Calibration Evaluation of the Cassini Radar Ring Observations

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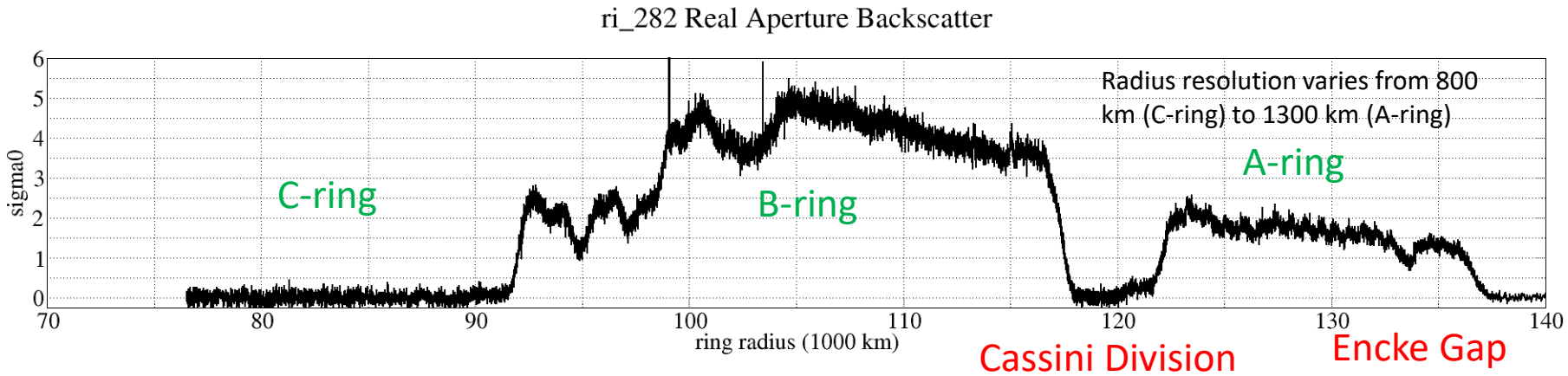
