AIRBORNE CAMPAIGNS
THE EARTH-OBSERVATION IN-SITU SOLUTION

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OHB DIGITAL CONNECT GMBH

„SMALL BUT SMART:
WE WANTED – AGAINST THE TREND – TO MAKE SPACE SYSTEMS SMALLER AND MORE COST-EFFECTIVE.“

PROF. DOTT.-ING. H.C. MANFRED FUCHS (1938-2014), FOUNDER OF OHB

NEW SPACE EARTH OBSERVATION

DISTRIBUTED SENSORS, REALTIME PERFORMANCE

"Novel and high-performance Earth Observation Systems combine ground resolutions well below 50 cm with video-like temporal resolutions and allow for response times below one hour, thus promising real-time applications in the near future."

[Image:ESA]

HOW AIRBORNE CAMPAIGNS CAN SUPPORT EO MISSIONS

AIRBORNE TEST ENVIRONMENT

CONDOR, MUSE-POD AND MAROC

Objective: Support developments in the area of airborne and satellite-based earth observation

Key Components

- Flight platform: Stemme S10 VTX (Condor)
- Ground System: Mobile Aerial Reconnessaince Operation Center (mAROC)
- Sensor platform: Multi-Sensor-Wingpod (MuSe-Wingpod)

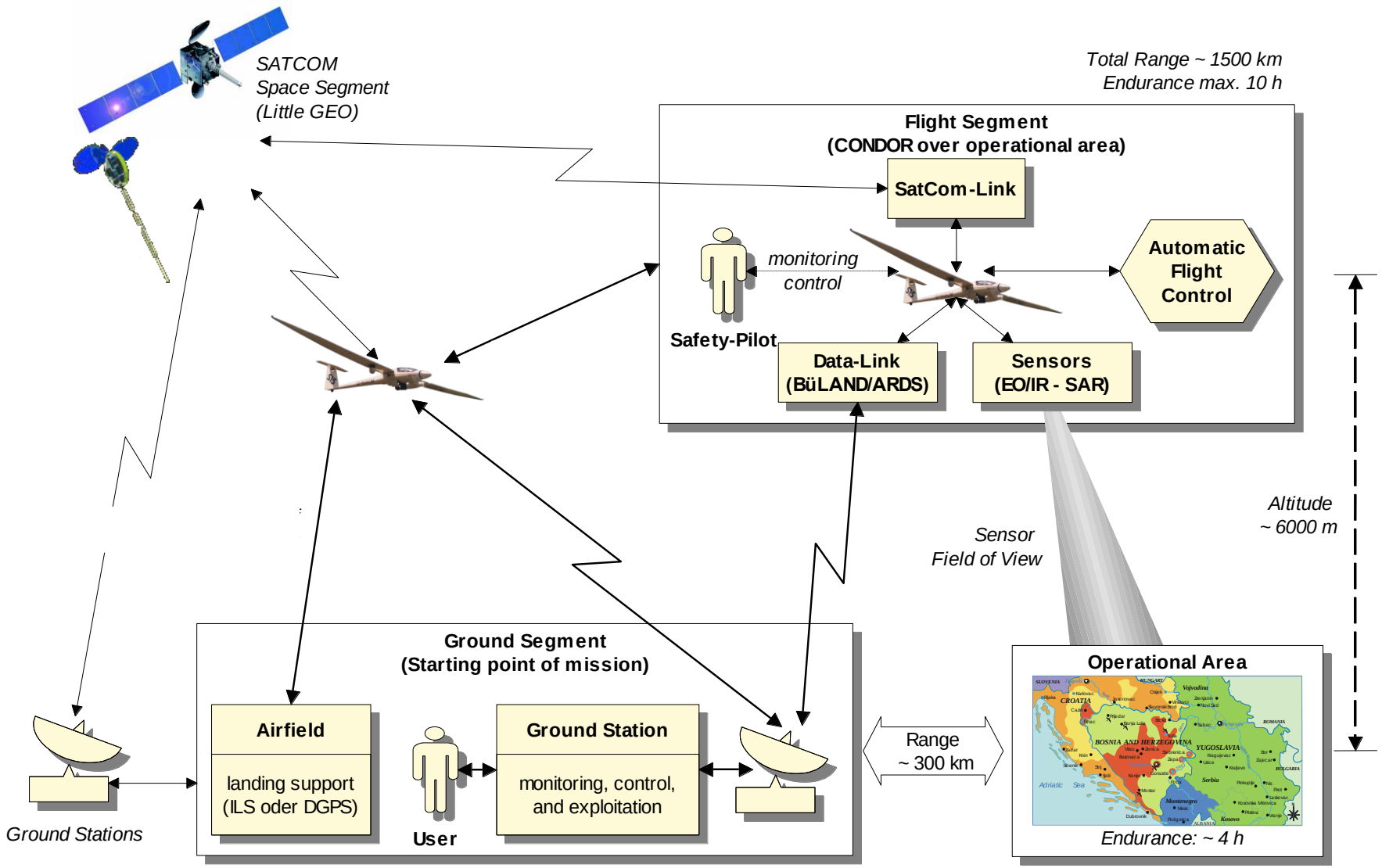
Mission preparation

Mission control

View from the cockpit

Transport

SYSTEM OVERVIEW



CONDOR

FLIGHT PLATFORM STEMME S10 VTX

- Quickly ready for use
- Eco-friendly
- Flexible payload configuration up to 60 kg per wing
- Long Endurance (6h) with exceptional gliding performance
- Silent operations, operation on grass or sand runways
- Transportable
- Small service effort, low operational costs
- On-board-processing capability

MAROC

MOBILE AERIAL RECONNAISSANCE OPERATION CENTER

- mAROC is OHB DC's decentralized, modular, transportable control center prototype
- It provides operational & user segment of a high performance airborne remote sensing system consisting of:
  - Database
  - Processing center
  - Several workstations
- Its decentralized structure is an important feature allowing individual components to be operated at different locations
- Worldwide transport possible via established logistics chains
  - All components are stored in robust standardized cases
  - Quick Assembly of all components within 1h


14:12
14:12
14:12

MUSE-WINPOD

SENSOR PLATFORM MULTISENSOR-WINGPOD

- Quickly equipable and cost effective solution for testing, e.g. active and passive optical sensors
- Load capacity of 45 kg
- Embedded power supply
- Embedded Inertial Meassurement Unit (IMU)
- Customizable sensor view windows
- Transportable
- Operation as laboratory setup possible


OHB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APPLICATION SCENARIOS

POSSIBLE APPLICATIONS

- Development support for:
  - Active and passive optical instruments
  - Components for data management
  - On-board-processing units
  - Automated & real-time data processing algorithms
- Calibration and validation activities

NEAR-REALTIME PROCESSING

TECHNOLOGY DEMONSTRATOR SELSAS (2015-2019)

- **Goal:** Evaluation and demonstration of near real-time processing of airborne 3D data
- Sensors: 3 x VIS cameras, 1 x NIR camera, LiDAR
- Processing steps included:
  - Georeferencing of sensor data
  - Automatic recognition of buildings
  - Provision of 3D information (via Structure from motion) in regions of interests
- Web based visualization of airborne (3D) data

SUPERSPECTRAL SENSOR (SUSE)

