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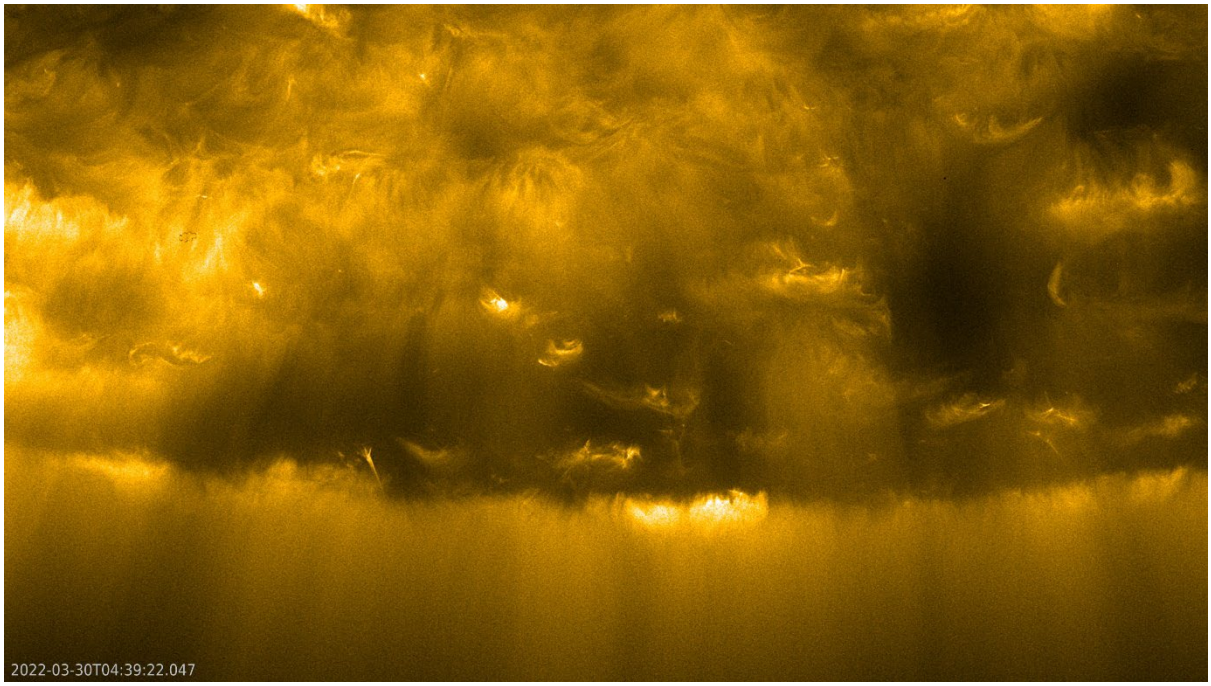
Research in Graubünden

# The sun still holds many secrets

Supposedly quiet regions are more active than previously thought

In February 2020, the “Solar Orbiter” space probe was launched from Kennedy Space Center/USA in the direction of the sun. The Solar Orbiter mission is intended to answer questions about the solar wind, the solar poles, the solar magnetic fields, and space weather. On board the European Space Agency (ESA) satellite are ten instruments that have been tested in advance specifically for conditions in space. Two of them were developed with contributions from the Physikalisch-Meteorologisches Observatorium Davos.




*Solar South Pole with newly discovered high-resolution plasma structures. Image: ESA/Solar Orbiter/EUI Team*

Astrophysicist Conrad Schwanitz is very fortunate to be part of this scientific mission, which involves several hundred researchers. At the recent conference “Graubünden forscht” conference in Davos, the young scientist gave a talk on his research on “Plasma Flows in the Quiet Sun” and was awarded a scientific prize by the Academia Raetica for his work. Schwanitz has been pursuing his research as a doctoral student in Professor Louise Harra’s Solar Astrophysics group at ETH Zurich since fall 2019 and is also a visiting researcher at the observatory in Davos, which is also headed by Louise Harra.

Schwanitz explains the background to his research: “The solar corona is the outermost layer of the solar atmosphere. It is characterized by temperatures of up to several million degrees Celsius and, at the same time, extremely low densities. Why the solar corona is so much hotter than underlying layers is not yet fully understood and is referred to as the ‘coronal heating problem’. The solar corona can be roughly divided into three distinct regions: active regions,

coronal holes, and the quiet Sun. The solar corona is known as the source of the solar wind, which is a ubiquitous stream of high-energy particles and electromagnetic fields. When it leaves the Sun, the solar wind moves toward Earth, where it can have significant effects. The beautiful effects on Earth can be observed as auroras. However, the solar wind can also cause satellite malfunctions, disruptions in communication systems and power outages."

Schwanitz is particularly interested in the plasma flows in the quiet Sun, that is, where there is supposedly little activity: "Thanks to a new instrument on board Solar Orbiter, the Extreme Ultraviolet Imager, we have already obtained many high-resolution images of the solar corona. They show that there is much more activity in the supposedly quiet regions than previously known. We don't know yet what this means for the solar wind. Do small, faint events in their sum perhaps have a significant impact on the solar wind after all? In our research group, we are using the latest data from the Solar Orbiter satellite in combination with data from other satellites to study the influence of these smallest known coronal features on the solar wind."

Conrad Schwanitz & Daniela Heinen

*Conrad Schwanitz. Photo: Johannes Frigg*

The Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center (PMOD/WRC) has been investigating the influence of solar radiation on the Earth's climate since its foundation in 1907. The observatory joined the Schweizerisches Forschungsinstitut für Hochgebirgsklima und Medizin Davos (Swiss Research Institute for High Altitude Climate and Medicine Davos) in 1926 and has been part of this foundation since then. www.pmodwrc.ch