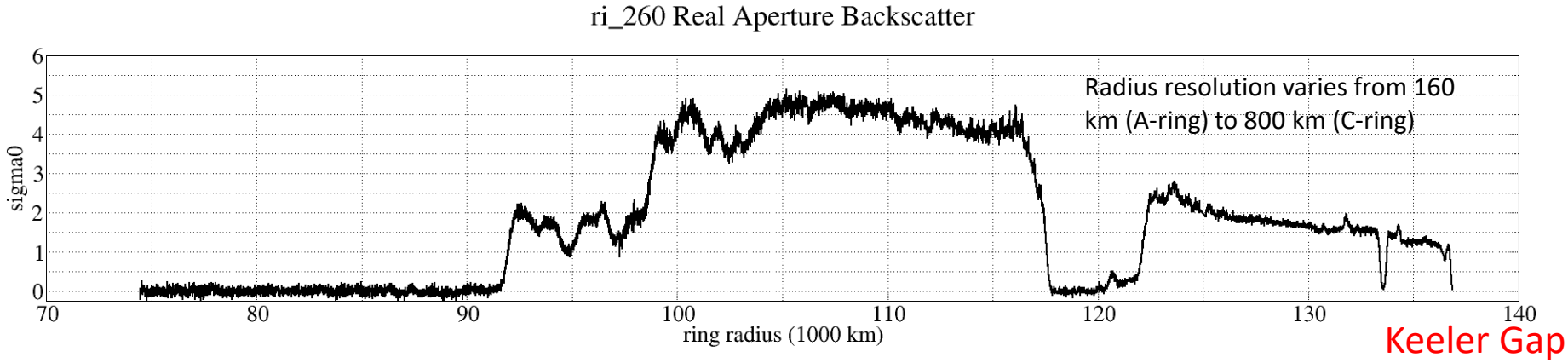
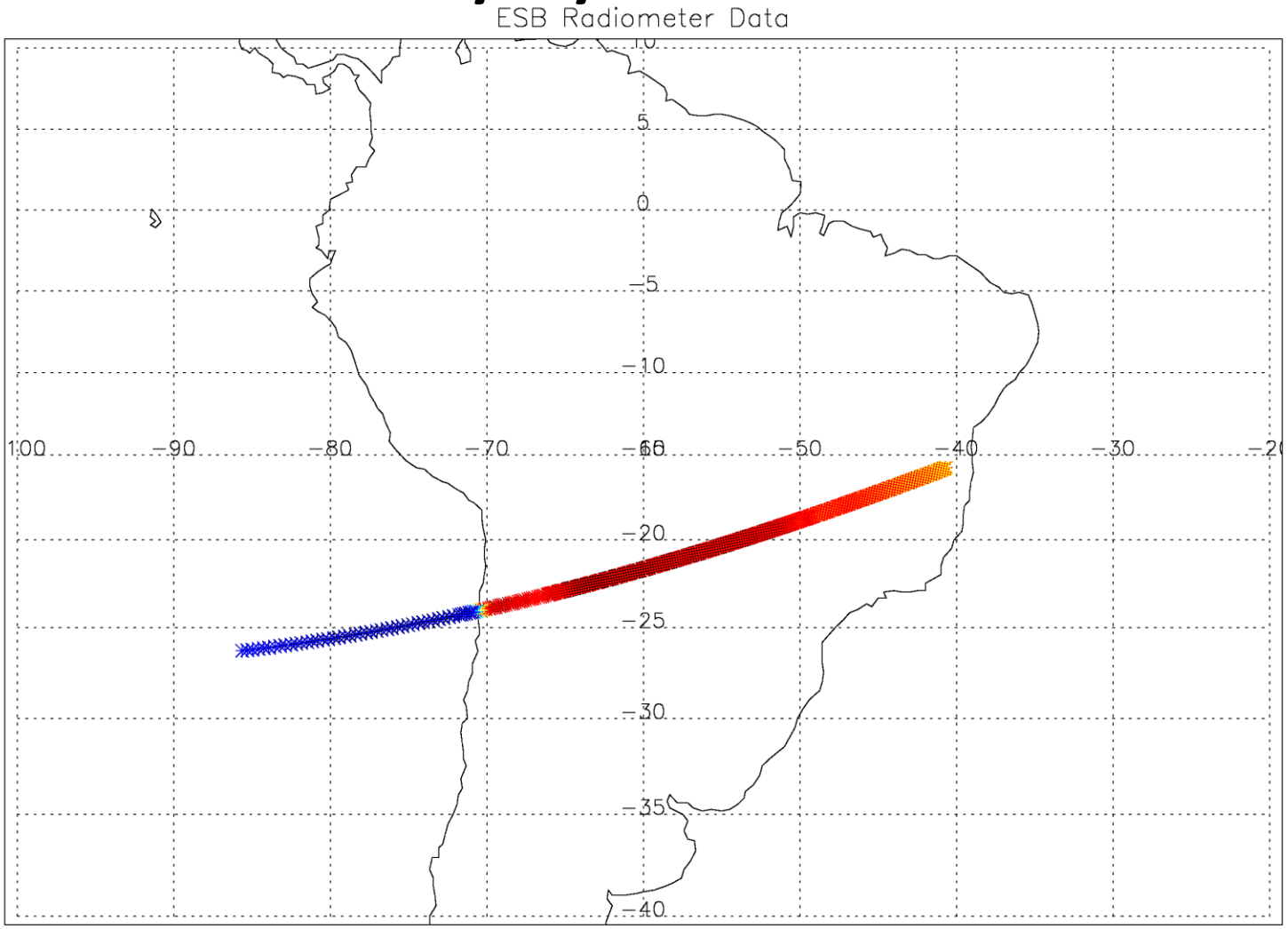
Calibrated Radar Backscatter From Radar Ring Scans





