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ClimCam Project
Climate change detection camera system using
Machine Learning
Mounted at Bartolomeo Columbus module
ISS

UNOOSA and Airbus Award 2021

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ClimCam:
AI Camera to be mounted at
ISS- Columbus-Bartolomeo

Egypt, Kenya Uganda (EKU) ClimCam



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Project Proposal submitted to United Nations Office for Outer Space Affairs (UNOOSA) Access to Space for All in partnering with Airbus Defense and Space GmbH.

“via the Airbus Partnership Agreement with ESA”

The call offers opportunity to accommodate a payload on the Airbus Bartolomeo external platform on the International Space Station.

1. We have submitted the proposal April 2020
2. We have been preselected June 2020.
3. Administrative process started July 2020.
4. Preliminary conceptual design submitted Dec 2020 for Review
5. Final Selection made at IAC Dubai 2021.



<https://unis.unvienna.org/unis/en/pressrels/2021/unisos559.html>

What is ClimCam?

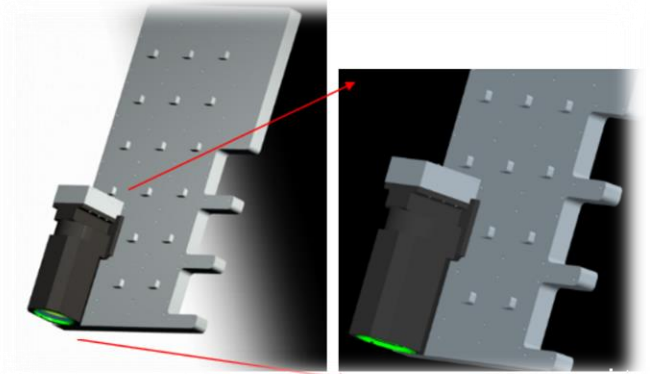


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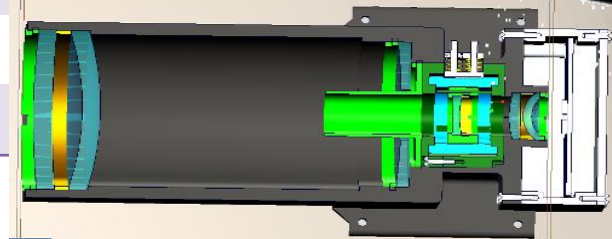
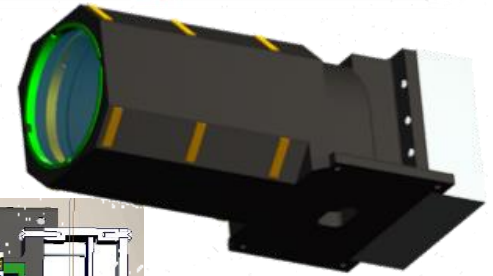


The ClimCam is a climate change detection camera system, that aims at monitoring the effect of climate change in east Africa.

The Camera is equipped with Machine learning Engine that can spontaneously detect changes of Area Of Interest- AOI.



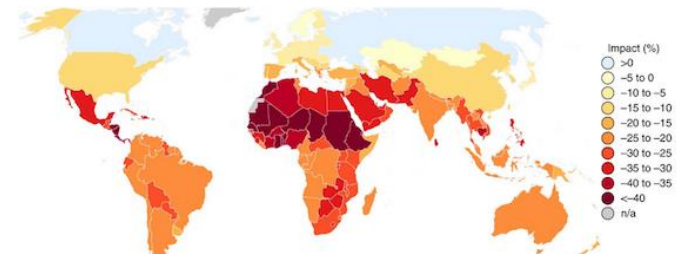
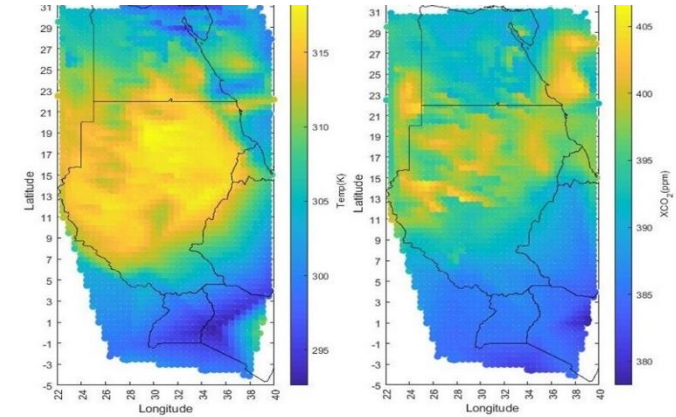
Payload camera Mass	3.5Kg
Payload Dimensions	98 x 98 x 300 mm
Payload camera Volume	$2.88 \times 10^{-3} \text{ m}^3$
AI classification engine	CNN





Project Objectives

- PrimObj-1: **Take color images for East Africa** with daily coverage area at least 20 Km² and Ground Sampling Distance 10 m at 400 Km altitude. During the "one year mission", the camera will have to acquire at least one image per day.
- PrimObj-2: **Determination and allocation of climate change effects at East Africa region.** Within one year of full operation, the camera will have to provide images relevant to floods, measured as (rate per area), and agricultural productivity & related forecast of weather status, measured per (Agriculture area).
- PrimObj-3: **Technology demonstration of the camera system onboard the ISS** at exposed space environment, by completing the one year life time of full operation. This demonstrates technical capabilities of Africa to use space technology for facing global challenges.





