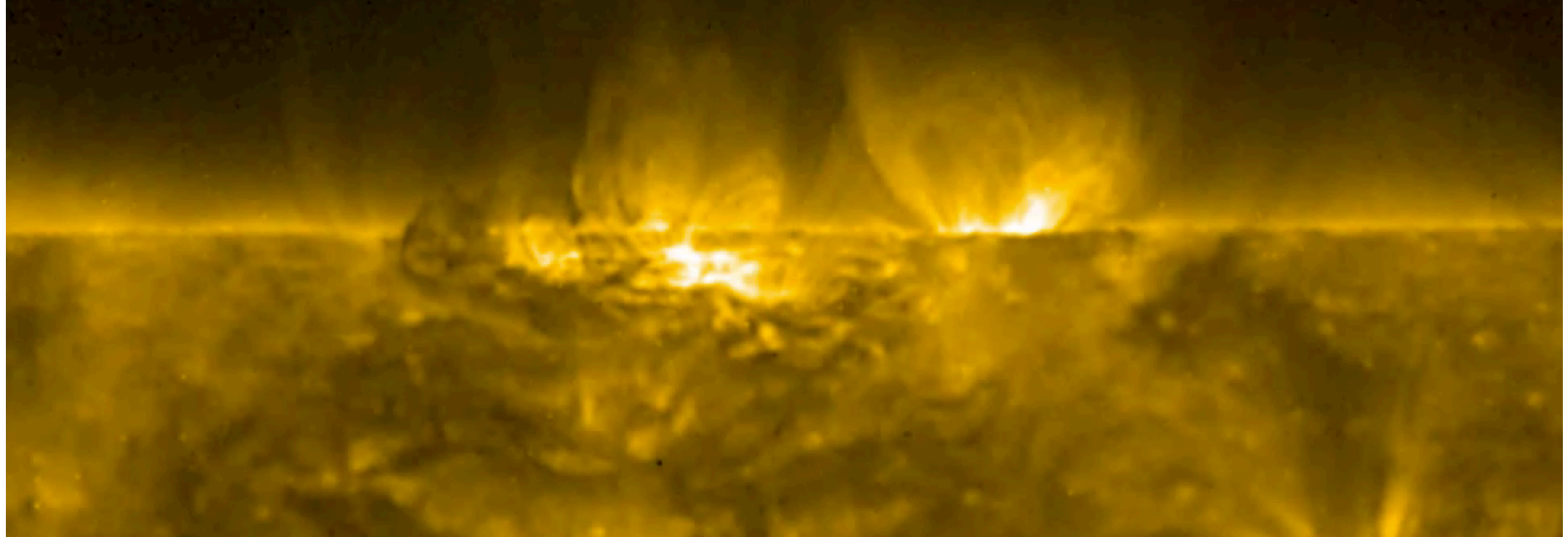
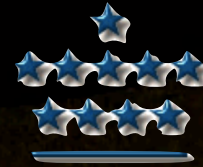


