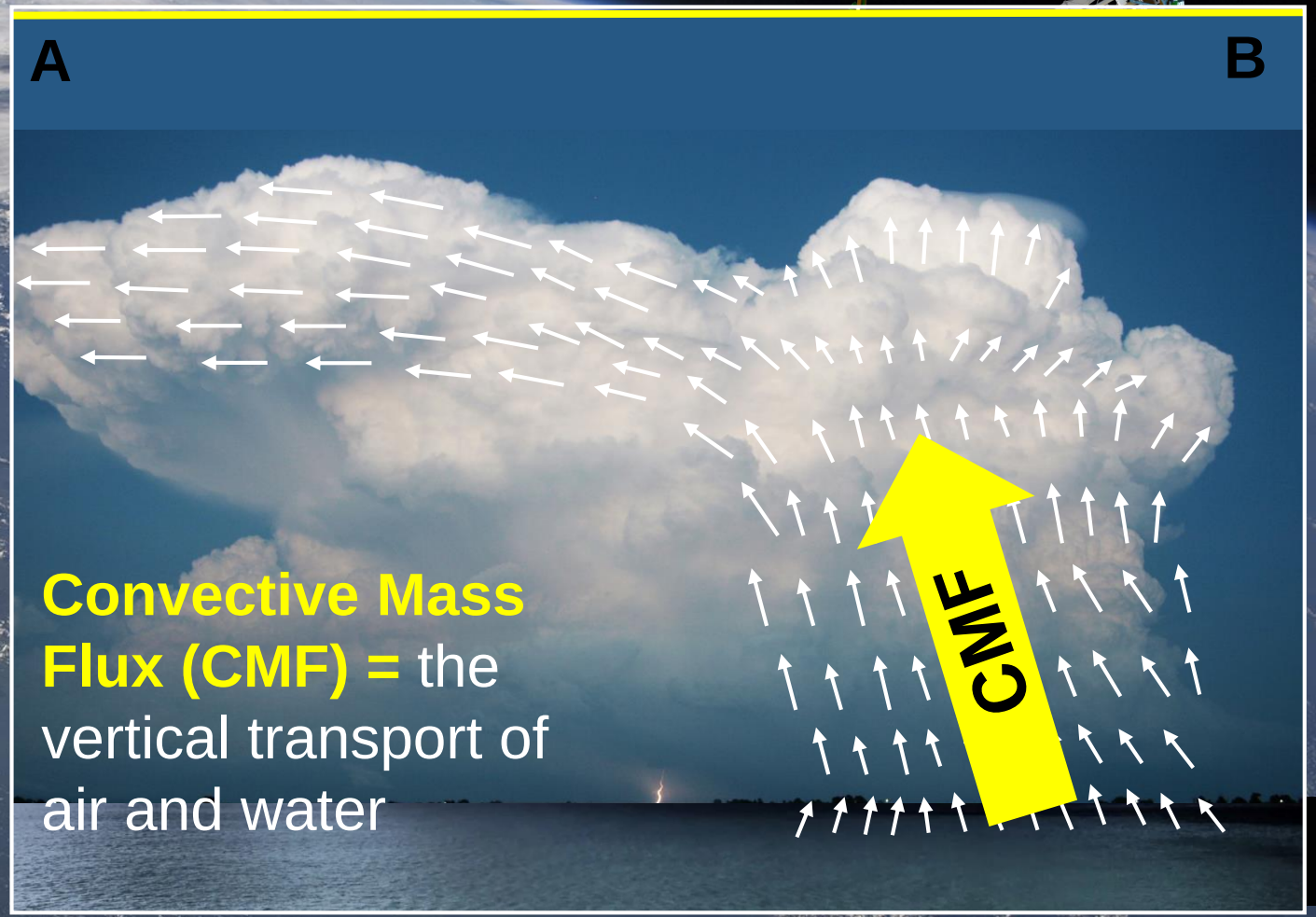

INCUS
NASA
INCUS
Investigation of Convective Updrafts
Colorado State University
NASA
Jet Propulsion Laboratory
California Institute of Technology