Rationale

- **African agenda 2063** "by 2063, Africa shall be a major social, political and economic force in the world, with her rightful share of the global commons e.g. space".
- **United Nation Sustainable Development Goals**
 - SDG-2: Zero Hunger,
 - SDG-4: Quality Education
 - SDG-9: Industry, Innovation And Infrastructure,
 - SDG-13: Climate Change Action,
 - SDG-17: Partnership For The Goals;
- **Objectives of African Space Policy and African Space Strategy:**
 - Promote Knowledge Sharing;
 - To Create An Industrial Capability;
 - Promote Capacity-Building For The Development Of Space Services;
 - Use Existing Space Infrastructure;
 - Develop And Enhance Early Warning Systems On The Continent; Promote Intra-Continental Partnerships;
 - Forge International Partnerships.



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Simulation of camera onboard the ISS



4 Days coverage

EKU ClimCAM

EKU -ClimCam



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Mission

- The camera will be installed at ISS for ONE year;
- The Camera Is RGB (0.4-0.5 ; 0.5-0.6; 0.6-0.7 μ -meter);
- We use Machine learning algorithm to classify vegetation;
- The data link available is 0.1 Mbps;



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Team Experience



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Payload camera Developed at EgSA

Space Qualified camera computer

- 6-2013
- 12-2015



Radiation testing
IP: EGPO 1114-2016

Space qualified integrated imaging system

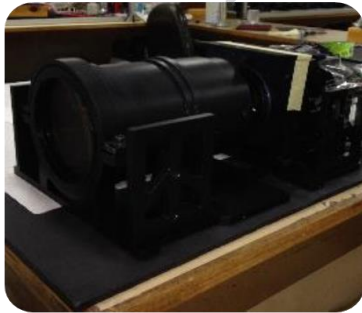
- 5-2016
- 6-2018



Multi- mission

Space qualified camera

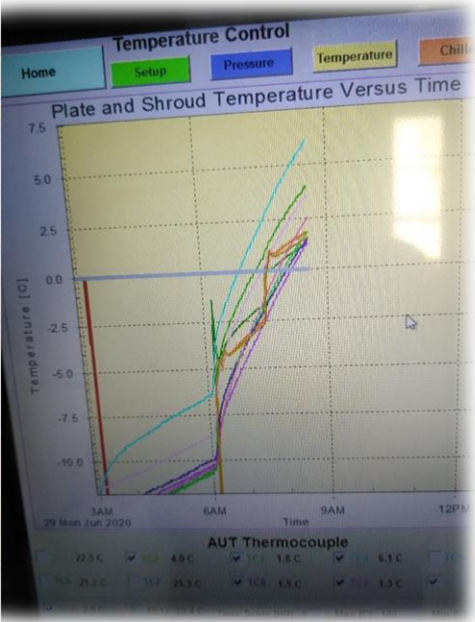
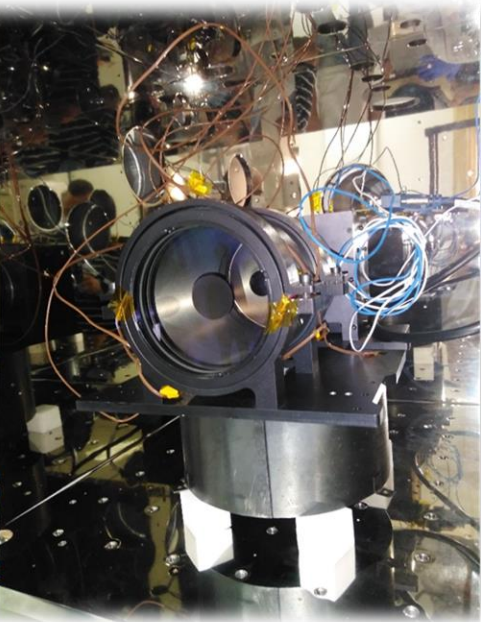
- 7-2017
- 12-2019



EKU -ClimCam



Qualification testing



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Previous Project:

Payload camera Developed at EgSA 2019



مشروع تصميم و تنفيذ كاميرا فضائية
للقمر الصناعي Nexsat-2

ابريل 2019

Technical Team-EgSA

No.	work package
1	Optical Engineers
2	Hardware engineers
3	software engineers
4	Mechanical engineers
5	Thermal analysis engineers
6	AI specialists
7	Operation SW developers





Thank you