COMPARISON OF RAM DOSE DATA WITH CALCULATED DOSE USING AN UPDATED ISS CAD

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Outline

- CAD Model Updates
- RAM Data
- Model Inputs/Assumptions
- RAM Data vs Model

CAD Model Updates

- Large effort by LaRC to update the ISS CAD models
  - Focus on accuracy of mass at the level of each rack
  - Module mass checked for accuracy
- A couple of remaining caveats
  - Additional stowage is not accounted for
  - Smoothed masses at the rack level could have some large impacts for points close to these smoothed masses

RAM Data

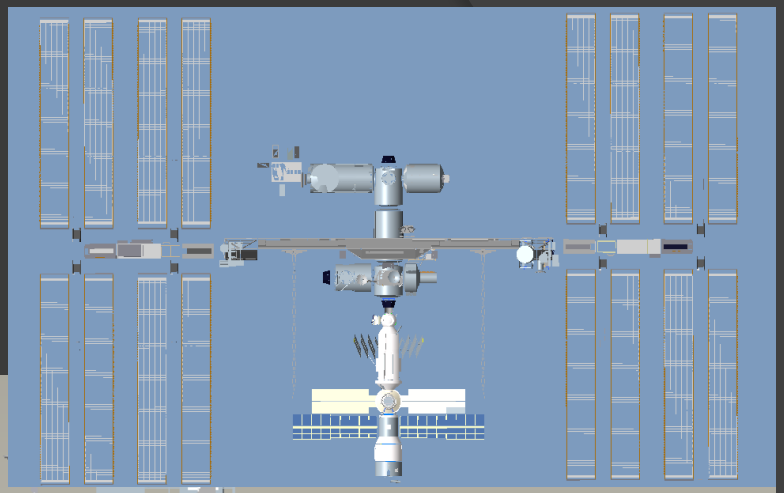
- RAMs flown on ISS
  - Launch: September 2, 2015
  - Return: June 18, 2016
  - Expedition Duration: 290.2 days
  - Average Orbital Altitude: 403.2km
  - Inclination: 51.6 degrees
  - Model compared to TLD-300 data

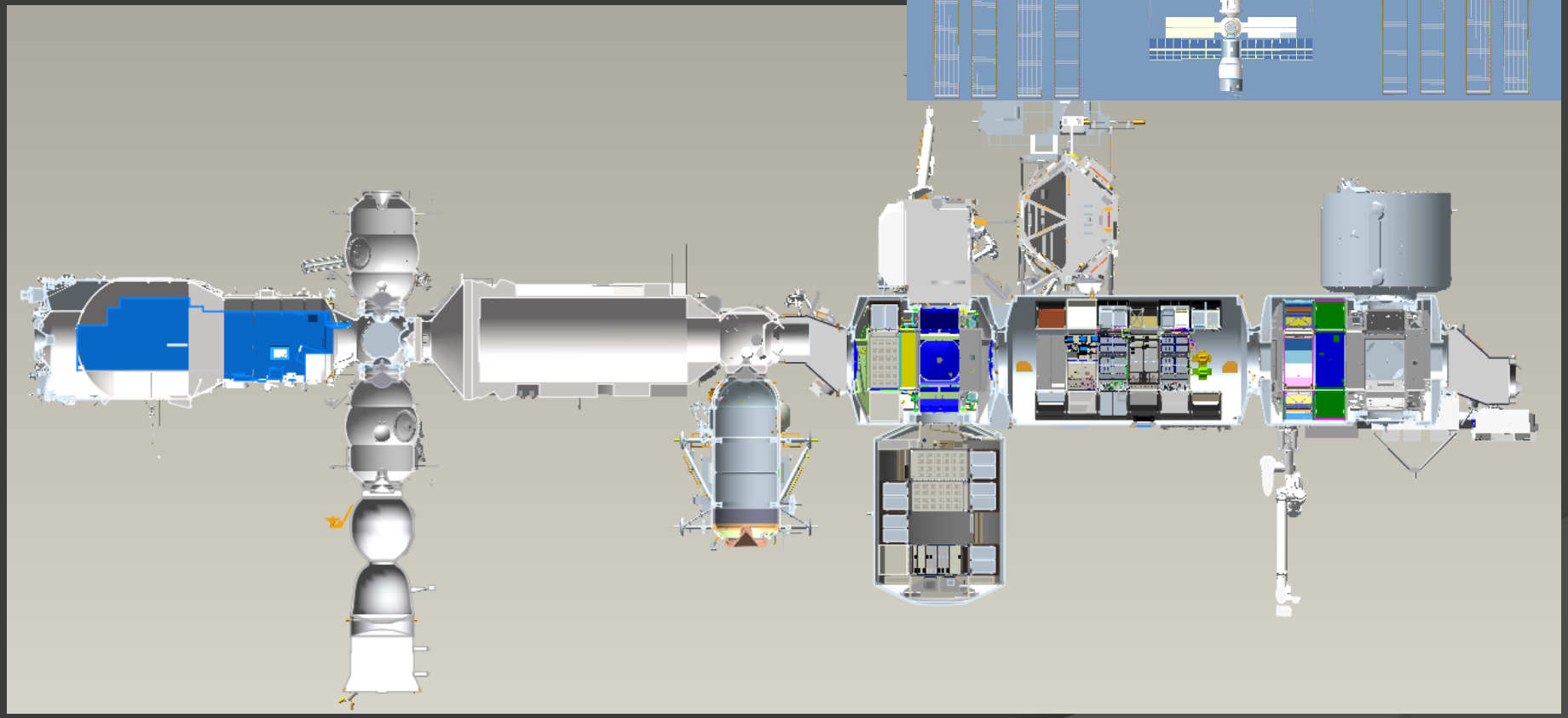
Simulation Description

- MeRIT (**M**ulti-environment Canc**e**r **R**isk Analys**i**s **T**ool) software tool that makes use of LaRC scripts (similar to OLTARIS)
  - Transport – HZETRN
  - Shields – CAD model raytraced with 10000 rays
  - Environment
    - Trapped – AP8 Model modified for ISS orbit using past datasets
    - GCR – BON2014 for Dec 2-20, 2015
  - Trajectory – ISS 1 minute trajectory for Dec 2-12, 2015

