



International Panel:  
Can Vicarious Calibration Replace Onboard Calibration  
Systems?

CalCon  
Utah State University,  
Aug 22-24, 2016

Dennis Helder  
South Dakota State University

# Can Vicarious Calibration Replace Onboard Calibration Systems?

- Relative Radiometric Gain
  - Detector equalization to ensure no streaking, striping or banding
  - Onboard systems largely based on diffuser
  - Vicarious techniques:
    - Side slither method
    - Lifetime statistics method
  - Vicarious methods can equal or outperform onboard systems
- SNR
  - Onboard systems can be very accurate, but with limited radiance levels
  - Data driven methods often overestimate SNR, but new approaches are giving more accurate estimates
- Absolute Radiometric Calibration
  - Onboard systems (diffusers) exhibit greater temporal resolution, excellent precision (~0.1%?), accuracy at 3%.
  - PICS not far behind with absolute accuracy approaching 3%, and precision pushing 1%.
  - Vicarious ground campaigns (team on site during overpass) consistently showing 3% precision and accuracy.
  - RadCalNet program (automated onsite measurements during overpass) likely capable of 3% accuracy and precision (?)
- Conclusions
  - For the highest precision and accuracy in absolute radiometric calibration, onboard systems have an edge over vicarious methods.
  - For all other measurements vicarious, data-driven, methods are equal or superior to onboard methods
  - For exacting science missions onboard calibrators need to be considered, for all other missions they may not be necessary.