

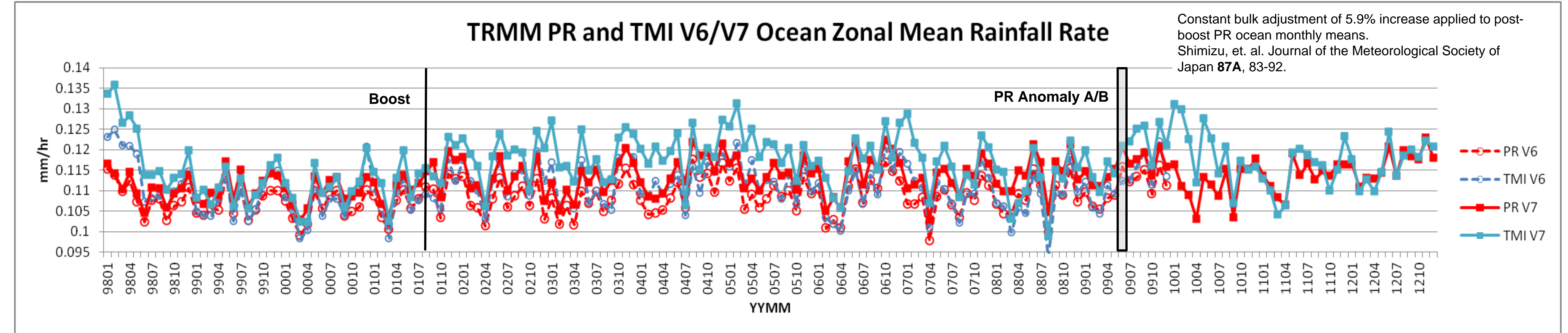
TRMM PR Precipitation Retrievals in the GPM DPR Era



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Introduction The Tropical Rainfall Measurement Mission (TRMM) Precipitation Radar (PR) has provided a precipitation data record extending back to Dec. 1997. The PR retrieval algorithms that provide these precipitation estimates have undergone extensive testing and validation over the life of TRMM, which may extend well into the Global Precipitation Measurement (GPM) mission era. The GPM core spacecraft will be launched in 2014 and includes the more advanced Dual-Frequency Precipitation Radar (DPR) which consists of two radars: one operating at Ku-band (much like TRMM PR) and the other at Ka-band. There is potential for both TRMM PR and GPM DPR to be operational at the same time resulting in increased sampling for Ku-based precipitation measurements and a unique opportunity for analysis and improvements of retrieval algorithms. **This work extends the usefulness and enhances the sampling of the TRMM PR precipitation record into the GPM era by allowing the TRMM retrieval algorithms to be used on DPR Ku-band data and will contribute to eventually using the GPM era algorithms on the entire spaceborne precipitation radar data set, back to 1997.**

TRMM PR Data Record TRMM offers a consistent 15+ year precipitation data record as illustrated in the time series below. The post-boost PR monthly ocean accumulations have been adjusted by a constant bulk 5.9%. TRMM PR algorithms will be used on the DPR Ku-band data to immediately extend this time series. Eventually, the GPM DPR algorithms will process the entire spaceborne radar data record to generate consistent retrievals throughout the entire time span. Means obtained from zonal average profiles courtesy J. Stout.



Retrievals with TRMM PR Algorithms on GPM DPR Ku Data

TRMM algorithms can be modified to accept DPR Ku-band data as input.

- Opportunity for retrievals from both GPM DPR and TRMM algorithms on the same data.
- Identify potential deficiencies for both GPM DPR and TRMM algorithms.
- Implications to 15+ year TRMM PR precipitation record.
- Comparisons not restricted to TRMM/GPM satellite coincidence data.
- Ease transition to processing entire 1997+ spaceborne radar data set with DPR algorithms.

Supplement coincident event data sets.

Coincidence events between TRMM and GPM satellites are valuable data sets however:

- time lags between PR and DPR coverage.
- look angles along slant range paths are not the same.
- time/spatial coincidence *with* precipitation are rare
- will take time to build up coincident statistics

Challenges.

Restrict TRMM PR algorithms to using data in +/-35 deg. latitude. Interpolation of DPR Ku data to TRMM PR 250m gating.

2A21: PIA estimates

- Surface reference statistics for the PIA estimates.
- Modify TRMM PR statistics based on any DPR Ku σ^0 biases?

