Model Validation at the Advanced Test Reactor

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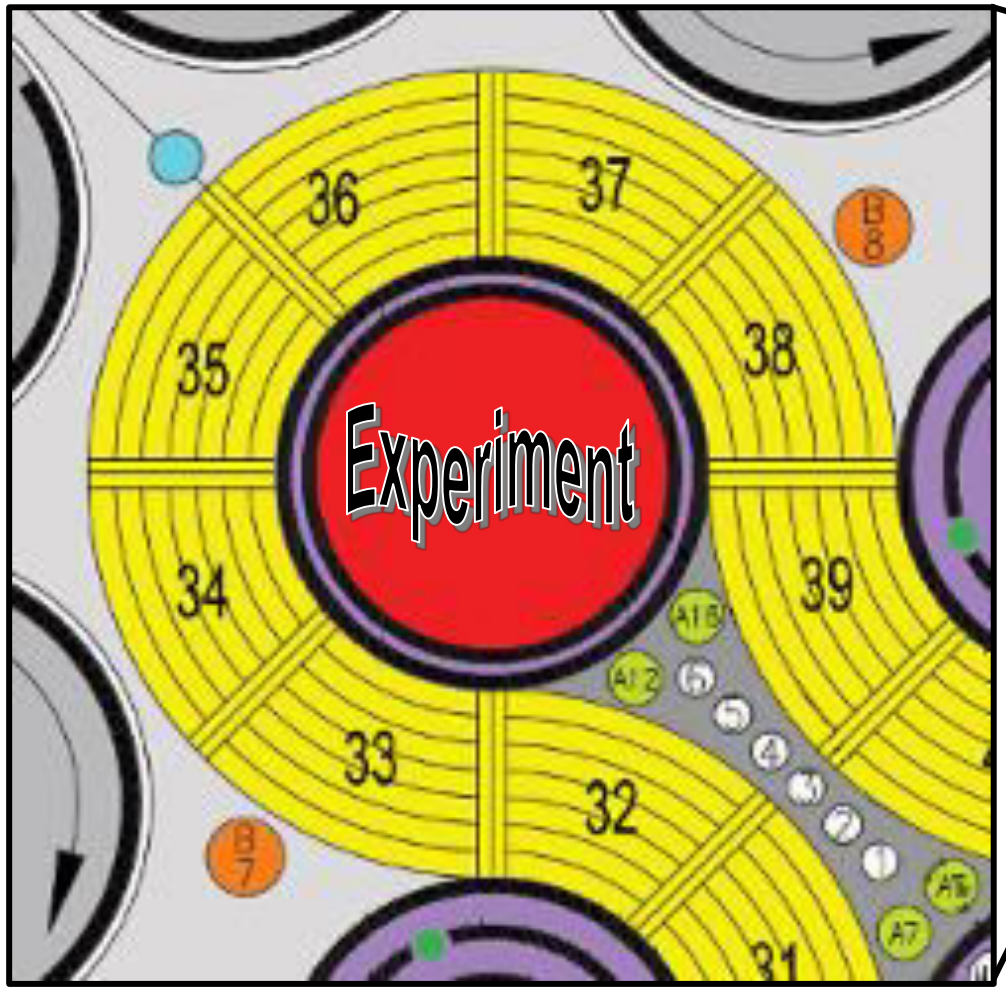
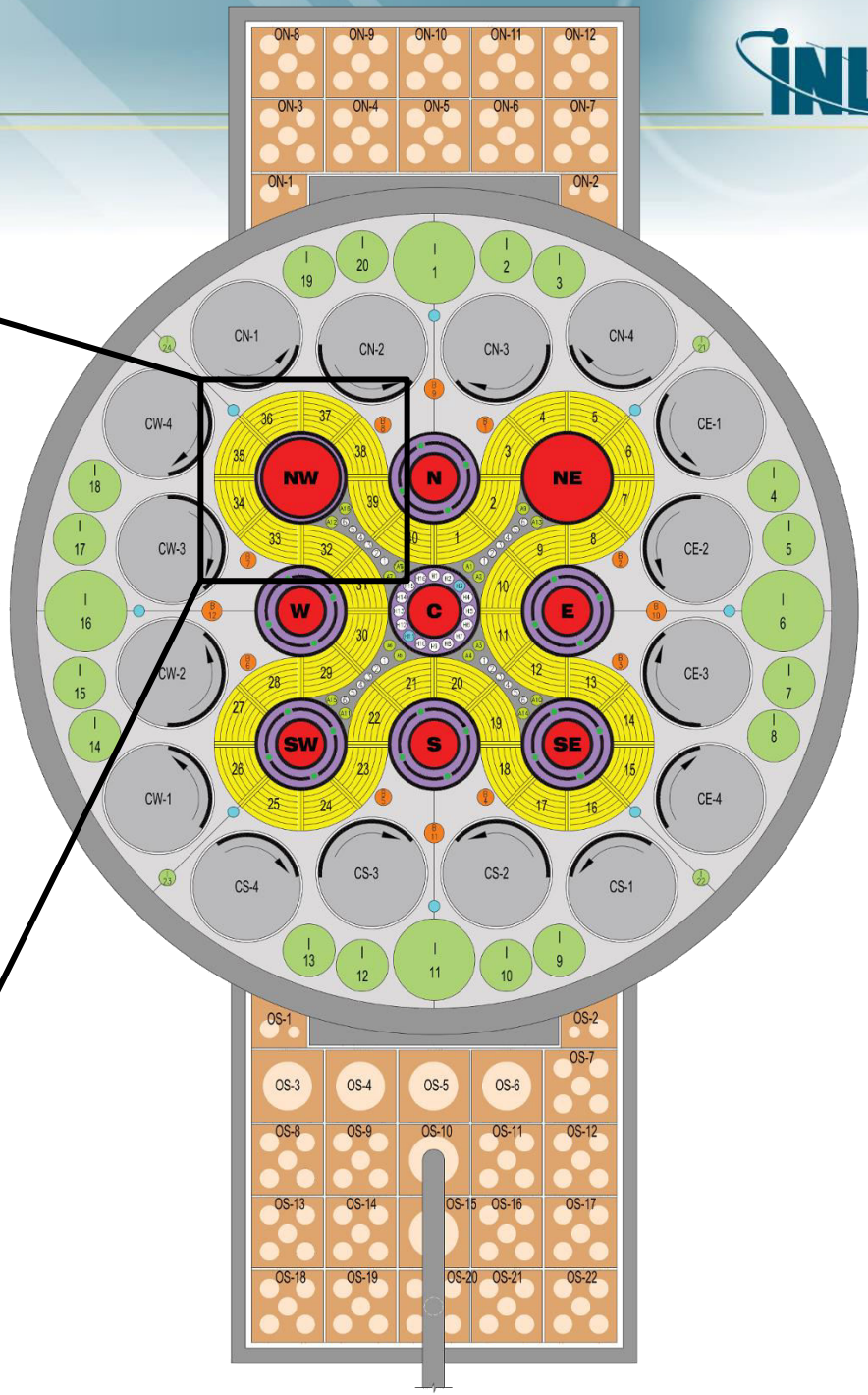
Advanced Test Reactor - Critical

