

TOWARDS AN ECOLOGICALLY RELEVANT MICROCLIMATE SENSOR FOR CLIFFS

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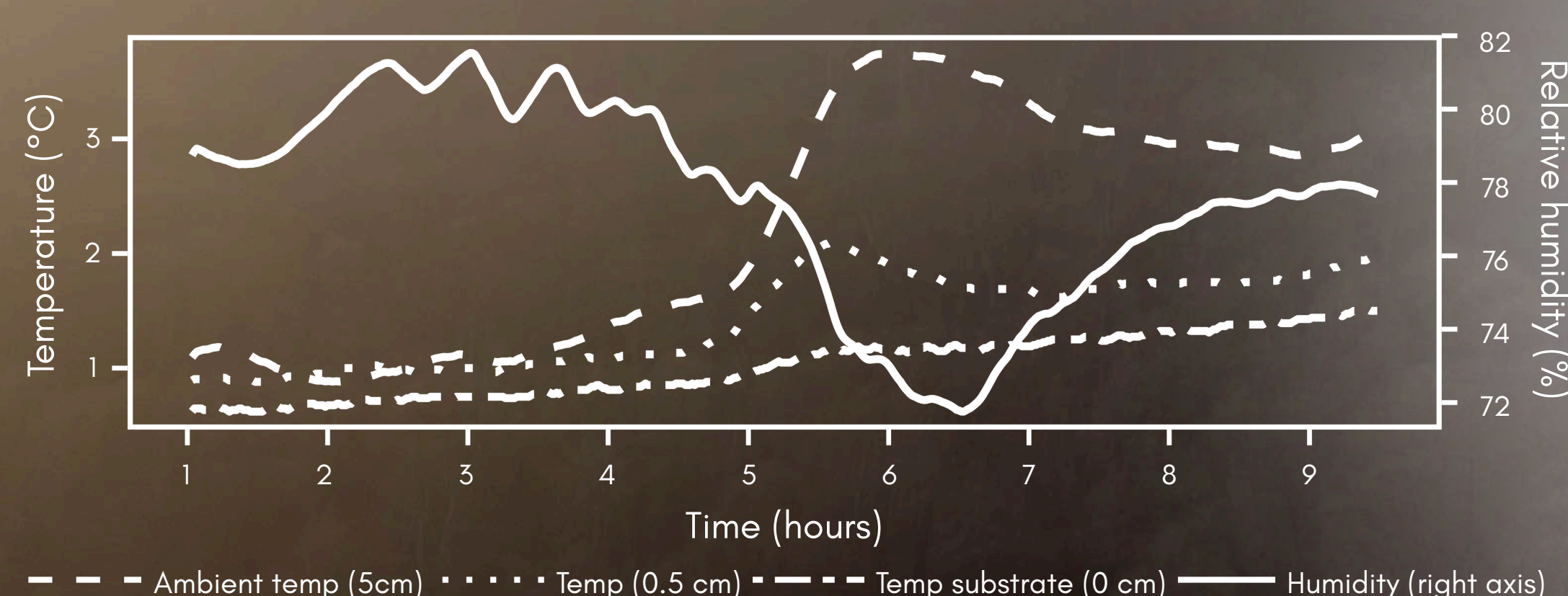
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FACING MEASUREMENT BIAS AND ACCESS LIMITS

Biodiversity responds to **microclimate**, yet these conditions are **poorly captured by existing sensors**, which are often **biased by solar radiation** in open ecosystems and lack **remote data transmission** for hard-to-access environments. We are therefore developing a **robust, low-power microclimate sensor** with improved **accuracy** and **wireless data transfer**, tested in exposed **cliff ecosystems** to enable reliable remote monitoring across challenging environments.

INITIAL PERFORMANCE TESTS

The prototype **captures expected** temporal **patterns** in temperature and humidity.



