Development and implementation of new aerospace technologies in the mid-low atmosphere and integration with satellite data for Earth observation and environmental pollution monitoring

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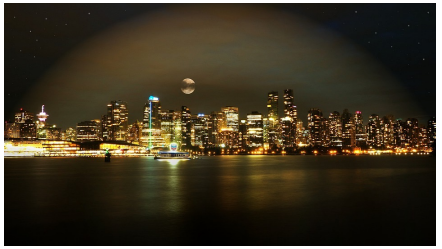
Supervisor: TBD

Research work presentation - 09/11/2022

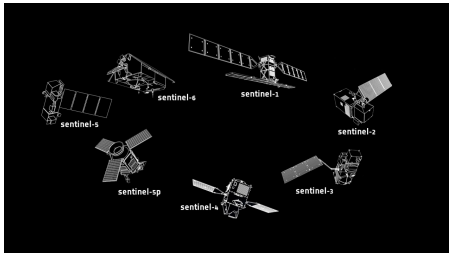
International Framework

- **Threat: Air Pollution**
- **Different types:**
  - ***atmospheric***
  - ***light***
  - *radiation*
  - *acoustic*
  - …
- **Repercussions:**
  - global warming
  - respiratory Diseases
  - habitat health
  - circadian phase shift
  - obstacle for observers
  - …

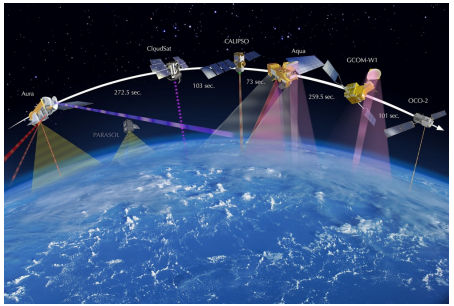


International Framework

- **Interest in pollutant estimation** (Copernicus, PNRR, …)
- **Definition of environmental parameters**
- **Environmental analysis**
  - satellite data
  - static sampling (ground level)
- **Gap in the mid-low atmosphere**
  - Drones
  - Balloons
- Interest pollutants movements, correlation and secondary effects
- **Integration of Data**



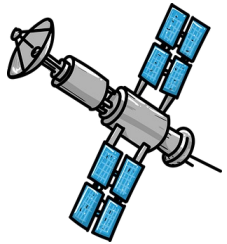
Sentinel constellation (2020) - ESA.

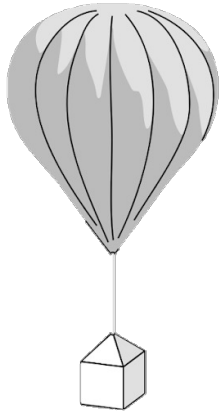


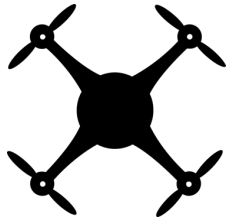
A-train satellite constellation (2014) - Wikipedia.

Research Objectives

- **Mid-low atmosphere analysis:**
  - Analytes: **VOC_s, PM, light, H_2O, O_3, CO_2**
  - New technologies and methods
    - sensors, samplers and detectors
    - dispersion models
    - Resolution improvements
  - Integration and Prototyping
- **Pollutants correlation** (light and chemical)
- **Data integration** (SAT, drones, balloons)
- **Crops studies** (rewatering, wine, …)



