SLICE

Space Launch Impact on Climate and Environment

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PhD student - Doctoral Candidate (DC4)

End of life emissions of composite materials upon re-entry

About SLICE

The Use of Space assets plays a crucial role in understanding climate change, but due to a drastic increase in launch rates, there is an urgent need to understand and mitigate potential environmental impacts of space activities, including the one from Launchers. While re-usability might be one quick win, large knowledge gaps persist for their operational phase from lift-off to landing/reentry. Here, the largest Global Warming Potential and Ozone Layer Depletion Potential are expected. Especially in the higher atmospheric layers, which are only accessed by launchers, potential impacts of emitted pollutants are amplified by very long retention periods and substance accumulation effects.

To investigate the Space Launch Impact on Climate and Environment, SLICE will therefore develop a research and training programme that bridges the current divide between space engineering and climate science to close the gaps that exist in the Life-Cycle Analysis of space launch systems. Thus, SLICE will contribute to advance the science of climate change by investigating the three most pressing research areas of this field: Launch Vehicle Emissions, Atmospheric Interaction & Climate Impact and System Analysis & Design.

This will generate actionable insights, on which SLICE will develop solutions to reduce greenhouse gas emissions, accelerate the delivery of the Green Deal and establish an environmentally sustainable access to space. It's the ambition of SLICE to generate desperately needed novel results, which will enable cutting-edge innovations.

At the same time, SLICE is committed to training a new generation of highly skilled, resilient, and environmentally aware researchers. They will combine deep scientific knowledge with an ecodesign mindset and the ability to communicate across disciplines and sectors. These doctoral candidates will be uniquely prepared to shape a sustainable future for space transportation in Europe - technically, environmentally, and politically. SLICE directly supports the European Green Deal, ESA's Agenda 2025, and will deliver crucial inputs for the EU Space Law and Product Environmental Footprint (PEF) regulations at European level, including the development of PEF Category Rules (PEFCR) for space.

About the host organization

EPFL is among the top 20 best technical universities in the World. The Laboratory for Processing of Advanced Composites (LPAC) is a centre of excellence in polymer composites, with activities related to high performance composites for space applications, low energy and out-of-autoclave processes, self-healing composites, as well as design for demisability. (https://www.epfl.ch/en/) and (https://www.epfl.ch/labs/lpac/)

EPFL Space Center is an interdisciplinary hub, working with students, academic institutions, international space agencies and industry partners, with an overall mission to promote space related research and education at EPFL. EPFL Space Center has launched in 2023 the Space Sustainability Hub to measure, analyse and act towards a more sustainable space environment and missions. eSpace has spun off the start-ups Clearspace, EcoDeltaV, and the non-profit Space Sustainability Rating Association. (https://espace.epfl.ch/)

Task description for your Individual Research Project (IRP)

Problem Definition:

CFRP structures are widely used in space applications and increasingly in upper stages as they provide stiff and light-weight solutions. However, their behaviour during re-entry is still not fully mastered, depending on the cases, they should demise sufficiently to avoid harmful uncontrolled large debris, or they should thermally resist the re-entry conditions for reusability, with the presence of thermal protections, which will damage during re-entry as a consumable. The impact of resulting emissions on the atmosphere is still not understood and there are no tools that can predict with sufficient precision the environmental impact of composite materials in these applications.

Research Objective:

- End-of-life impact analysis upon atmospheric re-entry of composite structures, with current materials as benchmark, and novel demisable (or not) concepts, with the aim to propose alternative solutions that reduce the potential for earth reaching debris, while minimizing the overall environmental impact (on the earth atmosphere, and overall, during the life of the launcher).

Expected Results:

- Assessing the demisability behaviour based on experimental results of simulated re-entry testing of several composite materials compositions and microstructure
- Contribution to the modelling of demisability of composites (based on thermal/mechanical behaviour)
- Chemical analysis of the degraded composites and residues
- Life cycle analysis (with focus on End of life scenarios) of the various composite solutions for the case study of a launcher
- proposition of optimised solutions, combining the required mechanical properties, structural requirements while presenting a minimal environmental impact following a practical case study proposed by AGG

Secondments:

- *University of Stuttgart (US, Stuttgart, Germany, ca. 5 months): demisability analysis*
- *Ariane Group GmbH (AGG, Bremen, Germany, ca. 3 months): case study analysis*

The IRP will have a strong link to other IRPs from different DCs for:

- Experimental exchange on ablation
- Exchange on chemistry/ climate models
- Exchange on LCA Analysis

Profile and requirements

Essential skills and requirements:

- MSc or equivalent in the field of aerospace engineering, material science, chemical science or similar
- Solid knowledge of Physical and Analytical Chemistry (heterogeneous chemical kinetics, phase changes), Materials science and in particular polymer reinforced structural composites,
- Ability to work efficiently and self-reliantly in a diverse inter-disciplinary and multi-cultural environment
- Ability to work in a team as well as independently
- Ability to solve complex problems with adherence of strict deadlines
- Proactive attitude
- Excellent communication skills (both written and verbal) in English to derive the full benefit from the network training
- As secondments and events are foreseen, applicants must be ready to travel within Europe, in particular for stays in Germany.
- Applicants must be eligible for admission to EPFL doctoral school, or already admitted within one of the programs, in particular EDMX (https://www.epfl.ch/education/phd/edmx-materials-science-and-engineering/).

