



supported by :



FROM **SCIENCE**  
TO **NEXT SPACE**  
MINIATURISED  
INSTRUMENTATION

**CENTRE  
SPATIAL**  
UNIVERSITAIRE  
DE GRENOBLE





**In France, space is an industry of the future. The miniaturisation of satellites represents a paradigm shift with the potential to unlock major innovations and open up the entire sector to new players.**

The CSUG unites Grenoble's ecosystem to focus on miniaturised space instruments and the processing of space data in the name of greater contribution to science, preparing students for careers of the future in New Space.

Centred around innovative projects with identified scientific and technological opportunities, the CSUG takes an original approach to teaching at the University. Created in 2015, the CSUG aims to begin developing one new satellite per year.

## OFFERING STUDENTS A PATH INTO SPACE

**The CSUG provides a unique opportunity when it comes to training young people for a demanding but promising sector using the 'Learning-by-Doing' approach, involving students from the Université Grenoble Alpes and Grenoble INP at the heart of its projects.**

The CSUG's education offering, backed by the Université Grenoble Alpes Foundation, is designed for students to work in cross-disciplinary teams under the supervision of professors, lecturers and researchers, as well as industry experts and sponsors. Each year, 100 students take part in the development of nanosatellites, from the design phase to pre-launch testing. The practical and expertise-based curriculum helps them build key skills that meet the real needs of businesses operating in the space sector.

## WHAT IS A NANOSATELLITE?

First developed in the United States, these satellites weighing less than 30 kg were initially used for their educational value.

However, their scientific and technological advantages are now widely recognised. Nanosatellites are lightweight, energy efficient and inexpensive, helping to make the space sector more accessible.

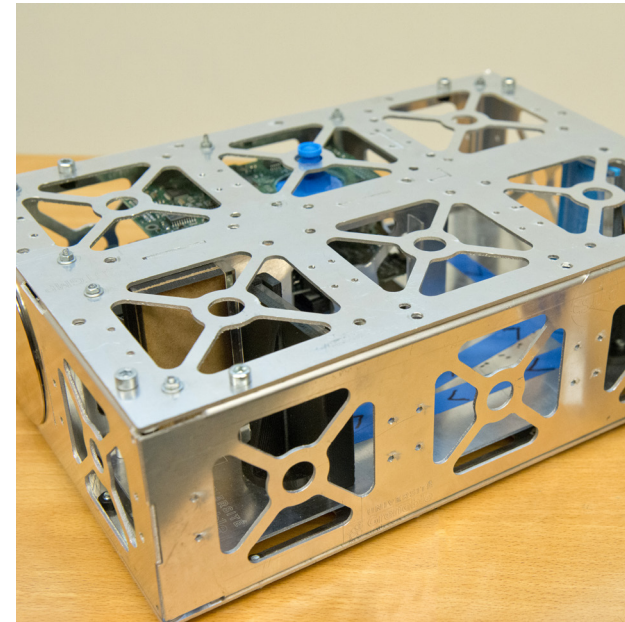
The size of a shoebox, they will be capable of generating data with the same quality as that of standard satellites.

## FACILITATING AMBITIOUS RESEARCH PROGRAMMES

**Miniaturised space instruments offer scientists new opportunities for observation.**

Starting in 2018, the CSUG's first satellites will be launched into orbit.

They will produce a wide variety of scientific feedback, be it for space weather, Earth observation or fundamental physics – all fields in which Grenoble's scientific community is highly skilled.



➔ Model of the ATISE instrument

## TAKING ADVANTAGE OF LOCAL EXPERTISE

**The main technological complication for nanosatellites lies in the miniaturisation of instruments.**

Grenoble has developed undeniable know-how thanks to three main factors:

- ➔ exceptional miniaturisation expertise,
- ➔ strong cooperation between academic and industrial players,
- ➔ top-quality innovative scientific research.

## ACCELERATING TECHNOLOGICAL DEVELOPMENTS

- ➔ Positioned as an interface and a portal, the CSUG draws on strong local expertise and the excellence of Grenoble's laboratories. As a result, it accelerates the development of miniaturised technology in Auvergne-Rhône-Alpes and serves to unite the different stakeholders in the region.



