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Brahmal Vasudevan Institute
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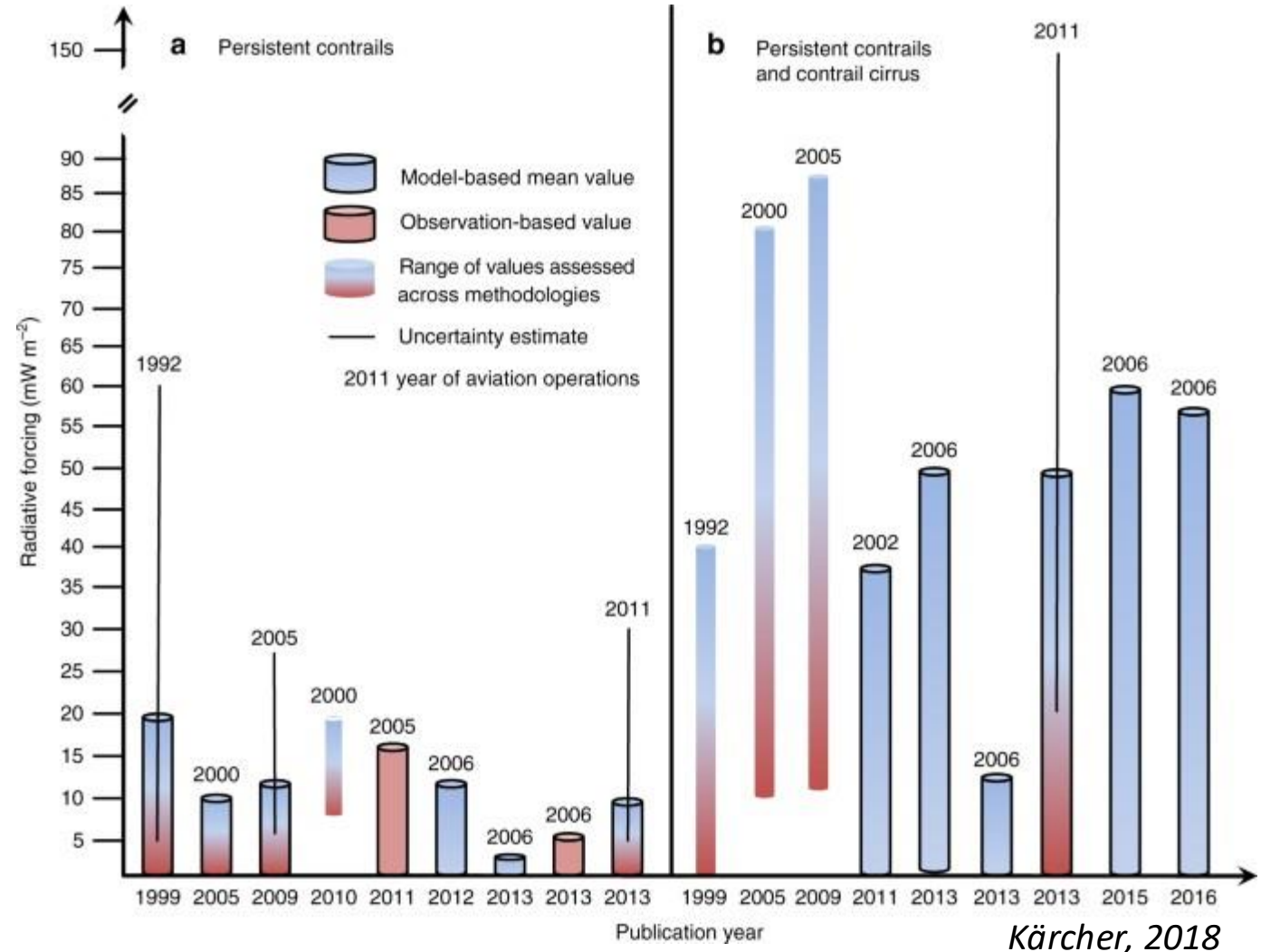
Uncertainties, disagreement, and robust contrail mitigation

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Contrail climate impacts: large but uncertain