Space Weather: Sunny days ahead

David Berghmans
Royal Observatory of Belgium



"Switch to Space", Topic 5: Physical Sciences, 2018 Oct 8, Egmontpaleis Brussel

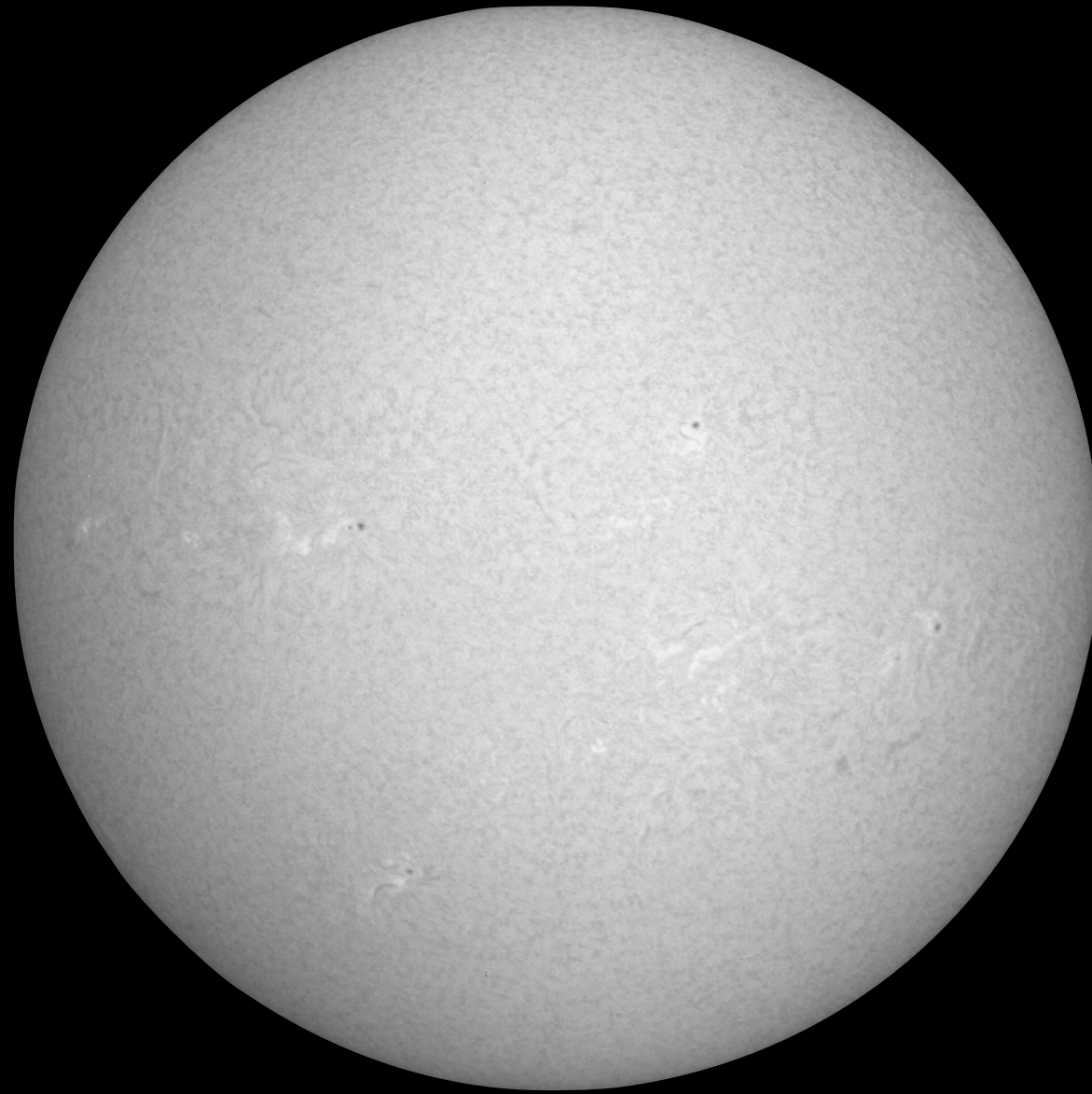
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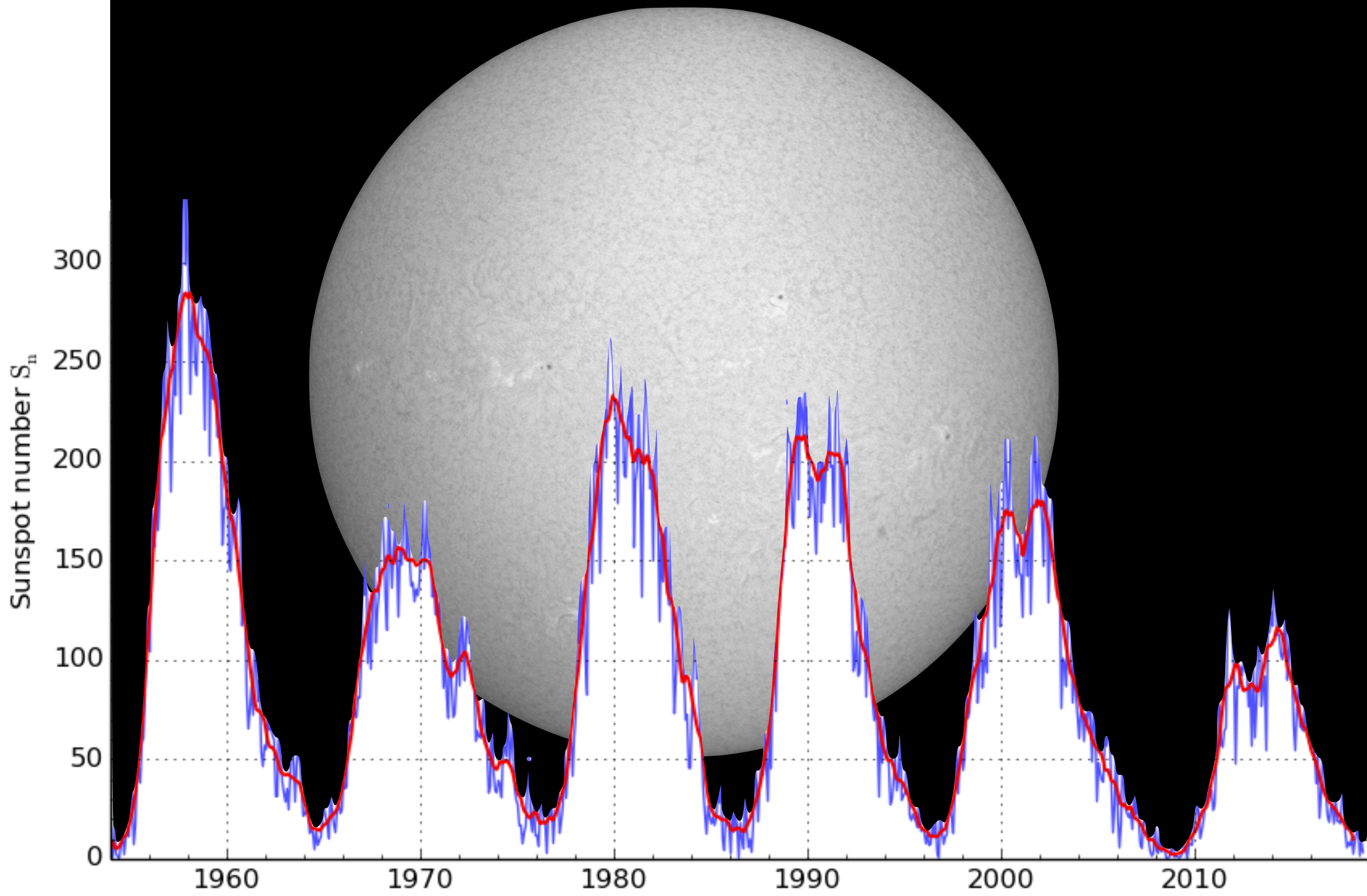




