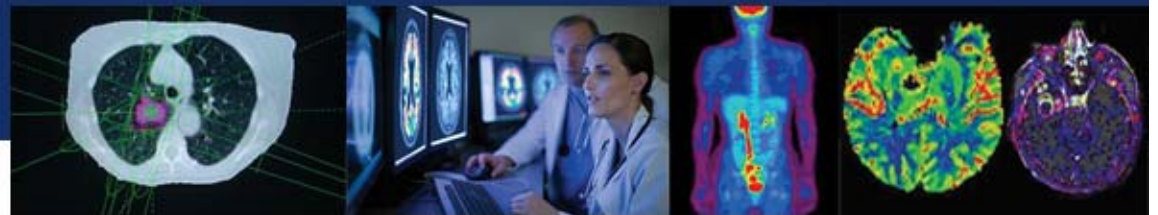


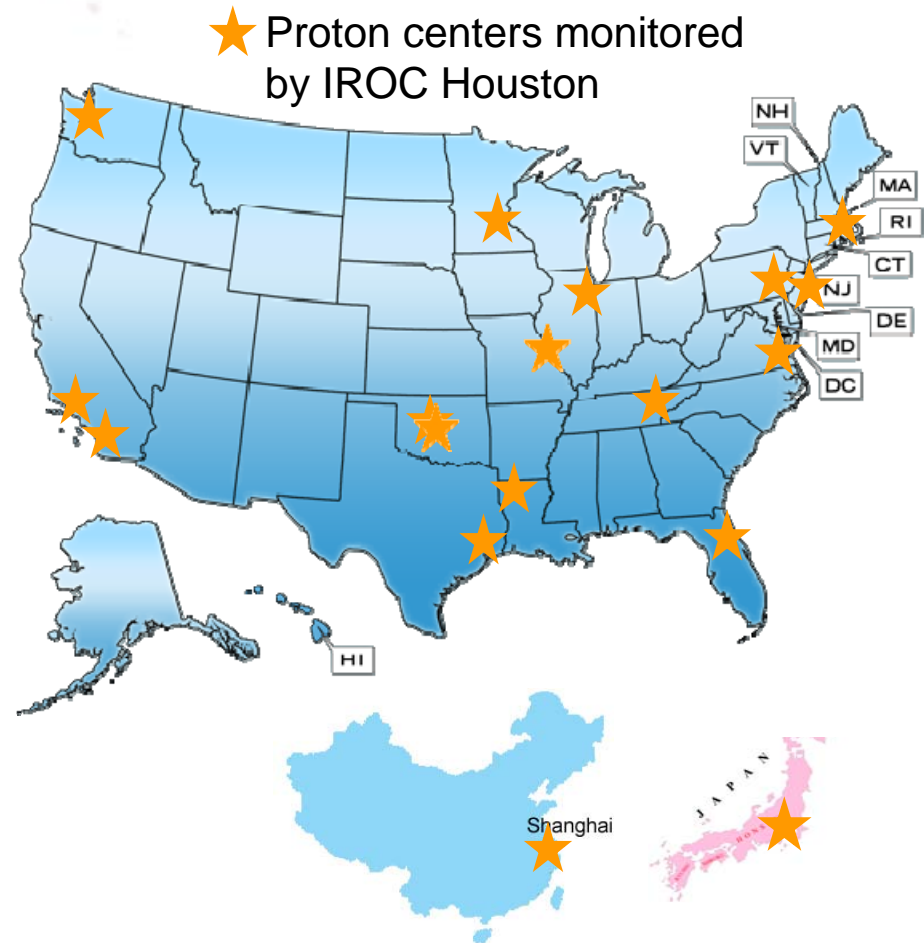
A Comparison of CT Number to Relative Linear Stopping Power Conversion Curves Used by Proton Therapy Centers



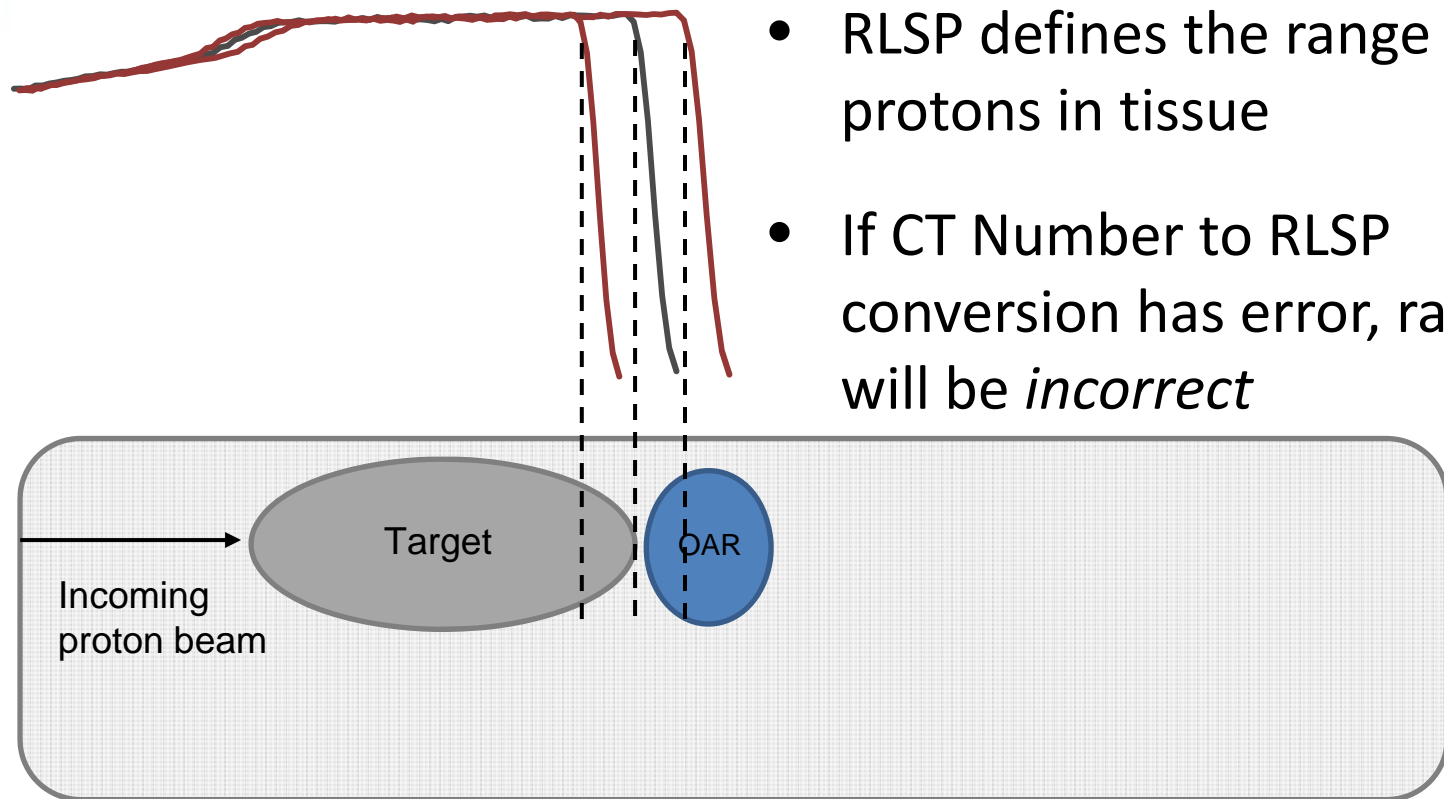
Paige A. Taylor, MS, DABR
IROC Houston
July 14, 2015