CAD Model Assembly

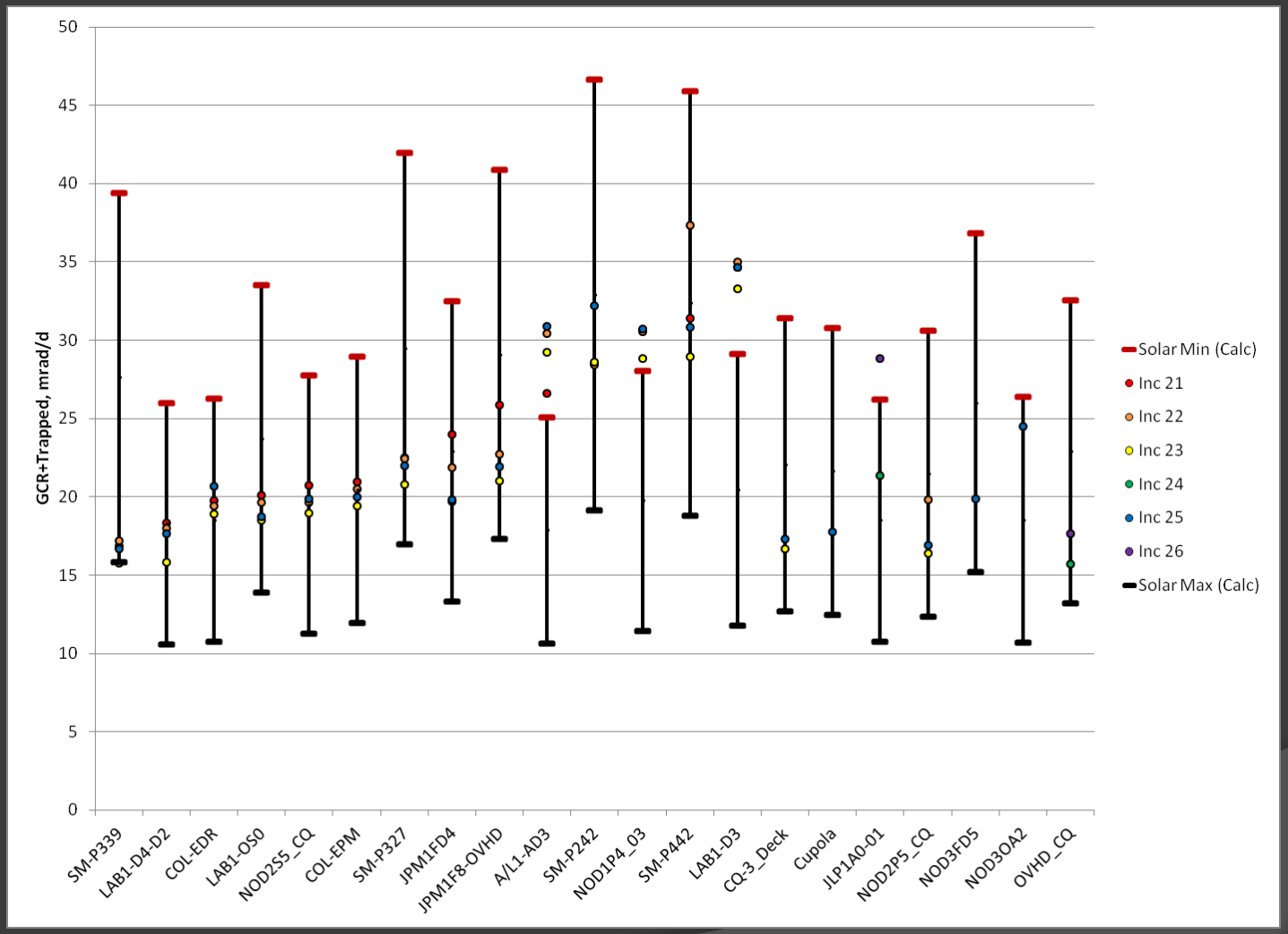
ISS Configuration





ISS RAM Comparison

Comparison to RAM Data (WRMISS 18)