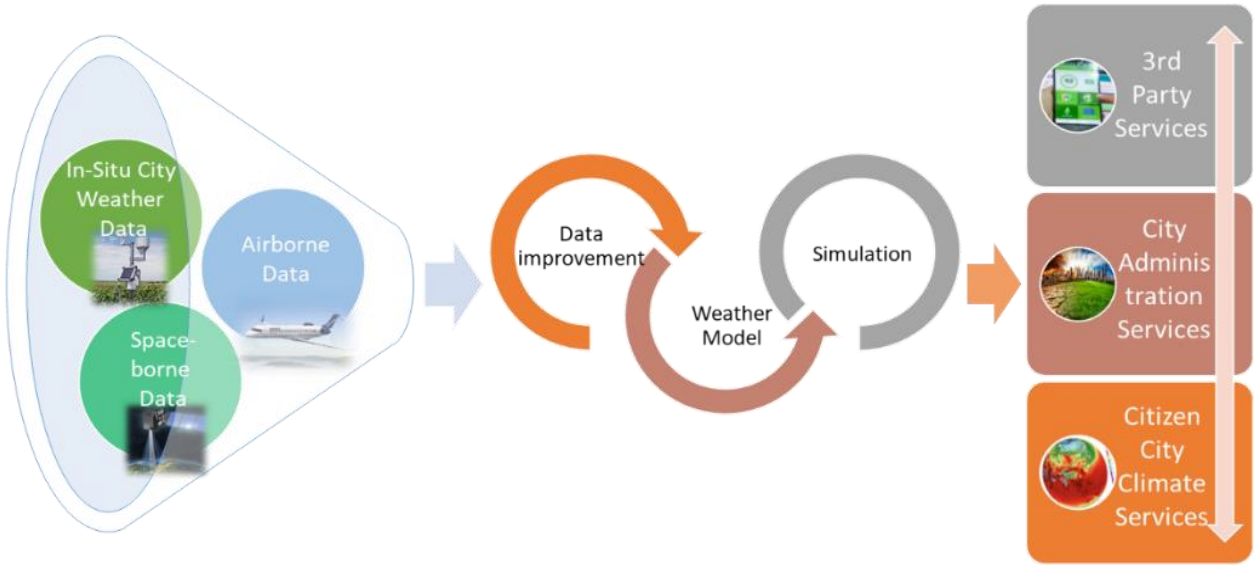
AN APPLICATION SPECIALIZED SENSOR FOR AERIAL RECONNAISSANCE

- Superspectral sensors – a category between multi- and hyperspectral, combining the advantages of both sensors
- OHB's superspectral sensor "SuSe":
  - Size, weight and power (SWAP) sensitive (drone applications)
  - Spectral range: 900 - 2500 nm
  - Up to ~30 bands – customizable between 10 - 200 nm width
  - Tailored for specific application
  - Good signal to noise ratio (SNR) by Time Delay and Integration
- Evaluation and demonstration of sensor performance via dedicated (future) flight campaigns

CITYCLIM

NEXT GENERATION CITY CLIMATE SERVICES USING ADVANCED WEATHER MODELS & EMERGING DATA SOURCES

- **Motivation:** Extreme heat poses significant risks to the world´s growing urban population & heat stress is likely to escalate with the anthropogenic increased temperatures
- **Goal:** Integration of in-situ, space-based (e.g. Copernicus) and airborne EO data into high-resolution weather model to assess their usefulness w.r.t. forecast quality and provide City Climate Services
- The project will establish:
  - **Open platform & generic framework** for efficient design of services based on diverse data
  - **Enhanced weather models** based on operational data from diverse existing & emerging sources
  - A set of **City Climate Services** customizable to specific needs of users in cities



