



# Andreas Müller / Prof. Hakan Kayal on the planned UAP camera on Mars

An interview by author Andreas Müller for GrenzWissenschaft-Aktuell (GreWi)



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Würzburg (Germany) - A research team from the University of Würzburg is participating in the German Mars mission 'Valles Marineris Explorer' (VaMEx) currently being planned by the German [Aerospace](#) Centre (DLR). Part of the project contribution, which is now being funded by the Federal Ministry of Economics and Climate Protection, is a camera that will look for unidentified anomalous [phenomena](#) (UAP) in the Martian sky.

This is the first time the German government has funded a research project via DLR with a clearly identified UAP component.

Grenzwissenschaft-Aktuell.de (GreWi) spoke to Professor Hakan Kayal about the planned mission and the UAP camera on the Red Planet.

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**Andreas Müller (editor GreWi):** Dear Mr Kayal, your project contribution to the exploration of the Mars canyon Valles Marineris, which is currently still in the planning phase, is called ‘Symphony’. Why?

**Prof. Hakan Kayal:** *In the context of VaMeX-3, our contribution aims to simulate a realistic exploration scenario in which a ground-based rover is used in a realistic analog mission for cave exploration. On the one hand, our contribution consists of a swarm of robots whose components, so-called autorotation bodies, are dropped from the air, then spin gently, guided to the ground like maple seeds, collecting data in the process. In this way, several of these drones can be distributed over a large area and ultimately used as sensor or repeater networks. On the other hand, so-called non-line-of-sight communication between the rover and the control centre on Earth is made possible with a simulated Mars orbiter. This involves complex control and data exchange between the various system elements, the autorotation body, orbiter, rover and control centre. This exchange is coordinated by another central system element, the ‘gateway’. In the future, this can be imagined as a lander that is naturally located outside the cave. This deployment and the communication between and to the individual components must be coordinated, i.e. orchestrated, in a similar way to an orchestra. Like a symphony. Hence the name. This network of signal amplifiers and data processors will be necessary and important in the vast Valles Marineris valley of Mars, because the individual components of the mission, which are to explore various aspects of the canyon with rovers and drones, not only have to communicate with and among each other, but also transmit the data obtained to the orbiter, which then sends it back to Earth.*

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**You can also read the background article on VaMeX-3 [HERE](#)**

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**GreWi:** And the UAP camera will also be part of this network?

**Kayal:** *That's right. The gateway is comparable to a lander. In addition to the coordination role for the extensive communication, it could itself contain some scientific instruments, such as cameras. Our camera system simulates a possible application on Mars. We can use it to detect short-term celestial phenomena such as meteor showers, cloud formation, lightning or UAPs. It is based on our previous projects on Earth: we have been operating cameras in Hessdalen in Norway for years, which is known for its recurring but still unexplained light phenomena in the sky. We recently updated this system with an AI-based stereo camera (...[GreWi reported](#)).*



The stereo camera system on the roof of the JMU campus in Würzburg. Source: JMU/IFEX