IROC Houston and Proton Therapy

- IROC Houston (RPC) has monitored proton centers since 2006
- Currently monitor 18 centers (2 abroad) – all are interested in NCI-funded clinical trials
- GOAL: comparable and consistent dose delivery

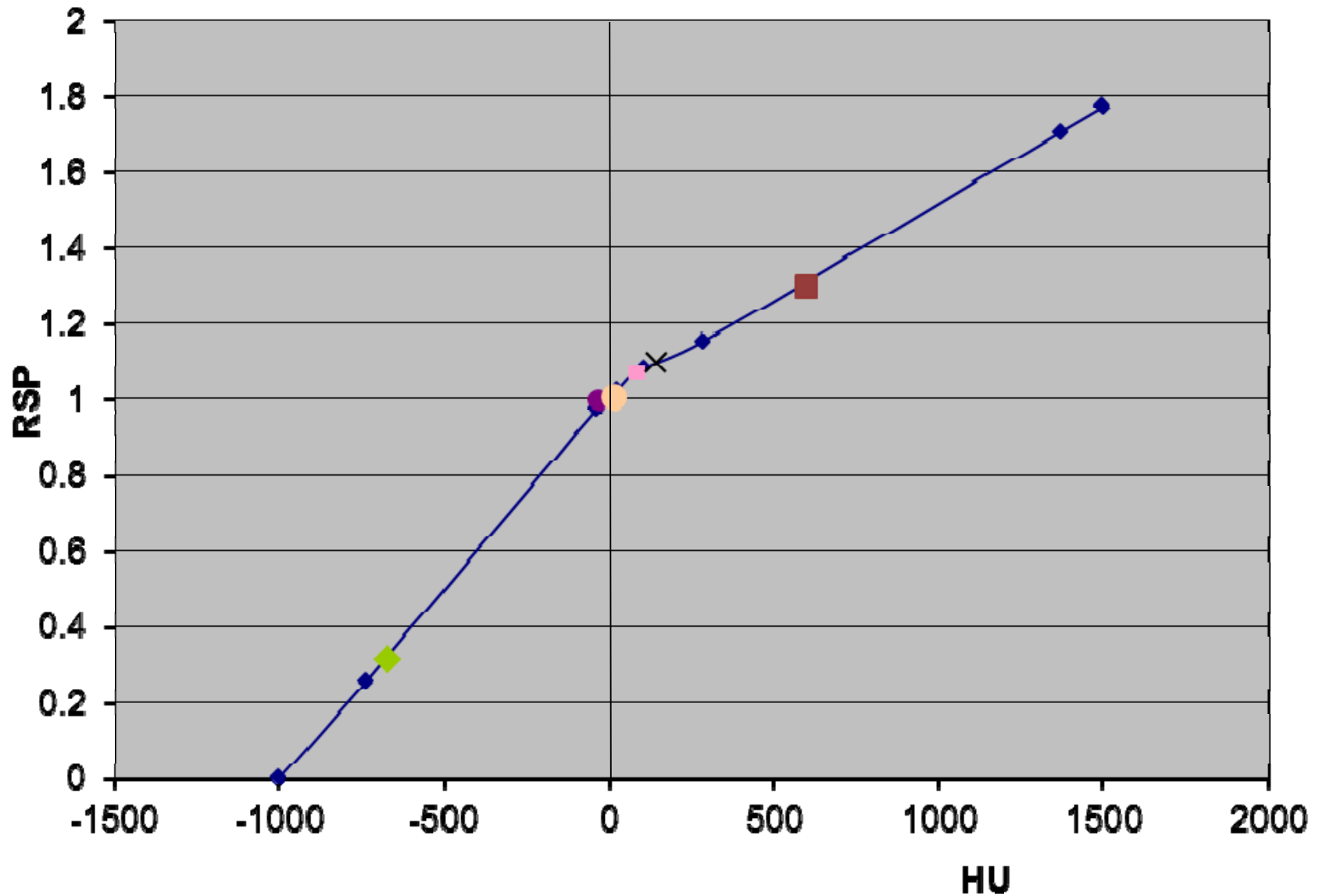


Why do we want consistency?