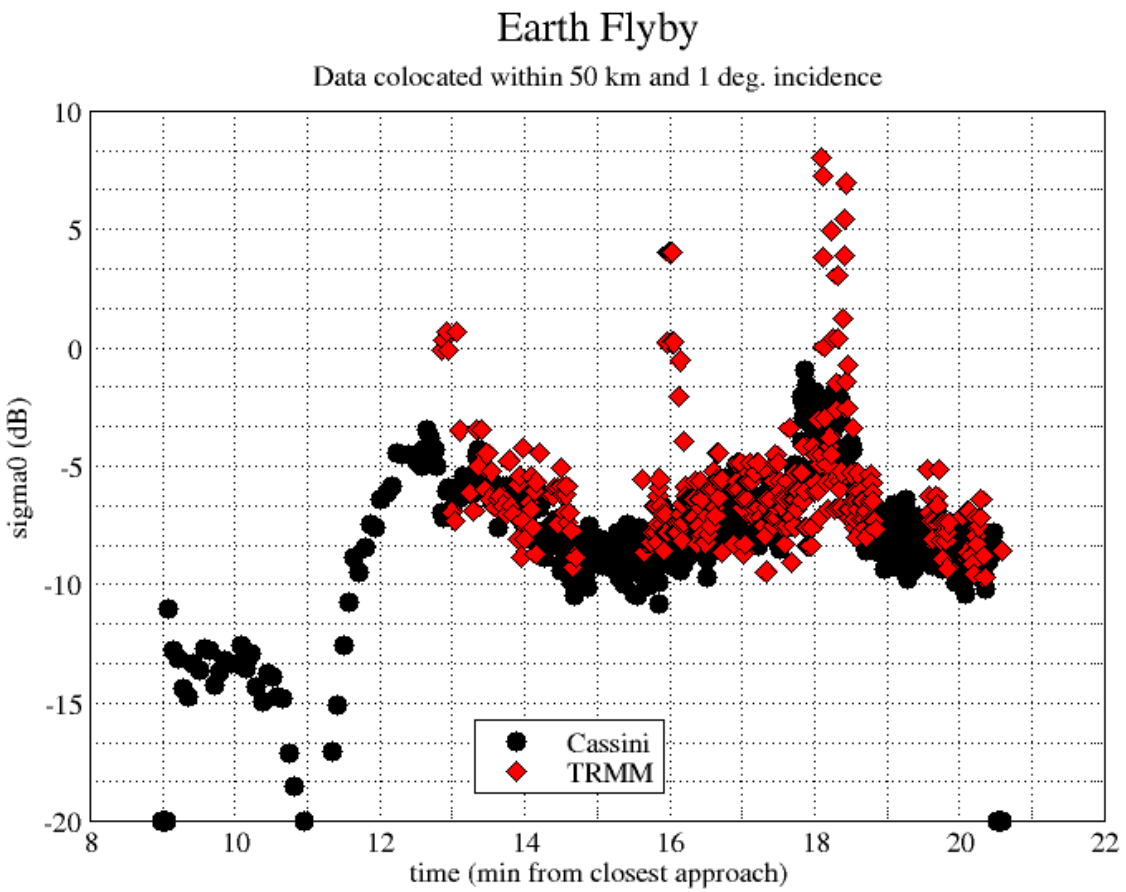
Note: sigma0 is normalized by area in the ring-plane and presented here in linear units. Unity sigma0 occurs when the received power equals what an isotropic scattering area would produce.

Earth Flyby Ground Track



Absolute Calibration Validation

- Cassini and TRMM backscatter (both Ku-band) co-located in space, time, and incidence angle.
- Same calibration constants used on Cassini radar Earth flyby data as all other Cassini radar results
- Same processing code used on Earth Flyby and Rings (some differences in geometry routines – flat ring plane vs planetary surface).
- Noise floor computed from time segmented Earth flyby data.
- Very good agreement on the absolute calibration.