2A23: Precipitation classification

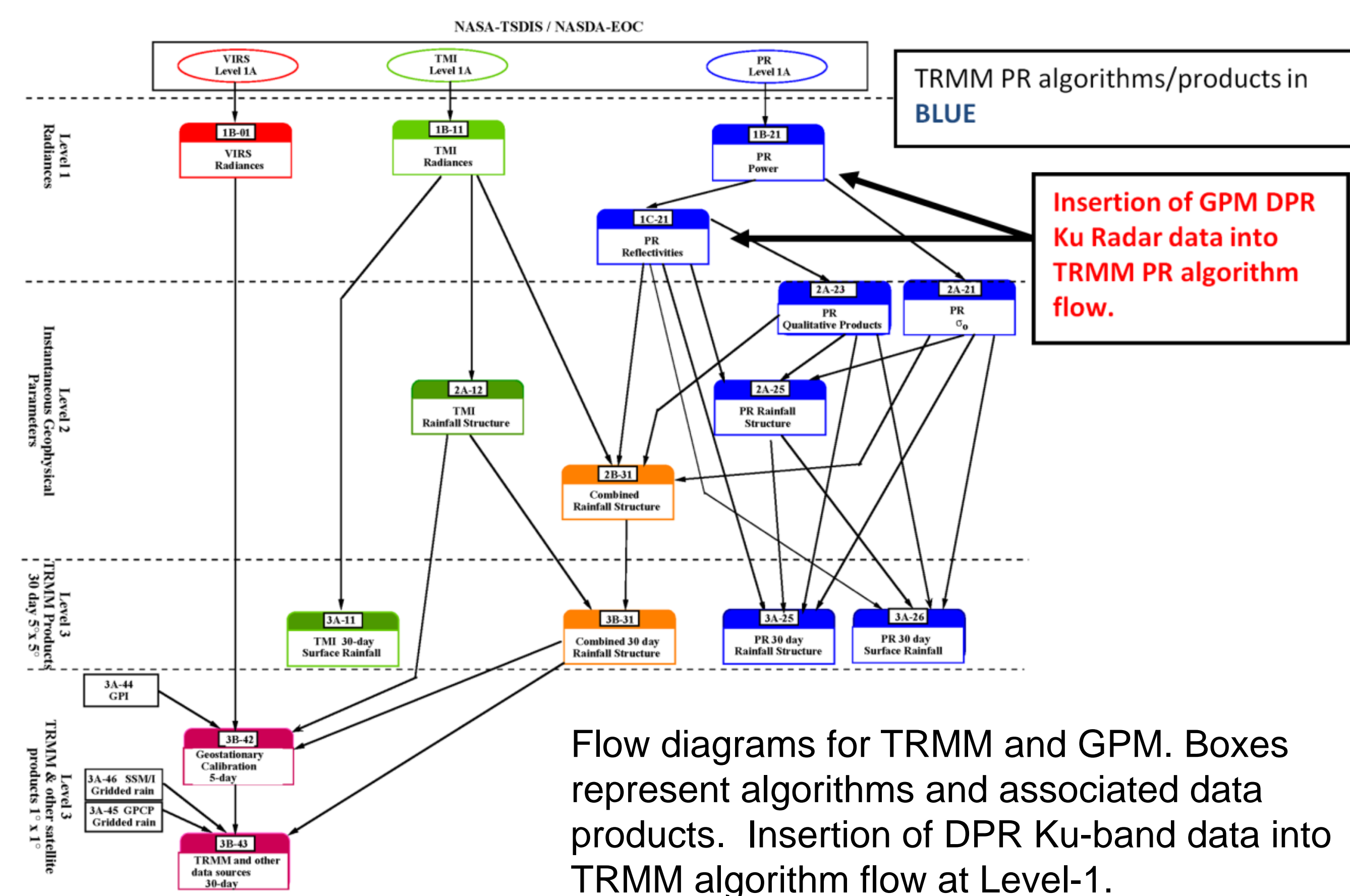
- Adjust tuning or possibly use GPM Ku algorithm classification.

2A25: Precipitation retrieval

- Modify algorithm to use 125m range gate resolution for all scan angles?