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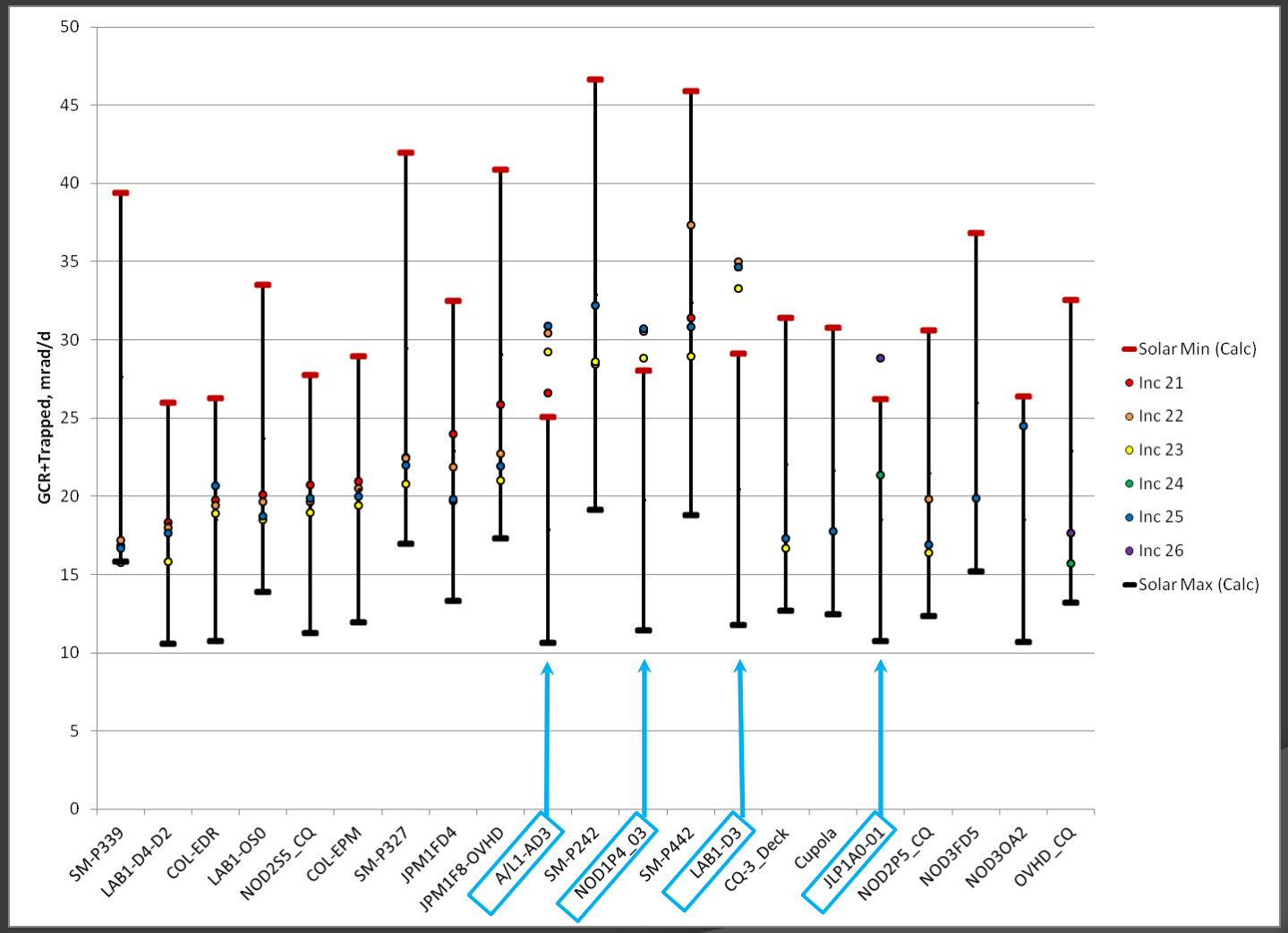