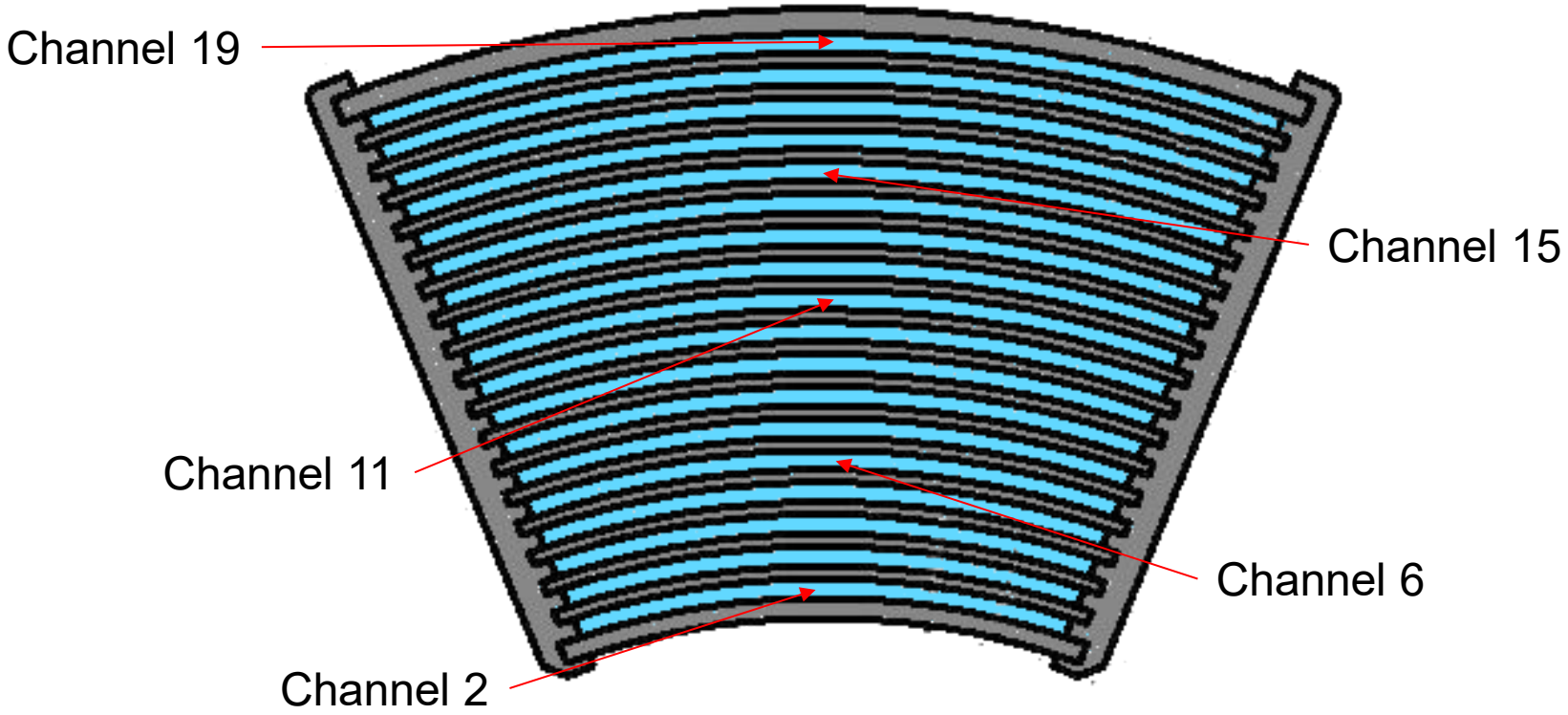
- ATRC is the zero-power “sister” reactor to ATR.
- Nearly identical
- ATRC has a variety of uses:
  - Physics testing
  - Model benchmarking
  - Dosimetry
  - And much, much more