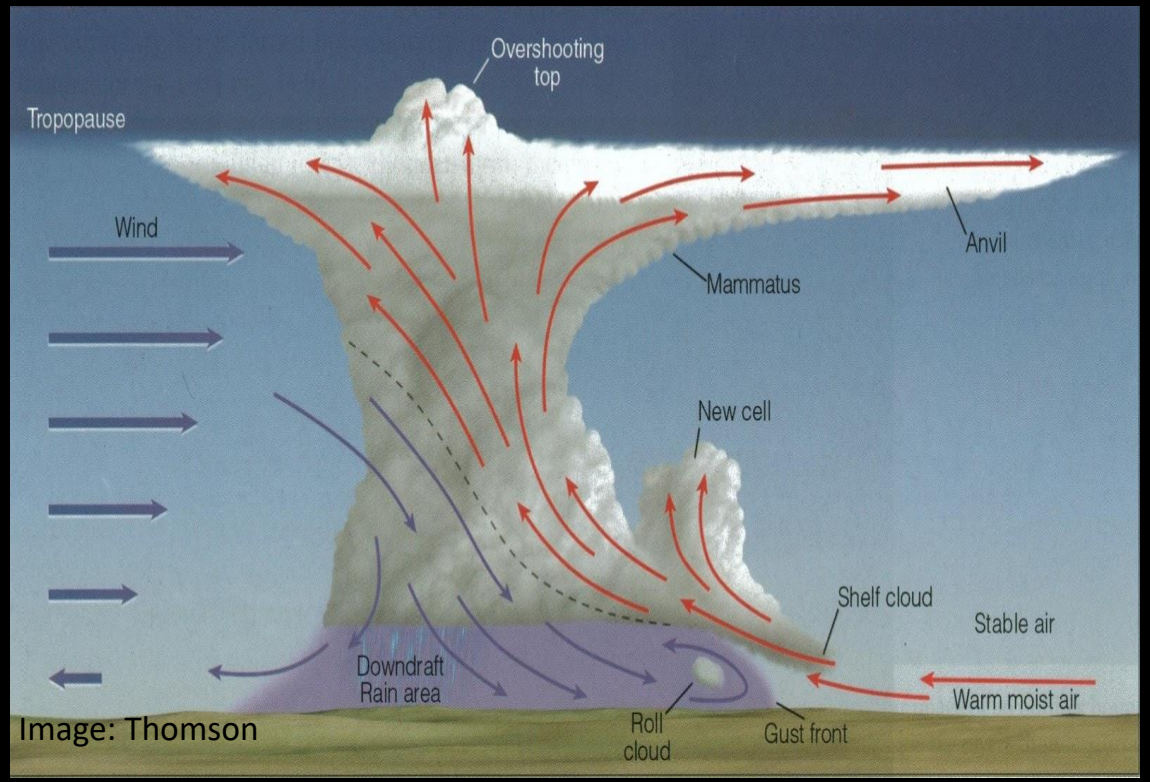
INCUS GOAL

To understand why, when and where tropical convective storms form, and why only some storms produce extreme weather.

INCUS will provide the first ever tropics-wide observations of CMF



Convective Mass Flux – Storm Scales



- Rising and sinking motion connects the boundary layer and upper troposphere & drives the large-scale circulation

INCUS Science Objectives

INVESTIGATION OF CONVECTIVE UPDRAFTS

Objective 1: ENV → CMF

Determine the predominant environmental properties controlling CMF in tropical convective storms

Objective 2: CMF → High Clouds

Determine the relationship between CMF and high anvil clouds

Objective 3: CMF → Current and Future Weather

Assess the relationship between CMF and type and intens
the weather produced

Objective 4: CMF in Models

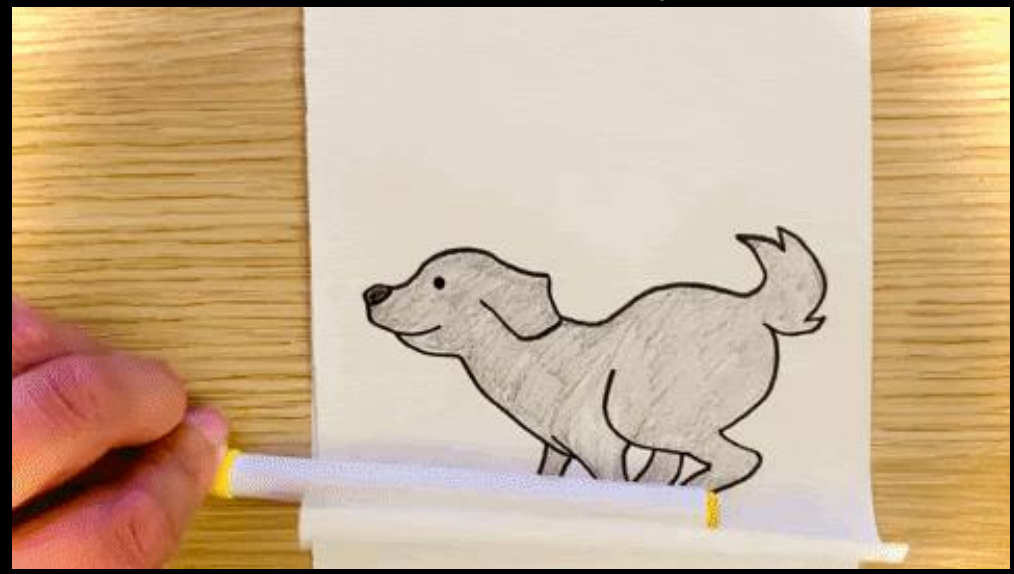
Evaluate these CMF observationally determined relationships in weather and climate models.