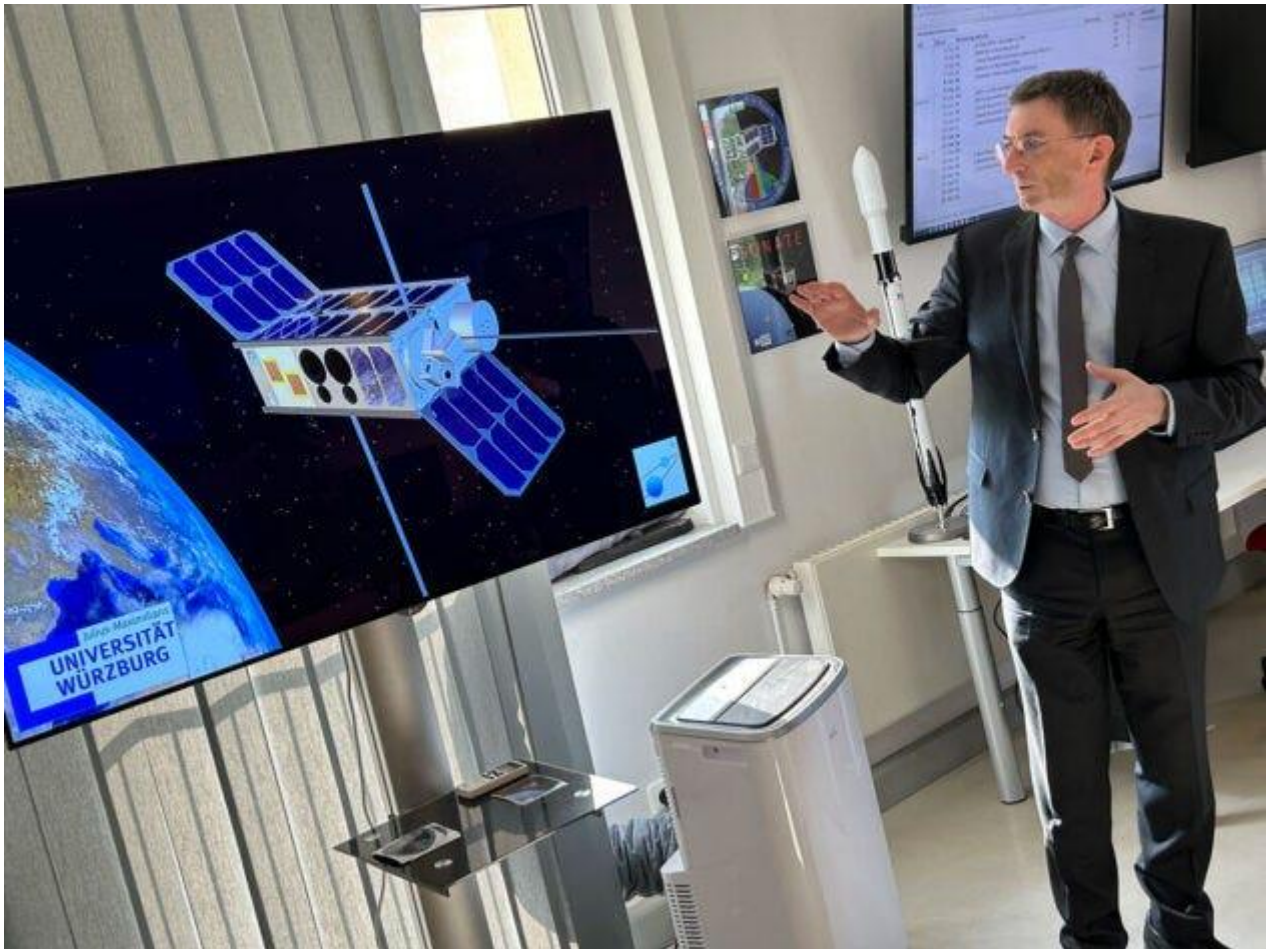
*Another model, the prototype of an observatory, is located on the roof of the university campus in Würzburg. There, an all-sky camera observes the entire sky and registers all flying objects that fly overhead. Additional observatories of this kind are currently being planned. With the help of artificial intelligence, these systems learn to distinguish between known terrestrial flying objects (birds, insects, balloons, airplanes, satellites, etc.) and supposedly unknown phenomena. However, the UAP camera for MarsSymphony will contain significant innovations and will be designed to meet requirements that are specific to MarsSymphony. This includes an automatic tracking system for meteors or UAPs to be recorded by high-resolution cameras. The integration of a camera system for sky observation on the gateway represents an important development step towards a detection system for short-term phenomena in the Martian atmosphere, and for researching UAPs. As part of the project, a previously terrestrial system for atmospheric observation and the exploration of UAPs is to be prepared as a prototype for use in exploration missions.*