ATR Fuel Pattern

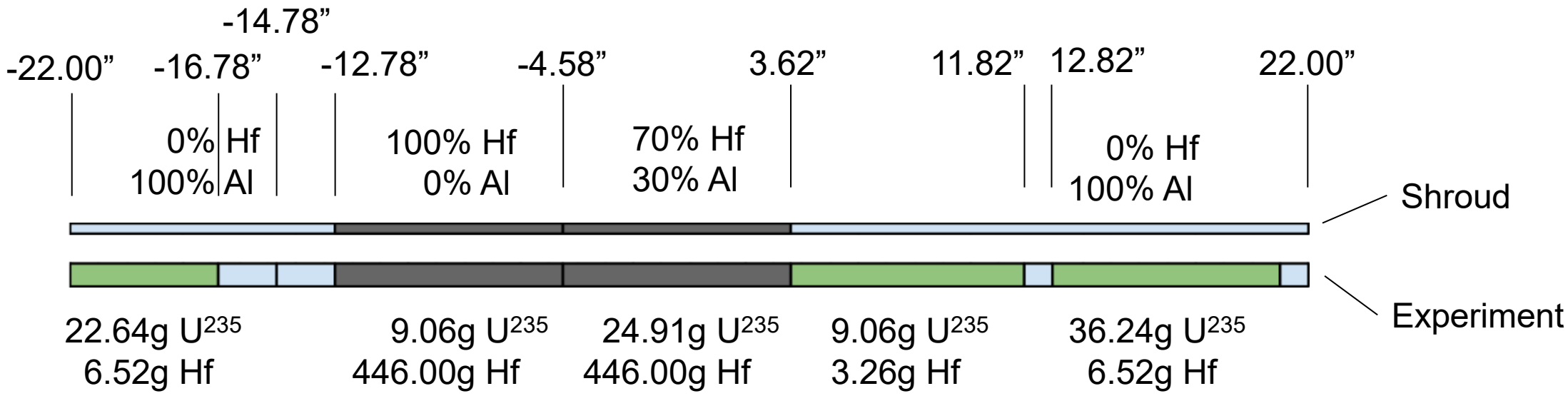




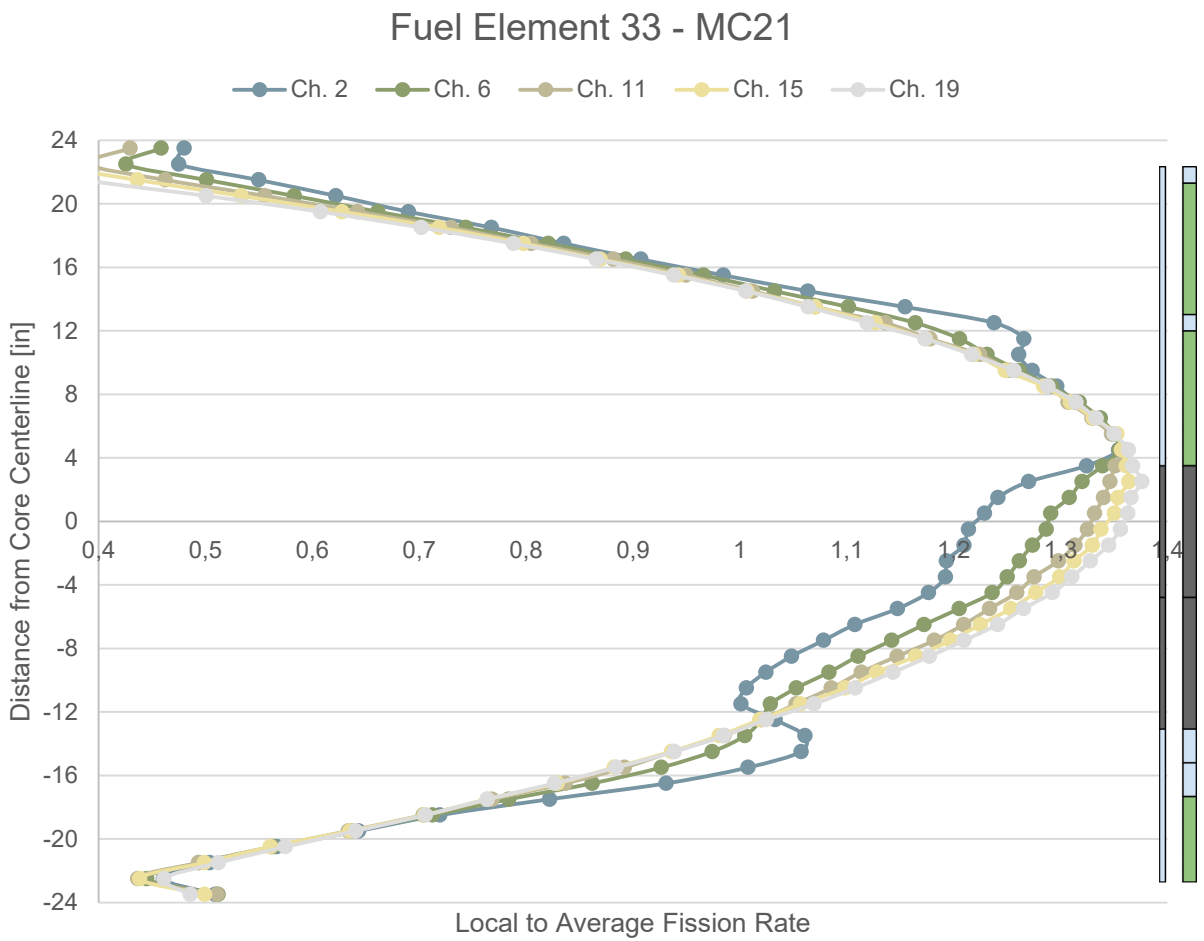
ATR Fuel Element Coolant Channels

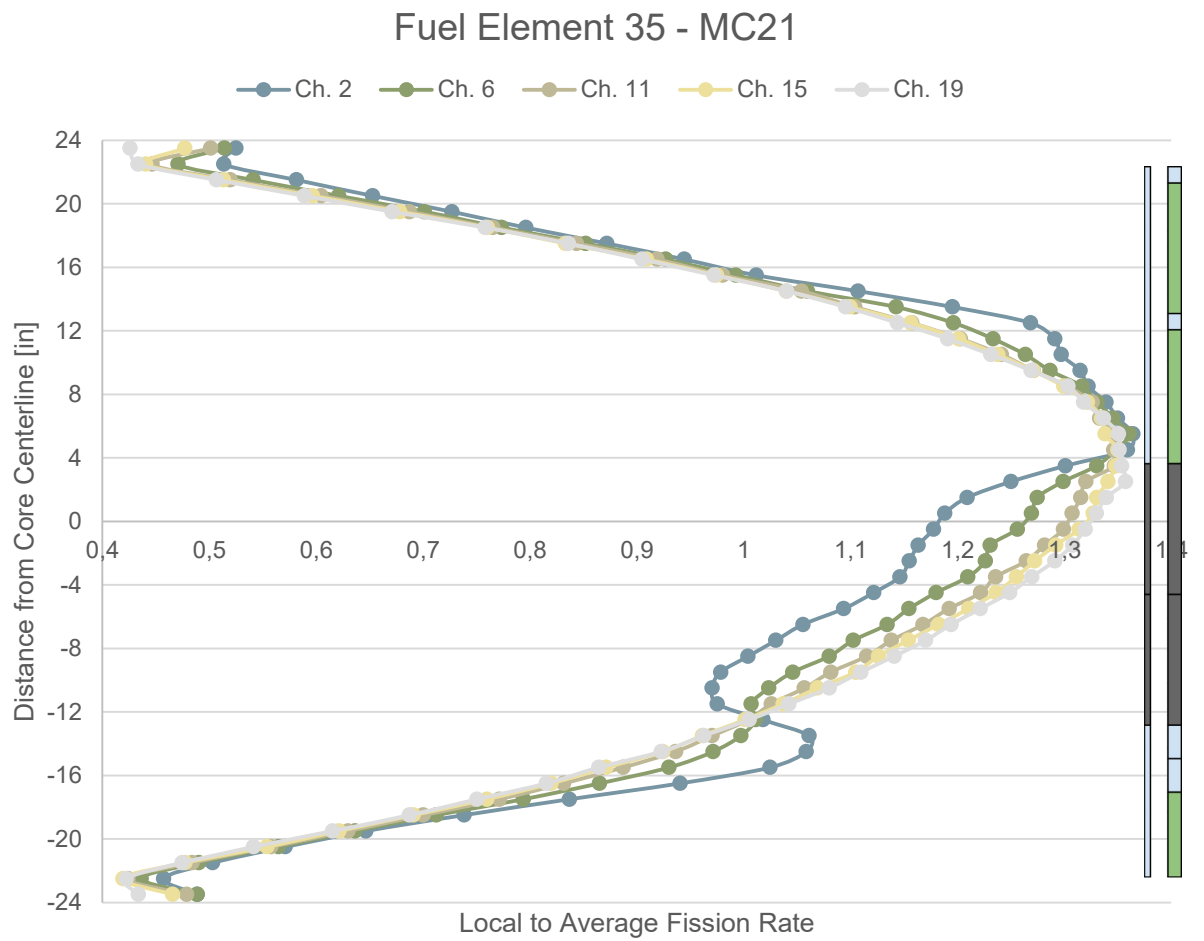


Experiment Setup