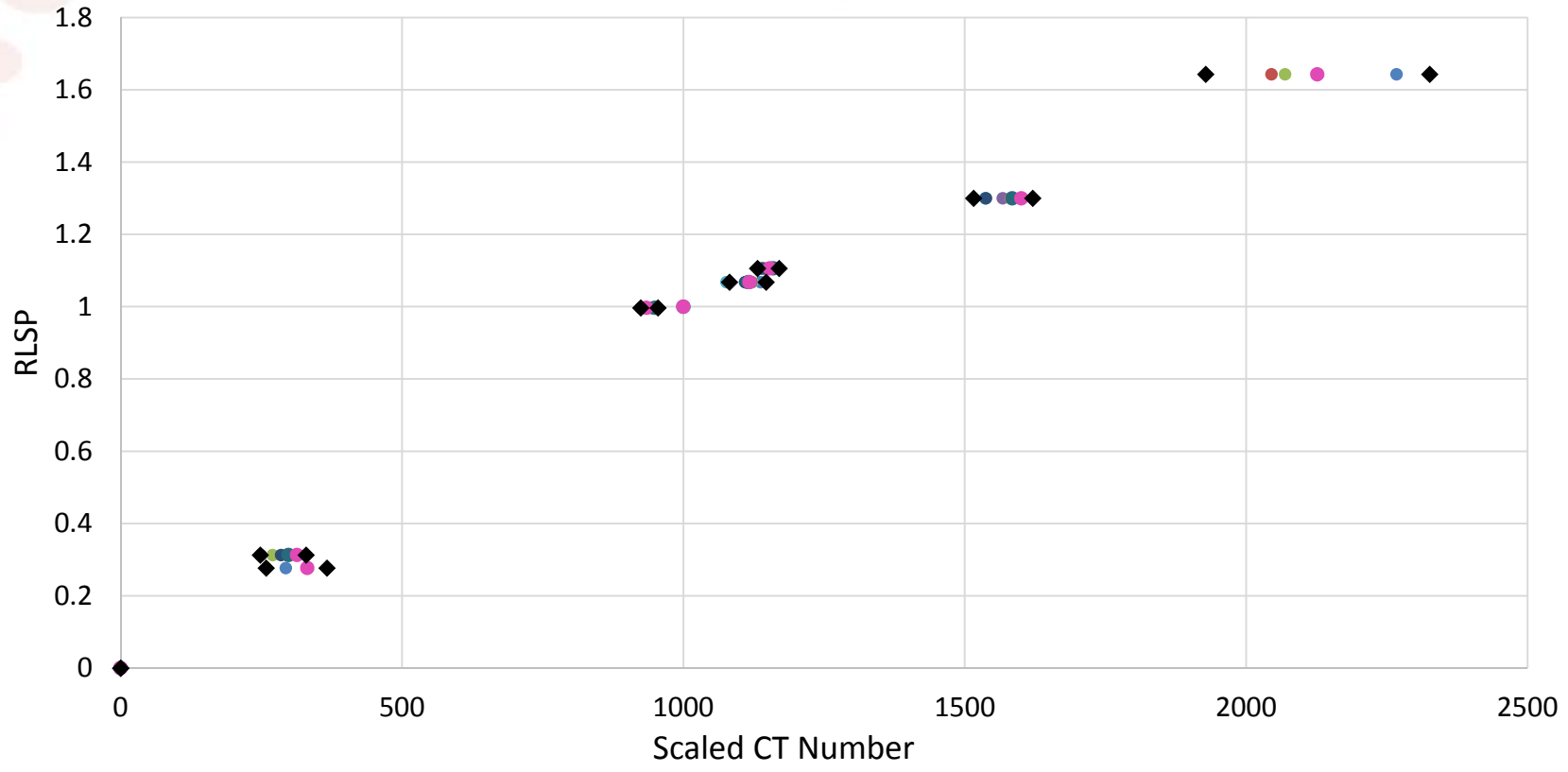


- RLSP defines the range of protons in tissue
- If CT Number to RLSP conversion has error, range will be *incorrect*