**GreWi:** Have the systems in Norway already detected Hessdalen phenomena?

**Kayal:** *We haven't seen anything in Norway that seems interesting. All we have seen so far are a lot of natural or artificial objects such as birds, insects, car headlights, lightning, etc. The reasons are: 1) There is probably simply nothing in our line of sight and field of vision. But of course we can't rule out the possibility of something appearing just over the next hill that we can't see. 2) The cameras are not perfect, there are occasional dropouts. By chance, of course, something could appear at just such a moment and we could miss it. Operational, continuous, reliable observation in all weathers is a technical challenge that should not be underestimated.*



**GreWi:** Another such AI camera for anomalies is currently on board a small satellite orbiting the earth. Please tell us more about that.  
**Kayal:** *In March 2024, we successfully launched our nanosatellite (6U cubesat) 'SONATE-2' into Earth orbit using a SpaceX Falcon 9 rocket.*



Prof Hakan Kayal explains the SONATE-2 mission. Copyright: A. Müller f. grenzwissenschaft-aktuell.de

*This satellite also has several cameras on board that will search for anomalies on the Earth's surface. It is currently being trained to recognize such anomalies and distinguish them from known phenomena and structures. SONATE-2 should therefore be able to detect anomalies in a new environment and autonomously recognize previously defined features on the Earth's surface, such as geometric shapes, which in the future could indicate geological, chemical or biological activity on other body surfaces in the solar system. In contrast to similar projects, this is the first time an AI has been trained for its tasks directly, and on-site in space, rather than on Earth. The cameras are also capable of autonomously detecting brief light phenomena such as lightning. Large parts of the technology that we are testing in space could also be used to detect UAPs in the future. In the past, we have investigated a small satellite for the dedicated detection of UAPs as part of a student project and studied its feasibility. With the appropriate funding, such a satellite system for UAP [research](#), undoubtedly consisting of a satellite constellation, would seem feasible.*

**GreWi:** Has SONATE-2 already detected anomalies on Earth? Have [UFOs](#) or UAPs perhaps even been located?

**Kayal:** *SONATE-2 does not have a UAP camera. That should not be misunderstood. But the training of the AI payload on board SONATE-2 is running successfully.*



An artificial island recognised as an anomaly by the AI camera on board Sonate-2.  
Copyright: A. Müller for grenzwissenschaft-aktuell.de

*The targets we selected on Earth as part of test scenarios, such as circular irrigation systems in Africa, are recognised. Anomaly detection is also working so far, and needs to be further optimised. When we talk about anomalies here, we mean structures that are clearly different from their other and expected surroundings - such as the aforementioned circular irrigated agricultural areas in the Sahara, architecture or artificial islands (see illustration).*

*In recent weeks, interim results have been presented at space conferences, listed [here](#):*



*"Early Results and In-Flight Experience of the 6U-Mission SONATE-2. Schwarz, Tobias; Balagurin, Oleksii; Greiner, Tobias; Herbst, Tobias; Kaiser, Tobias; Kayal, Hakan; Maurer, Andreas. In Small Satellites, System & Services Symposium (4S). Palma de Mallorca, Spain, 2024."*

*"Novel On-Board Data Processing Strategies on Nanosatellite SONATE-2. Maurer, Andreas; Balagurin, Oleksii; Greiner, Tobias; Herbst, Tobias; Kaiser, Tobias; Kayal, Hakan; Schwarz, Tobias. In Small Satellites, System & Services Symposium (4S). Palma de Mallorca, Spain, 2024."*

*Further experiments and improvements to the system are the subject of ongoing activities.*

**GreWi:** Back to VaMEx-MarsSymphony: The University of Würzburg's share of the planned VaMEx project also includes a UAP camera. So this would be the first time that we would be searching for unidentified flying objects and phenomena (UFOs/UAPs) on another planet. How did you come up with the idea of doing this on Mars?