Unique Time Differencing (Δt) Approach

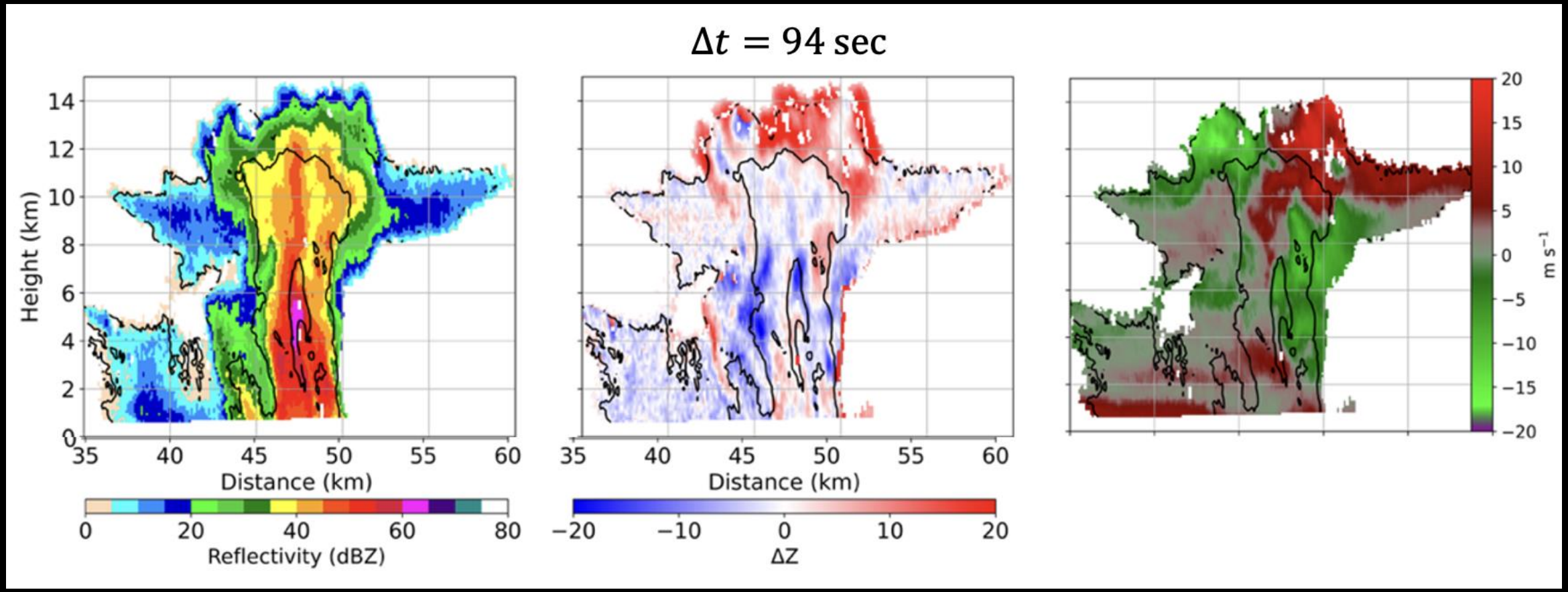
W of 15 m/s corresponds to ~1km/min

Rapidly sampling the cloud state in time provides information on the storm motion and hence CMF

Exploratorium.edu



Does it work?