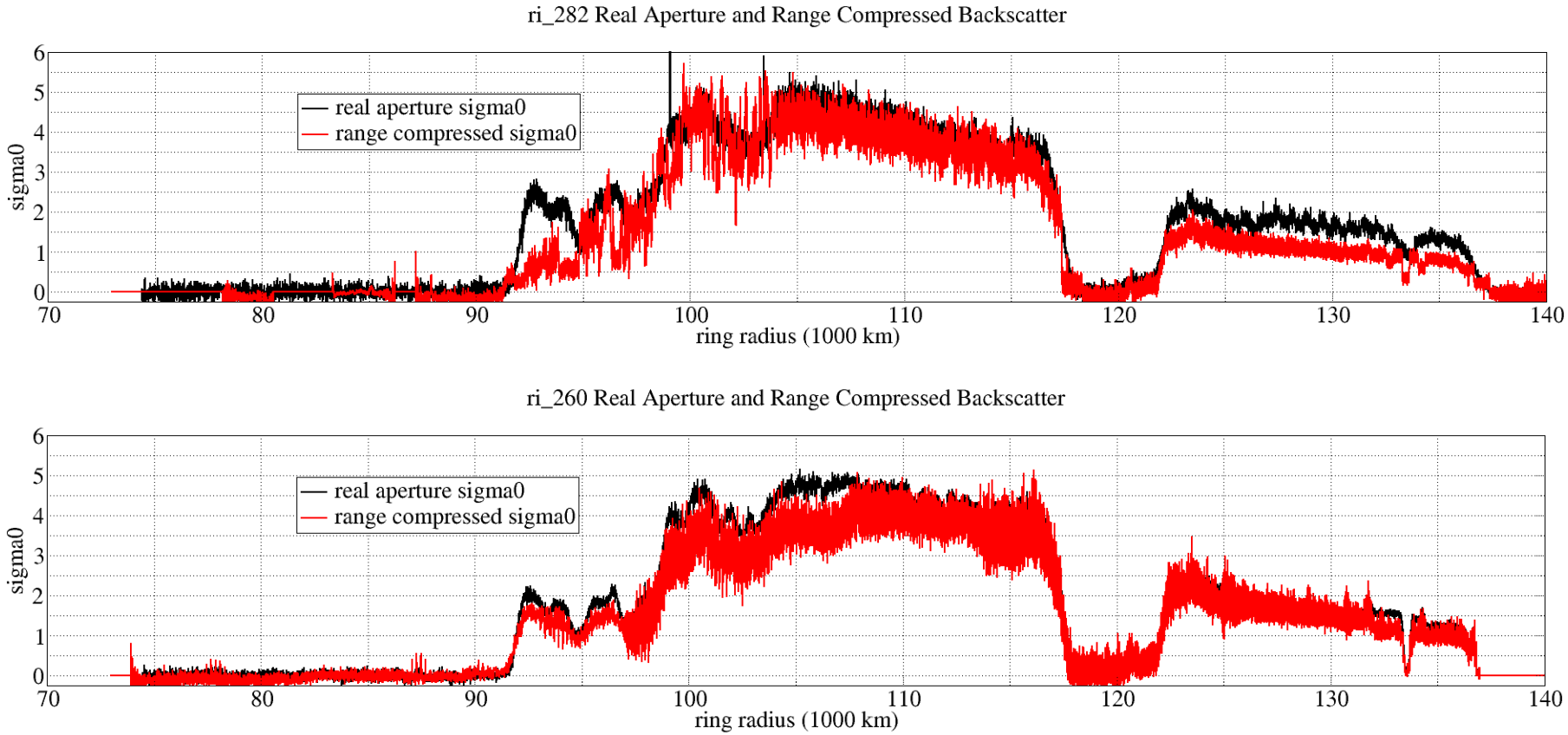


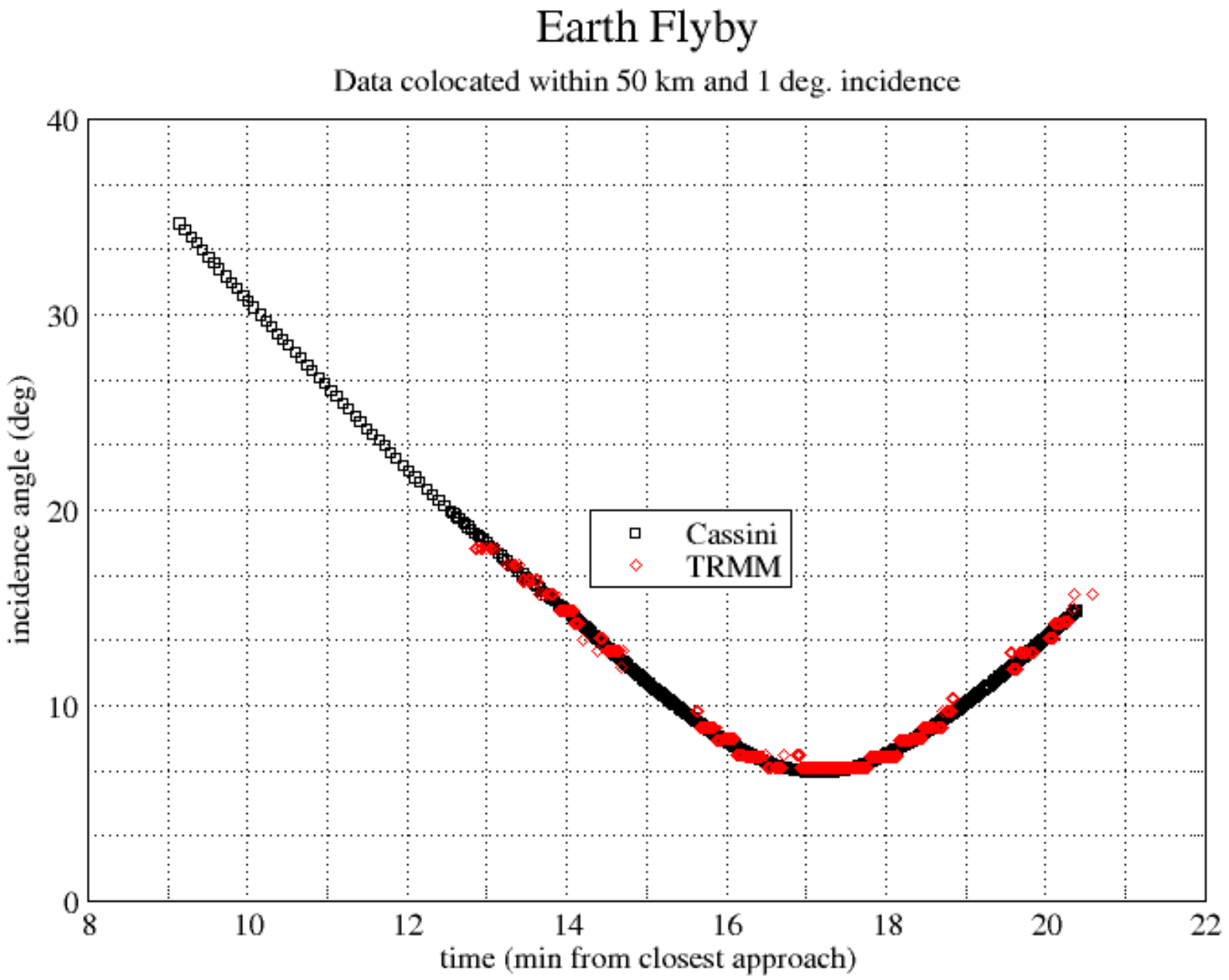
- Backup

Validation Summary

- Earth Flyby allows comparison with separately calibrated Earth orbiting radar systems including TRMM which also operated at 13.8 GHz.
- Same calibration constants (ADC conversion, attenuator values, transmit power, receiver gain) applied to Earth flyby measurements and Saturn system measurements.
- Same processing code used on Earth flyby and Rings.