<http://www.observatory.be>

Simon Schmidt www.globalview.be



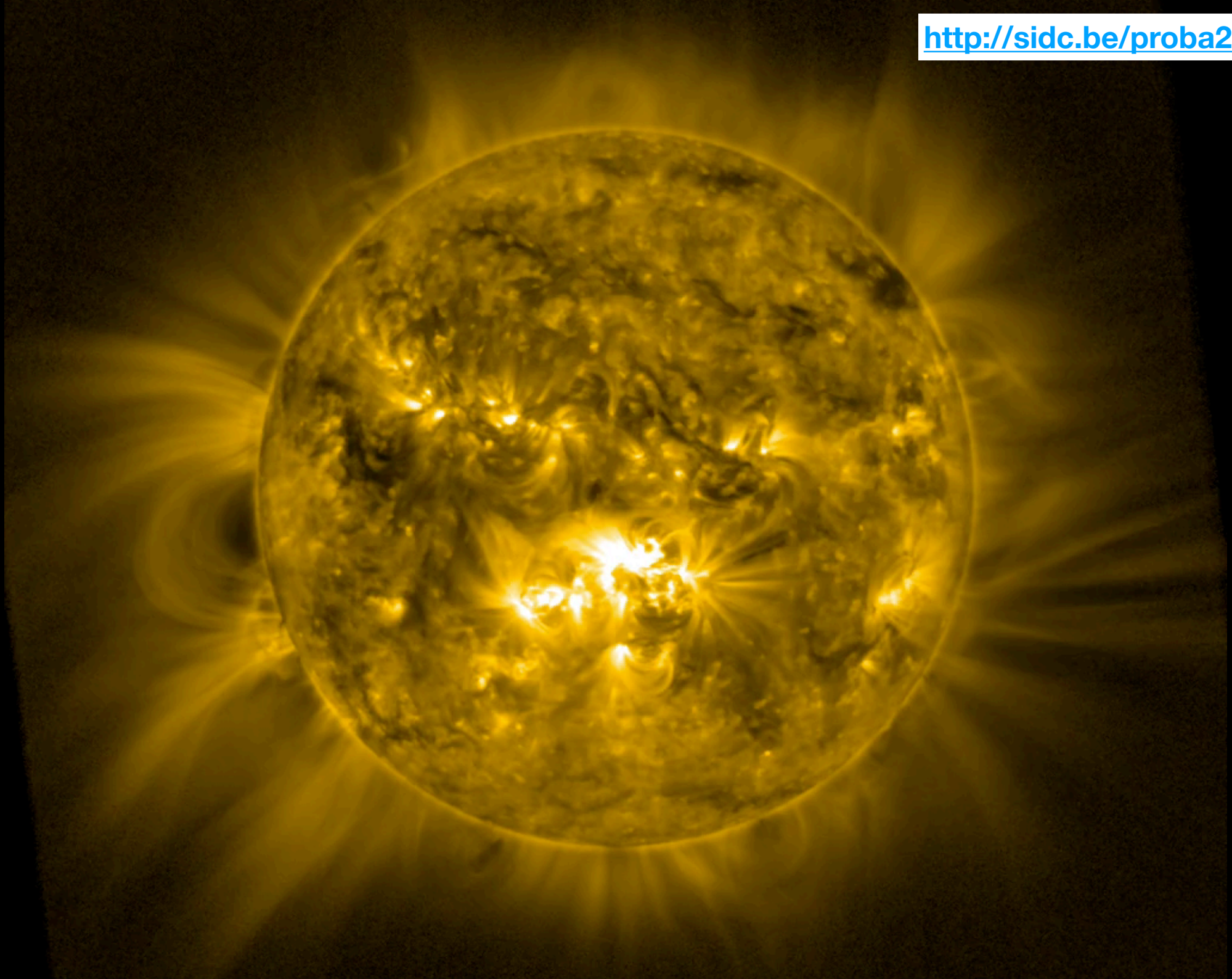


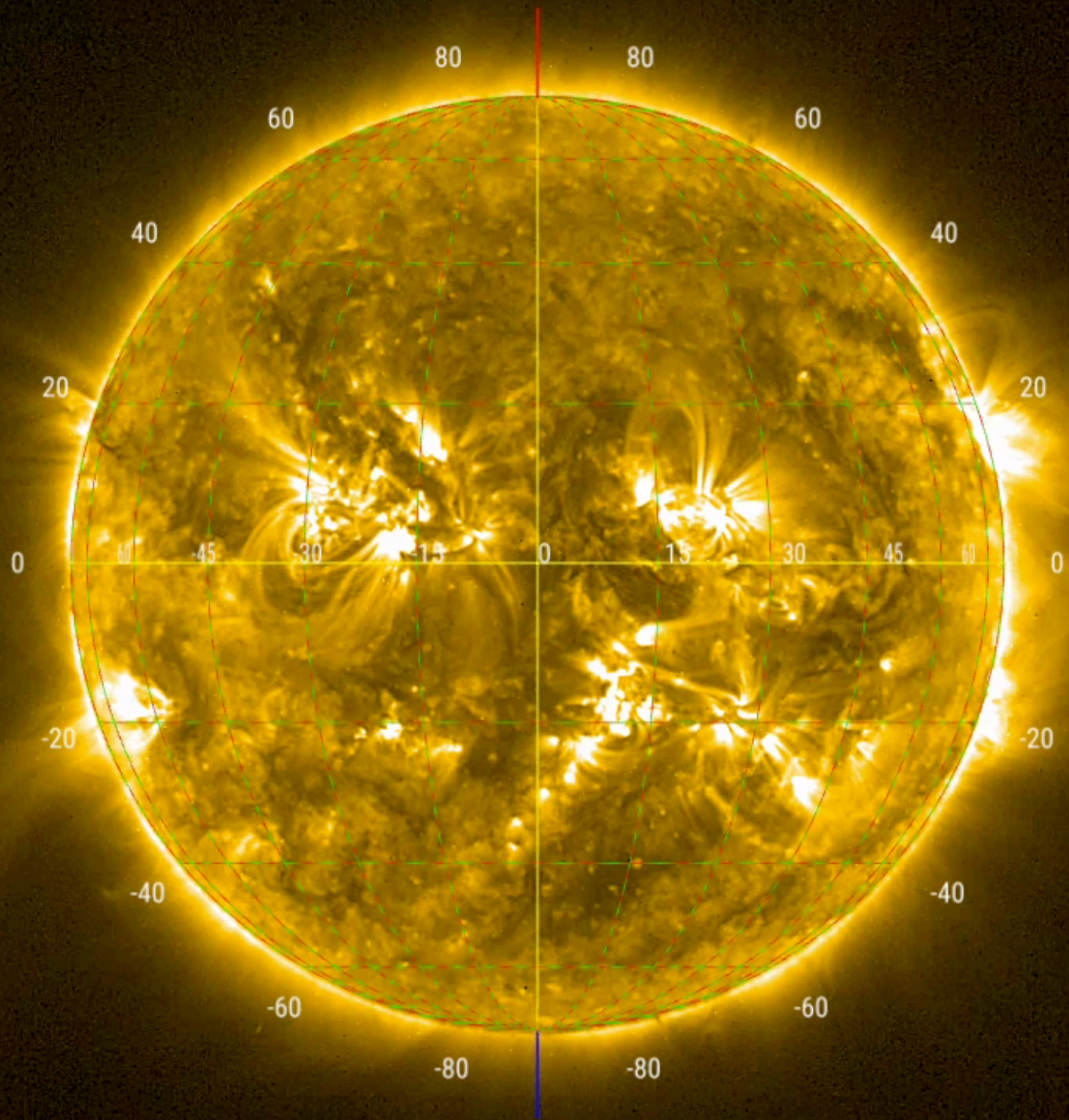


Observations from the ground

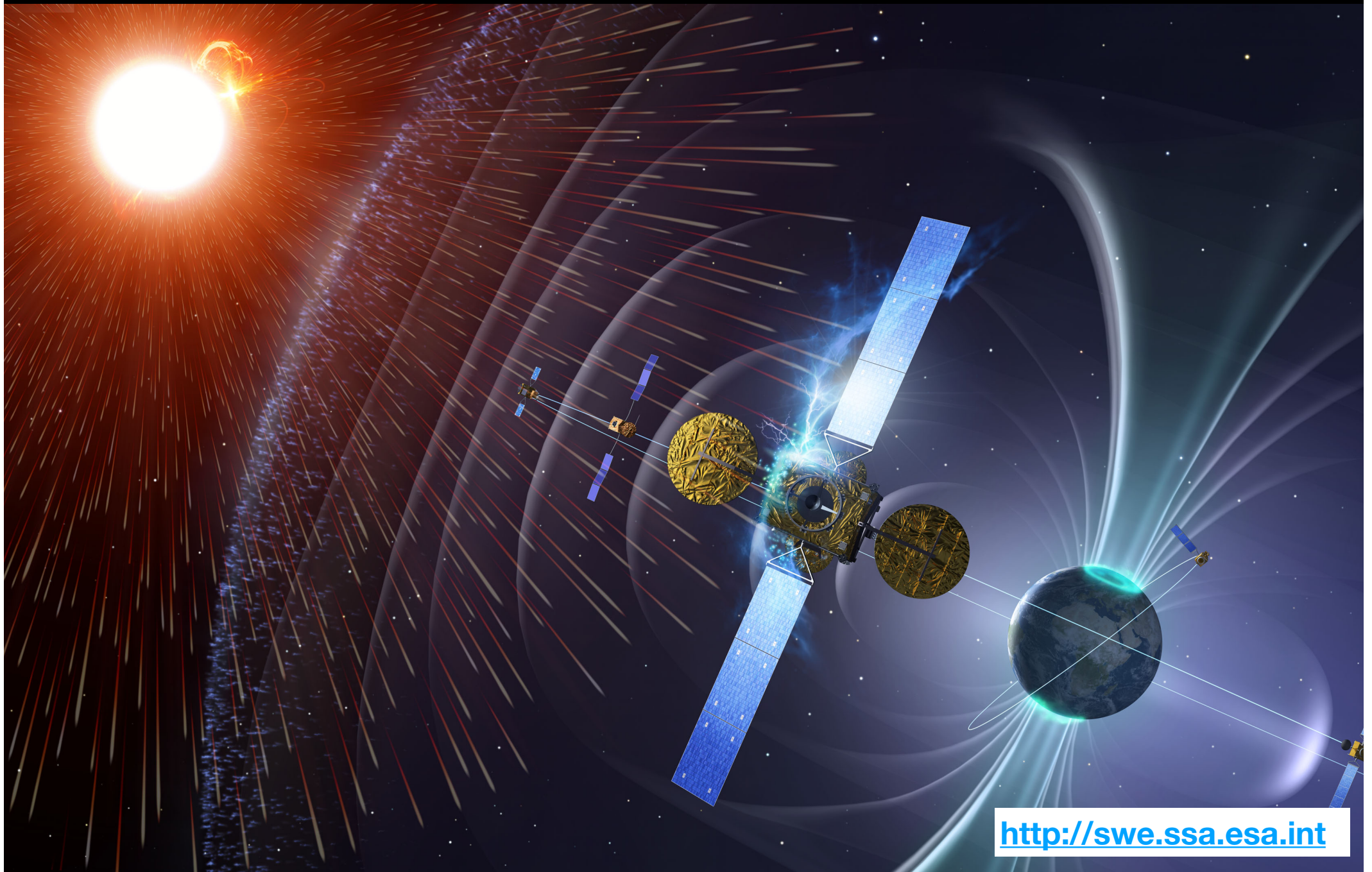
<http://sidc.be/uset>

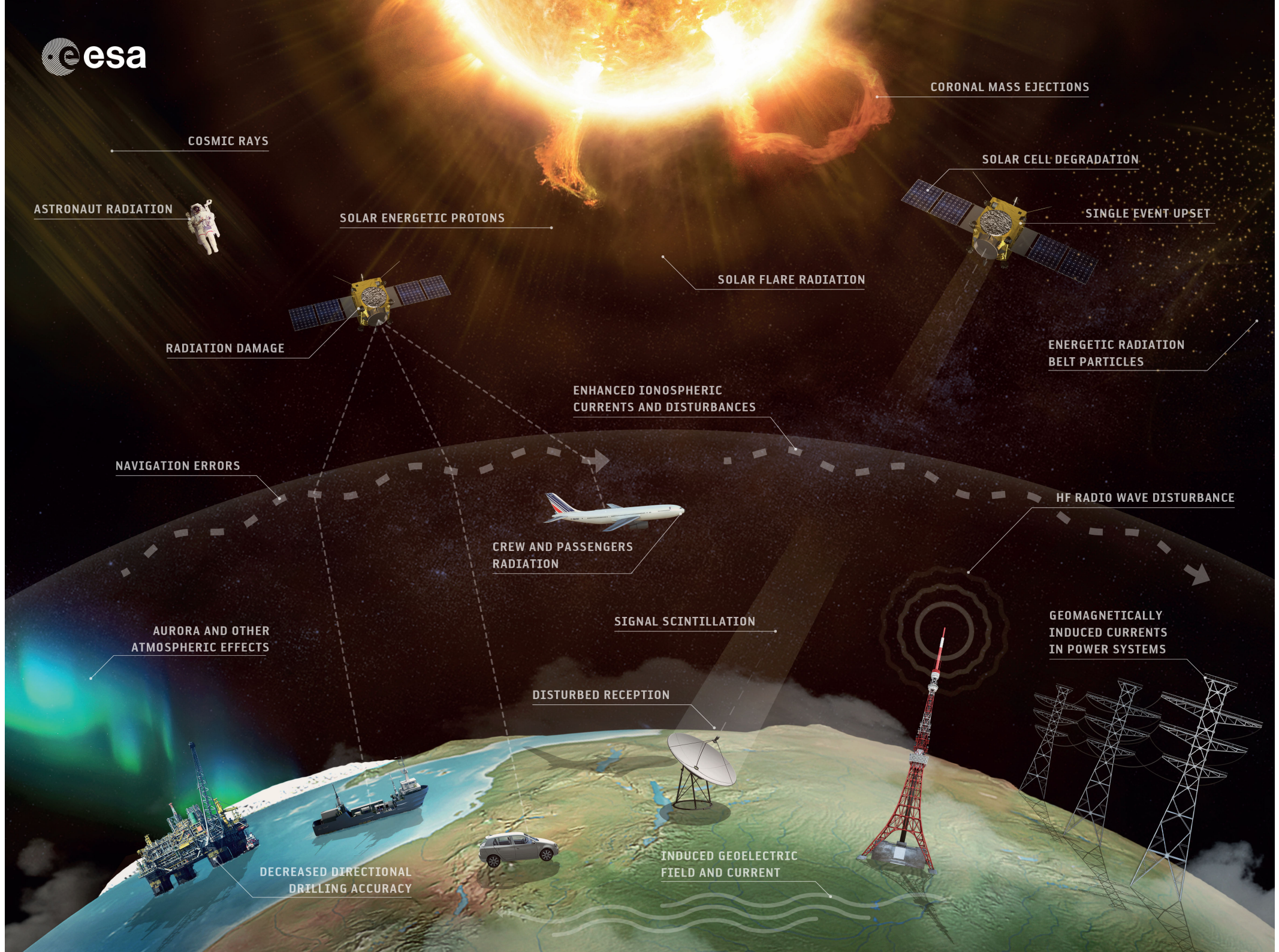
