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Annex to the Media release, December 6, 2018

Four researchers from the University of Bern are awarded EU research prizes

Four of the highly-regarded "ERC Consolidator Grants", the research prizes of the European Research Council (ERC), have been awarded to researchers at the University of Bern. This reflects the excellence of the research in Bern – especially in the fields of medicine, as well as in space and climate research.

Countering environmental change with satellite observations

Prof. Dr. Adrian Jäggi, Astronomical Institute of the University of Bern (AIUB)

Adrian Jäggi studied Astronomy, Physics and Mathematics at the University of Bern. After completing his doctorate in 2006, he was invited to the Institute for Advanced Study at the Technical University of Munich as a Carl von Linné Junior Fellow. In 2009, he returned to the University of Bern as a senior research assistant, a position in which he assumed leadership of the Satellite Laser Ranging activities at the Swiss Optical Ground Station and Geodynamics Observatory in Zimmerwald. In 2012, he was elected Director of the Astronomical Institute of the University of Bern. His area of research is Space Geodesy, with a special focus on orbit determination and gravitational field determination from the precise tracking data of artificial satellites.

1. What does the SPACE TIE project involve?

The Earth is subject to continuous environmental changes. Satellite observations provide the required data basis for being able to record such changes, to quantify them, to understand the underlying mechanisms and finally, to become aware of the societal challenge presented by the observed environmental changes. The objective of the project, which has now been awarded an ERC grant, is to develop new paths for the determination of a long-term stable reference frame, which is needed for a best possible recording of climate-relevant changes with amplitudes of 1 to 3mm per year, such as sea level rise. "The Bernese GNSS software, which will play a key role for the developments of the SPACE TIE Project, has been under development at the Astronomical Institute of the University of Bern for many years," explains Jäggi, the leader of the SPACE TIE project.

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2. **To what extent is your research of societal relevance?**

The products that are generated in the scope of SPACE TIE will enable climate-relevant changes such as mass-changes due to the melting of the ice sheets in Greenland and Antarctica, to be studied in detail.

3. **How, in specific terms, can the funding be put to use?**

The funding will create four positions for doctoral students and two PostDoc positions.

Researching cardiac regeneration after wounds

Prof. Dr. Nadia Isabel Mercader Huber, Institute of Anatomy

Nadia Mercader is Professor of Developmental Biology and Regeneration at the Institute of Anatomy of the University of Bern and a Visiting Professor at the Centro Nacional de Investigaciones Cardiovasculares (CNIC) in Madrid. After studying for her degree at the ETH Zürich, she completed her doctorate at the CNIC in Madrid. Her research project addressed the molecular principles of limb development. After completing her studies in 2003, in the scope of a project on limb generation, she was a visiting scientist at the Max Planck-Institute for Cellular Biology and Genetics in Dresden. As a PostDoc at the European Molecular Biology Laboratory (EMBL) in Heidelberg, she then launched a research project looking into embryo development in the zebrafish. In 2007, she was appointed Junior Group Leader at the CNIC in Madrid. It was there that she established the current focal point of her research into cardiac development and regeneration, for which she was awarded an ERC Starting Grant in 2013. In 2015, she moved to the University of Bern.

1. **What does the TRANSREG project involve?**

The TRANSREG project (Transgenerational epigenetic inheritance of cardiac regenerative capacity in the zebrafish), which is being led by Nadia Mercader from the Institute of Anatomy, is researching the impact of previous wounds on the cardiac regenerative capacity of the zebrafish. For Mercader, it is the second time she has received support from the European Research Council: As a junior researcher, she was awarded an ERC Starting Grant.

2. **To what extent is your research of societal relevance?**

The issue of whether previous wounds affect the healing and regeneration of tissues is a general question in regenerative medicine and is expected to be of importance also for the development of therapies in humans.

3. **How, in specific terms, can the funding be put to use?**

With the research funding, we want to recruit young, leading-edge researchers who will help us to answer our research questions.

Improving the measurement of the climate performance of the ocean

Prof. Dr. Samuel Jaccard, Institute of Geological Sciences
Samuel Jaccard is an SNF Professor for Paleoceanography and Marine Bio-Geo-Chemistry at the Institute of Geological Sciences and the Oeschger Centre for Climate Change Research (OCCR) of the University of Bern. He completed his doctorate at the ETH Zürich in 2006, before spending two years as a Post-Doc at the University of British Columbia in Vancouver. He then returned to the ETH Zürich, where he spent five years as a senior research assistant. In the fall of 2013, Samuel Jaccard moved to the University of Bern as a Swiss National Science Foundation (SNF) professor. The focus of his research was on gaining a superior understanding of the supply channels for nutrients in marine ecosystems, the availability of oxygen in the heart of the ocean and the feedback effects that these processes have on variations in the climate. Samuel Jaccard was recently nominated as one of the main authors of the 6th Assessment Report on Climate Change of the Intergovernmental Panel on Climate Change (IPCC).