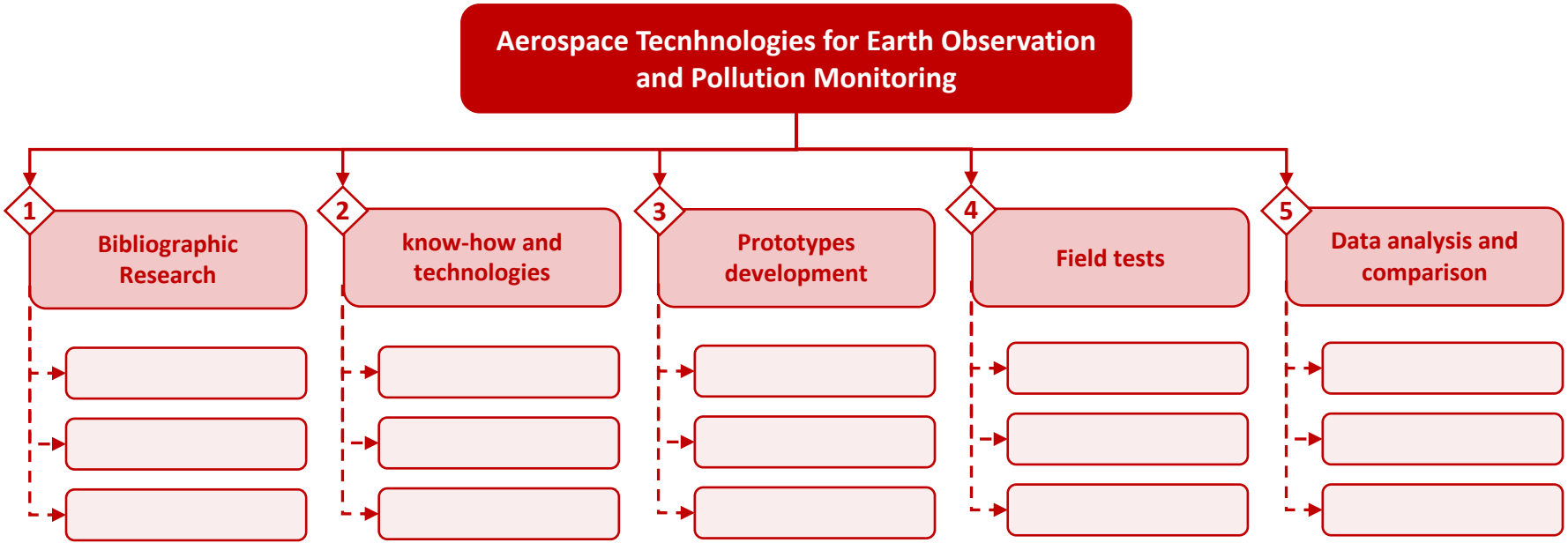




Previous Knowledge

- **Innovative Projects:**
  - **O-ZONE:** Pollution sampling in the stratosphere with a stratospheric balloon (ESA BEXUS project)
  - **AVERLA/SEALS:** Avalanche victim rescue with drones
- **Flight Mechanics Research Group**
  - **MINLU:** Light pollution measurements
  - **AREO:** Earth observation with camera on balloon
  - …

WBS Diagram


Aerospace Tecnhnologies for Earth Observation and Pollution Monitoring
1
Bibliographic Research
2
know-how and technologies
3
Prototypes development
4
Field tests
5
Data analysis and comparison

GANTT Chart

WBS	TASK TITLE	FIRST YEAR												SECOND YEAR												THIRD YEAR											
		T1			T2			T3			T4			T1			T2			T3			T4			T1			T2			T3			T4		
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
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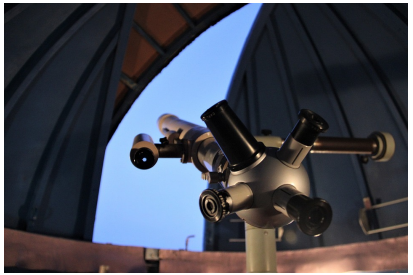
5.	Data analysis and comparison																																				

- Know- How
- Development and Testing
- Data integration

Academic Collaborations

- **DAFNAE & TESAF**: Crops monitoring and study
- **University of Pisa:** Stratospheric balloon launches
- **University of Chile**: Light Pollution research
- ***Others**: TBD*



Industry Collaborations

- **Officina Stellare**:
  - *Earth Observation*
  - *Astronomy*
  - *Satellite data*

- ***Others**: TBD*

Periods Spent Abroad

- **Chile:**
  - *Light pollution analysis*
  - *Single effect of light pollution*

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- ***Others**: TBD*
  - *Single effect of chemical pollution*
  - *Analysis of satellite data*

Thank you for your attention