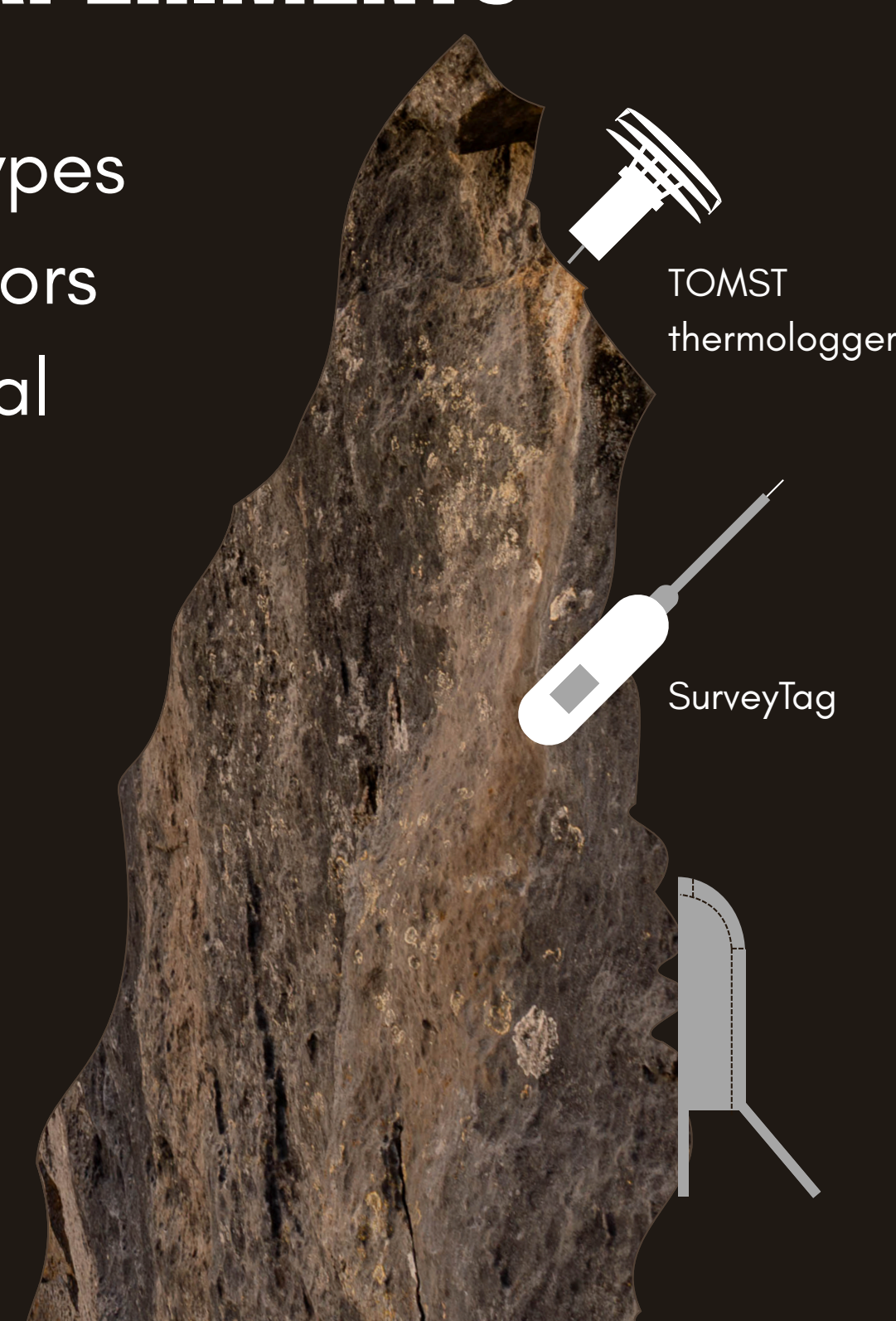
OUT-OF-BOX DESIGN

Thermal decoupling minimizes radiation-induced bias to improve accuracy.

Near-substrate (0.5 cm) or substrate (0 cm) temperature
Relative humidity
Ambient air temperature

UPCOMING EXPERIMENTS

Compare prototypes with default sensors in an experimental set-up on cliffs



Test
→ Measurement error
→ Radiative overheating

PROGRESS & REMAINING CHALLENGES

- | | |
|-------------------------|---|
| ✓ Conceptual design | ? Additional costs (IoT, substrate temperature) |
| ✓ IoT data transmission | ? Robust design |
| ✓ Data logging | ? Bias solar radiation |

CLIFFS AS IDEAL TEST ECOSYSTEMS

- Biodiversity hotspots**
→ Strong need for research and conservation
- Extreme microclimatic gradients**
→ Large environmental variation over short distances
- High solar exposure**
→ Challenging conditions for accurate measurements
- Difficult access**
→ Climbing or rappelling = time- & resource-intensive
- Remote & harsh environment**
→ Risk of obstructed signals & sensor damage

A BENCHMARK FOR BROADER APPLICABILITY

Performance under extreme cliff conditions demonstrates broader potential across ecosystems and research.

Picture: Kobe Burdack

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