Comparison of Real Aperture and Range Compressed Backscatter




Earth Flyby
Data colocated within 50 km and 1 deg. incidence
incidence angle (deg)
time (min from closest approach)
Cassini
TRMM
0
10
20
30
40
8
10
12
14
16
18
20
22

Ground-Based Rings Backscatter

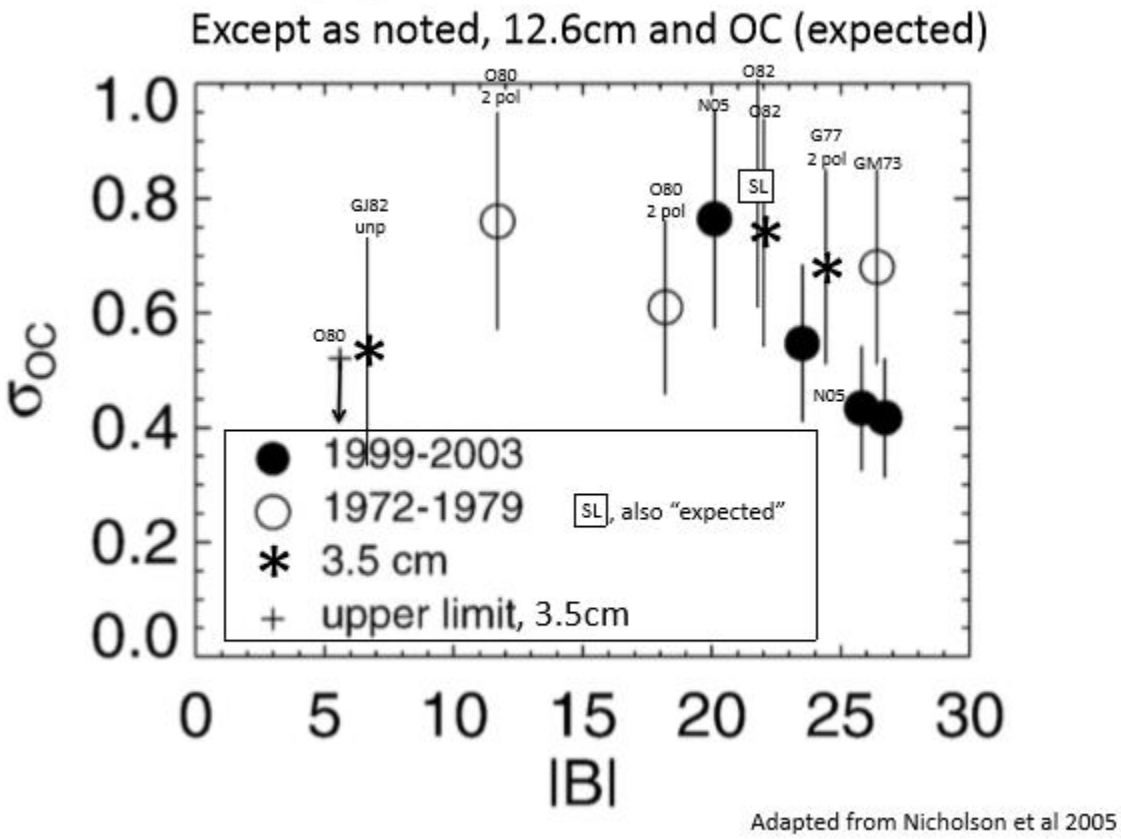
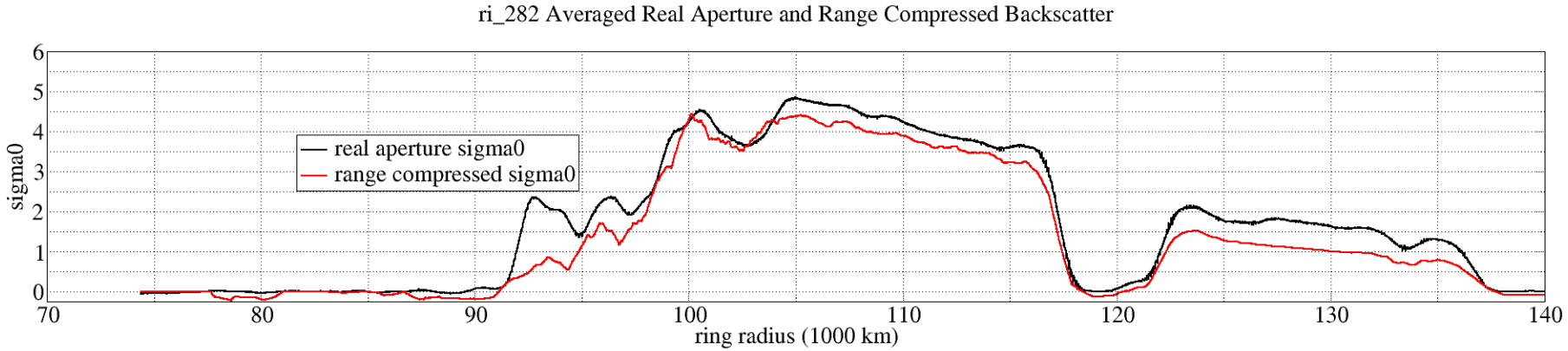