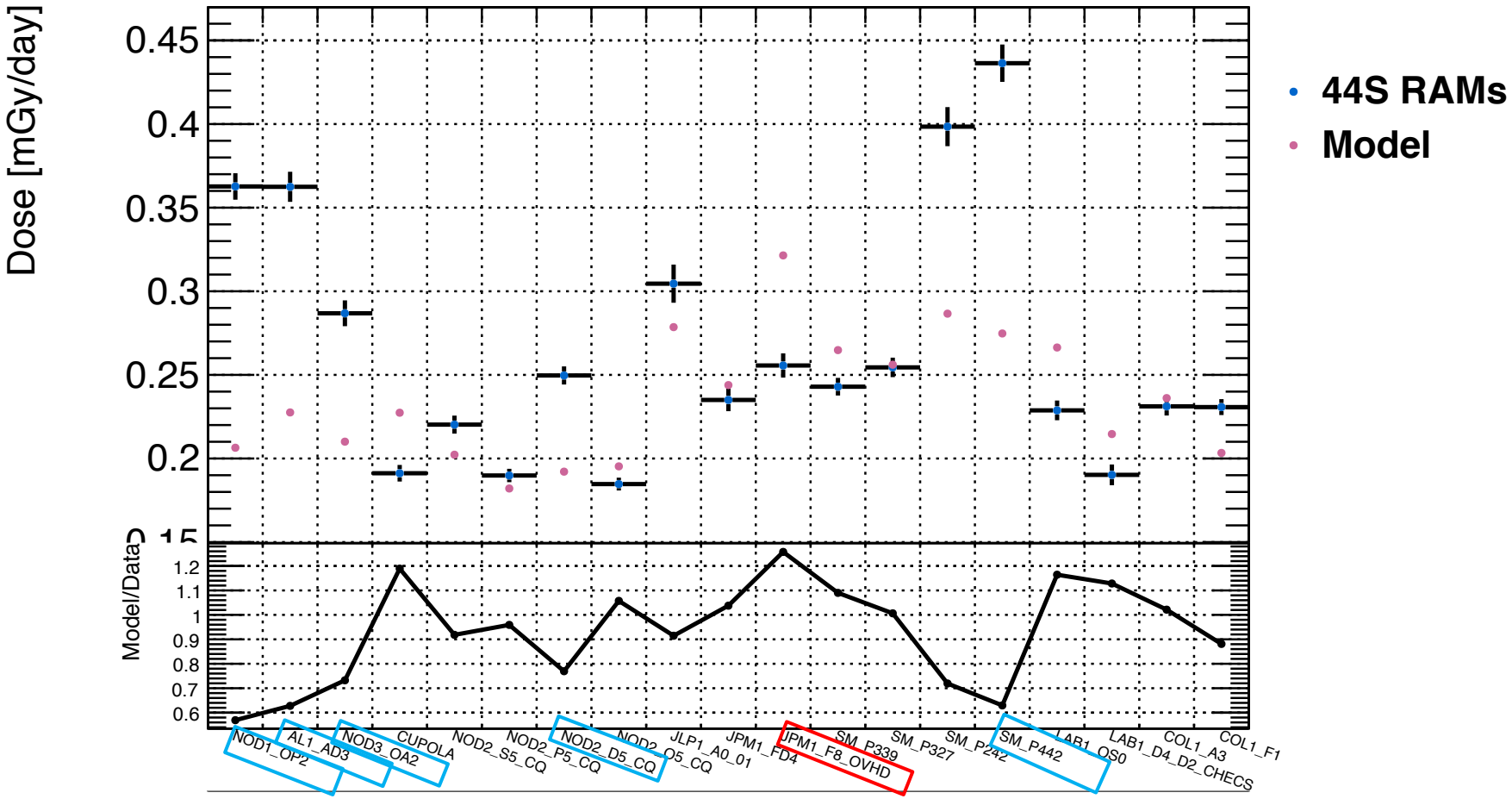
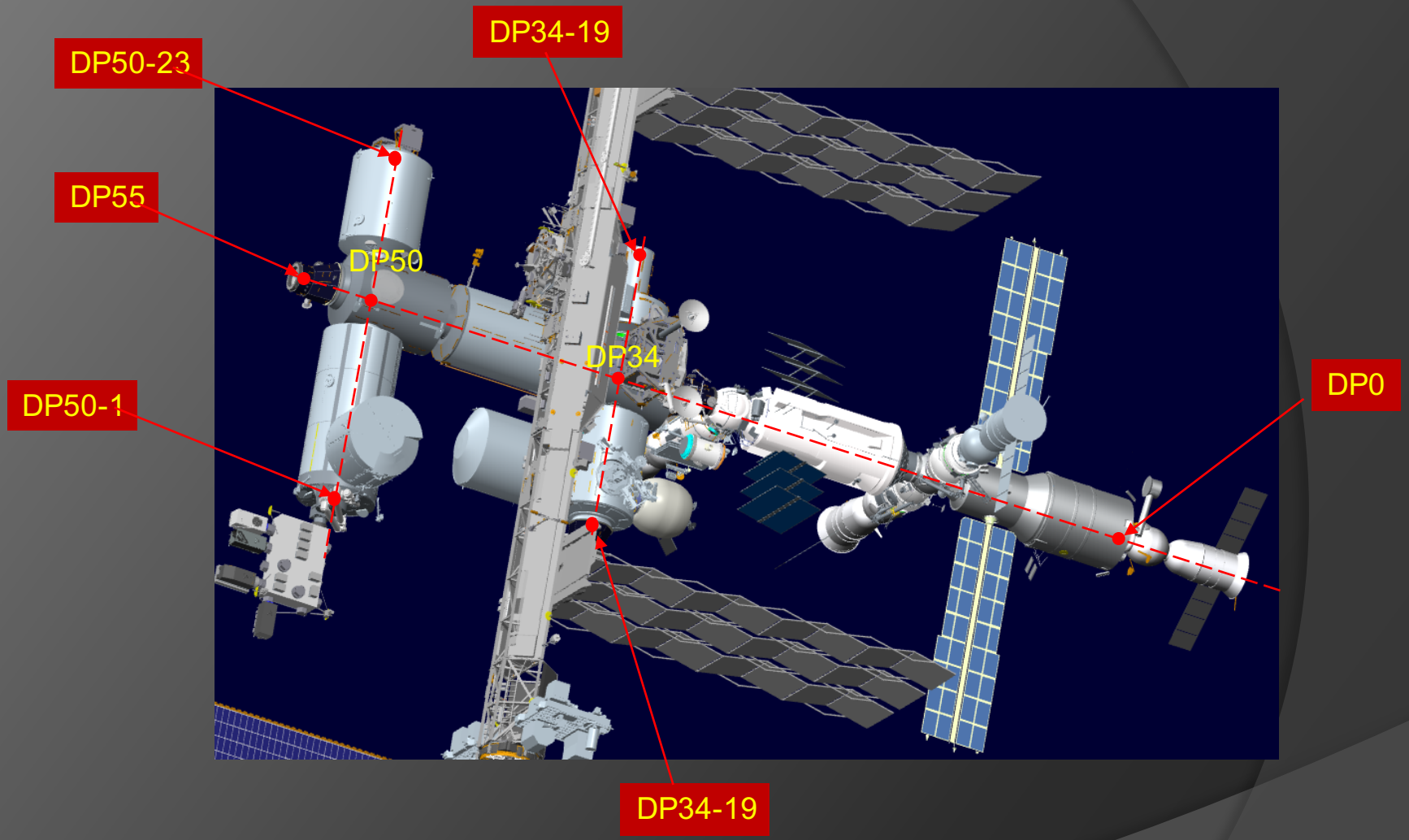