Prediction of Local to Average Axial Flux with MC21





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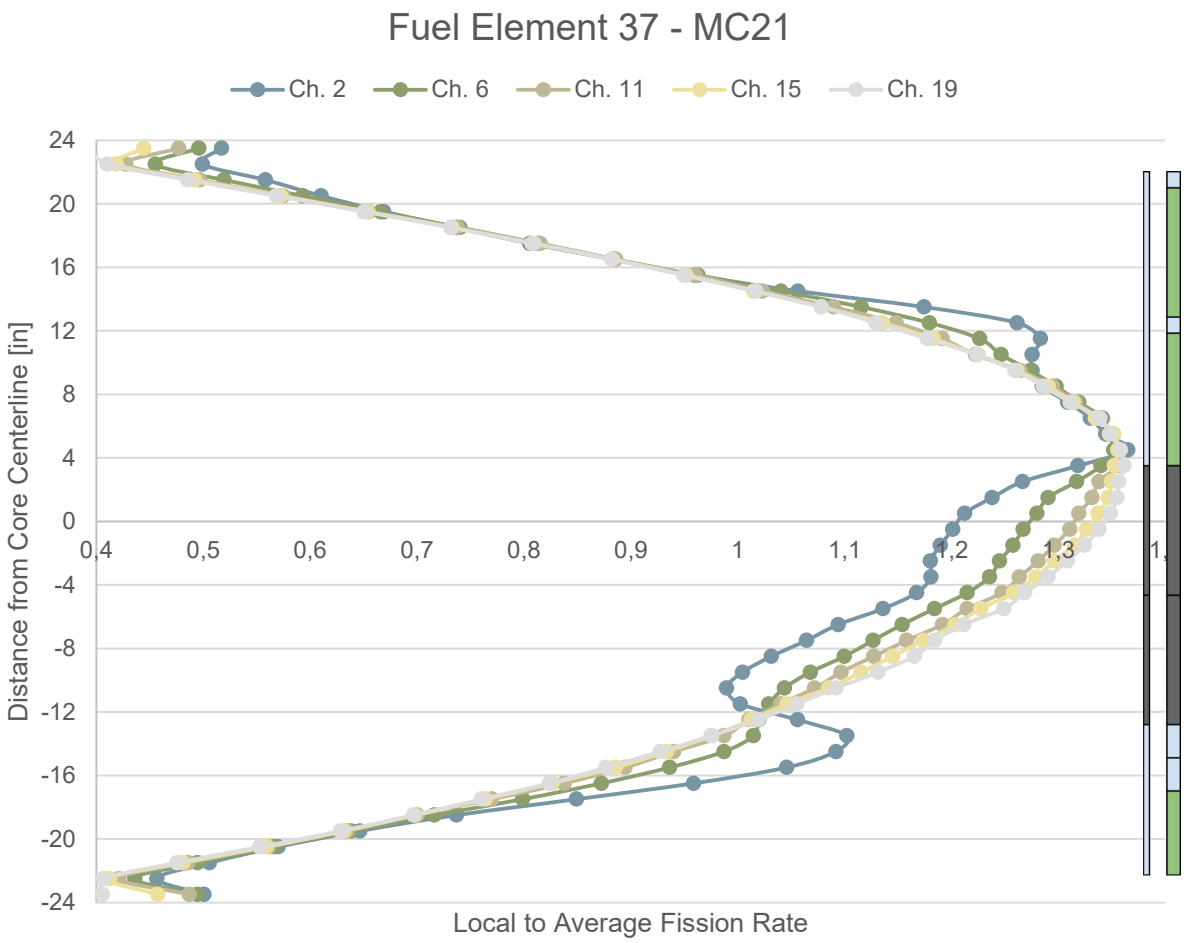
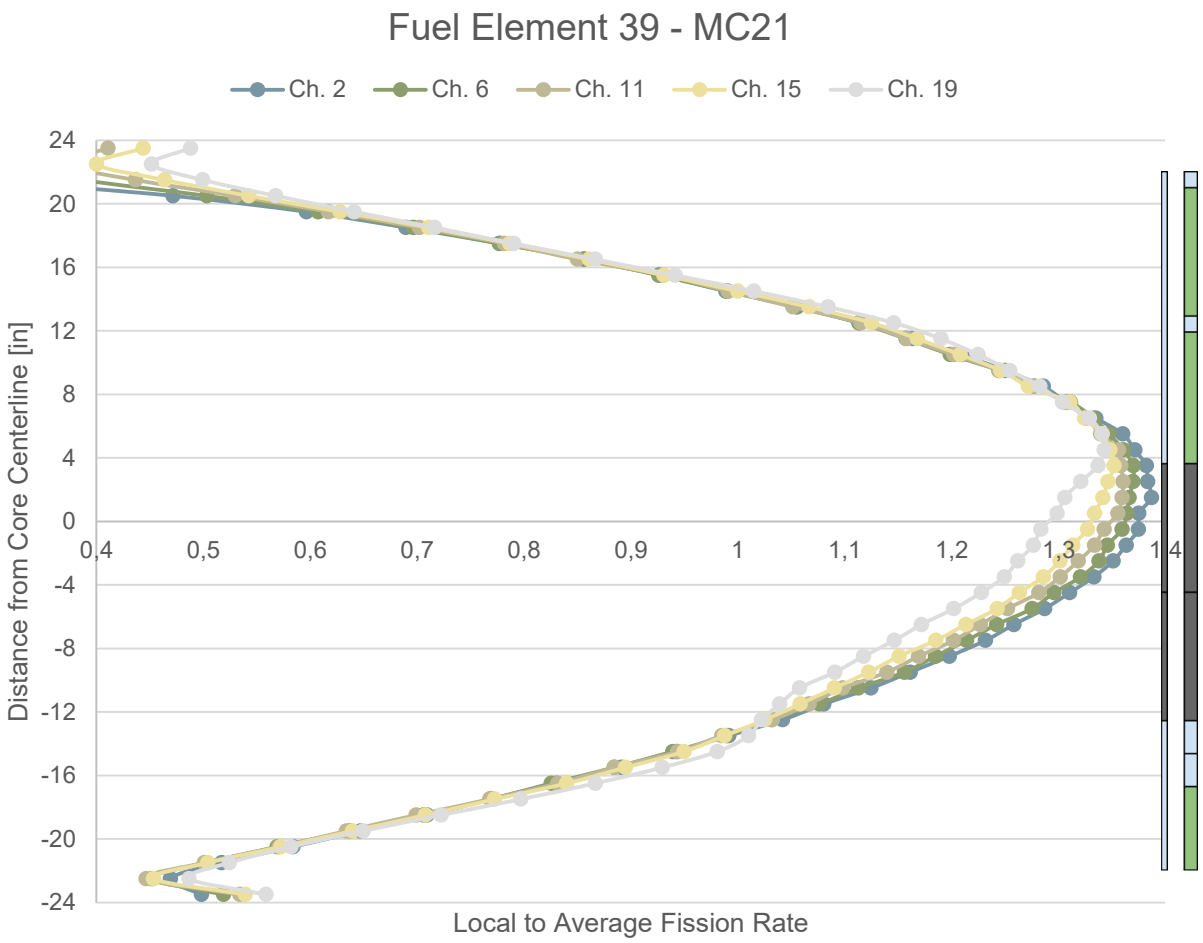
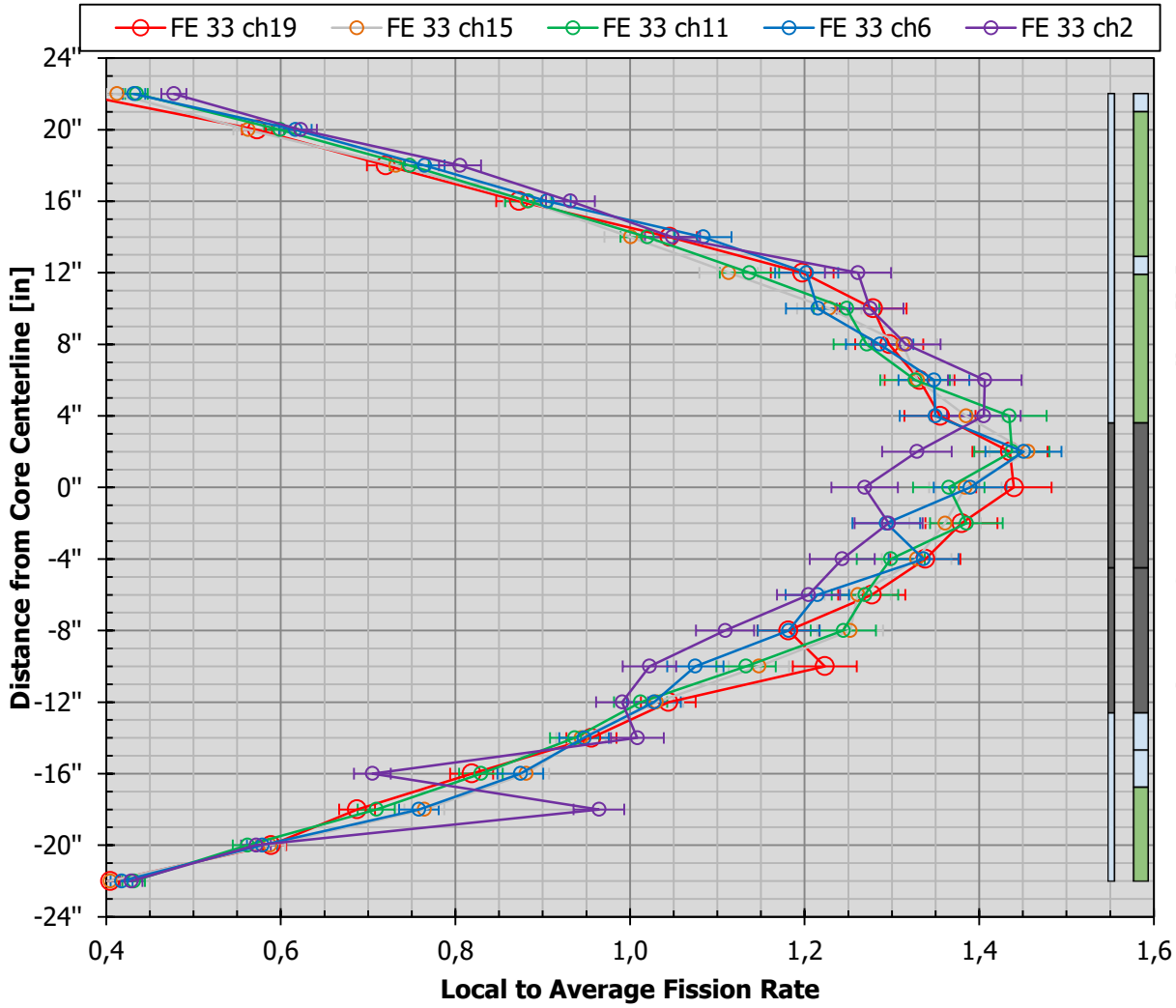