**Kayal:** *We still don't know what UFOs and UAPs are. Mars and Earth are very similar in many ways, from geology to meteorology. If there are UAPs on Earth, they could also be visible in the Martian sky. Another advantage of such a detection would be that on Mars we could at least rule out known terrestrial triggers of many classic UFO/UAP sightings such as birds, insects, balloons and aeroplanes etc. as explanations for any UAPs detected from the outset. The number of terrestrial satellites and probes on and around Mars is also still manageable and their flight and orbital paths are known, predictable and easy to check. However, we are not looking for little green men on Mars, but anomalies that could indicate new events or characteristics. The chances of this are small, but such a detection on Mars would be a sensation and would provide us with data that often stands in the way of clarifying these phenomena with terrestrial systems.*

**GreWi:** So the camera is not looking for green Martian individuals. But what if you do discover them?

**Kayal:** *Mars and Earth are similar, but we know that Mars has evolved over many millions of years from a once presumably life-friendly world to an environment that is now hostile to life, at least on the surface. Higher life forms that exists today on Earth are almost impossible there and there are no known traces of an advanced civilisation. Life on Mars, if it ever existed at all, is probably only present in the form of microbes. However, one of the aims of the entire VaMEx mission is to search for life on Mars. So we don't want to rule anything out. What this presumed Martian life will look like and whether it is actually 'green', we will be happy to be surprised.*

**GreWi:** The funding of the project with federal funds is also unique to date (funding code 50RK2451A) and seems to me to be a big step for serious research into UAP in Germany.

**Kayal:** Absolutely. This is the first time ever that a research project with a very specific and recognised EAP component has been supported with federal funds. We are very grateful for this. In 2022, research into EAP was explicitly included in the IFEX research canon. This funding is also a recognition of our efforts to reduce the stigmatisation and taboo surrounding this field of research, including at an academic level. We hope that this will open the door to further UAP projects with significant funding and perhaps also lead to collaborations with relevant state institutions.

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To date, the **Interdisciplinary Research Centre for Extraterrestrials (IFEX)** is the first and only research centre in the world where, in addition to space research and the development of space technologies, [UAP/UFOs are officially researched as part of the research canon of a high-ranking university](#). To this end, IFEX not only works with a number of interdisciplinary researchers and scientists, but also with long-standing civilian UFO researchers as associated members: [www.uni-wuerzburg.de/ifex](http://www.uni-wuerzburg.de/ifex)

#### **Further information on UAP research at IFEX**

[International UFO researchers meet for UAP workshop at the University of Würzburg](#) 29 May 2024

[Series of publications on UAP studies at IFEX of the University of Würzburg](#) 19 May 2022

[University of Würzburg adds UAP/UFOs to its research canon](#) 8 February 2022

[First steps towards the establishment of an official German UAP research centre](#) 13 October 2022

[University of Würzburg participates in instrumental research into the 'Hessdalen phenomenon'](#) 6 April 2018

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**GreWi:** Finally, what's next for VaMEx and your 'symphony'?

**Kayal:** Thanks to the funding, the VaMEx-3 MarsSymphony phase officially started on 1 August 2024. The first important milestone for the project was reached with the kick-off meeting on 5 September. Now the work is really getting underway. Next year, an analogue mission in an earthly quarry will test whether the robot swarm and communication work as planned. Our UAP camera is also already being used in this simulation and is already playing an important role: its video recordings of the sky with the UAPs simulated there by drones, for example, provide sufficiently large volumes of data to test the resilience of the communication system. If this analogue mission is successful, a possible follow-up project will adapt the hardware to the sometimes extreme and demanding requirements for use on Mars; after all, the Martian atmosphere is thin, the average temperature is minus 63 degrees Celsius and large dust storms regularly sweep across the planet's surface. A Mars orbiter is not always in sight. All the components of our symphony orchestra, including the UAP camera, have to be able to withstand and perform in such conditions.

**GreWi:** Mr Kayal, thank you very much for your comments and good luck.

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