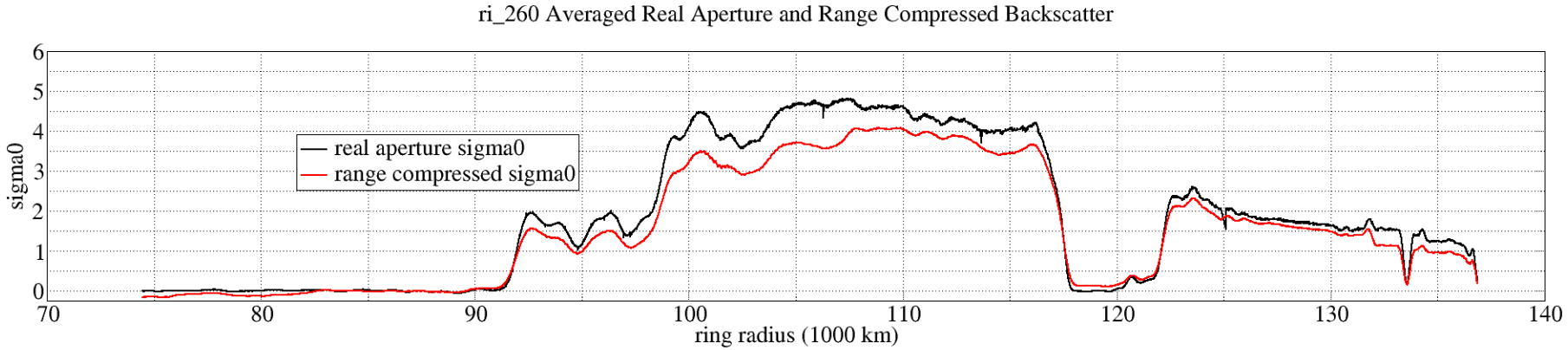


Figure2: Summary of "expected sense" single polarization radar reflectivity of the rings, σOC or σSL, for 3.5cm (asterisks) and 12.6cm (circles and square). Adapted from Nicholson et al 2005, Icarus.

Comparison of Averaged Real Aperture and Range Compressed Backscatter





Averaging taken over the radius extent of the beam footprint.