➔ Artist's impression of the ATISE satellite in flight

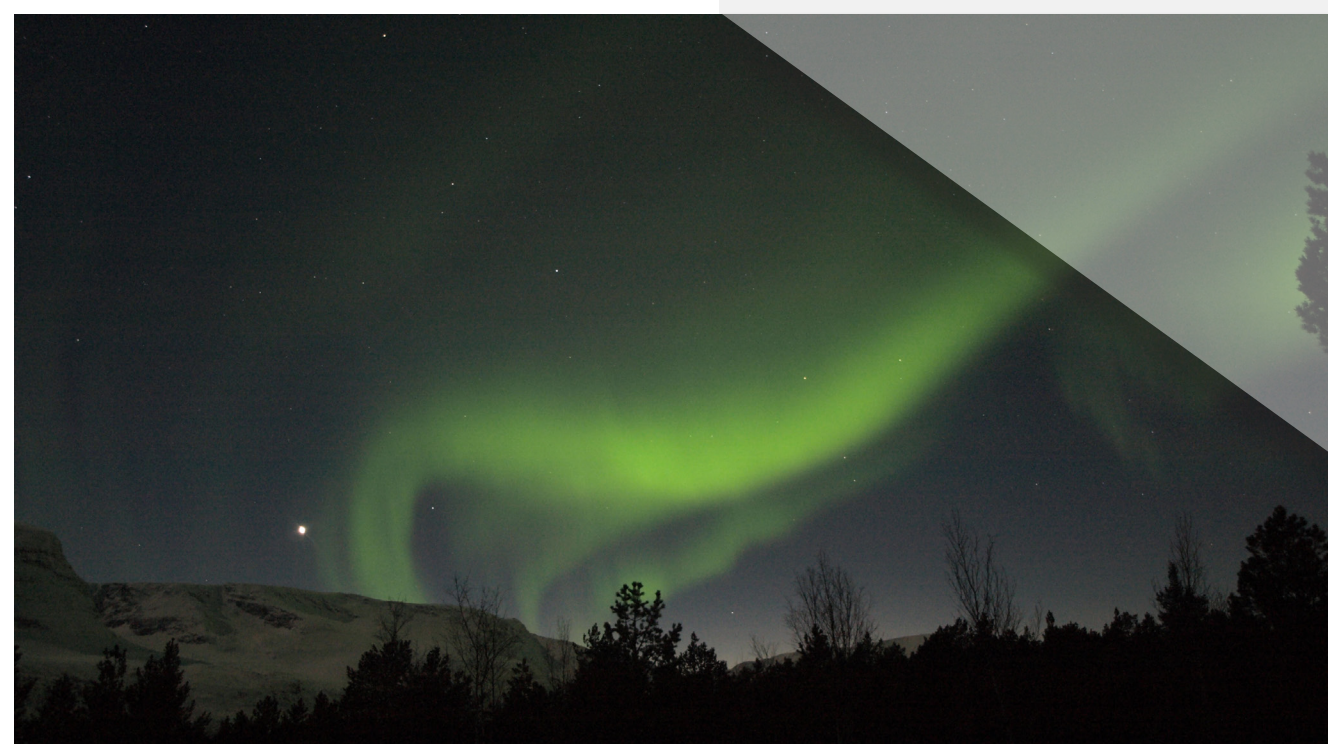


➔ Students from different courses working around the model

## SUPPORTING AN INDUSTRY OF THE FUTURE

- ➔ By preparing students for changes in the space sector, the CSUG is strengthening employability in the region.

Through the involvement of local business professionals alongside the students, it is creating a dynamic and a bridge for skills sharing. It also supports start-ups and contributes to promoting innovation and employment for the future.



➔ Mission to observe the Northern Lights – Skibotn, Troms county, Norway – March 2017



# THE CSUG FIRST PROJECTS

Since September 2016, the CSUG has been developing four space projects.

- **ATISE and AMICAL Sat**, in the field of space weather, in collaboration with the Toulouse University Space Center, MIET SMC-TC and MSU-SINP.
- **NanoBob**, in the field of quantum communication, in collaboration with IQOQI of the Austrian Academy of Sciences.
- **NanoCarb**, payload of the European H2020 Project SCARBO including an innovative spectro-imaging instrument (Technology Readiness Level 5).

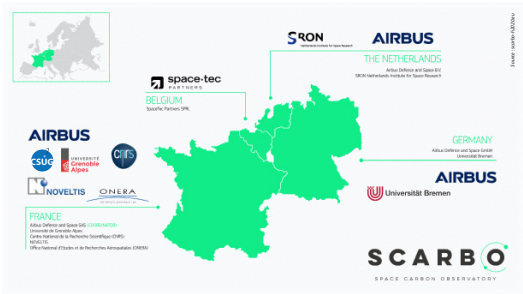
The CSUG also pursues instrument development activities with its institutional and private partners.

At the national level in France, the CSUG enjoys technical support from the CNES through various programs, including Janus, and several experiments are currently codeveloped in Toulouse.

# THE CSUG ABOARD ONE OF THE BIGGEST EUROPEAN SPACE PROJECTS

By means of NanoCarb, the CSUG is responsible of a major instrument of the Horizon 2020 project SCARBO (Space CARBOn Observatory), in the field of anthropogenic greenhouse gases monitoring. It is implemented by a consortium of 10 European organisations led by Airbus Defence and Space. The project kicked-off its activities in January 2018 and will run until December 2021.

SCARBO may become a part of the Second Generation of the Copernicus Space Component, which means Grenoble and the CSUG would stand as a key player into Space Miniaturised Instrumentation at European level.



# CONTACTS

**Centre Spatial Universitaire de Grenoble**  
**Mathieu Barthélemy**  
*mathieu.barthelemy@univ-grenoble-alpes.fr*  
T: +33 (0)6 83 20 83 77  
[www.csug.fr](http://www.csug.fr)

**Fondation Université Grenoble Alpes**  
**Nathalie Martino**  
*nathalie.martino@univ-grenoble-alpes.fr*  
T: +33 (0)6 71 68 58 33  
[www.fondation-uga.fr](http://www.fondation-uga.fr)

# SPONSORS



# PARTNER AGENCIES



# WITH THE PARTICIPATION OF