How can IROC Houston catch errors in

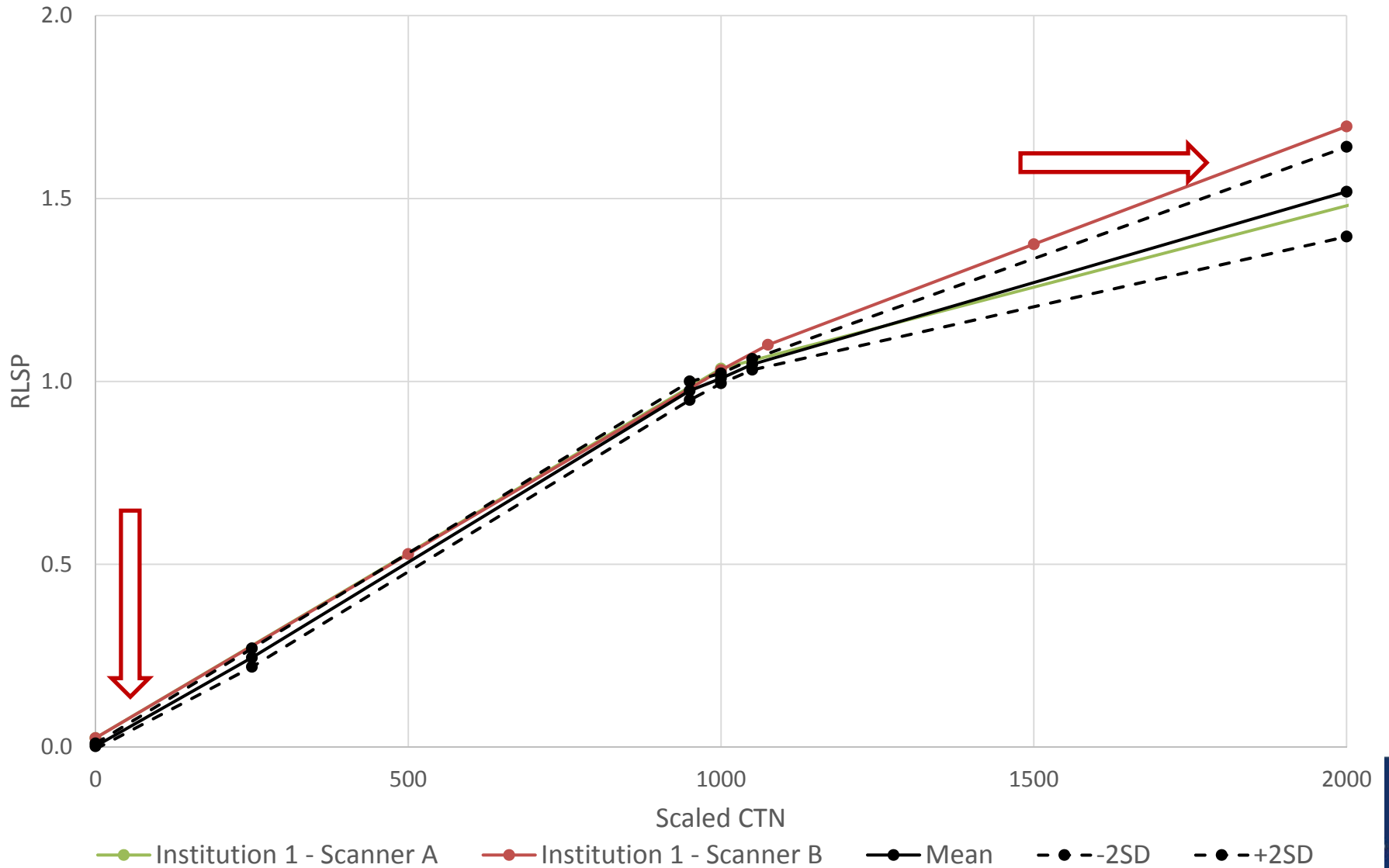


Scaled CTN for IROC Houston Phantom