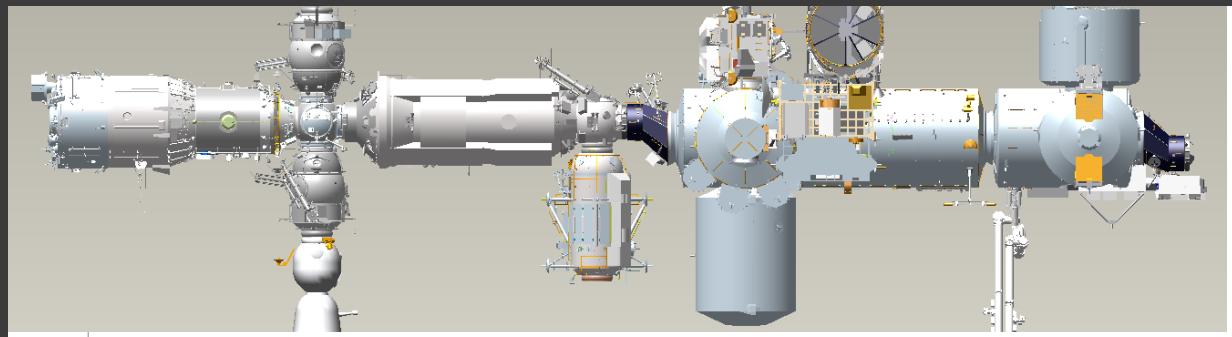
Updated RAM comparison

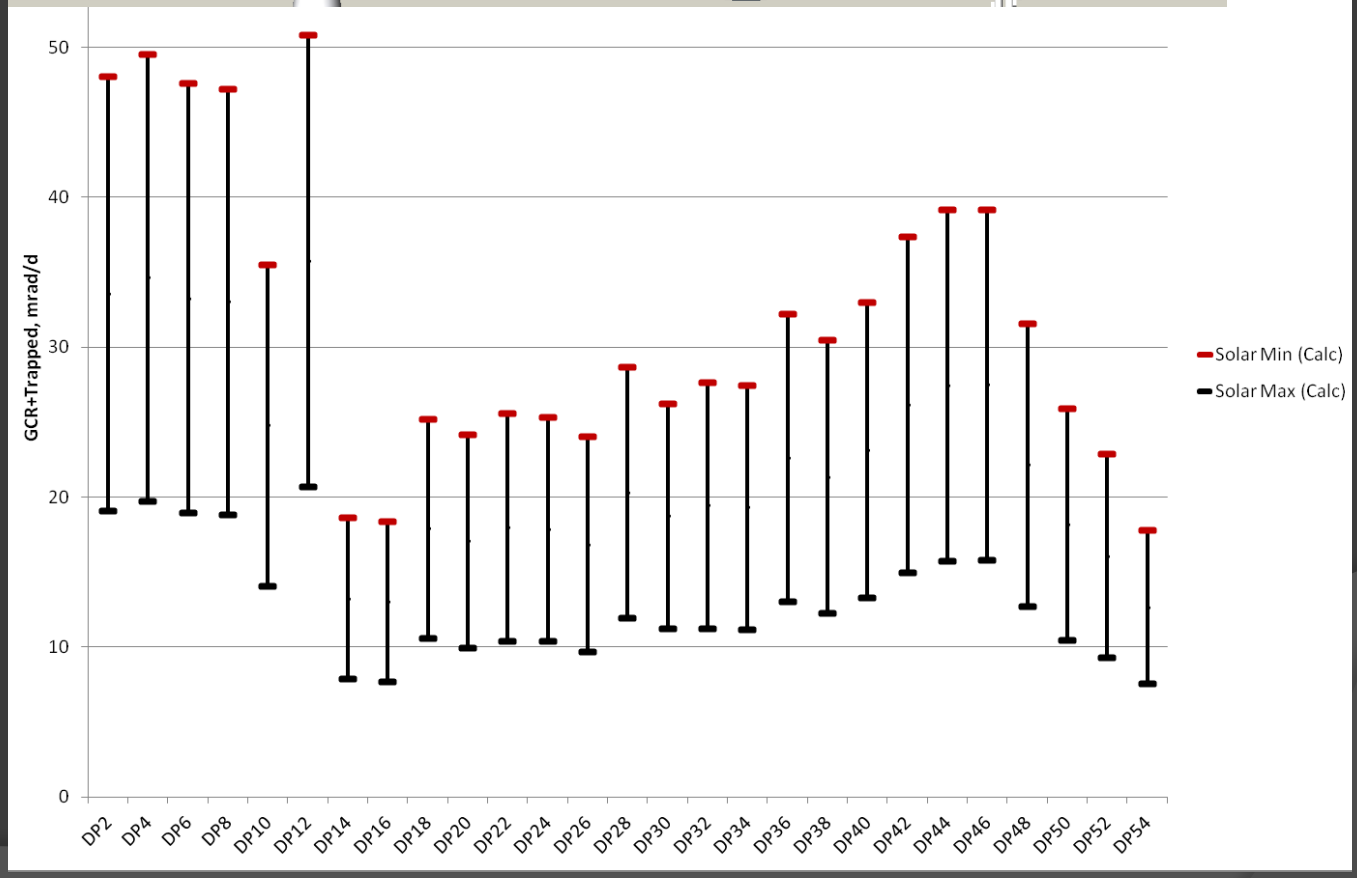


ISS CAD Shielding Survey


DP34-19
DP50-23
DP55
DP50
DP34
DP50-1
DP0
DP34-19

Primary Axis