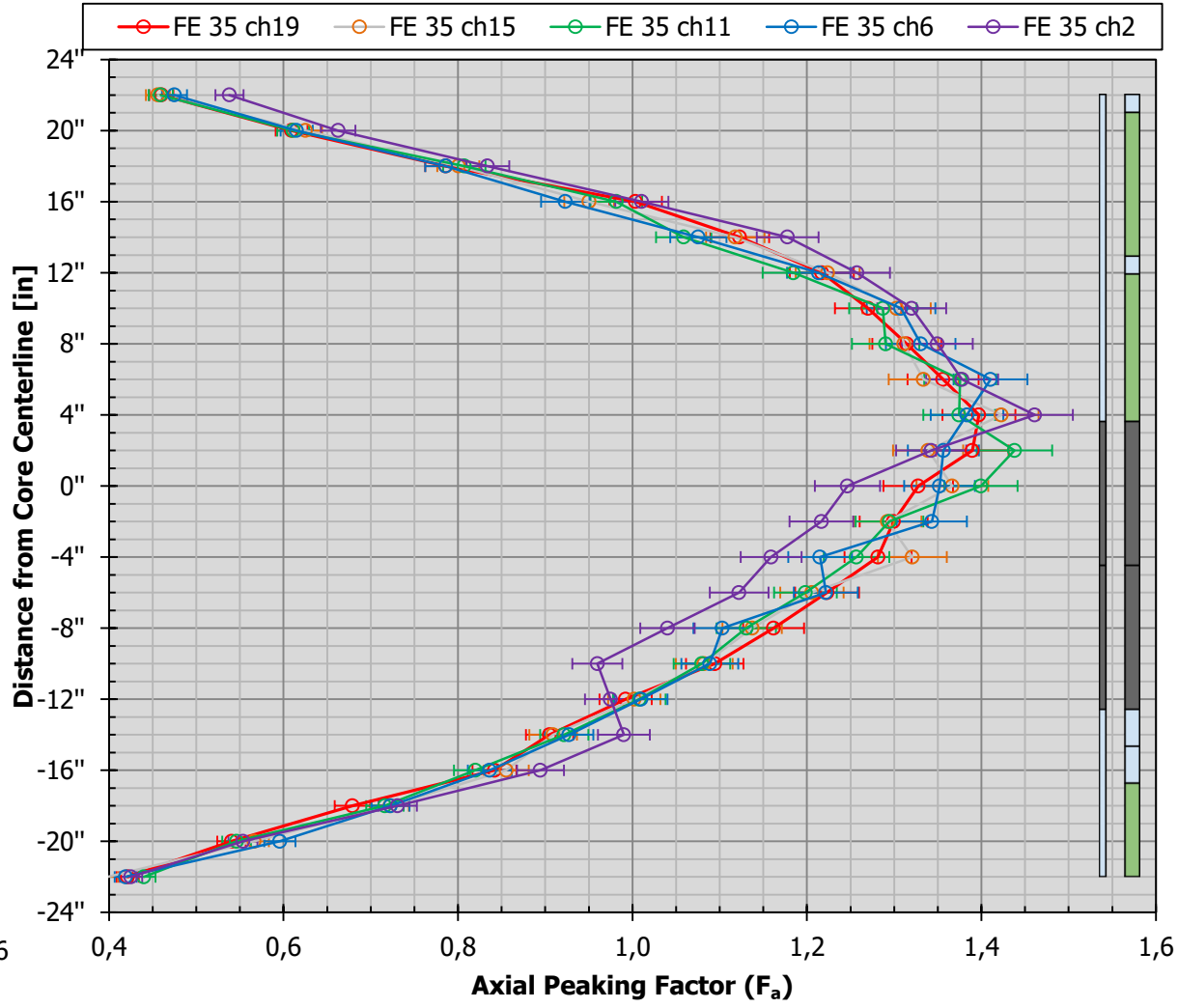


Results of ATRC Flux Run

Fuel Element 33 - ATRC Data

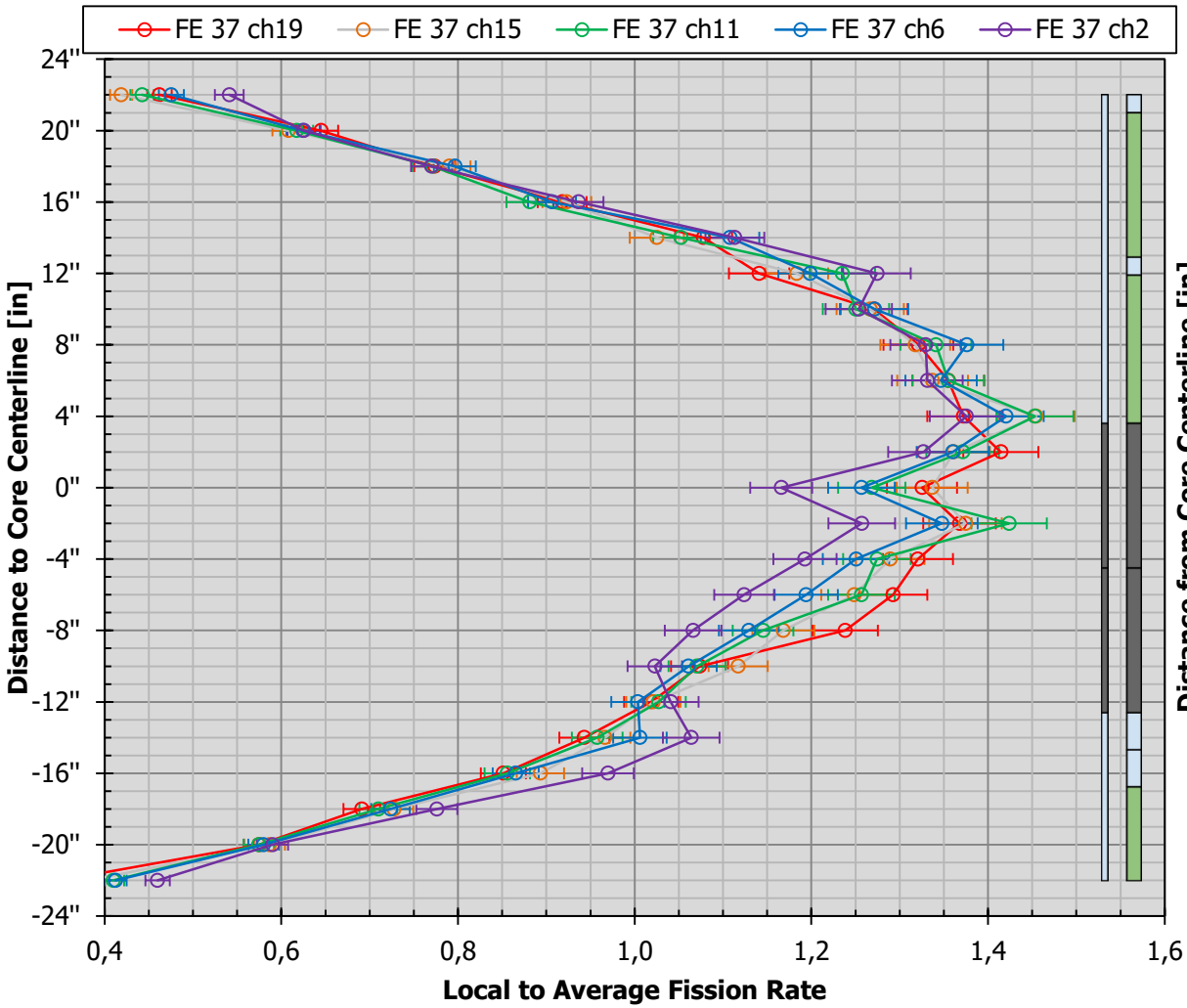


Fuel Element 35 - ATRC Data

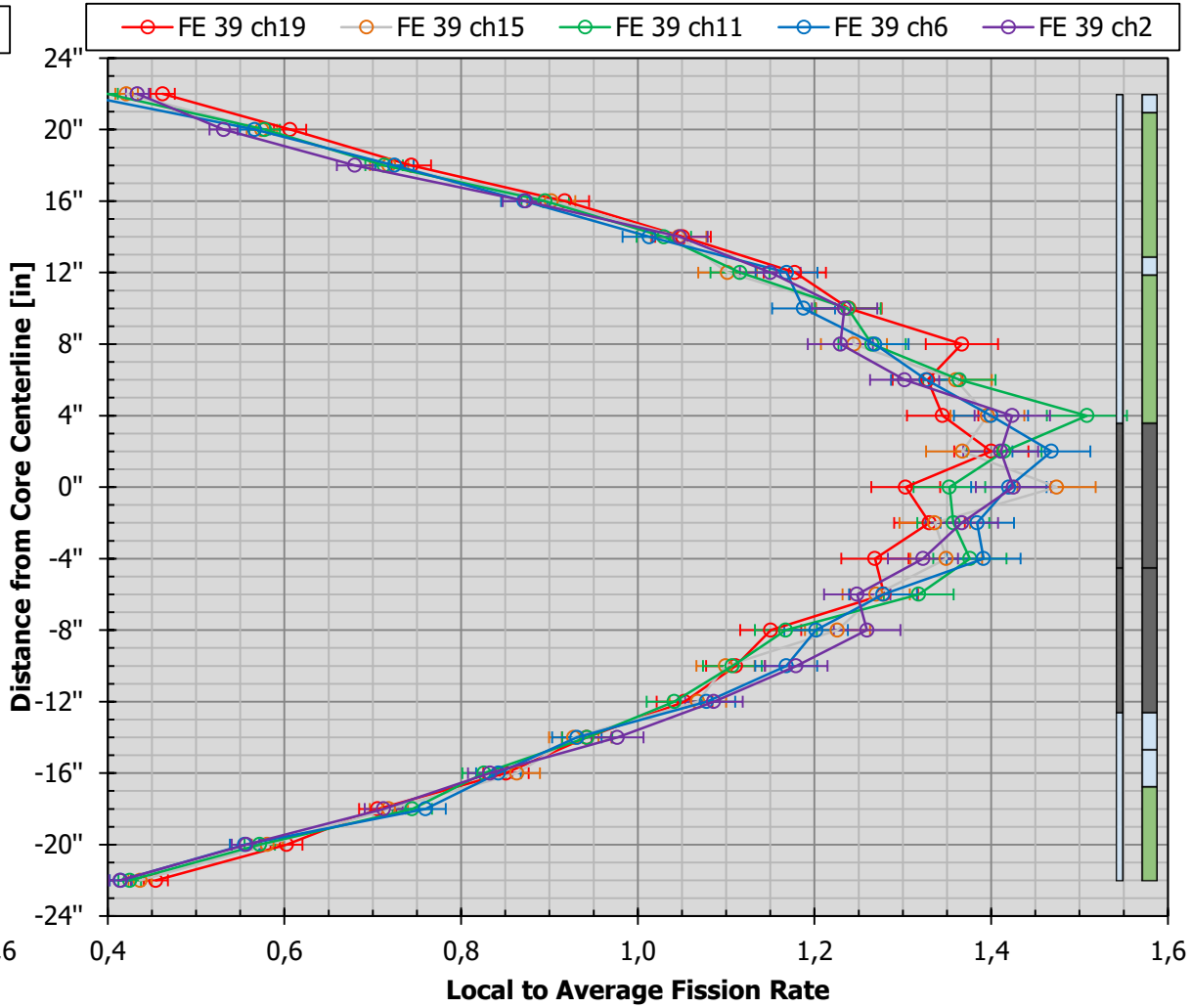