Contrail RF (climate impact)
rivals aviation CO₂ – with
high uncertainty

But **baseline uncertainty** is
not the same as **mitigation**
uncertainty



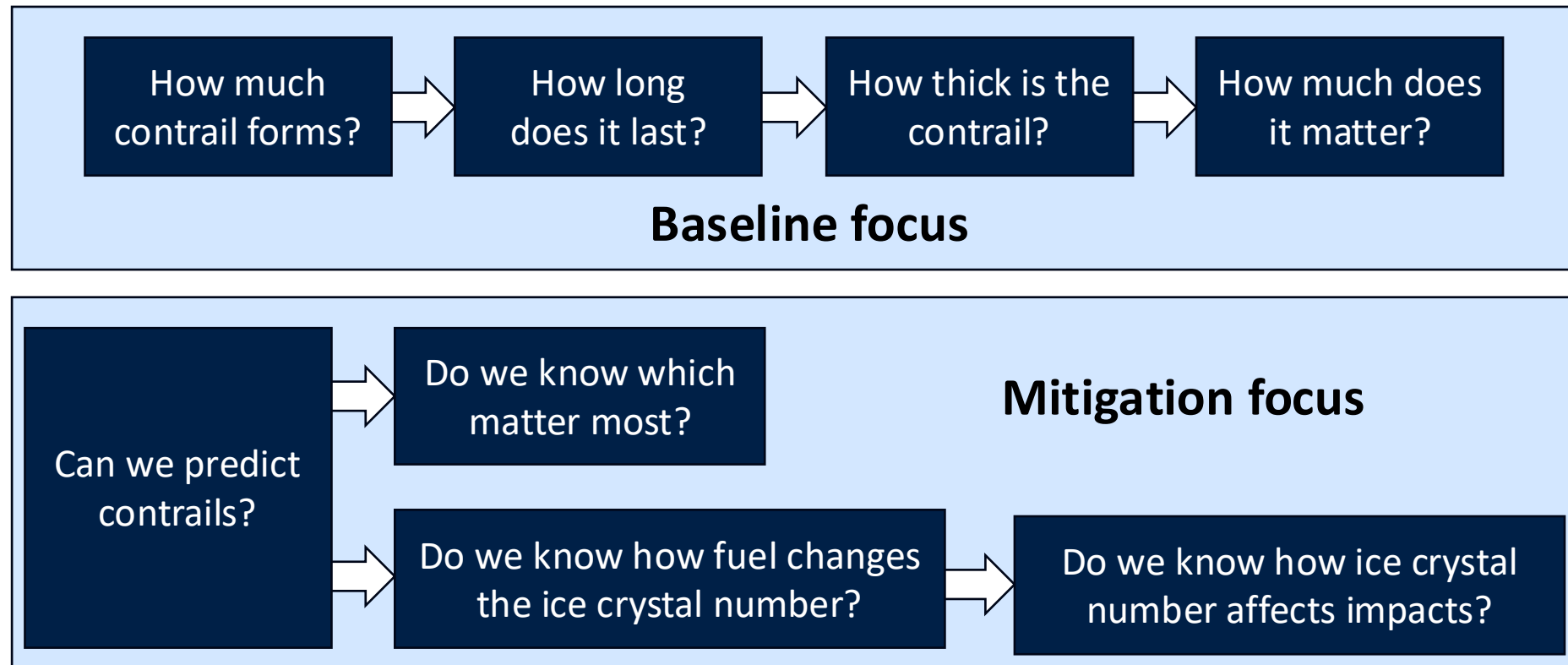
Options for mitigation