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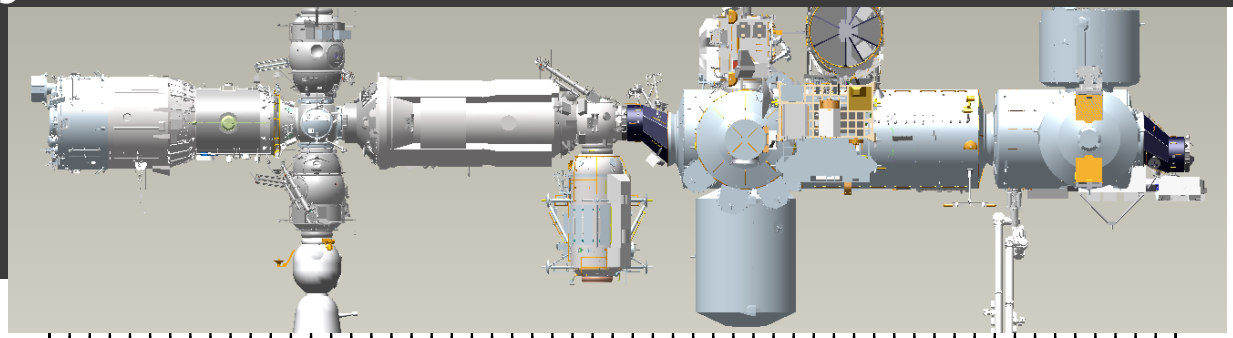
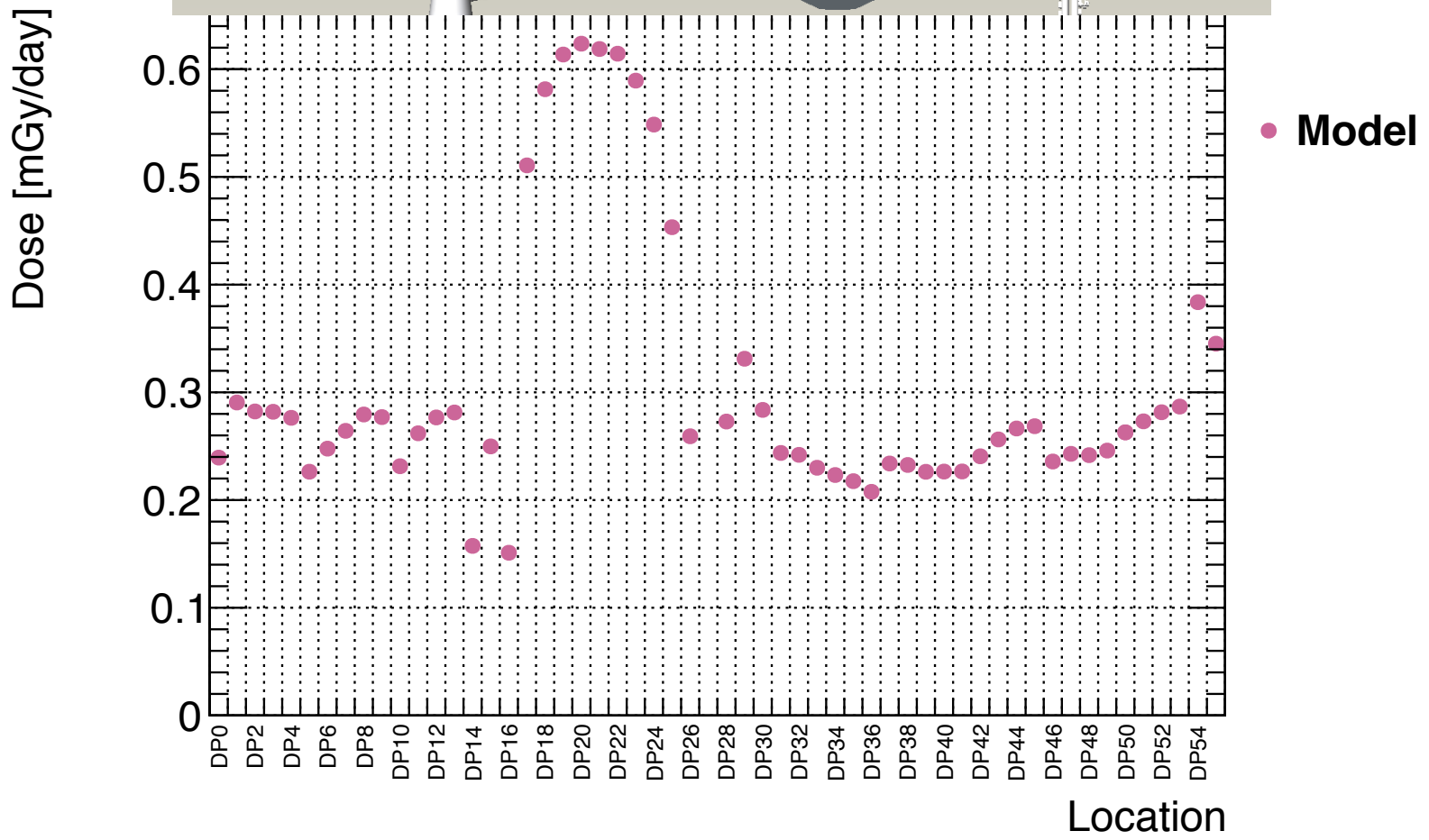
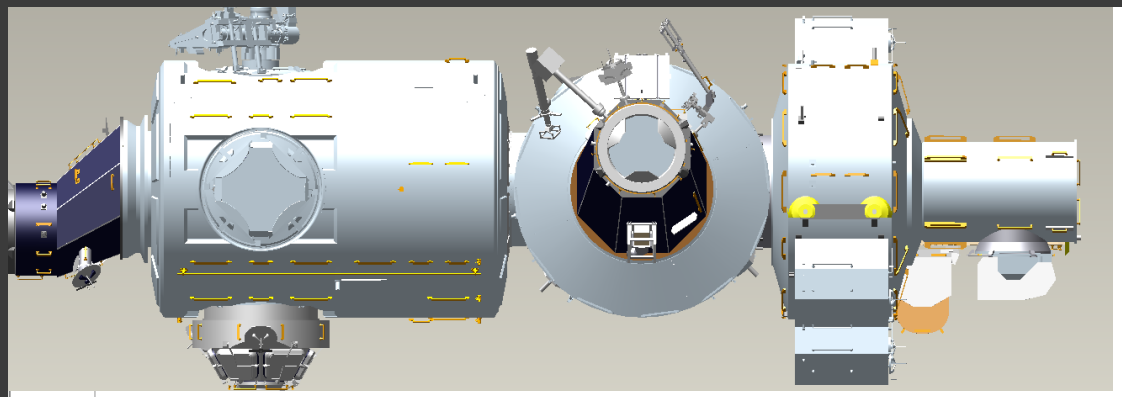
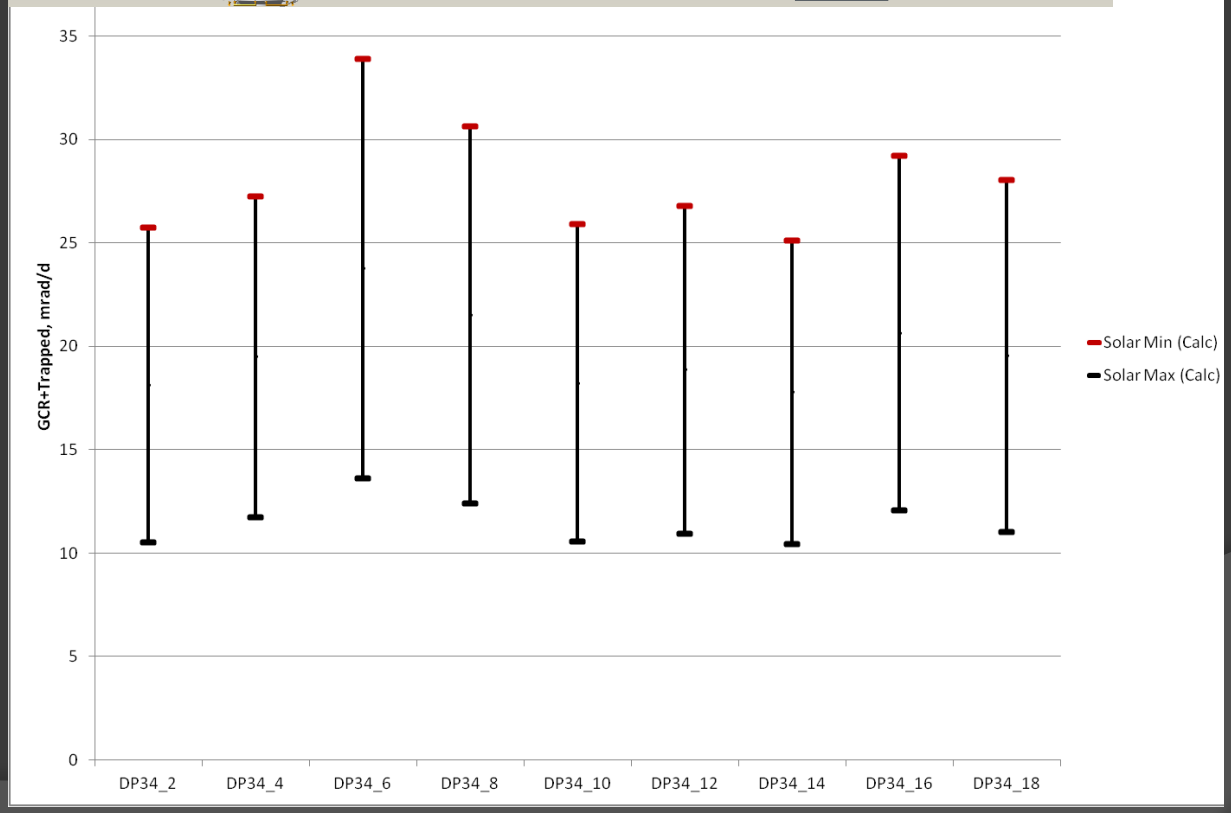