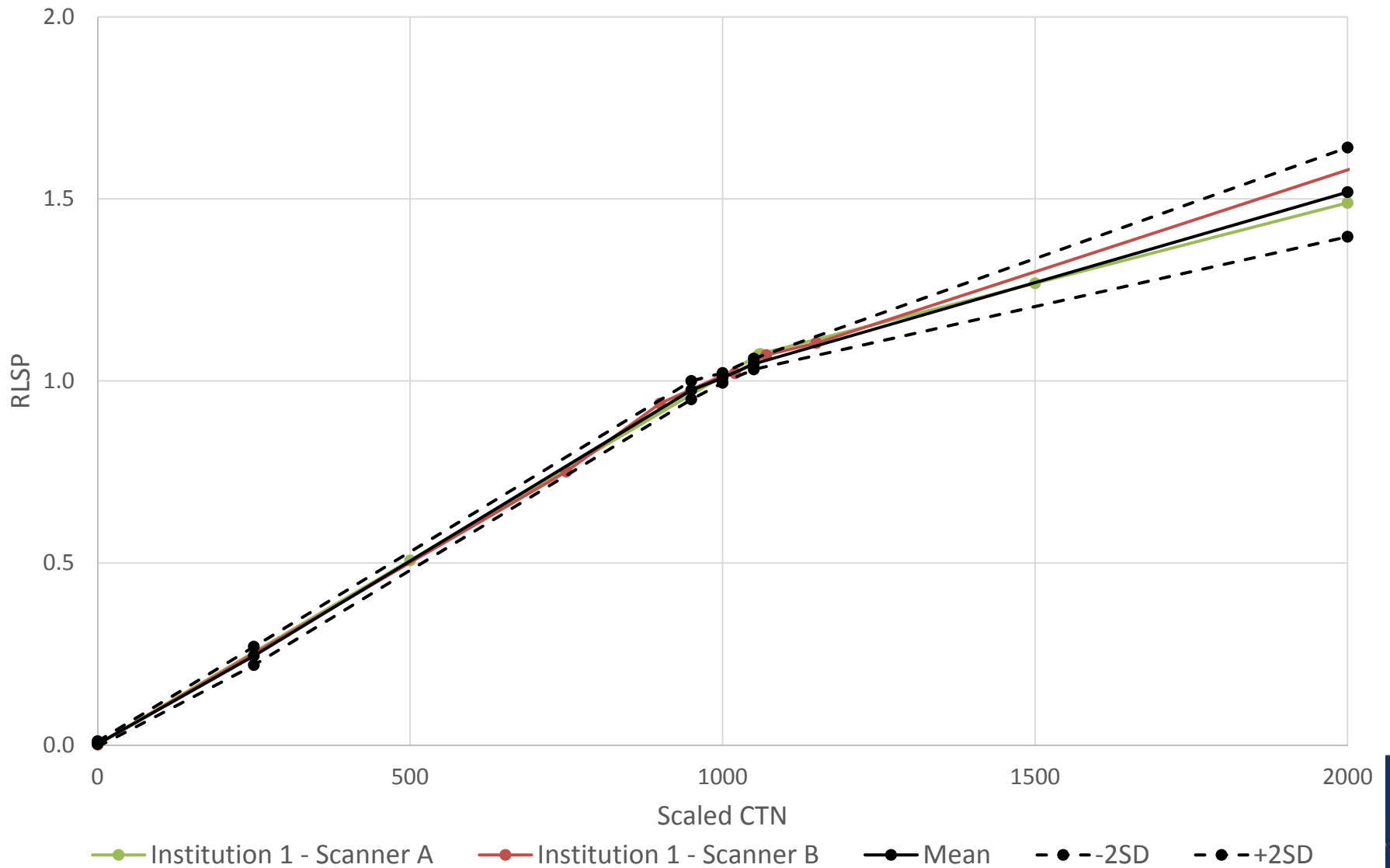


813 814 828 828-1 834 835 837 838 IROC +2SD -2SD

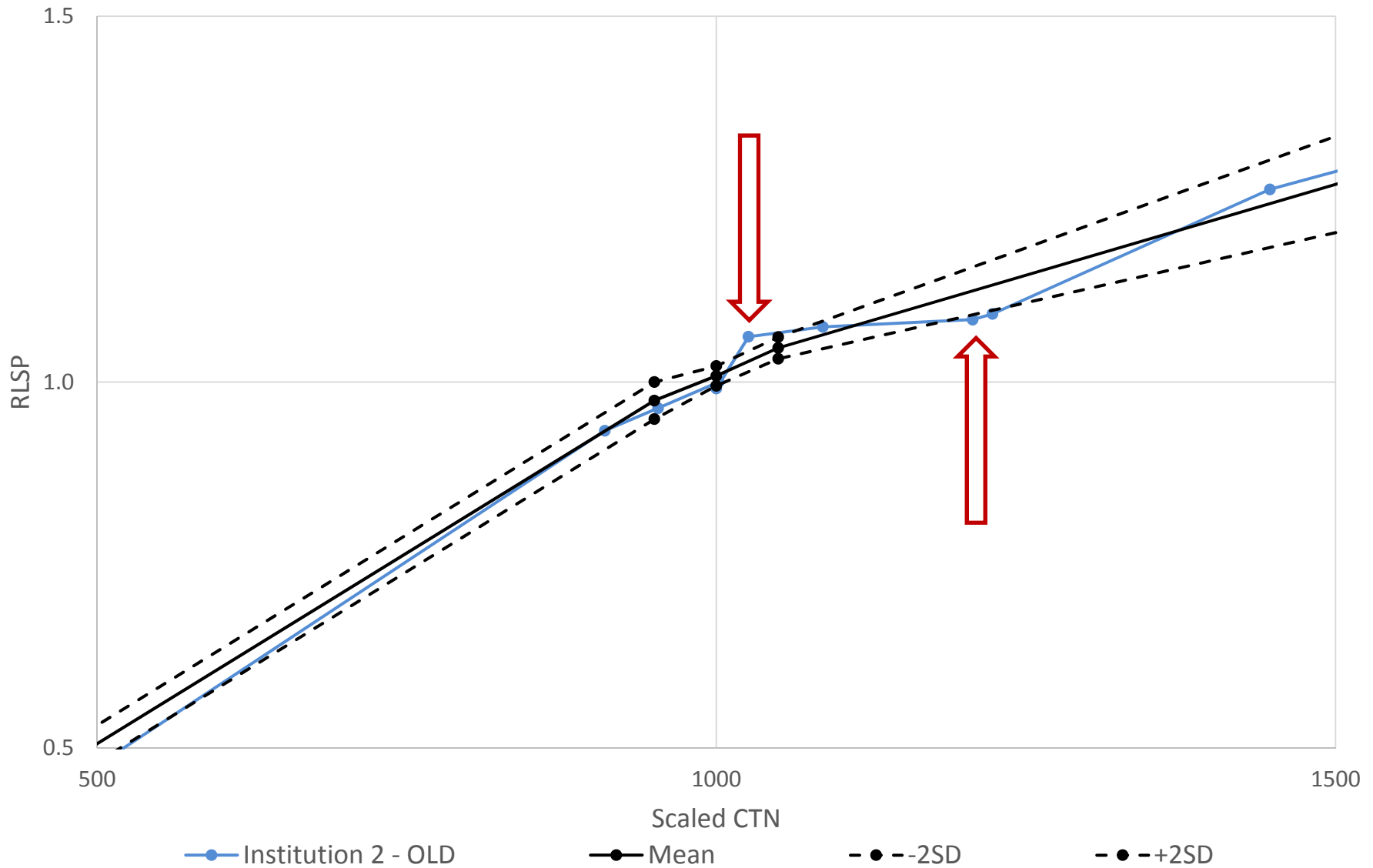
