




HAIL RISK TO PV SYSTEMS




NEW RESEARCH PROJECT 2026-2027:
CREATING ACTIONABLE KNOWLEDGE ABOUT **CURRENT AND FUTURE HAIL RISK TO PV SYSTEMS** IN SWITZERLAND
COMBINING EXPERTISE ON CLIMATE HAZARDS, RISK ASSESSMENT AND ENGINEERING

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COLLABORATIONS



INTRODUCTION

IN SWITZERLAND HAIL FREQUENCY AND INTENSITY HAVE INCREASED OVER THE PAST ~60 YEARS (WILHELM ET AL. 2024)

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THIS TREND WILL CONTINUE IN A WARMING CLIMATE (THURNHERR ET AL. 2025)

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RISING NUMBER OF PV INSTALLATIONS

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RISING DAMAGE COSTS FOR PV INFRASTRUCTURE

WHERE IS THE HIGHEST RISK?
HOW WILL IT CHANGE IN THE FUTURE?
WHAT CAN WE DO ABOUT IT?

RESEARCH QUESTIONS

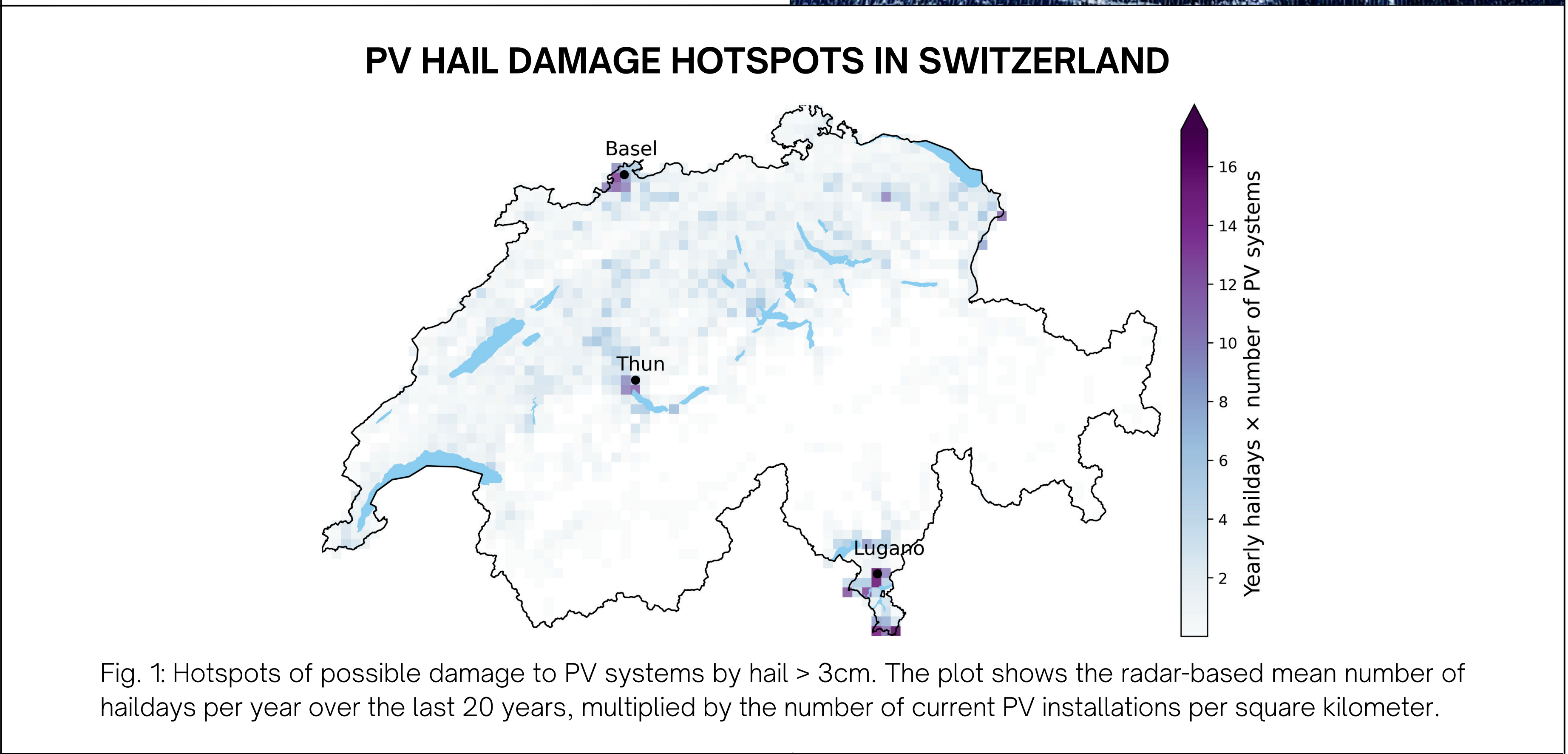
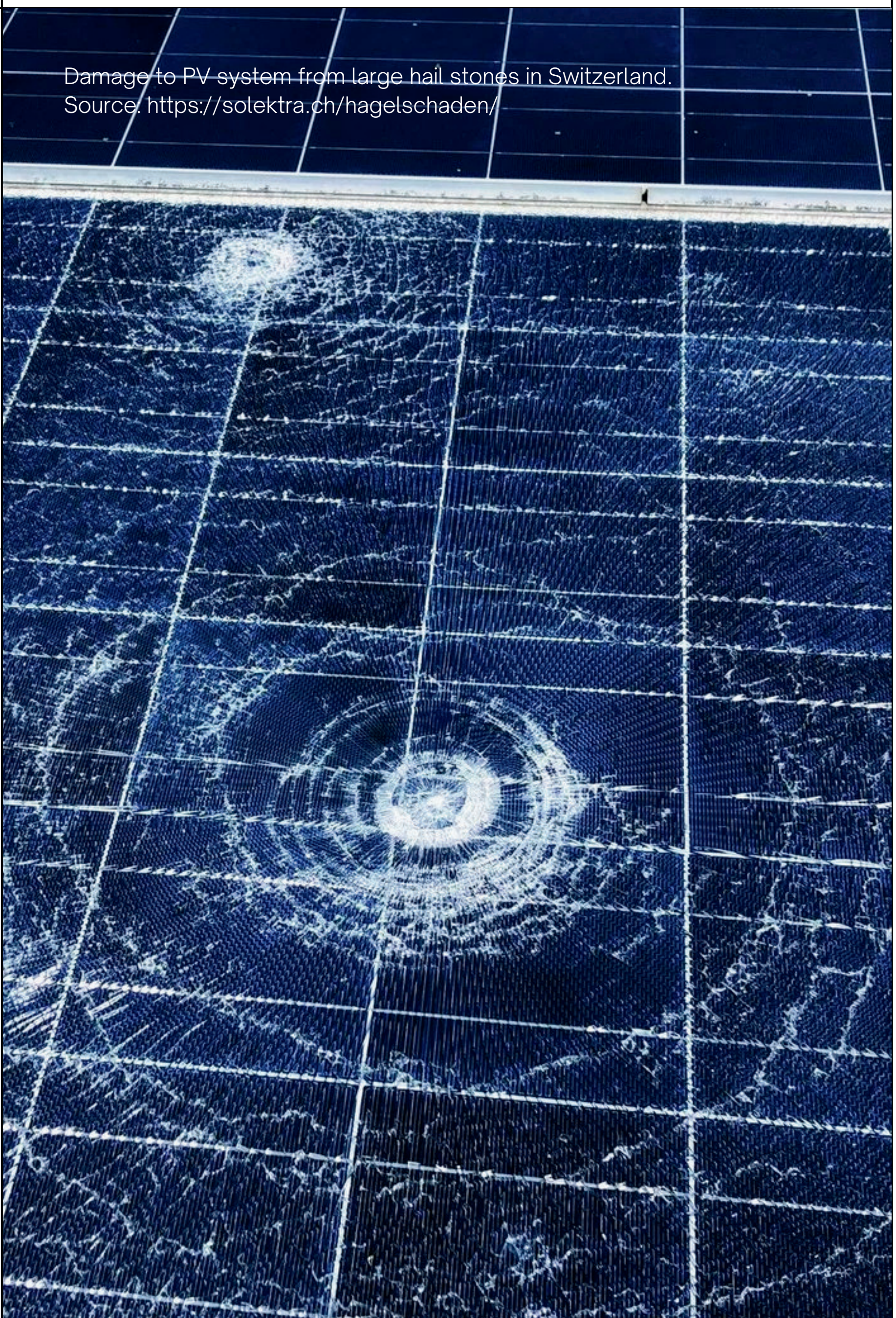
- What physical and technical factors determine the **vulnerability of PVs** to hail damage (e.g., glass thickness, orientation, angle..)?
- What are **minimum hail sizes causing real-world damage** and which losses + degradation is expected at which size?
- How often do hail events exceed current building and SIA standards?
- How will the **hail risk to PV** change in the future?
- Where are **low-risk, high-potential regions** for future PV installations?

FIRST RESULTS

Where are hotspots of large hail occurrence ?
→ **Hail (> 3cm) frequency hotspots are in southern Ticino, Emmental, Entlebuch, the Napf region and along the Jura.**

Where do these regions coincide with high numbers of PV installations?
→ **Currently, the PV hail damage potential is highest in Basel, Thun and southern Ticino (Fig. 1).**

How do hail events affect the average lifetime of PV systems?
→ **Hail is driving early decommissioning of PV installations! Among investigated end-of-life PV systems, the mean lifetime of PV systems is significantly lower (>2 years).**



- PLANNED PROJECT OUTPUTS

 - High-resolution **hail risk assessments for present and future** climate conditions
 - A validated **PV hail-damage model**
 - Worst-case scenarios** and **ecological impact** assessments
 - An ML-based tool for **automated detection of PV hail damage**
 - Recommendations** for resilient PV systems, siting, and repair strategies and **adaptation strategies**
 - Public open-source dashboards for hail risk and post-event assessments**

WE ARE HAPPY FOR YOUR FEEDBACK

What are relevant research questions for you?
Which project outputs would be useful to you?
Are you interested in a collaboration?

CONTACT US!

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Survey