<http://sidc.be/humain>





The Earth Magnetosphere





CORONAL MASS EJECTIONS

COSMIC RAYS

ASTRONAUT RADIATION



SOLAR ENERGETIC PROTONS

SOLAR CELL DEGRADATION

SINGLE EVENT UPSET

SOLAR FLARE RADIATION

RADIATION DAMAGE

ENERGETIC RADIATION
BELT PARTICLES

ENHANCED IONOSPHERIC
CURRENTS AND DISTURBANCES

NAVIGATION ERRORS

HF RADIO WAVE DISTURBANCE

CREW AND PASSENGERS
RADIATION



AURORA AND OTHER
ATMOSPHERIC EFFECTS

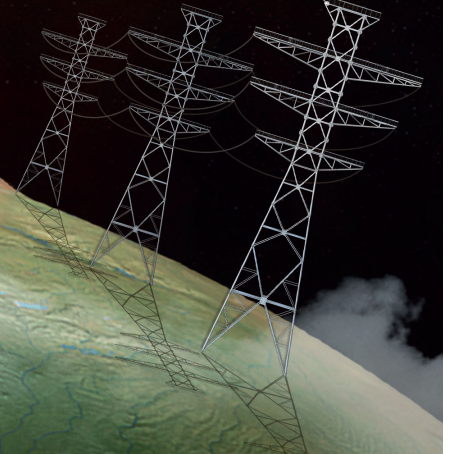
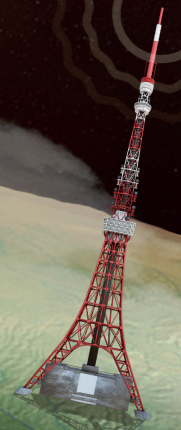
SIGNAL SCINTILLATION