CTN-RLSP Case Study 1



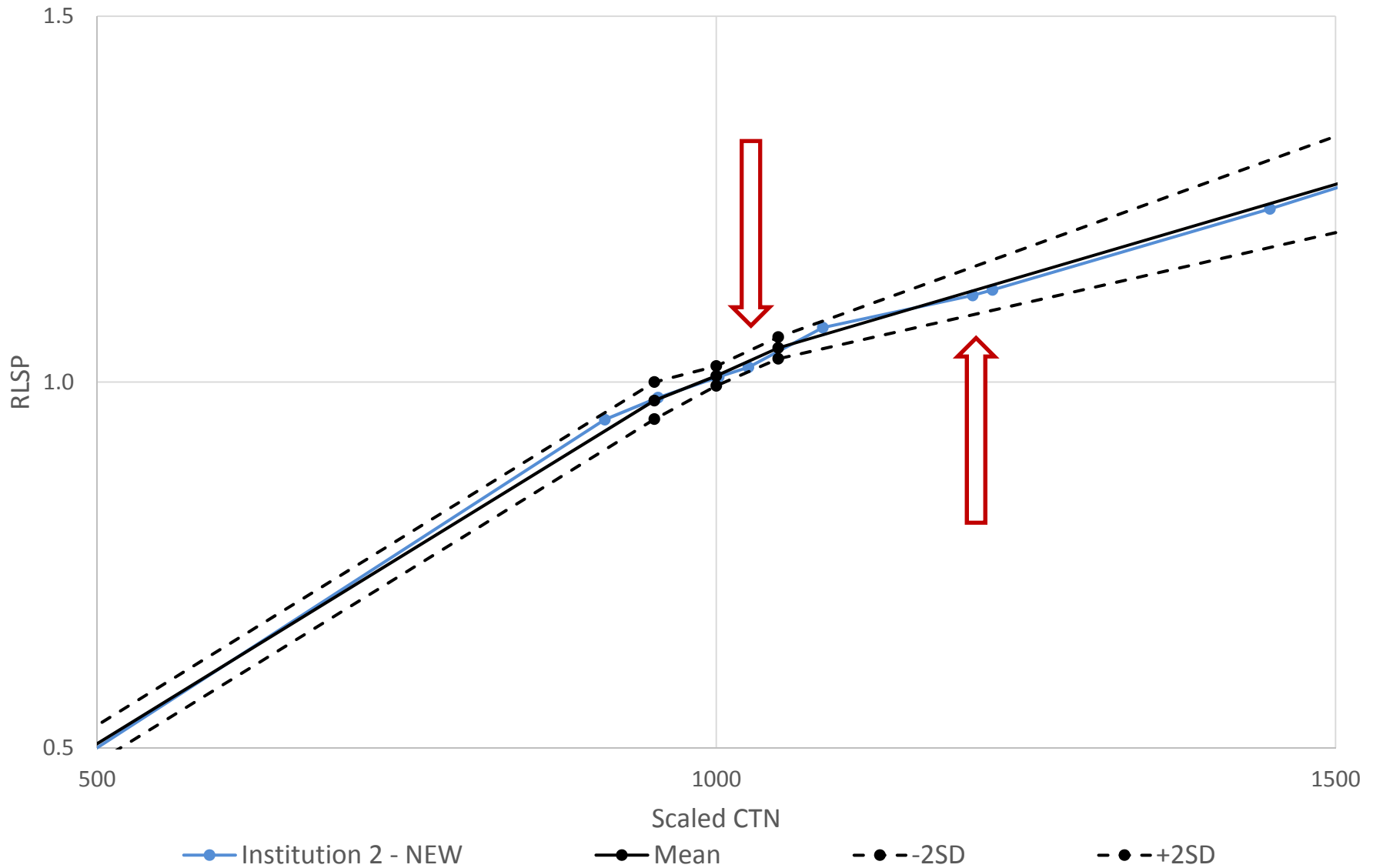
CTN-RLSP Case Study 1



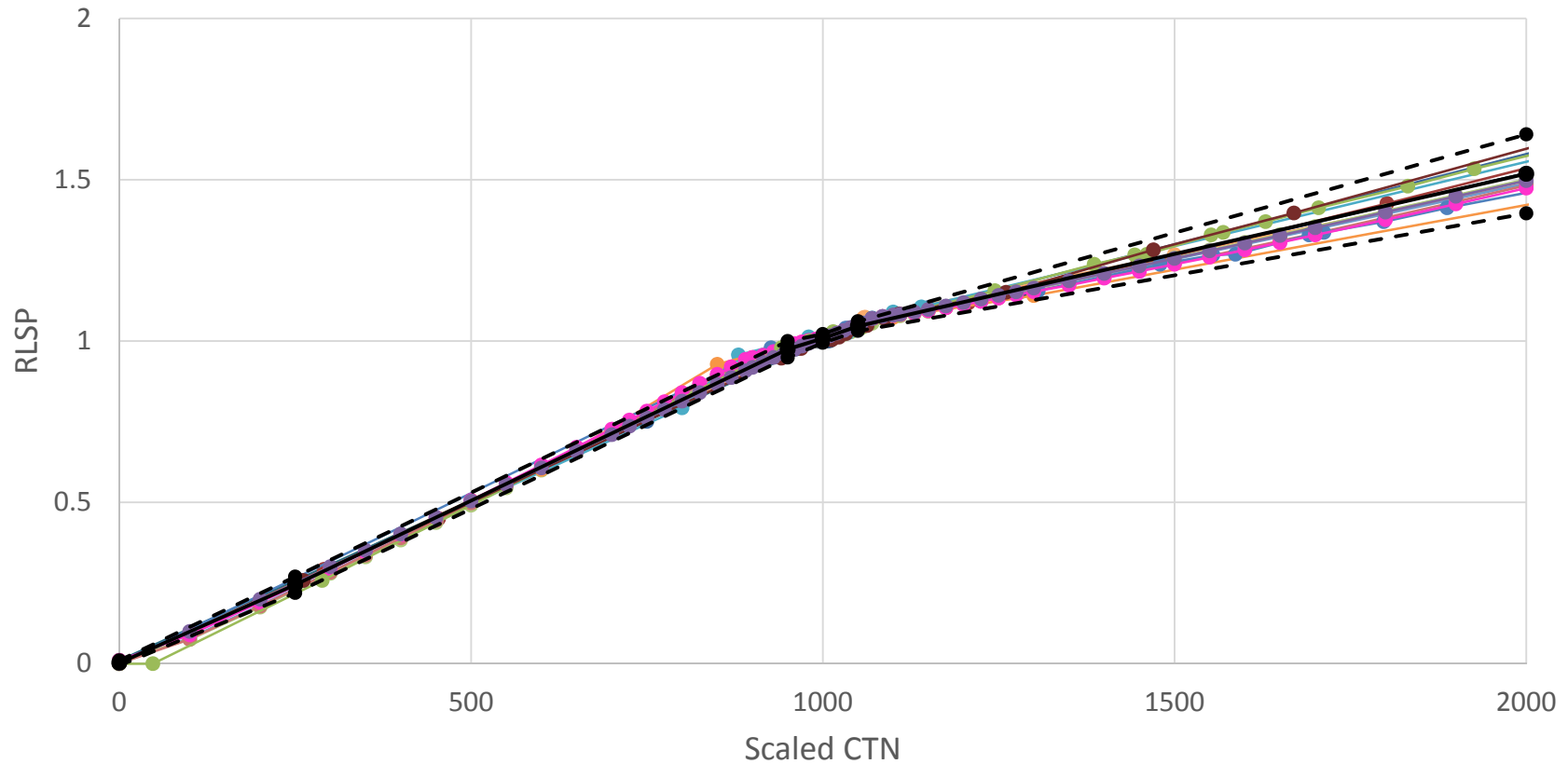
