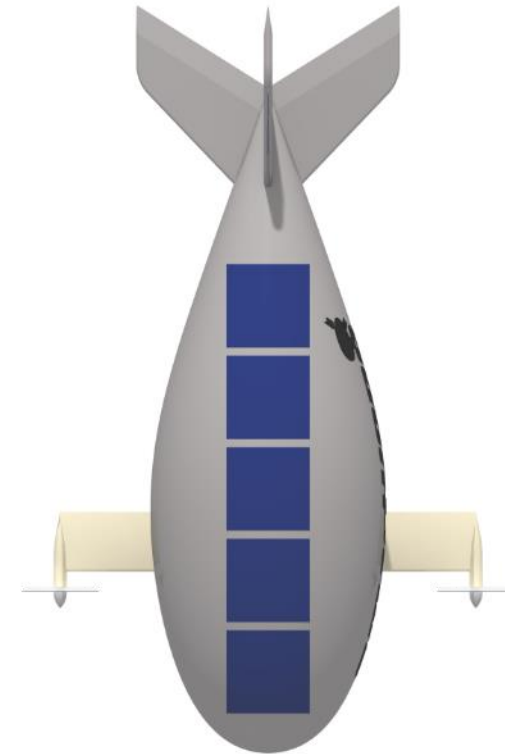
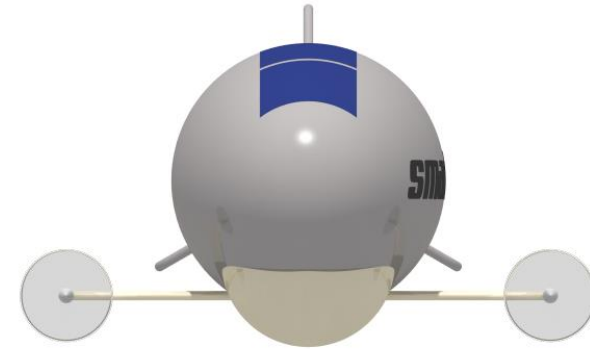
- **Swath**: Can cover most urban areas with a single frame
- **Persistence**: Hovering over the AOI can increase $>x100$ the information gathered per image (photons)
- **Spatial Resolution**: Very high. Closer than satellites (x20)

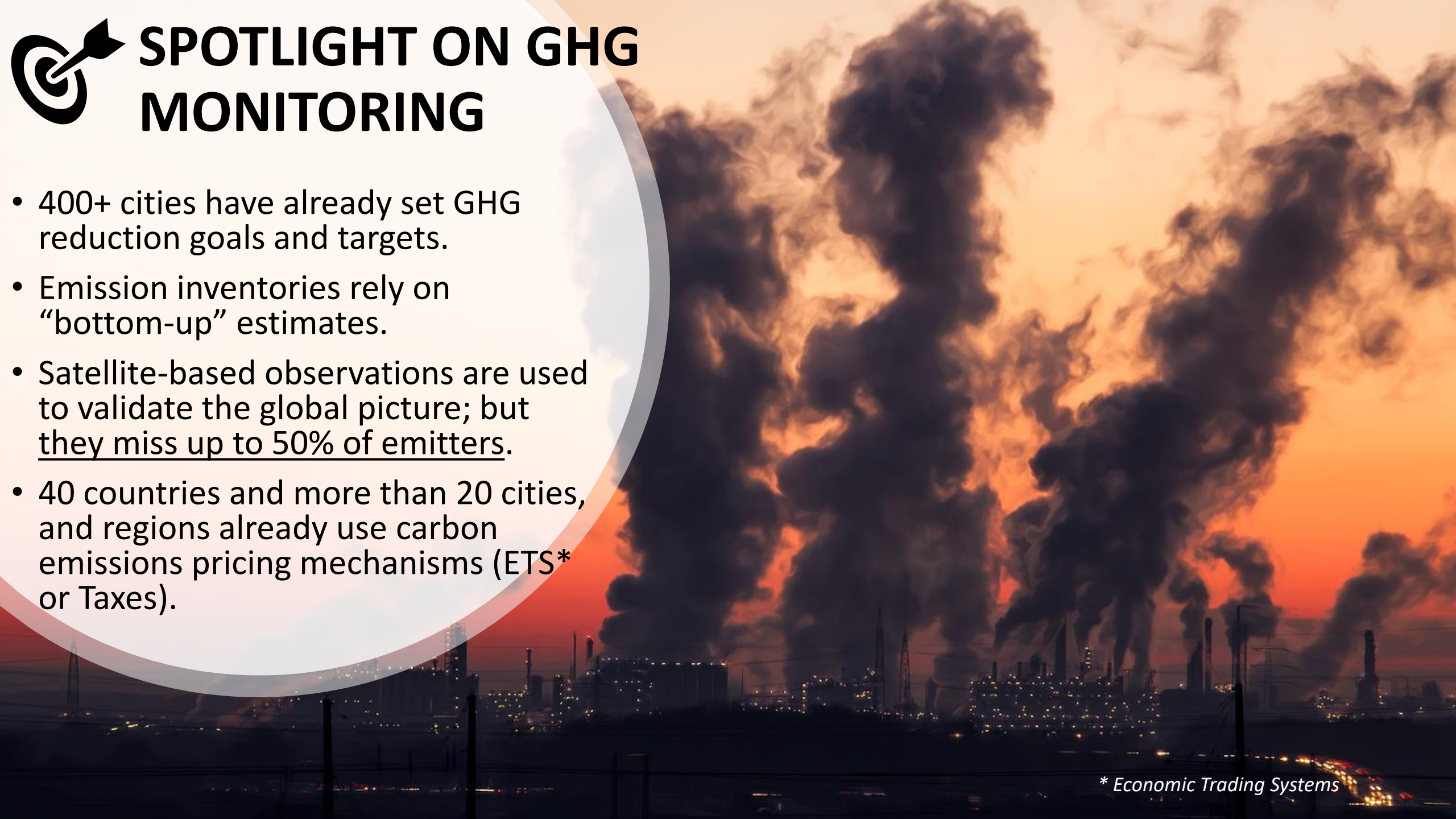


smartHAPS

proposed concept

- Small payloads
- Based in the ones used in nanosats
- Less demanding (power, envelope)
- Smaller platform





SPOTLIGHT ON GHG MONITORING

- 400+ cities have already set GHG reduction goals and targets.
- Emission inventories rely on “bottom-up” estimates.
- Satellite-based observations are used to validate the global picture; but they miss up to 50% of emitters.
- 40 countries and more than 20 cities, and regions already use carbon emissions pricing mechanisms (ETS* or Taxes).

** Economic Trading Systems*



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