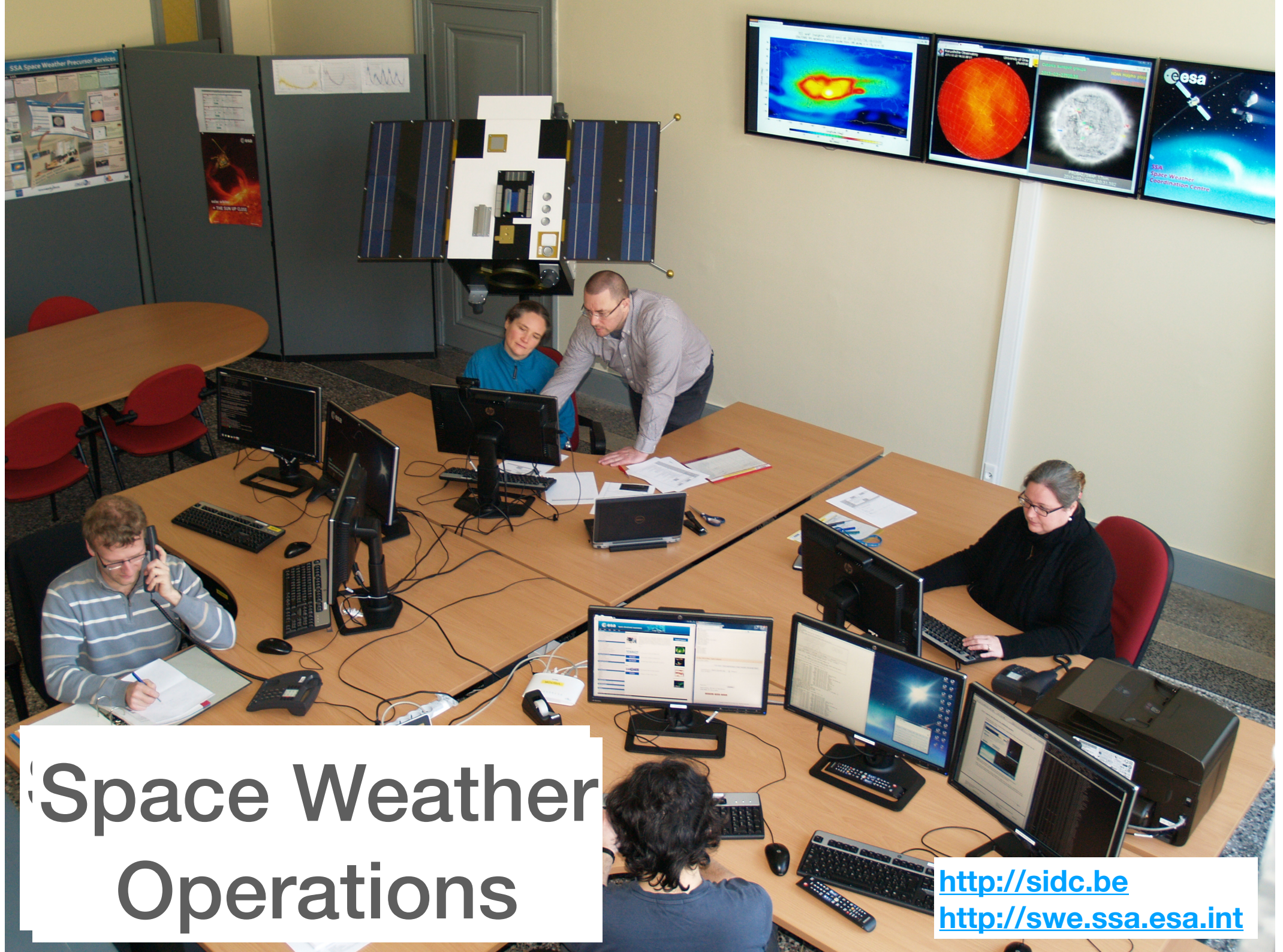
GEOMAGNETICALLY
INDUCED CURRENTS
IN POWER SYSTEMS