Desired skills:

- Knowledge in EcoDesign, climate sciences and life-cycle assessment
- Project management
- Knowledge of the host institution language is a plus, i.e. French and/or German.
- Experience in extra curricula association
- Teaching experience

Candidates may apply prior to obtaining their master's degree but cannot receive an employment contract before having obtained the master's degree.

Candidates may apply to multiple positions offered within SLICE but should carefully choose the ones that they apply for.

In addition:

Horizon Europe MSCA Mobility Rule: According to the MSCA rules, the candidates can be of any nationality but they must not have resided or carried out their main activity (work, studies, etc.) in Switzerland for more than 12 months in the 36 months immediately before their recruitment date. unless as part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

Horizon Europe MSCA Eligibility Criteria: Doctoral Candidates (DC) must, at the date of recruitment by the host organization, have not been awarded a doctoral degree.
For this Swiss Individual Research Project, the Swiss State Secretariat for Education, Research and Innovation (SERI) acts as funding agency, as Switzerland participated in Horizon Europe as non-associated third country at the time of the submission of the SLICE proposal. The DC employed by PSI and enrolled at ETHZ does not have the status of an official MSCA grantee but is a "SERI-funded MSCA DN Grantee".

Applicants who do not fulfill the Mobility Rule and the Eligibility Criteria CANNOT be considered for the research position.

Benefits

- You will be working within our international group of researchers, both LPAC and the EPFL space center with experience in a broad range of sciences.
- You will get in contact with the other members of this international consortium.
- You will benefit from the well-structured training program offered by the host institution and the SLICE consortium to develop skills and a thorough understanding of space transportation systems and their environmental impact.
- You will be employed by the host organization for 36 months (plus 12 months for a 4 year PhD thesis at EPFL).
- A competitive salary plus allowances. Moreover, funding is available for technical and personal skills training and participation in international conferences.
- You will participate in international conferences and secondments to other organisations within the SLICE network and in outreach activities targeted at a wide audience.

Please find additional information in the Information package for Marie Curie fellows in doctoral networks (https://op.europa.eu/s/z831).

Selection procedure

For the selection procedure, the SLICE consortium will appoint a Recruitment Committee (RC) for each position. The selection will be carried out in two consecutive stages. In the primary selection, the RC evaluates all submitted application documents. Eligible candidates of sufficient quality will be shortlisted. In the final selection, short-listed applicants are invited to interviews, held either in person at the host institution or via video-conference, and to complete a position-specific task. Both interviews and tasks are evaluated against predefined criteria, leading to a ranked list of candidates. Final decisions are made by consensus within the RC. Applicants will be informed about rejection or admission to the interview stage by the end of March 2026, and final outcomes will be communicated by the end of June 2026. The employment and relocation phase will then start immediately, allowing sufficient time for contracting, visa applications, and relocation before the official start of the DC projects in October 2026 at the latest, if possible earlier.

Timeline

Application deadline:	31.03.2026
Primary Selection:	30.04.2026
Final Selection:	30.06.2026
Starting date:	01.10.2026 or earlier

Application

Interested candidates are invited to submit **one single PDF** containing the following documents in this exact order:

- Application form
- Cover letter
- An evidence-based CV that reflects a representative array of achievements and qualifications appropriate to the position you are applying for
- Reference letters or, at minimum, the contact details of persons that may be contacted for reference
- Educational and professional certificates (university degree(s) with marks, internships, workshops, languages, etc.)

Moreover, you must submit:

- Short video (maximum 30 seconds, not longer). The video must include: personal introduction, background and your motivation to apply to the research position

All the application documents must be submitted via email to **slice@tu-dresden.de**

The email subject must be "**Application for DC4 position**".

The email size incl. attachments **must not exceed 30 MB** in total.

You will receive an automatic reply if we have received your email. Please avoid any questions on the status of the selection process. We will inform you as soon as there is an update.

Candidates whose application is not compliant with the requirements above will not be considered.

Application deadline: 31 March 2026 at 11:59 PM CEST
Expected starting date: 1 October 2026 (or earlier)

Applications and enclosures received after the deadline will not be considered.

More information and other vacant positions can be found at:

- Website: https://www.slice.eu/
- LinkedIn: https://www.linkedin.com/company/slice-dn/

Additional information

We in the SLICE consortium value diversity and we commit to equal treatment of all applicants irrespective of gender, sexuality, health status as well as social, cultural or religious background.

For additional information about the research project and this individual position, please contact: slice@tu-dresden.de

Technische Universität Dresden

EPFL