Results of ATRC Flux Run

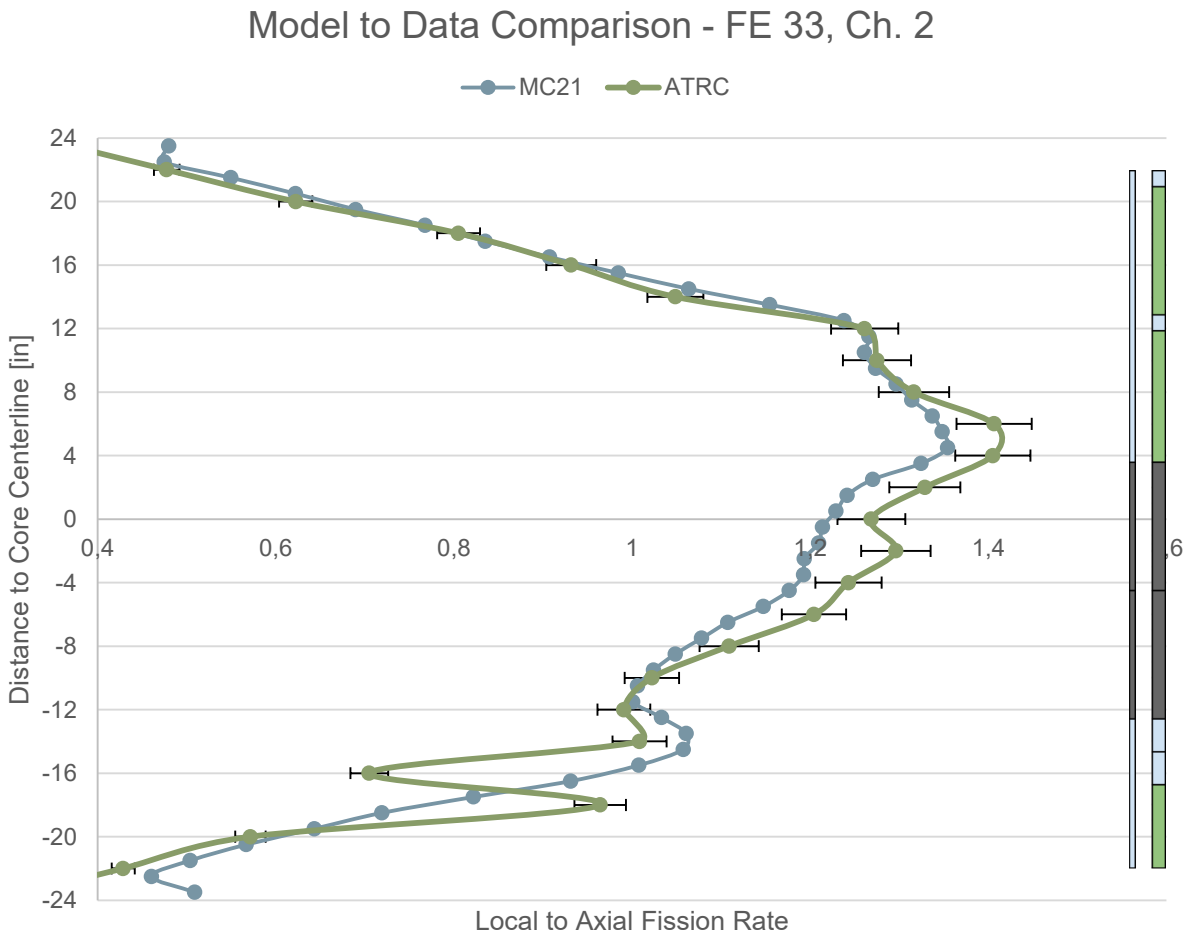
Fuel Element 37 - ATRC Data

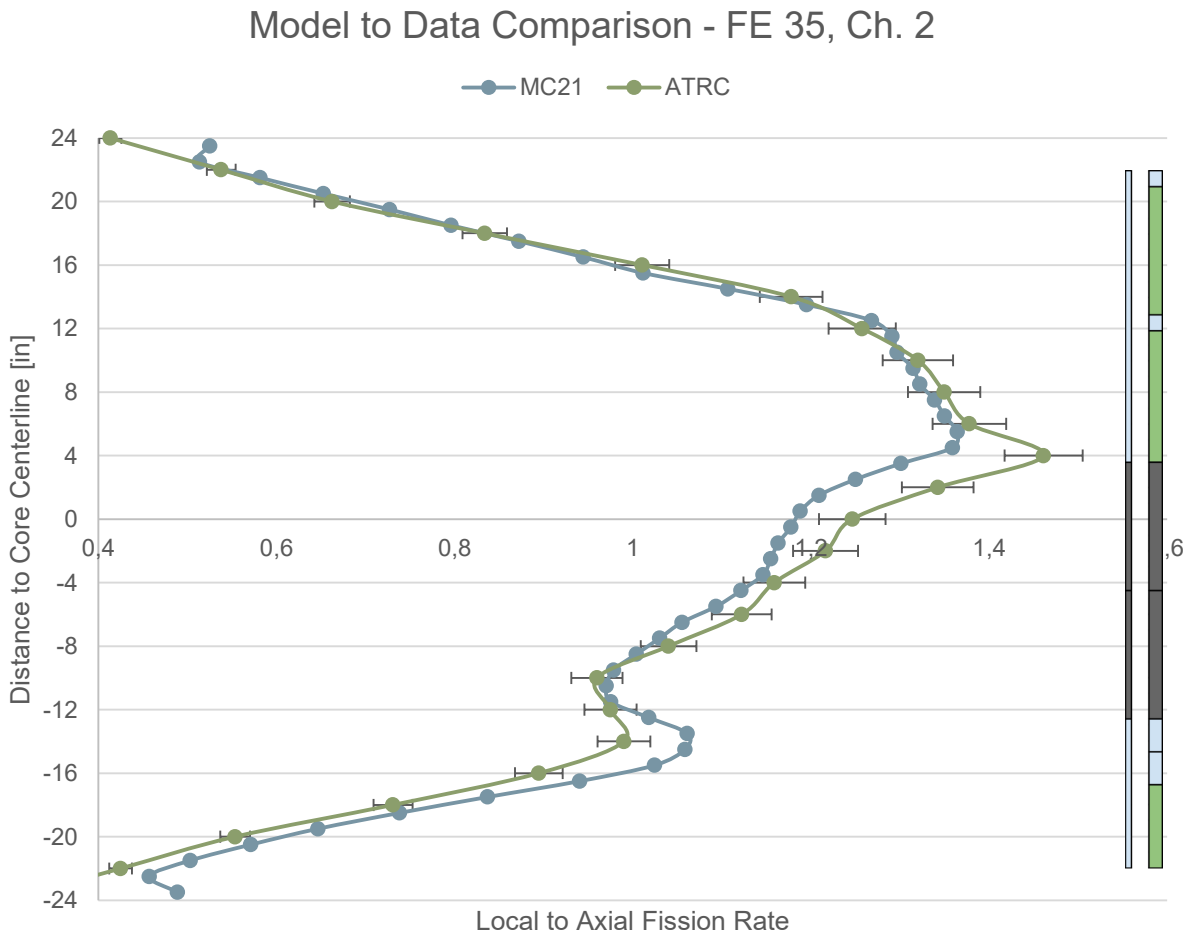


Fuel Element 39 - ATRC Data