1. Navigational avoidance – predict and avoid



2. Technological
mitigation – modify
the contrail

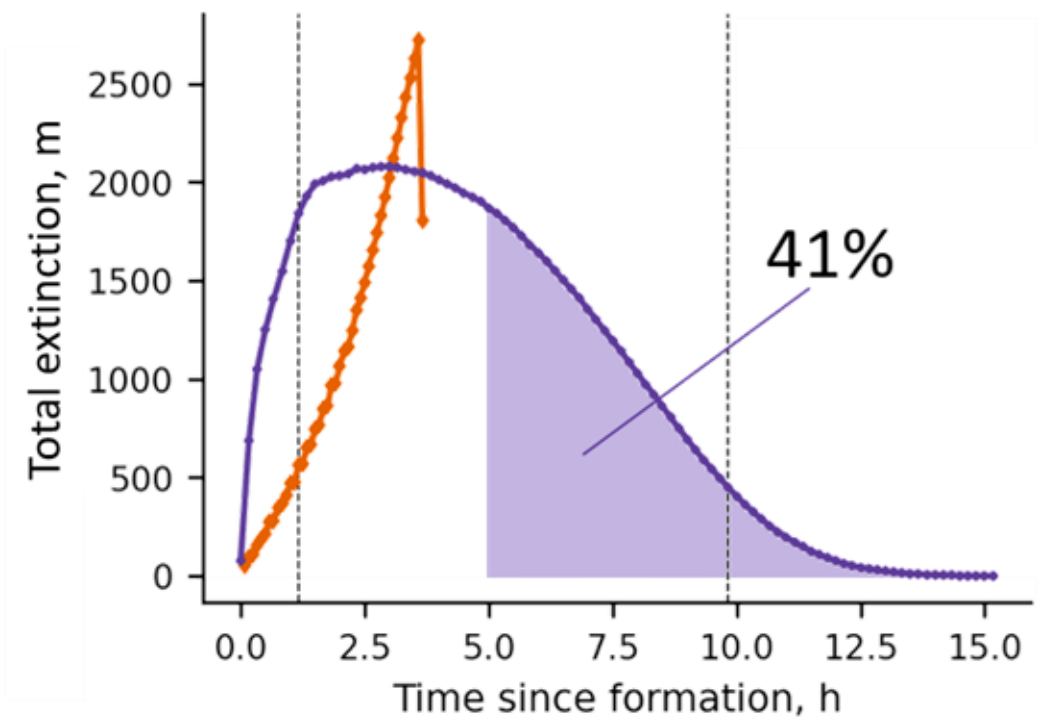
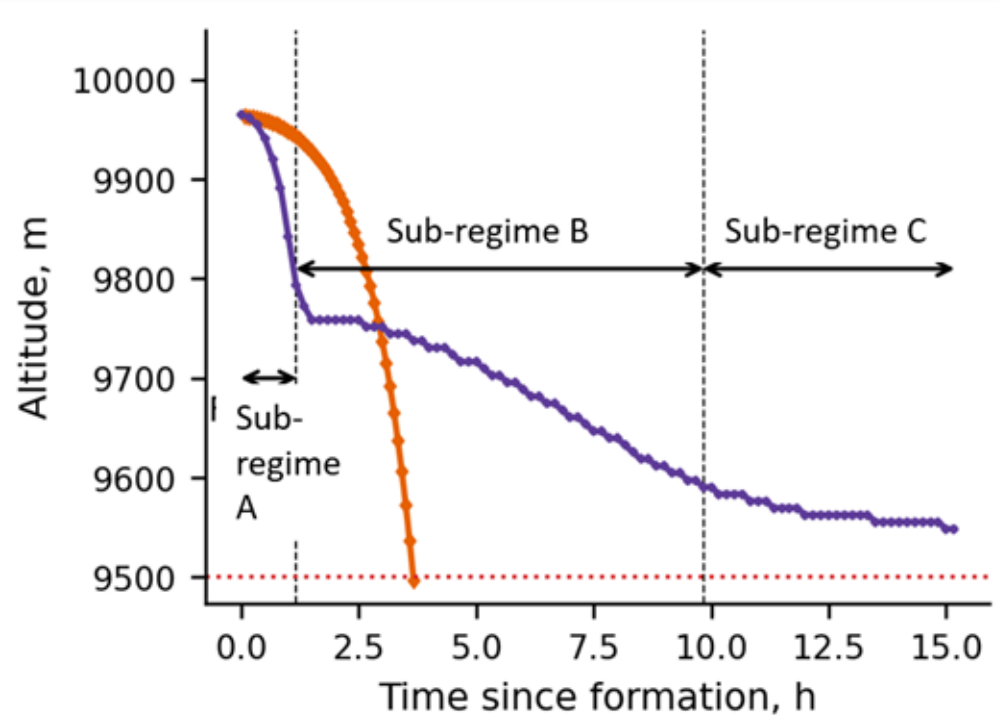
What exactly is uncertain?



