

From Convective Fraction to Latent Heating

What the precipitation record does not yet constrain

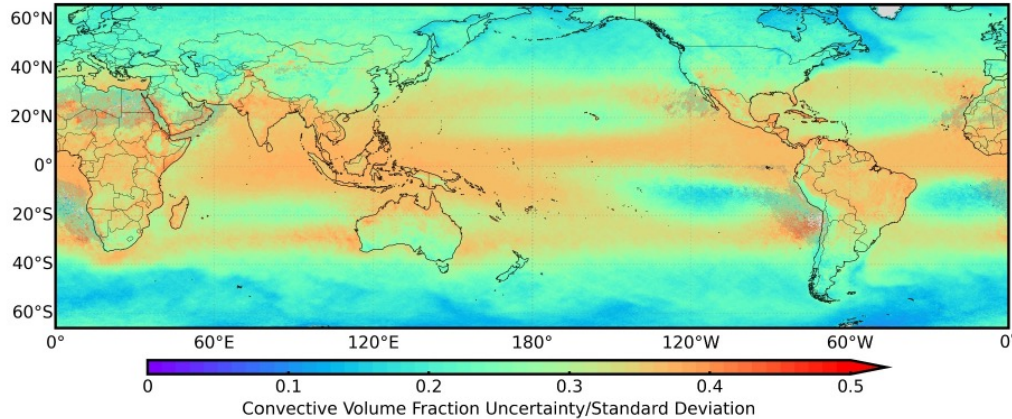
Veljko Petković

ESSIC, University of Maryland, College Park



1. RECENT ADVANCE

GMI Convective Fraction Uncertainty

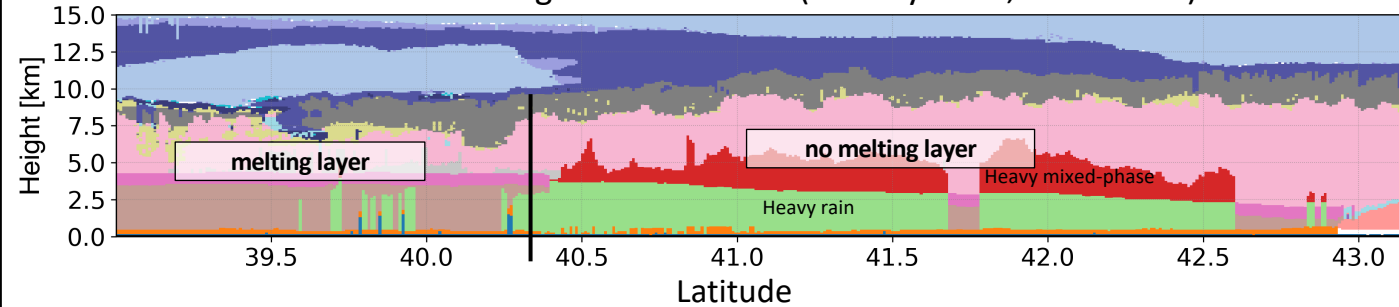


Eight years of GMI and Ku-band radar collocations (2015–2023). **Uncertainty in the convective/stratiform partition is structured, not random:** it peaks in deep tropical convection and in the oceanic transition zone, and tracks ice-phase signal (at 89 and 166 GHz). **Every operational latent heating algorithm is built on that partition,** so this uncertainty likely propagates straight into heating.

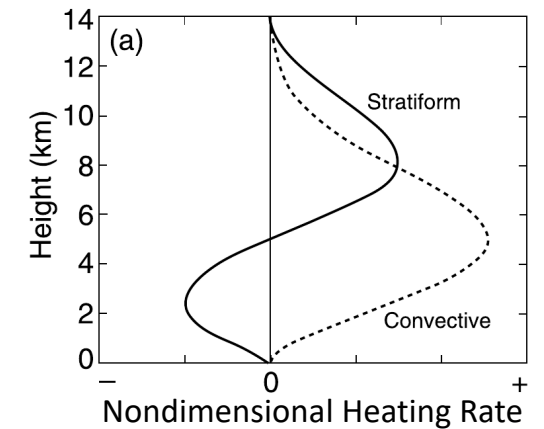
Ji, Petković et al. (2026), JGR Atmos; Hong and Petkovic (2025), JGR: Atmos.

2. WHAT WE CAN NOW SEE, AND WHAT WE STILL CANNOT

EarthCARE Target Classification (13 May 2026, NW Pacific)



The convective/stratiform partition has a physical signature, the melting layer: present in stratiform columns, absent in convective ones. EarthCARE locates it from the reflectivity bright band together with the Doppler velocity gradient across the freezing level. Here it runs continuously below 40.4°N and is gone to the right, where the classification is heavy mixed-phase over heavy rain.



Houze (2004), Rev. Geophys., Fig. 4a

3. WHERE WE NEED TO GO *GPROF V08 already delivers a latent heating profile (for every radiometer in the constellation)*

The global LH product exists. But there is no observational heating truth to rely on. Every available target is model-derived, and it has never been tested against the one spaceborne instrument that can resolve the structure that sets it. Radar curtains cover a few percent of the tropics at any moment; the radiometers carry the global record. Comparing them, with data already in orbit (EarthCARE) and more Doppler to come (PMM, INCUS), might be the cheapest progress available on latent heating.