1. What does the SCrIPT project involve?

The production of biomass through photosynthesis is a key component of the global carbon cycle and the climate system. During photosynthesis, phytoplankton convert dissolved inorganic carbon dioxide into organic material. What is known as the “biological carbon pump” is one of the key mechanisms for the removal of CO_2 from the atmosphere and its subsequent sequestration in the ocean interior. The combination of a variety of complex processes leads to a net transfer of carbon from the Earth’s surface to the depths of the sea. Despite the relevance of these processes in the global carbon cycle, the biological carbon pump remains poorly constrained.
The key objective of the research project is the development of a new geochemical tool in order to quantify the strength of the biological carbon pump based of stable chromium isotopes. In the form of a comprehensive multi-disciplinary calibration program, the project is examining the extent to which stable chrome isotopes can be used for this purpose. This should provide an insight into the future performance of the oceanic carbon pump which play a major role in climate change.

2. To what extent is your research of societal relevance?

Since the industrial revolution 150 years ago, the oceans have absorbed 30-40% of the CO_2 which have arisen due to the burning of fossil fuels and changes in land usage. Research has shown, however, that in recent years, the buffering capacity of the oceans may have declined. The SCrIPT project aims to contribute to gaining a deeper understanding of how the oceanic carbon cycle will evolve in the near and more distant future. This will allow for the better modeling and forecasting of future climate change.

3. How, in specific terms, can the funding be put to use?

The project will enable the funding of two Post-Doc and two doctoral positions by February 2019. With these appointments, we want to clarify the relationships between chromium isotopes and the marine carbon cycle. The key focus of the research relies on phytoplankton culture experiments, water column measurements and marine sedimentary investigations.

The role of volcanic eruptions in climate change

Dr. Michael Sigl, Oeschger Centre for Climate Change Research (OCCR)
After graduating in Geography at the University of Regensburg, Michael Sigl completed his doctorate at the Department of Chemistry and Biochemistry of the University of Bern. It was there that he developed methods for dating glacier ice from high altitude Alpine regions with the use of radioactive carbon. From 2011 until 2014, he worked as a PostDoc at the Desert Research Institute (Reno, USA). In the highly-regarded Ultra-Trace Chemistry Laboratory, he developed new, multi-disciplinary methods for the reconstruction of atmospheric trace substances in the past. Since 2015, as a PostDoc at the Paul Scherrer Institute (Villigen) and the University of Oslo, he has been working on research projects on the reconstruction of anthropogenic and natural influencing factors on the global climate. He is also a member of the executive committee of the interdisciplinary working group "VICS-Volcanic Impacts on Climate and Society" of PAGES (Past Global Changes).

1. **What does the THERA project involve?**

Volcanic eruptions are a global environmental risk and have had a major impact on the history of the earth, the climate and humanity. As past experience has taught us, in the not-distant future, somewhere in the world, it is certain that volcanoes will once again send large quantities of greenhouse gases into the atmosphere, possibly causing droughts, crop failure and famine. To be prepared for the regional and global impact of volcanic eruptions and to be able to forecast the likelihood of extreme events of this kind, we require a continuous and complete reconstruction of all of the climate-relevant volcanic eruptions that have occurred in the past. Such a record does not exist, although like a history book, the evidence of all the major eruptions is archived in the ice sheets of Antarctica and Greenland. The objective of THERA is to reconstruct the global volcanic activities since the end of the last ice age with using ice cores to better understand their impact on climate change in the past, the present and the future.

2. **To what extent is your research of societal relevance?**

In addition to impacts by asteroids and comets, huge volcanic eruptions are the only natural environmental hazard with a global impact – whereby volcanic eruptions are considerably more likely to occur. The risk of this natural environmental hazard encompasses two factors which are mutually independent: on the one hand, the frequency of the natural environmental hazard, and on the other, the possible extent of the damage that it causes. Both of these factors are being studied in detail by THERA for the first time and allow for a quantification of the risks for the global community.

3. **How, in specific terms, can the funding be put to use?**

The funding will be used in order to develop innovative analytical methods which allow for the reconstruction of the location (specifically, Tephra), and the height of the eruption column (specifically, sulfur isotopes) of previous volcanic eruptions. This will allow conclusions to be drawn on the impact of volcanic eruptions on the climate. The grant will also allow for the funding of two PhD students and one PostDoc.