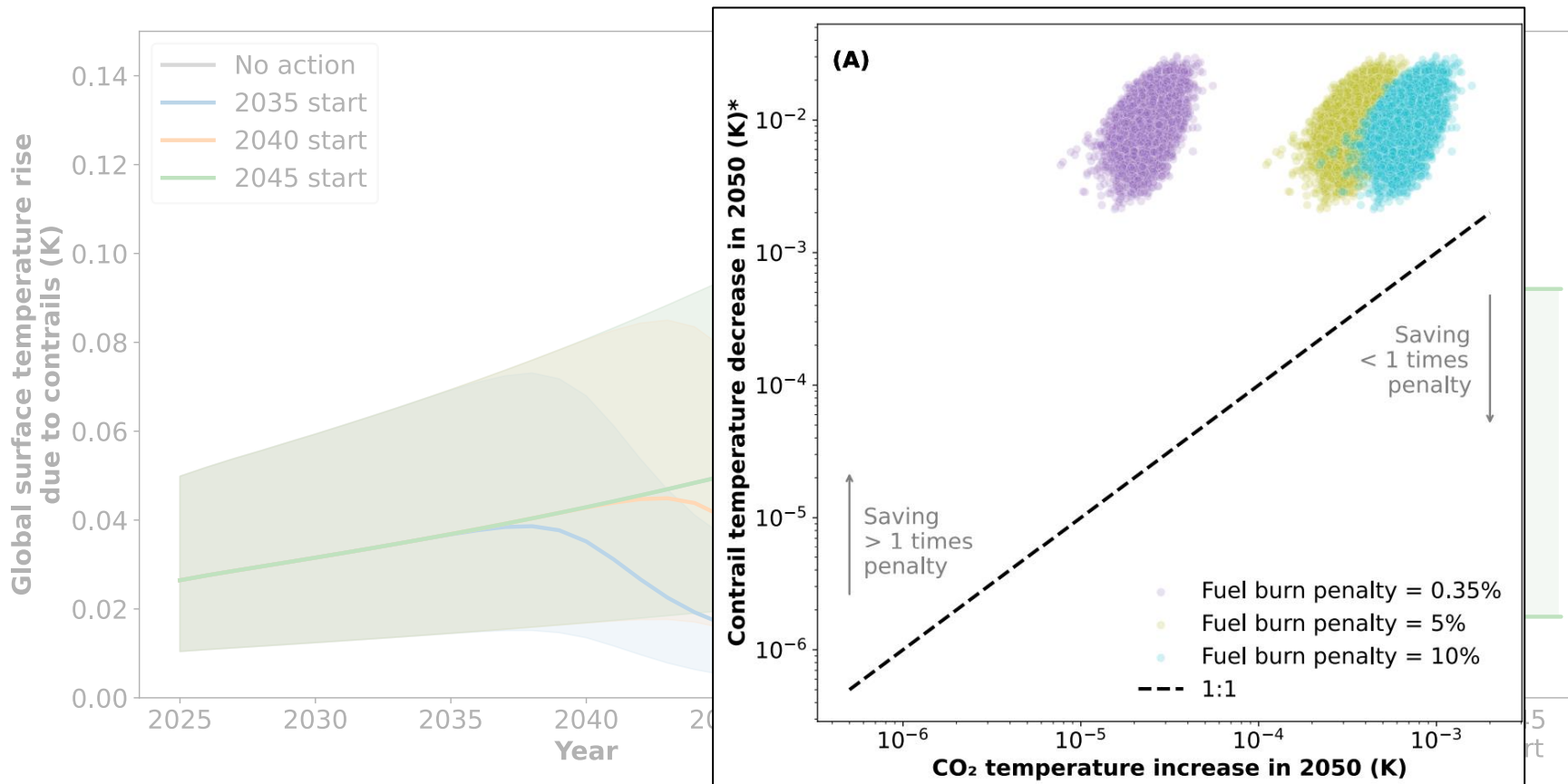
Fragile model-based strategies carry risk

Takeaway: models don't agree on which specific contrails cause most impact

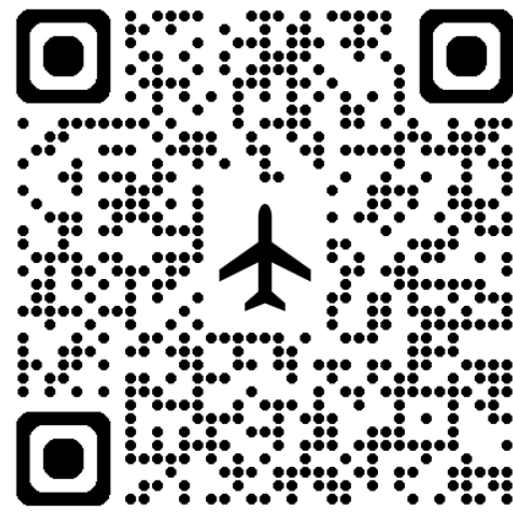
CoCiP APCEMM



Robust strategies let us learn by doing



Smith et al., 2026
(Nature Comms)



Takeaway: avoidance expected to yield benefits even if contrail climate impacts uncertain

Open questions in contrail mitigation

- How confident are we in the **baseline uncertainty**?
- How do we achieve **verifiable mitigation**?
- What effect would **technological levers** have on contrails?
- How can we build **robust** rather than **fragile** strategies?