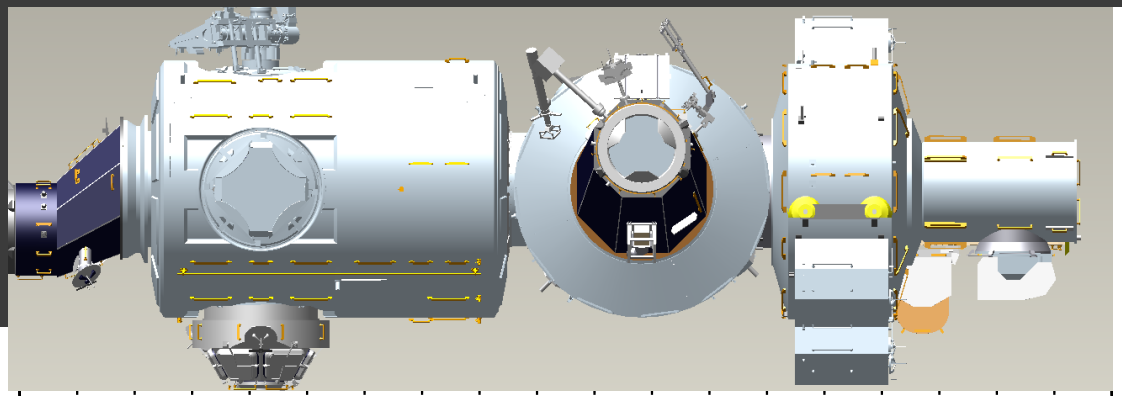


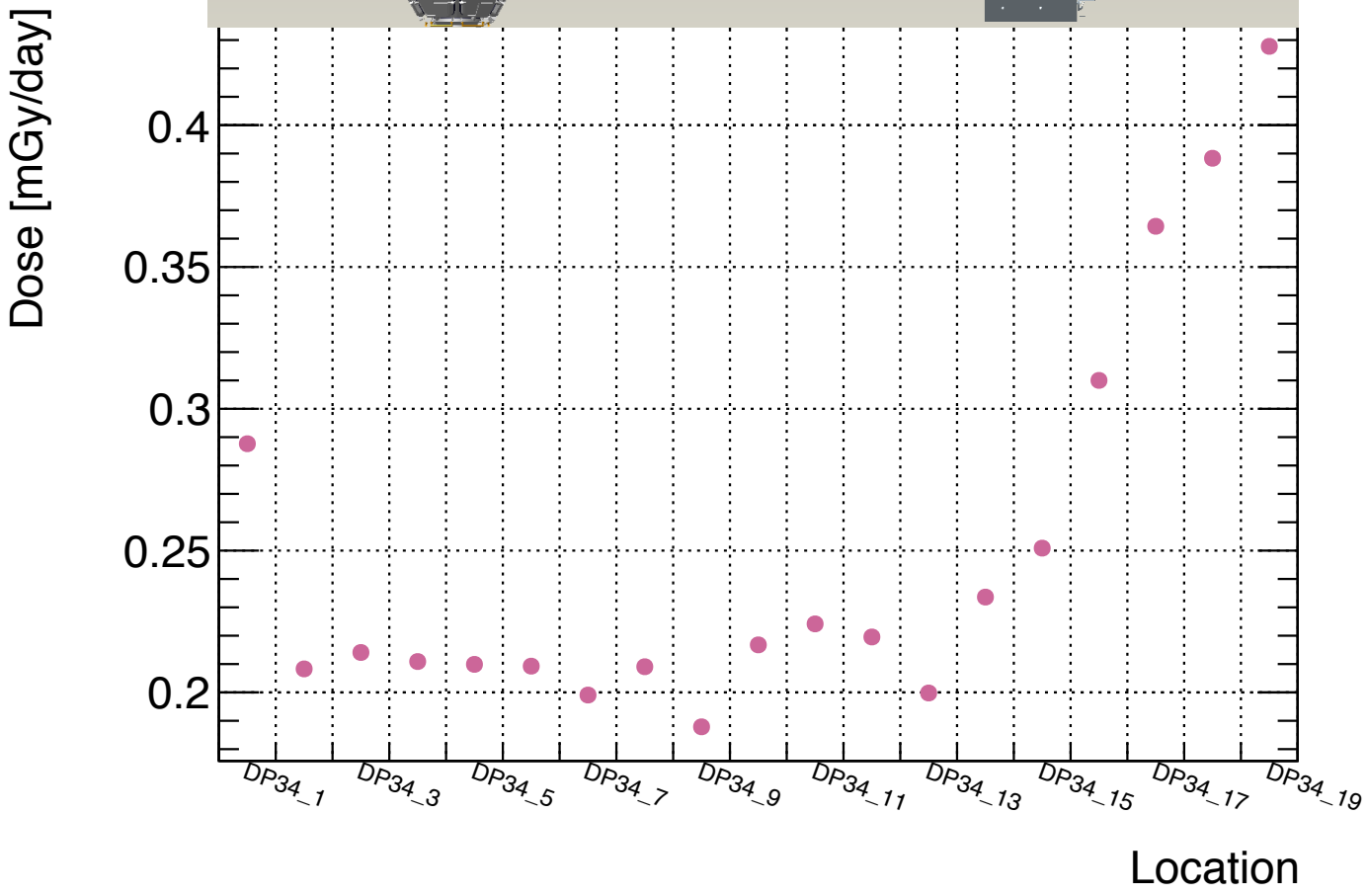
Node1 Axis



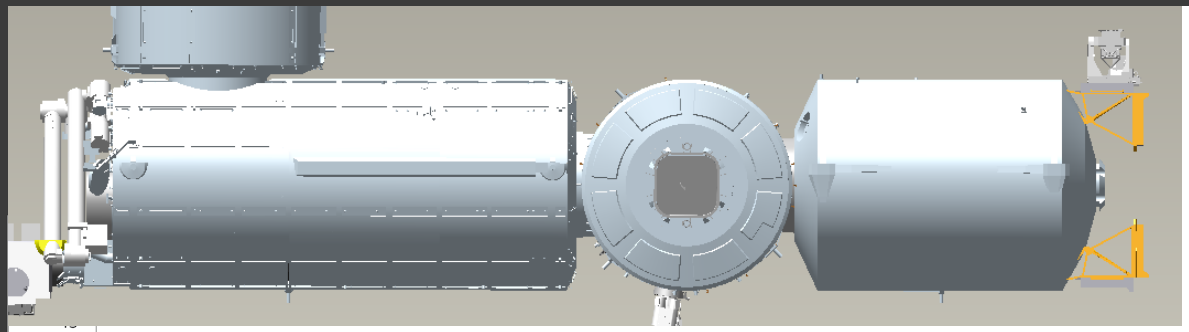

35
30
25
20
15
10
5
0
GCR+Trapped, mrad/d
DP34_2
DP34_4
DP34_6
DP34_8
DP34_10
DP34_12
DP34_14
DP34_16
DP34_18
Solar Min (Calc)
Solar Max (Calc)