CTN-RLSP Case Study 2



CTN-RLSP Case Study 2

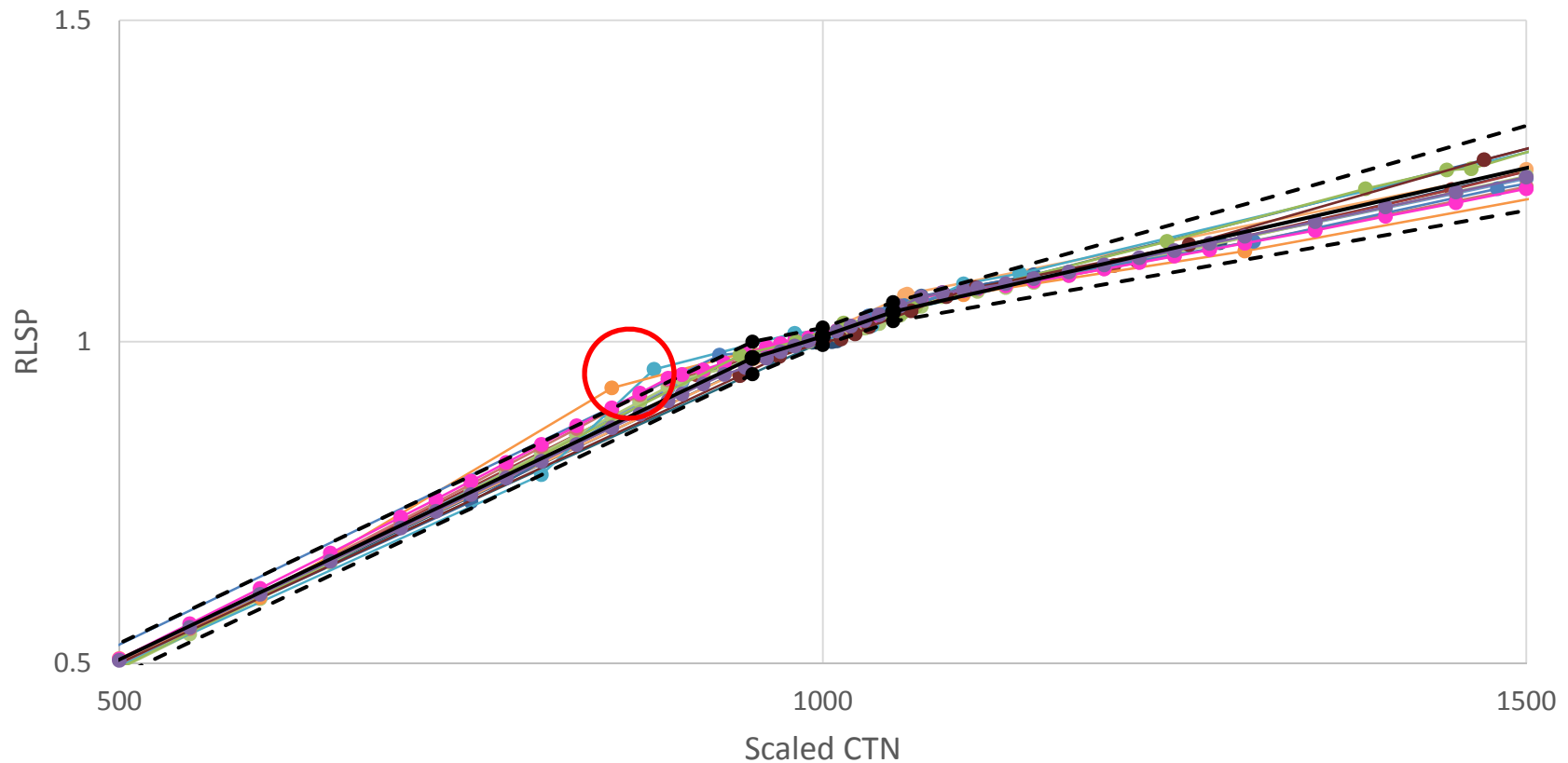


Where is there still room for improvement?