MC21 Prediction and ATRC Data Comparison





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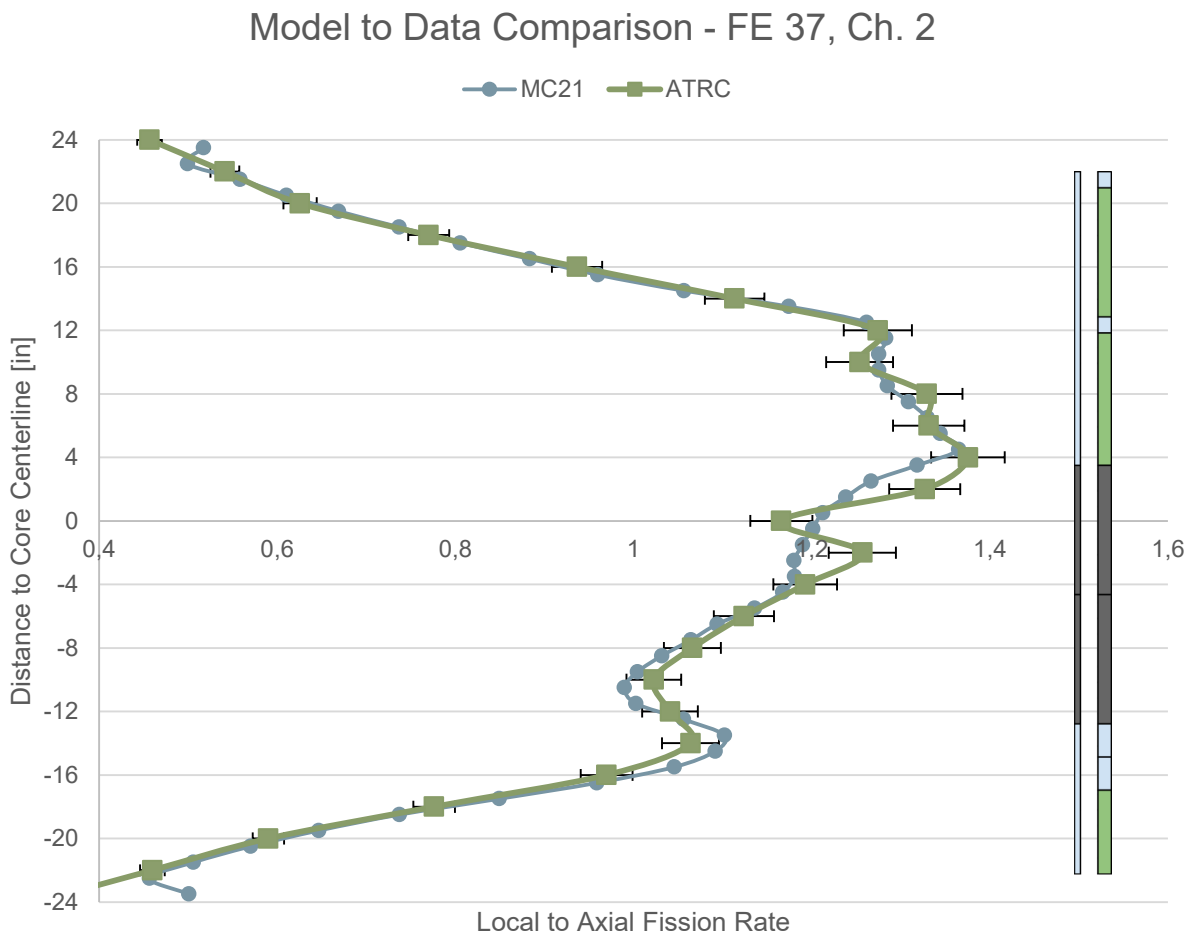
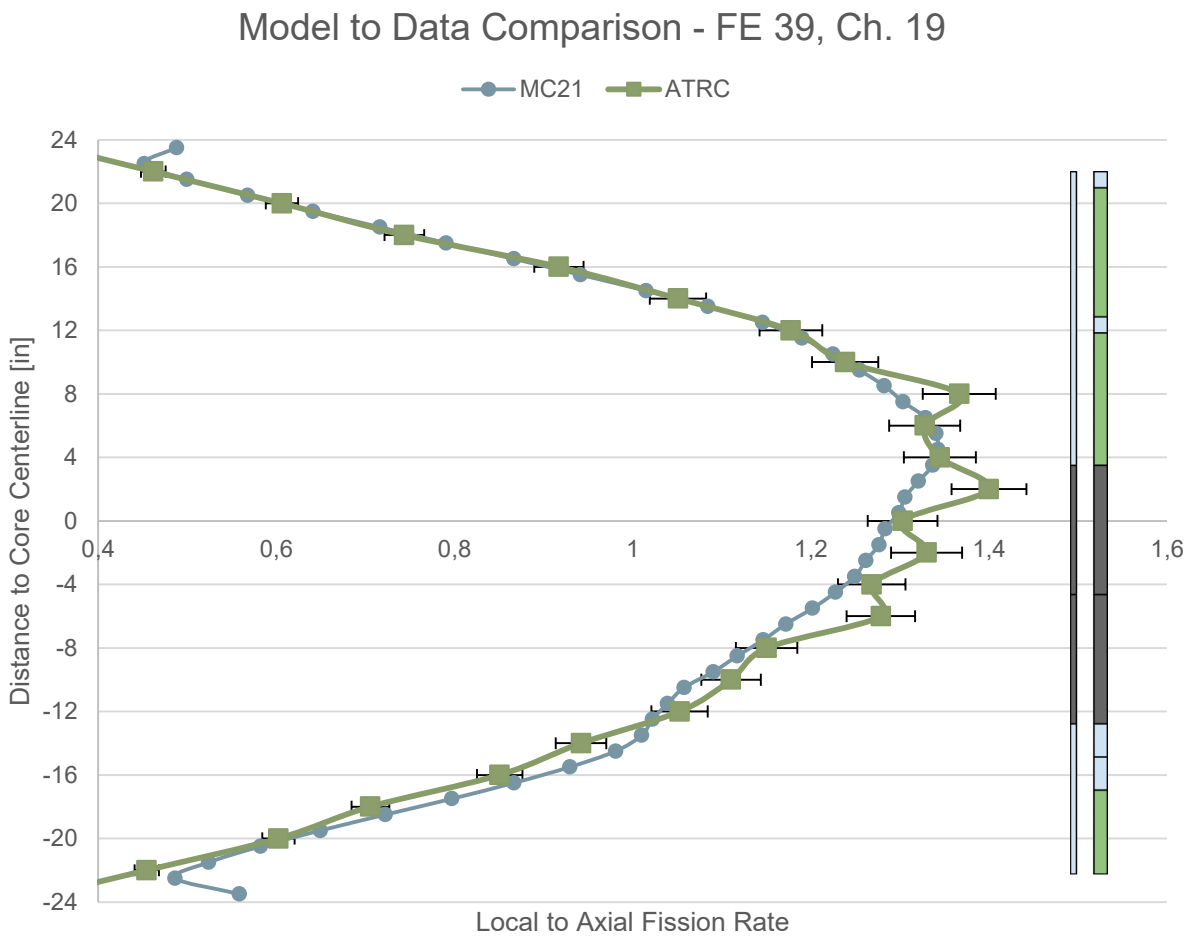
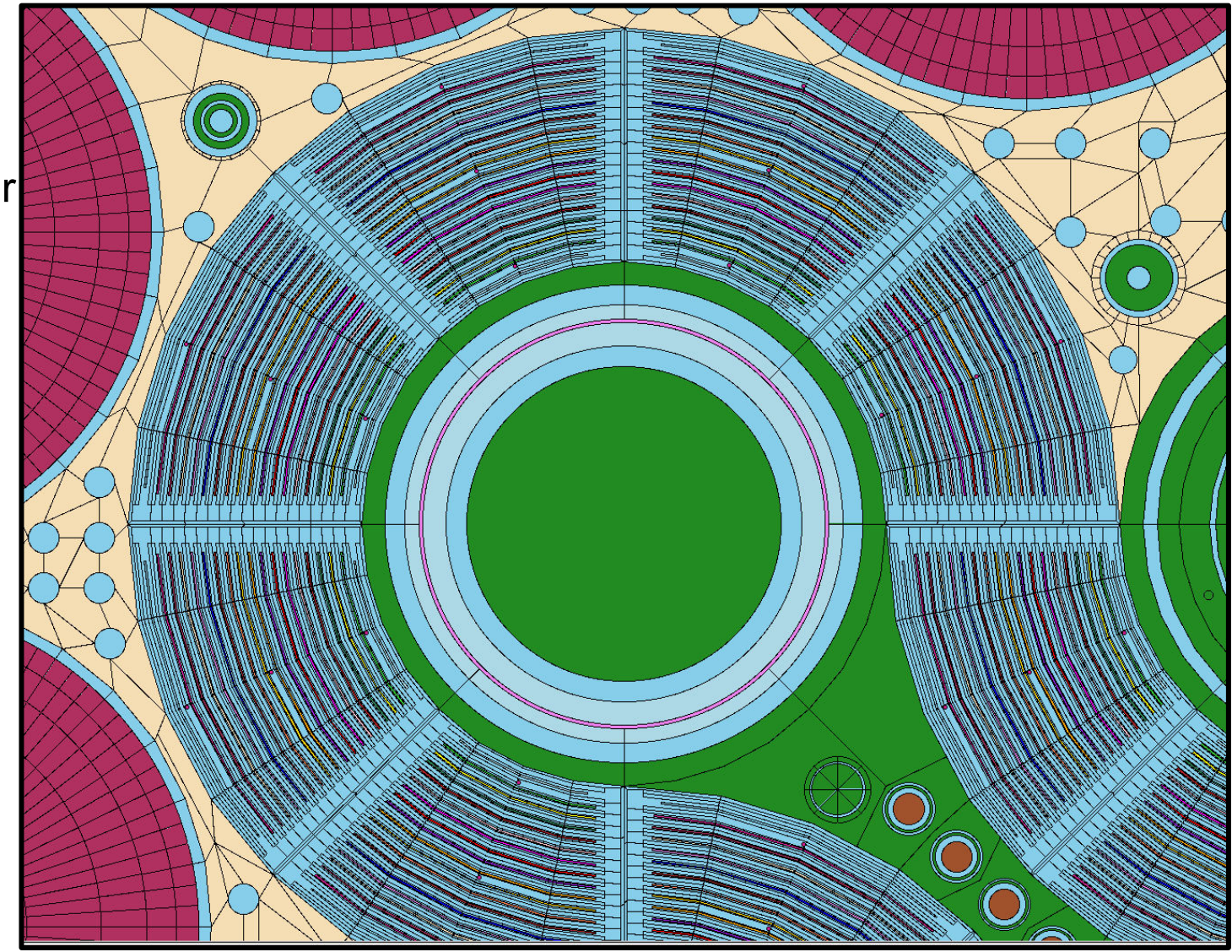