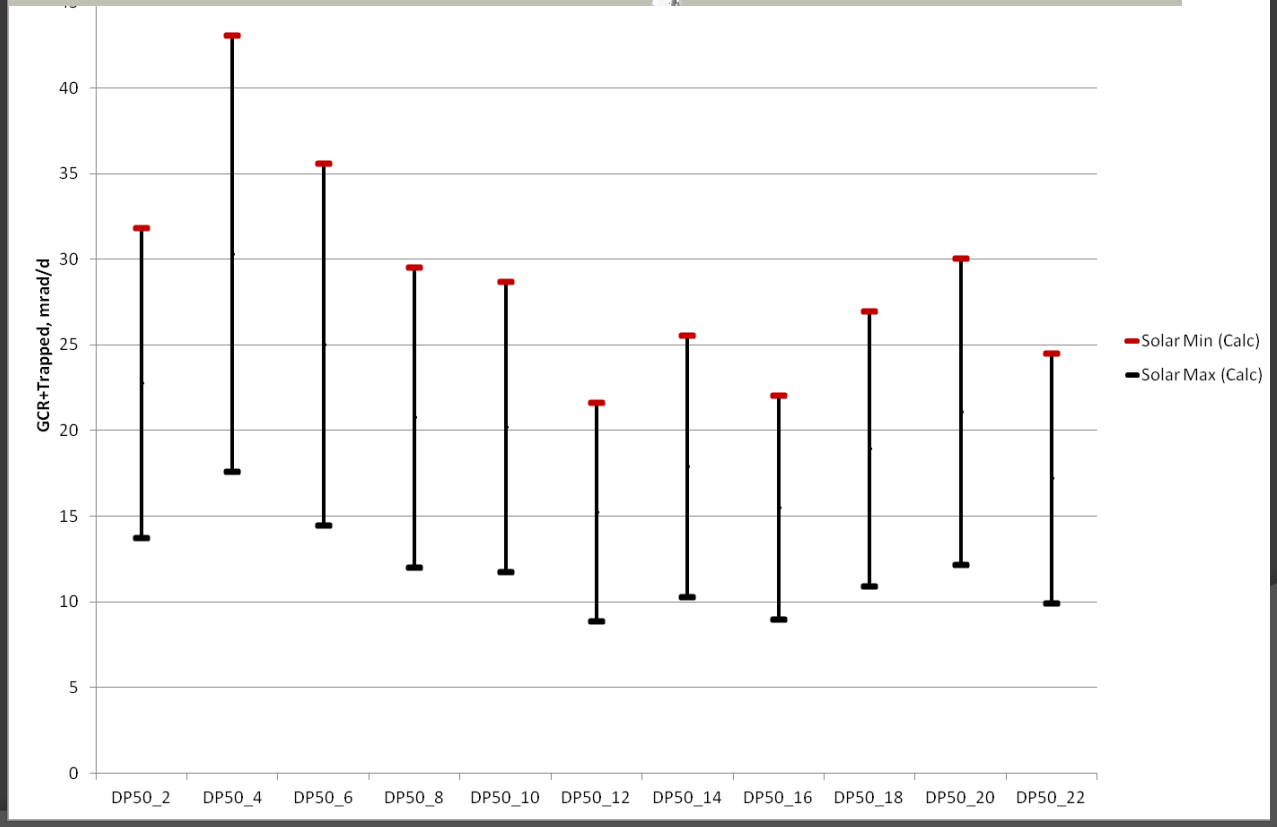
Node1 Axis



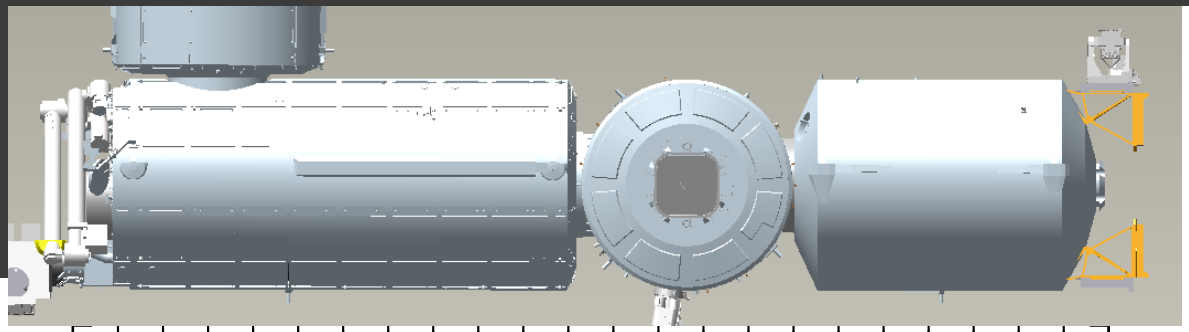

Dose [mGy/day]
0.4
0.35
0.3
0.25
0.2
DP34_1
DP34_3
DP34_5
DP34_7
DP34_9
DP34_11
DP34_13
DP34_15
DP34_17
DP34_19
Location

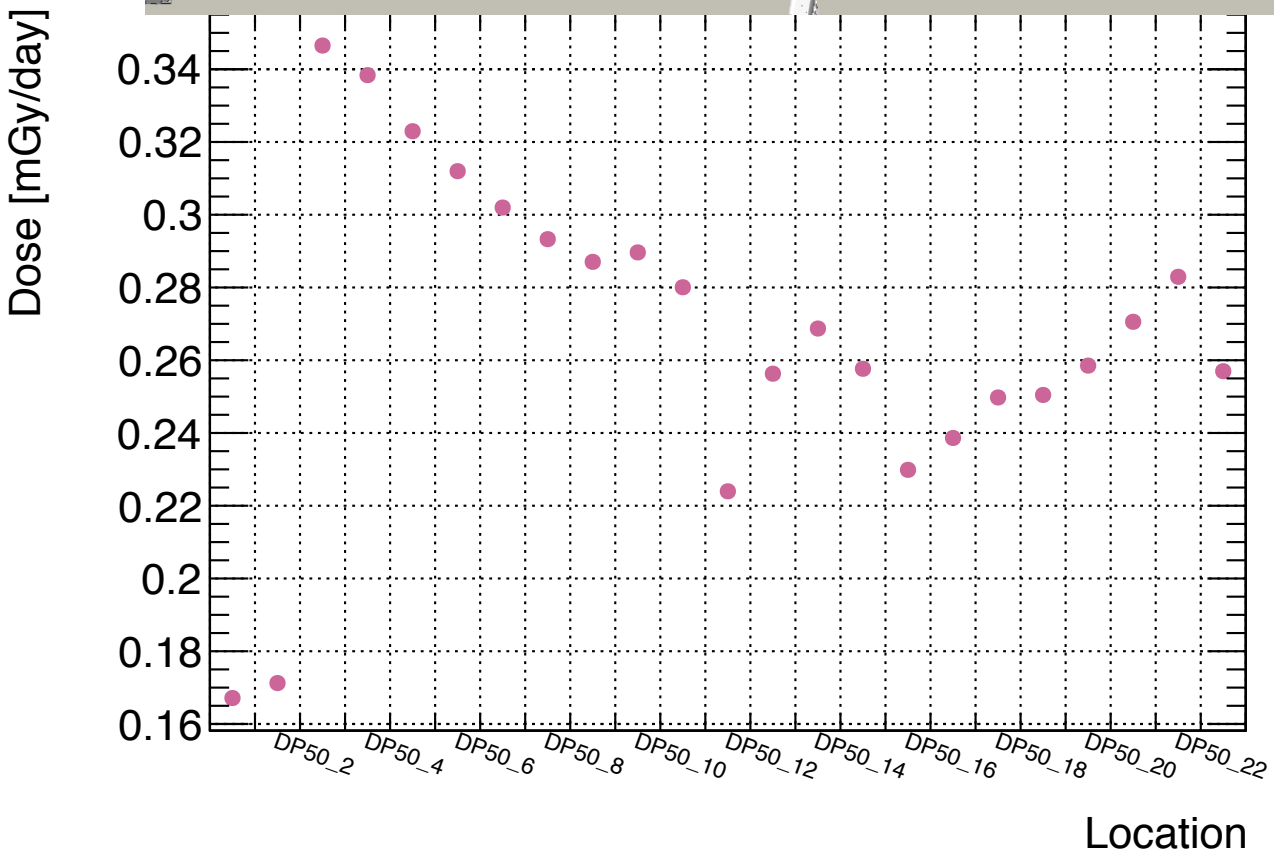
Node2 Axis




GCR+Trapped, mrad/d
0
5
10
15
20
25
30
35
40
DP50_2
DP50_4
DP50_6
DP50_8
DP50_10
DP50_12
DP50_14
DP50_16
DP50_18
DP50_20
DP50_22
Solar Min (Calc)
Solar Max (Calc)

Node2 Axis



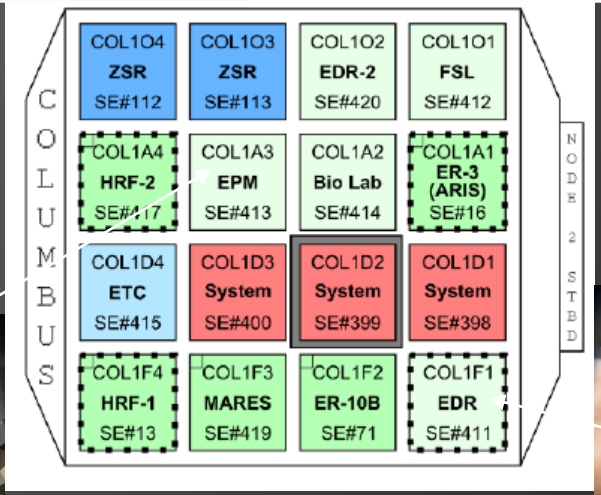

Dose [mGy/day]
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
DP50_2
DP50_4
DP50_6
DP50_8
DP50_10
DP50_12
DP50_14
DP50_16
DP50_18
DP50_20
DP50_22
Location

Conclusions

- Updated CAD model results show characteristics of the model that would be expected.
- RAM data vs model compare well in most cases
- There are still some areas with smoothed mass that need more work
- Supplemental stowage needs to be added into the model

Questions?

RAM Label	Location Description
COL_EPM	Face of European Physiology Module Rack (COL1A3), above Right Utility Distribution Panel.
COL_EDR	Face of European Drawer Rack (COL1F1), on Lower Utility Distribution Panel.



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