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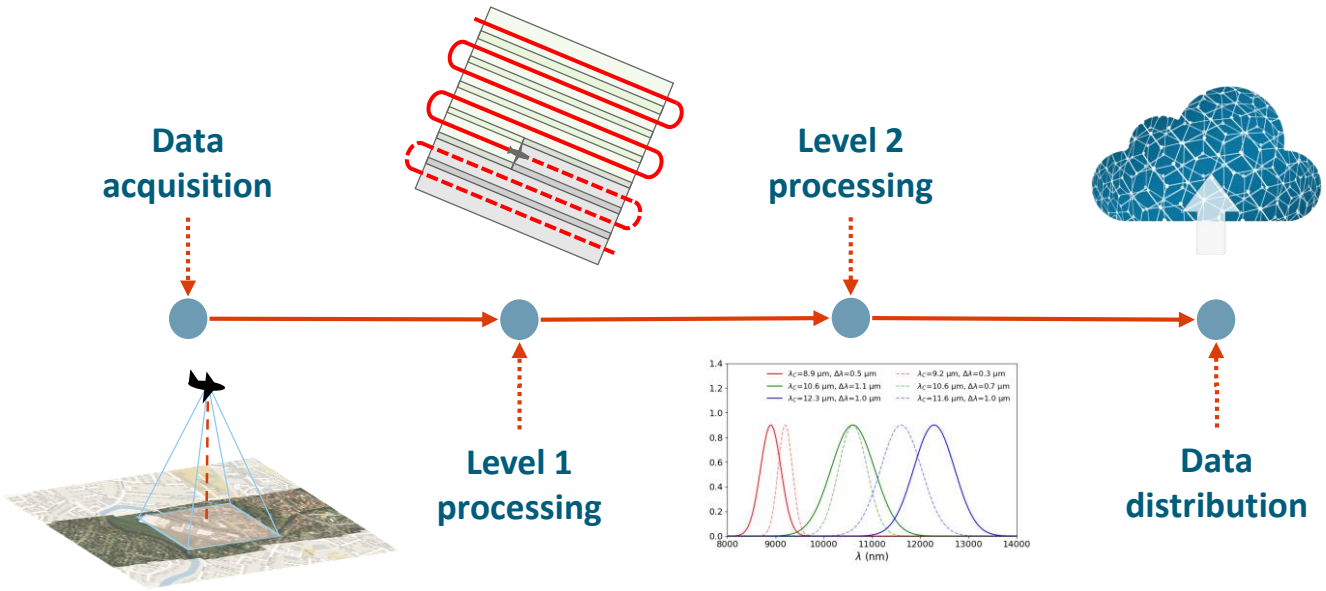
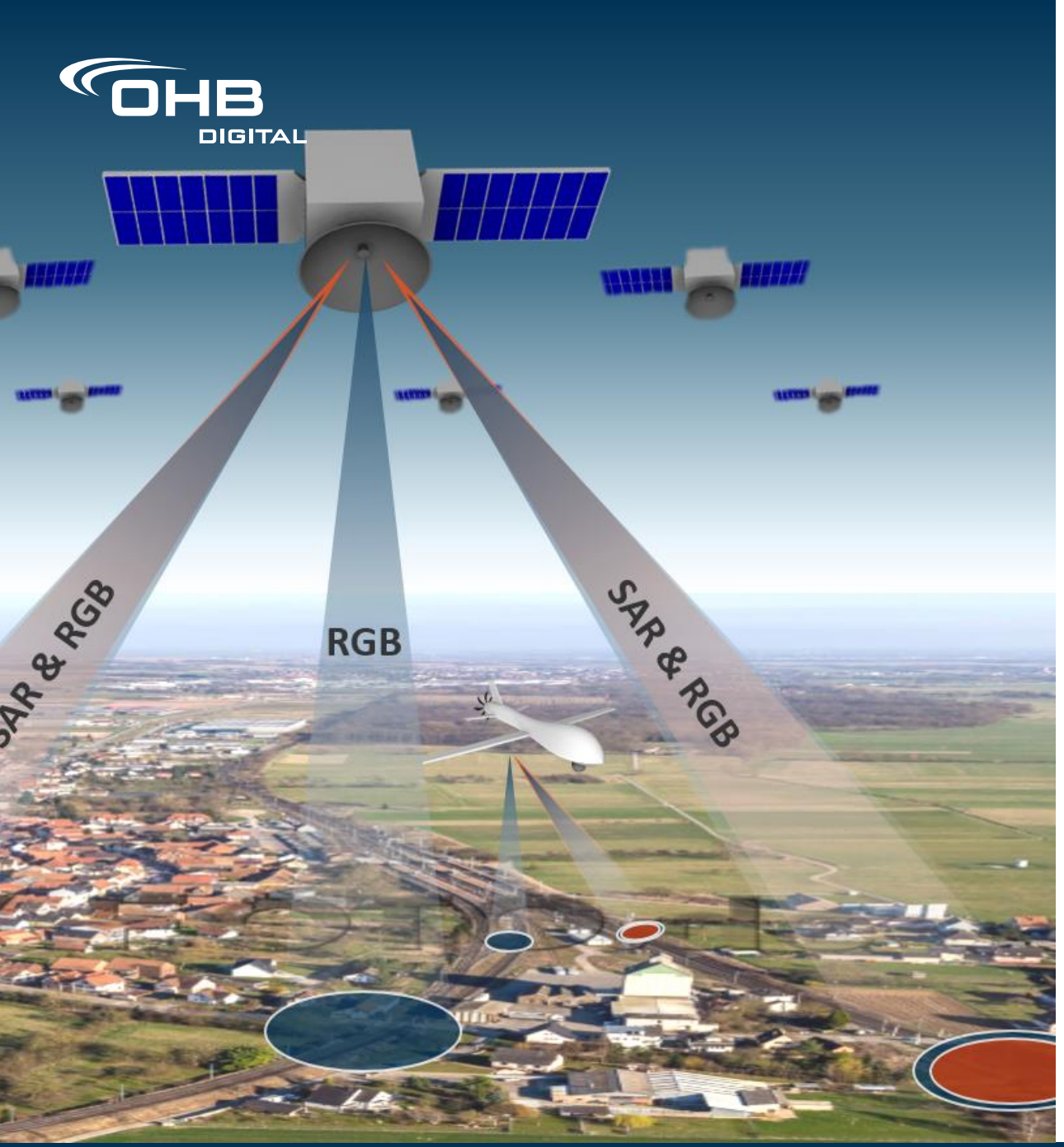
https://www.cityclim.eu/

CITYCLIM

AIRBORNE MEASUREMENTS

- High-resolution LST data is an key element for high-resolution urban weather models in CityCLIM
- However, high-resolution spaceborne LST data is not yet available
- Airborne remote sensing allows us to bridge this gap ☺





INFRASTRUCTURE MONITORING

CURRENT PROPOSED CONCEPT

- **Goal:** Realtime infrastructure monitoring (with focus on railways) using VIS & SAR sensor data and on-board processing
  - On-board processing & detection of damages/ obstacles is the key aspect for efficient data handling
  - Relevant data can be transmitted to earth below 15 min
- Support via airborne campaigns:
  - Acquisition of VIS & SAR sensor data to allow development & training of dedicated algorithms
  - Proof-of-concept of full system (including on-board processing & data transmission)

SUMMARY

- OHB DC‘s airborne test environment consists of:
  - Flight platform: Stemme S10 VTX (Condor)
  - Sensor platform: Multi-Sensor-Wingpod
  - Ground System: Mobile Aerial Reconnessaince Operation Center (mAROC)
- It has been in operation for over a decade now (with continuous improvements)
- Activities especially focus on development support for:
  - Passive and active optical instruments
  - Data management components
  - On-board-processing units
  - Automated & real-time data processing algorithms
- … this also includes calibration and validation activities

THANK YOU!

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