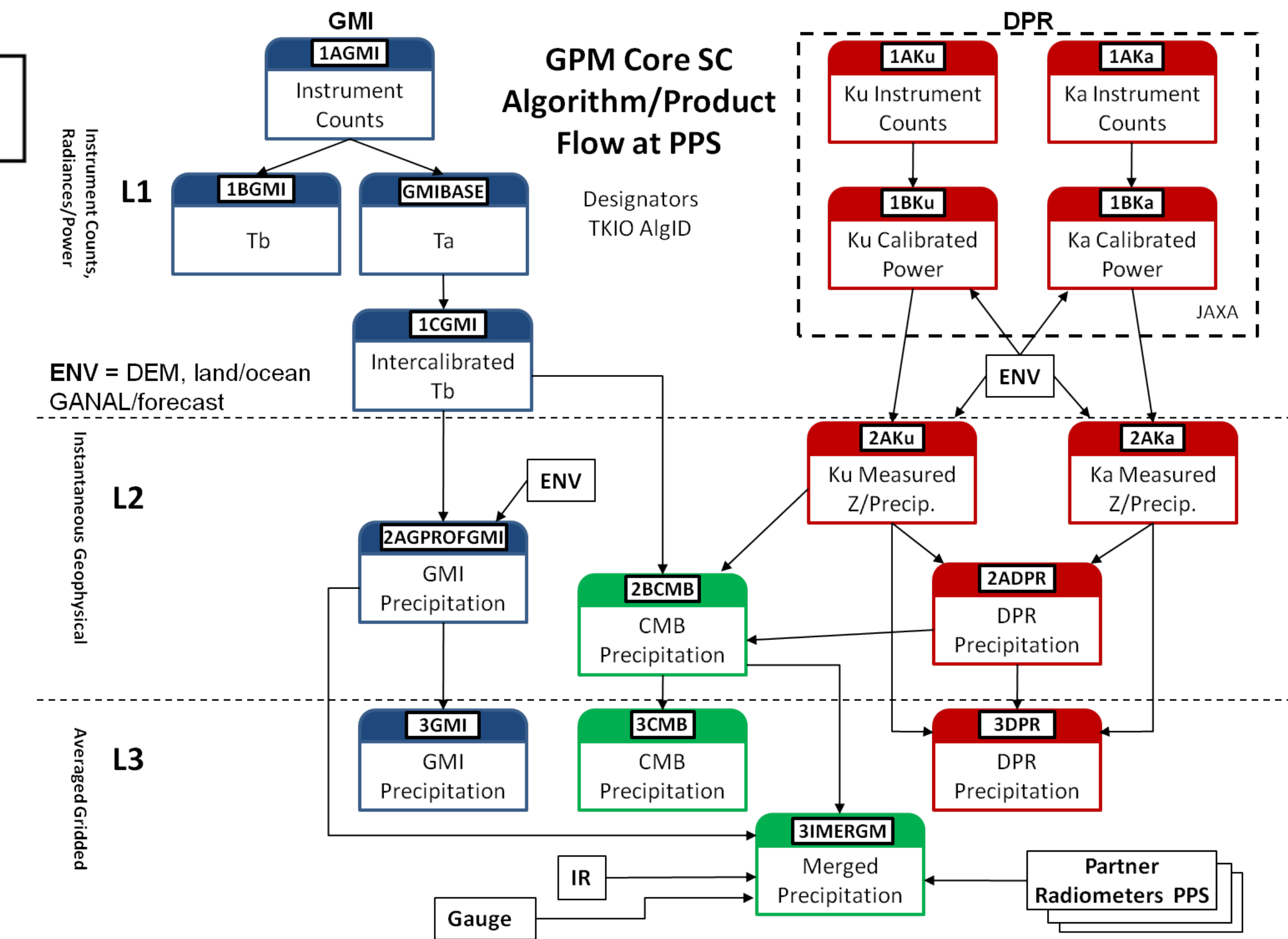
Work in parallel with JAXA/NASA DPR Team use of TRMM PR data for DPR algorithm development.

TRMM Algorithm Flow Diagram



Flow diagrams for TRMM and GPM. Boxes represent algorithms and associated data products. Insertion of DPR Ku-band data into TRMM algorithm flow at Level-1.

GPM Algorithm Flow Diagram



Implications for DSD adjustments for TRMM PR Data Record.

JAXA/NASA DPR team is using TRMM PR data now to test GPM DPR algorithms.

TRMM PR retrieval algorithm uses surface reference PIA estimates to partially adjust initial DSD assumptions.

Movement away from initial DSD assumptions impacts retrievals. →

For GPM Ku-band data these assumptions and adjustments can be investigated on **all** the data.

Eventual Goal: Entire spaceborne radar data set processed with a consistent set of assumptions.

2A24 is TRMM 2A25 algorithm with initial DSD assumptions locked. Data from DSD working group study at Darwin.