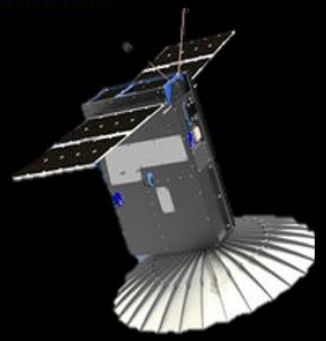


Dolan et al., 2023

INCUS Made Possible by Miniaturization

INVESTIGATION OF CONVECTIVE UPDRAFTS

3 RainCube Ka-band radars



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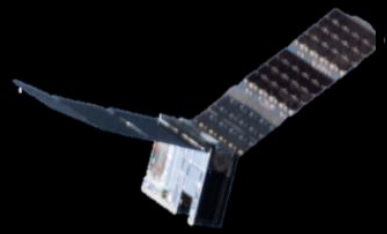
TEMPEST-D mm-wave radiometer



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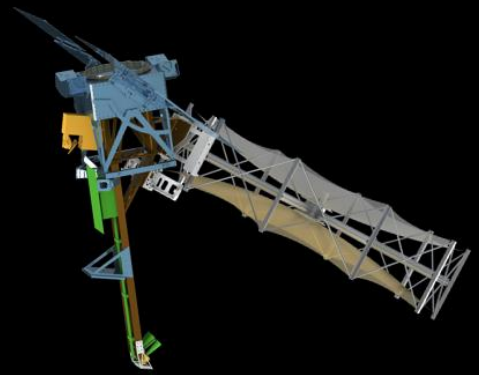
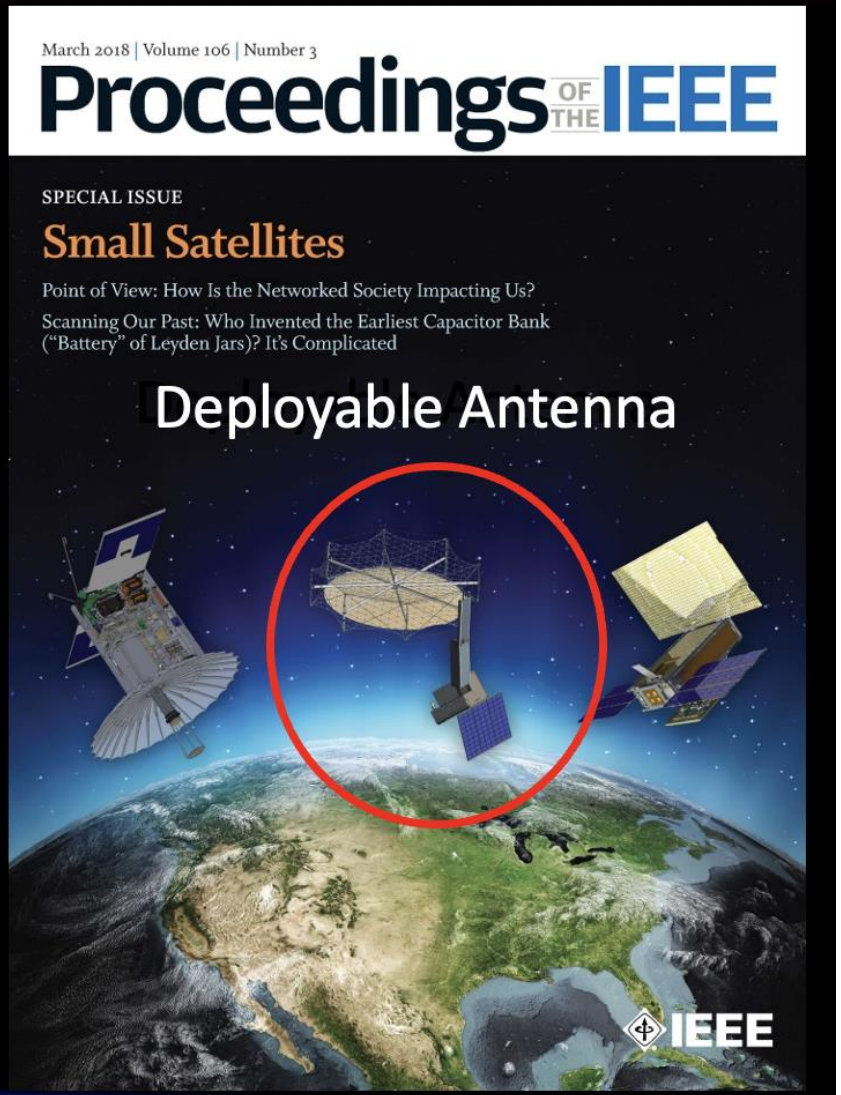
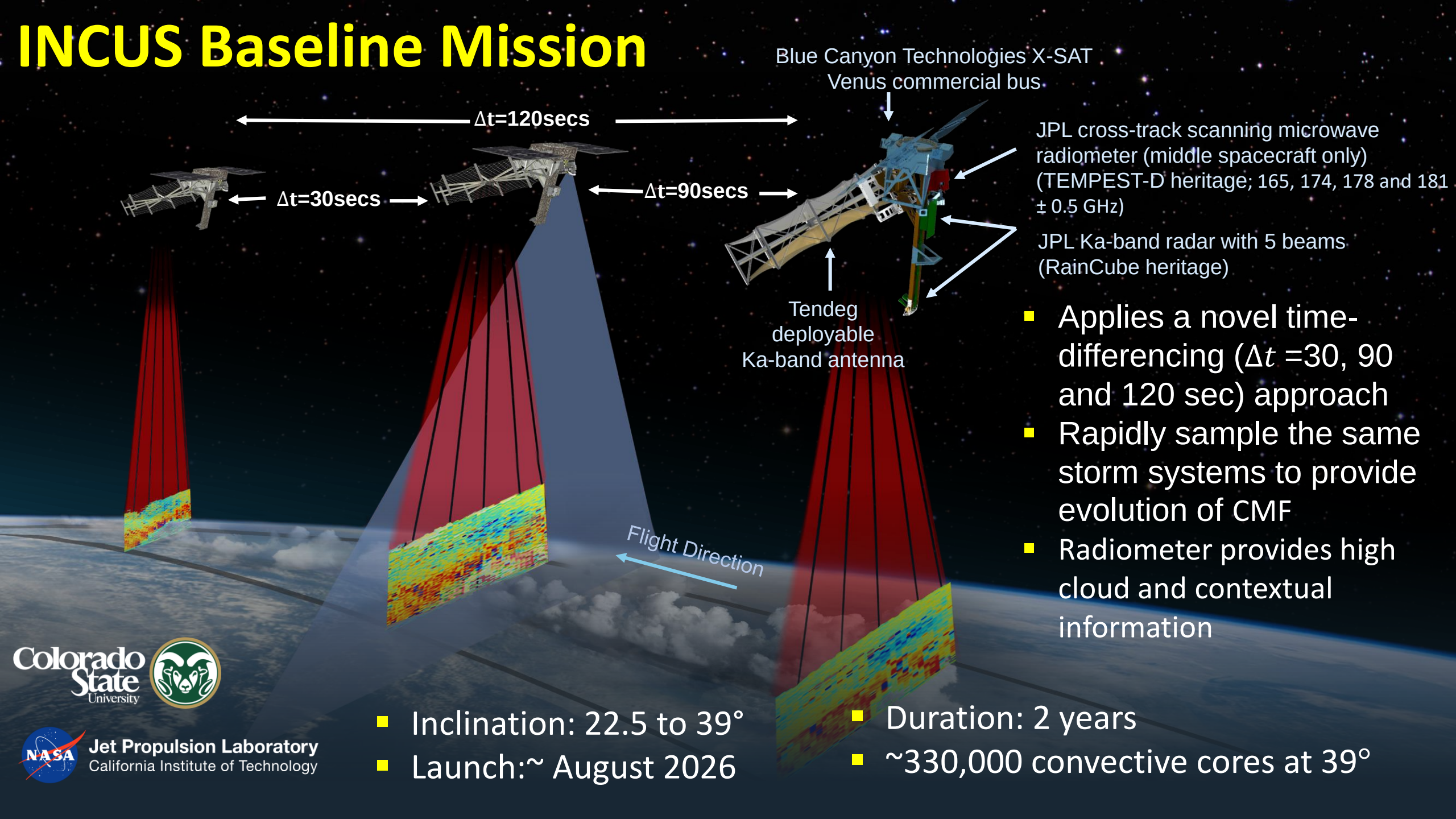


- RainCube and TEMPEST-D implemented as tech demos by NASA's ESTO



INCUS Baseline Mission



- Applies a novel time-differencing (Δt =30, 90 and 120 sec) approach
- Rapidly sample the same storm systems to provide evolution of CMF
- Radiometer provides high cloud and contextual information

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- Inclination: 22.5 to 39°
- Launch:~ August 2026
- Duration: 2 years
- ~330,000 convective cores at 39°