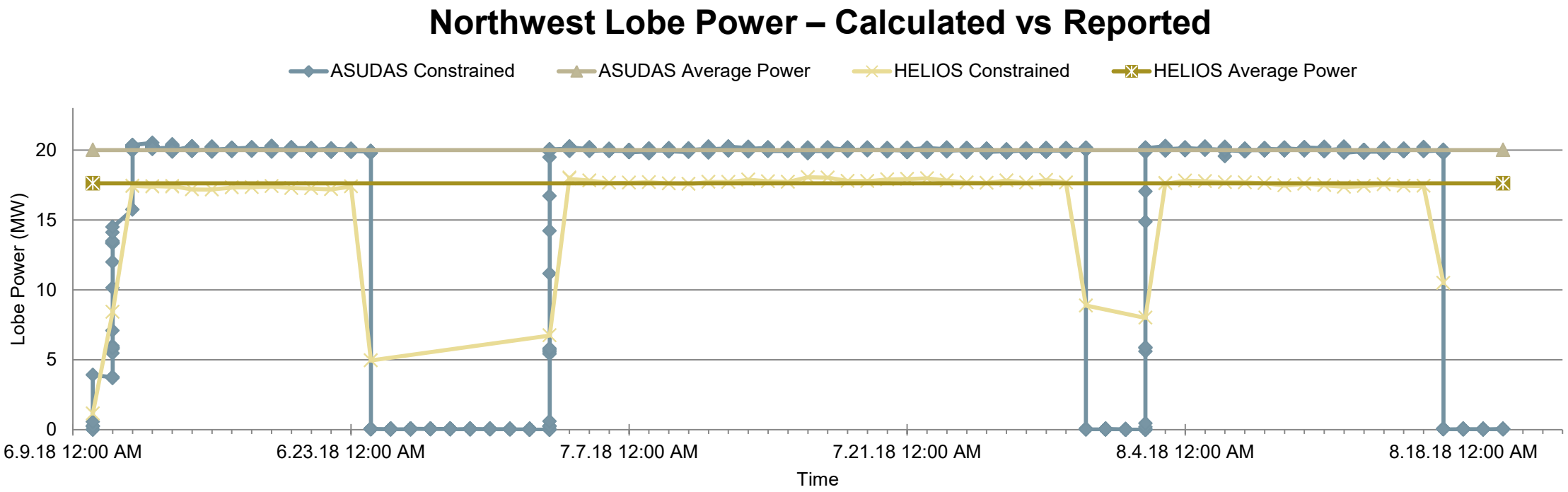
HELIOS Model Validation and Biasing

- HELIOS (Studsvik) is currently used to perform core physics analysis at ATR
- Two-dimensional transport code
- 48” test train is “pancaked” into 1 cm wafer
- ATRC “run” is benchmarked against actual ATRC run
- Model is sometimes “corrected” to ATRC measured worth



Uncertainties

- Always improving: quantifying biases via as-run analyses.



ASUDAS Average Power (MW)	HELIOS Average Power (MW)	Difference (%)
20.00	17.81	-11.93

Questions