DISTURBED RECEPTION

DECREASED DIRECTIONAL
DRILLING ACCURACY

INDUCED GEOELECTRIC
FIELD AND CURRENT

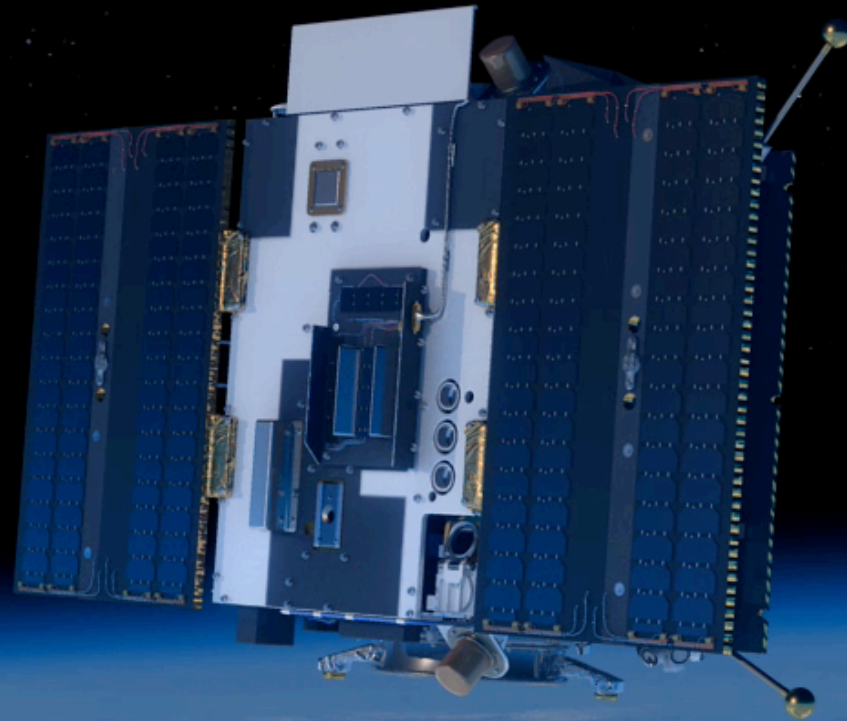




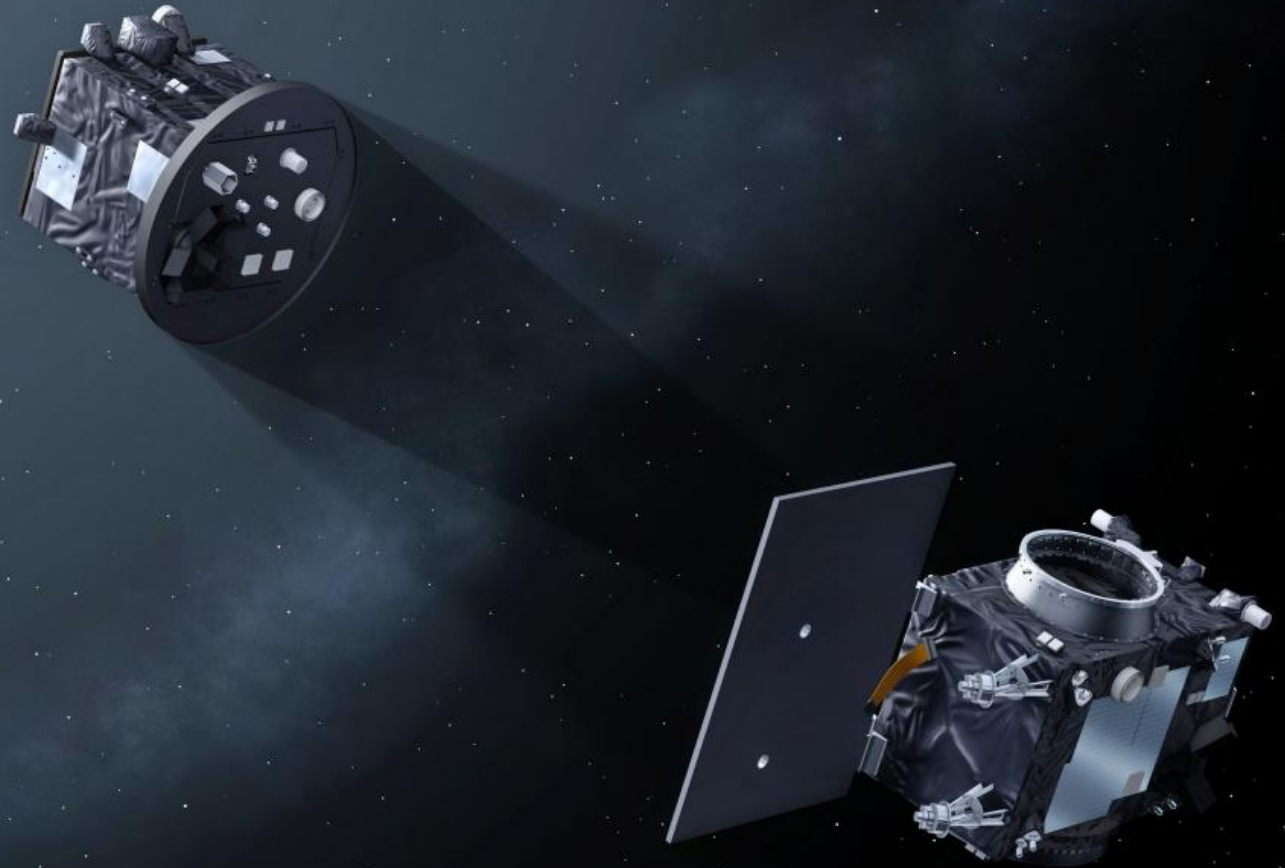
Space Weather Operations

<http://sidc.be>
<http://swe.ssa.esa.int>

PROBA2



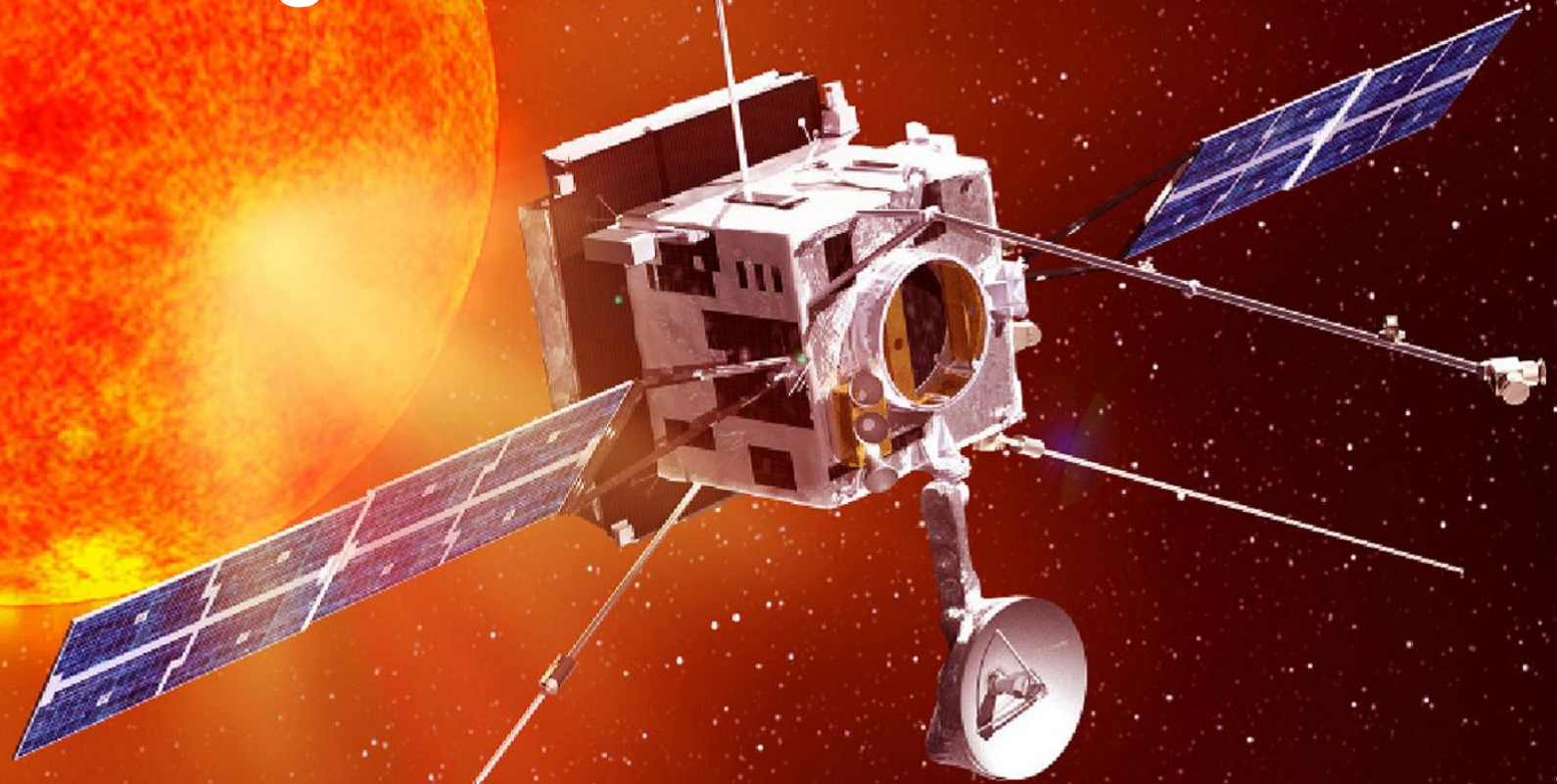
PROBA-3



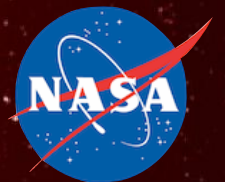
Solar Orbiter

will reach $<0.3\text{AU}$

will reach >30 deg latitude



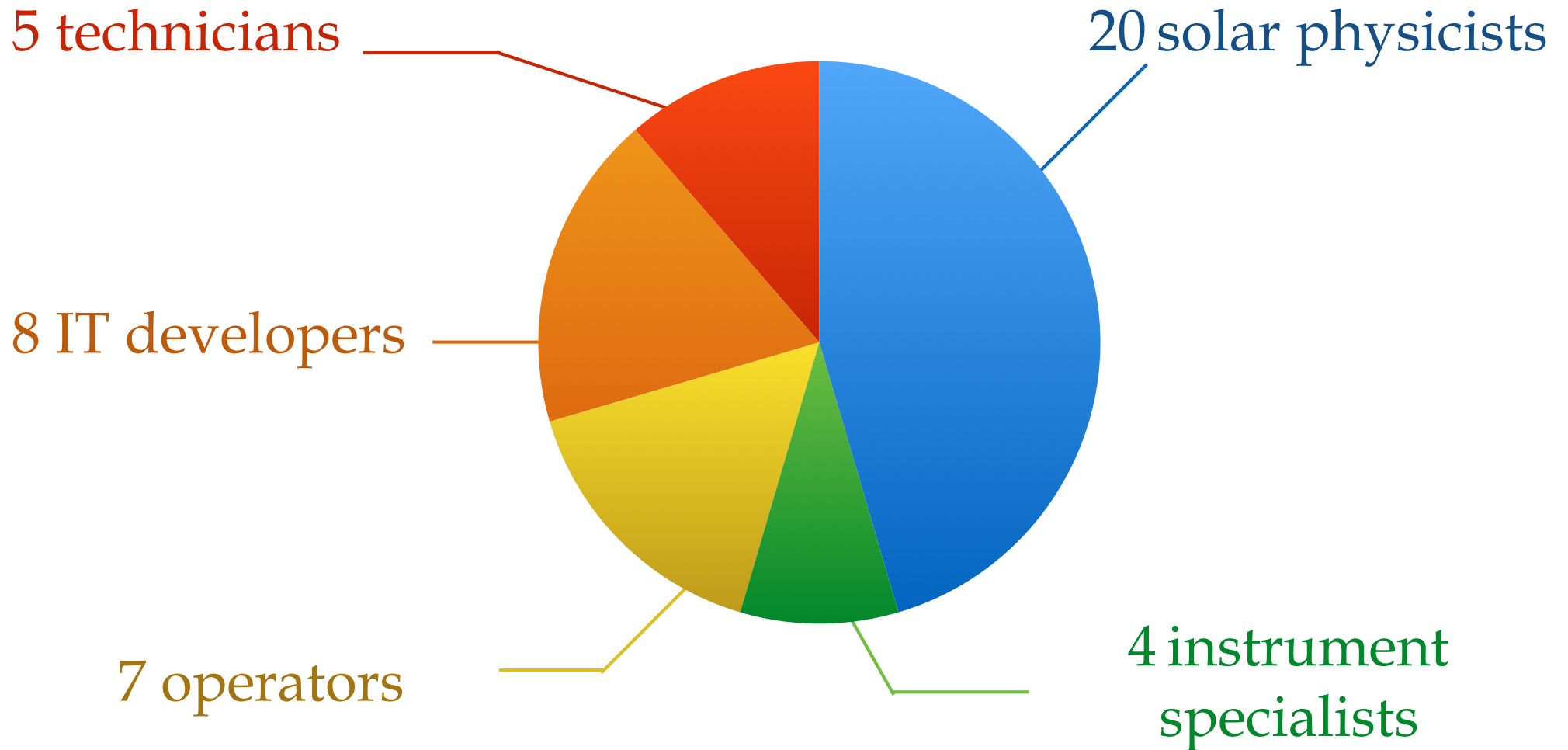
solar orbiter



A technician wearing a white hairnet, a white surgical mask, and blue cleanroom attire is working on a complex piece of scientific equipment. The equipment is mounted on a large, dark, flat surface and consists of several cylindrical metal components connected by various cables and hoses. The technician is focused on adjusting or inspecting one of the components. The background shows a cleanroom environment with a glass door and a yellow and black striped safety barrier.

Extreme Ultraviolet Imaging Telescope

Solar Physics at ROB: 44 people



including 5 PhD students & 13 nationalities,
average age << 47 year

What?



Summary

- The Sun is a Rosetta stone for stellar physics and plasma physics
- The influence of the Sun (space weather) is an engineering challenge for modern (space) technology
- Belgium is only a small country for our planet but with a giant research community for our star
- Solar Physics in Belgium is young, very international and waiting for its biggest projects yet