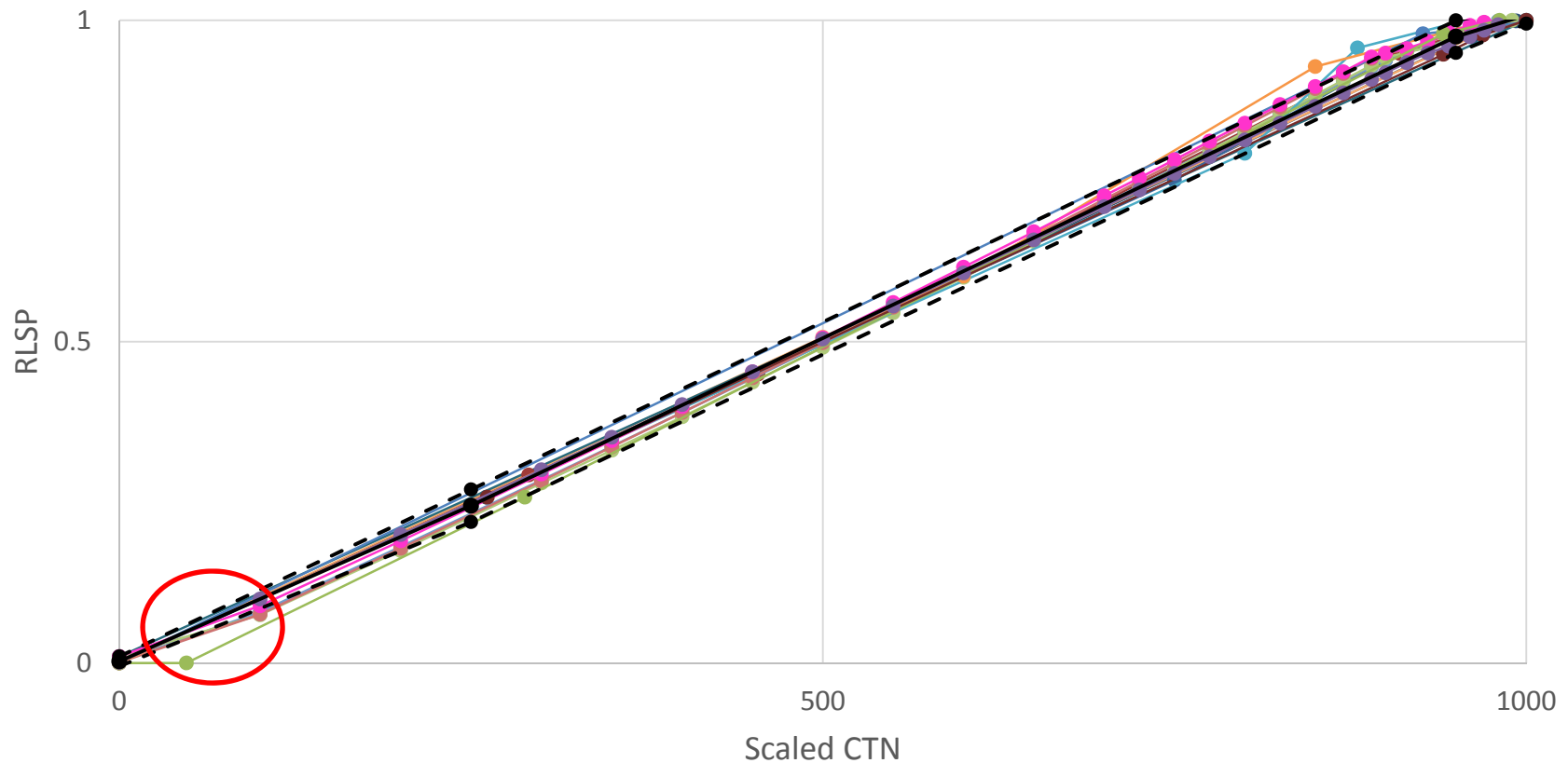


729 730c 730d 775 779b 784 792 798-1 810
813 814 828 834 835 837 Mean +2SD -2SD

Where is there still room for improvement? Fatty tissue



Where is there still room for improvement? Low CT Numbers

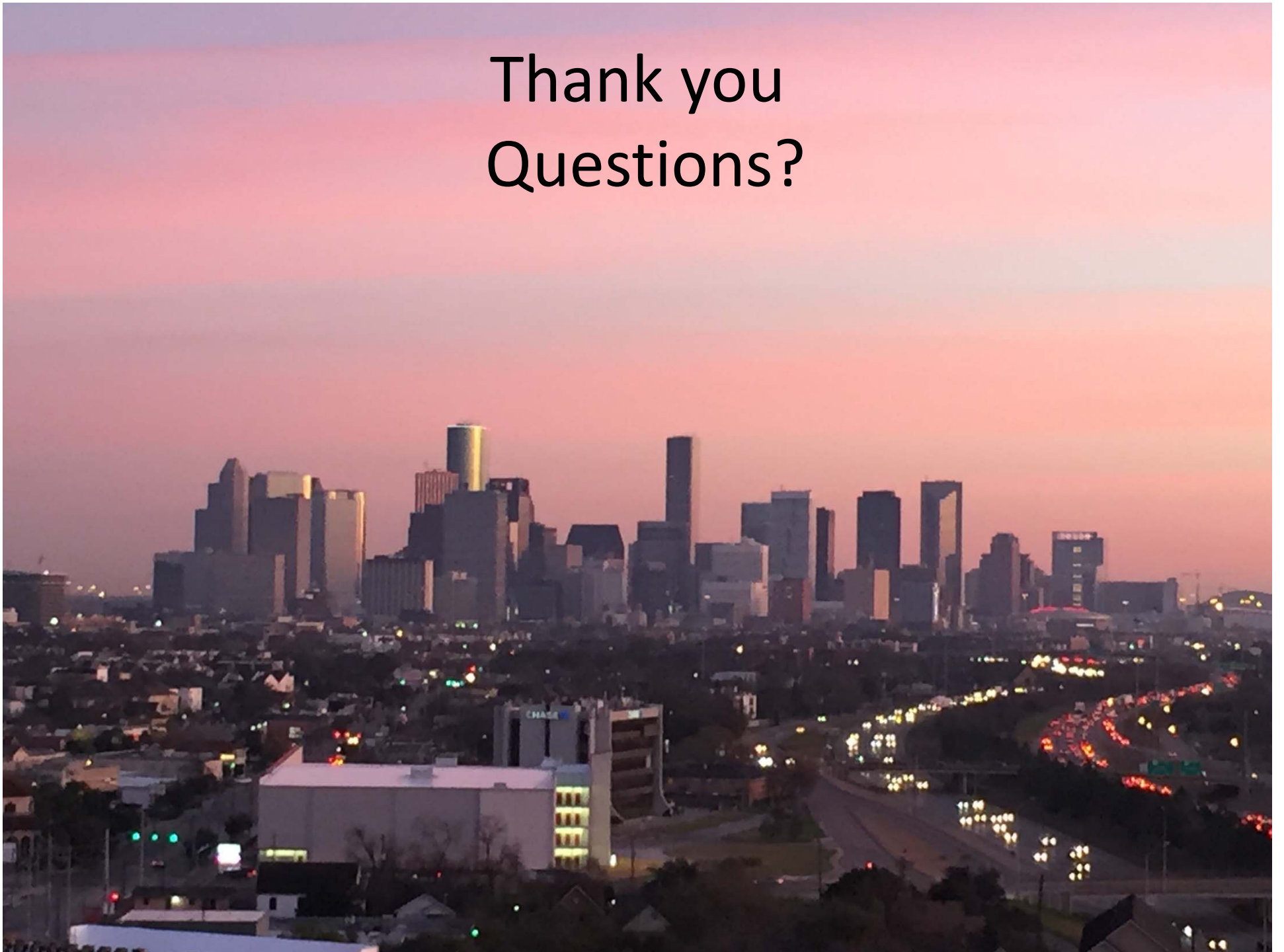


729 730c 730d 775 779b 784 792 798-1 810
813 814 828 834 835 837 Mean +2SD -2SD

CTN-RLSP

- Phantom and on-site dosimetry audits have caught several errors and discrepancies among proton center CTN-RLSP conversion curves
- Several institutions have implemented corrections
- Still a few outliers around fatty tissue and low CTNs

Thank you
Questions?



On-site Dosimetry Audits

- 20 on-site dosimetry audits for scattered, uniform scanning, and PBS systems
- Review:
 - Absolute calibration
 - Dosimetry for reference and patient fields
 - Treatment planning procedures
 - Machine & patient-specific QA
 - IGRT
 - CT vs. RLSP calibration curve

