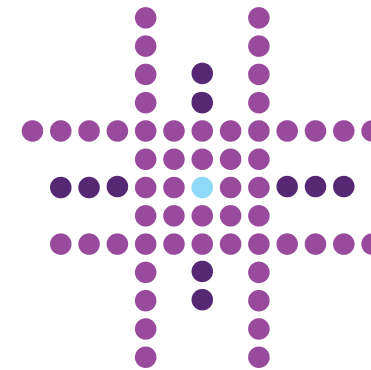


# Nuclear data verification with depletion calculations

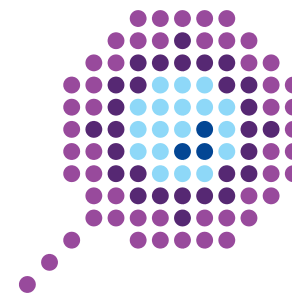
# Framework

- Renewed interest in Spent Fuel Characterisation
  - H2020 EURAD project, SFCOMPO, DH blind test, SKB-50, WPNCS, ...
- SNF integral responses:
  - Nuclide inventory → BUC
  - DH
  - n-emission,  $\gamma$ -emission
- Depletion calculations:
  - Fuel fabrication data, reaction operation and irradiation conditions
  - **Nuclear data**



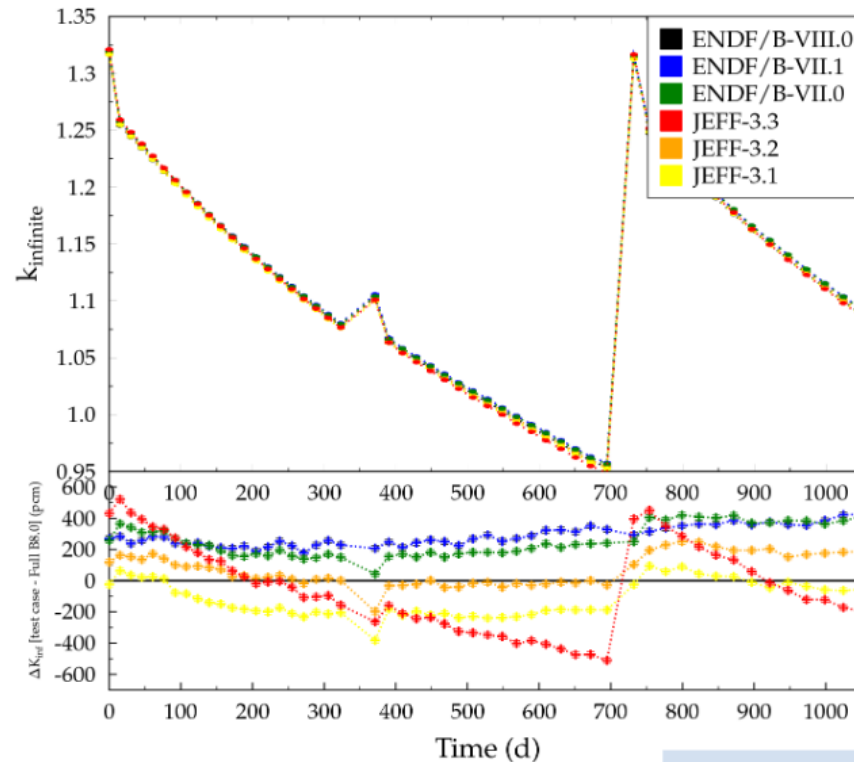
# Nuclear data

- Sensitivity analyses
  - Guide for nuclear data evaluators
- Criticality
  - HQ benchmarks
- Extension to other responses → New trends
  - Shielding benchmarks
  - **Depletion benchmarks**
- E.g:  $^{239}\text{Pu}$  in JEFF-3.3 / Ref: R. Ichou – JEFDOC-2000  
G. Žerovnik – JEFFDOC-1995



# SFCOMPO case

## ARIANE GU3 results

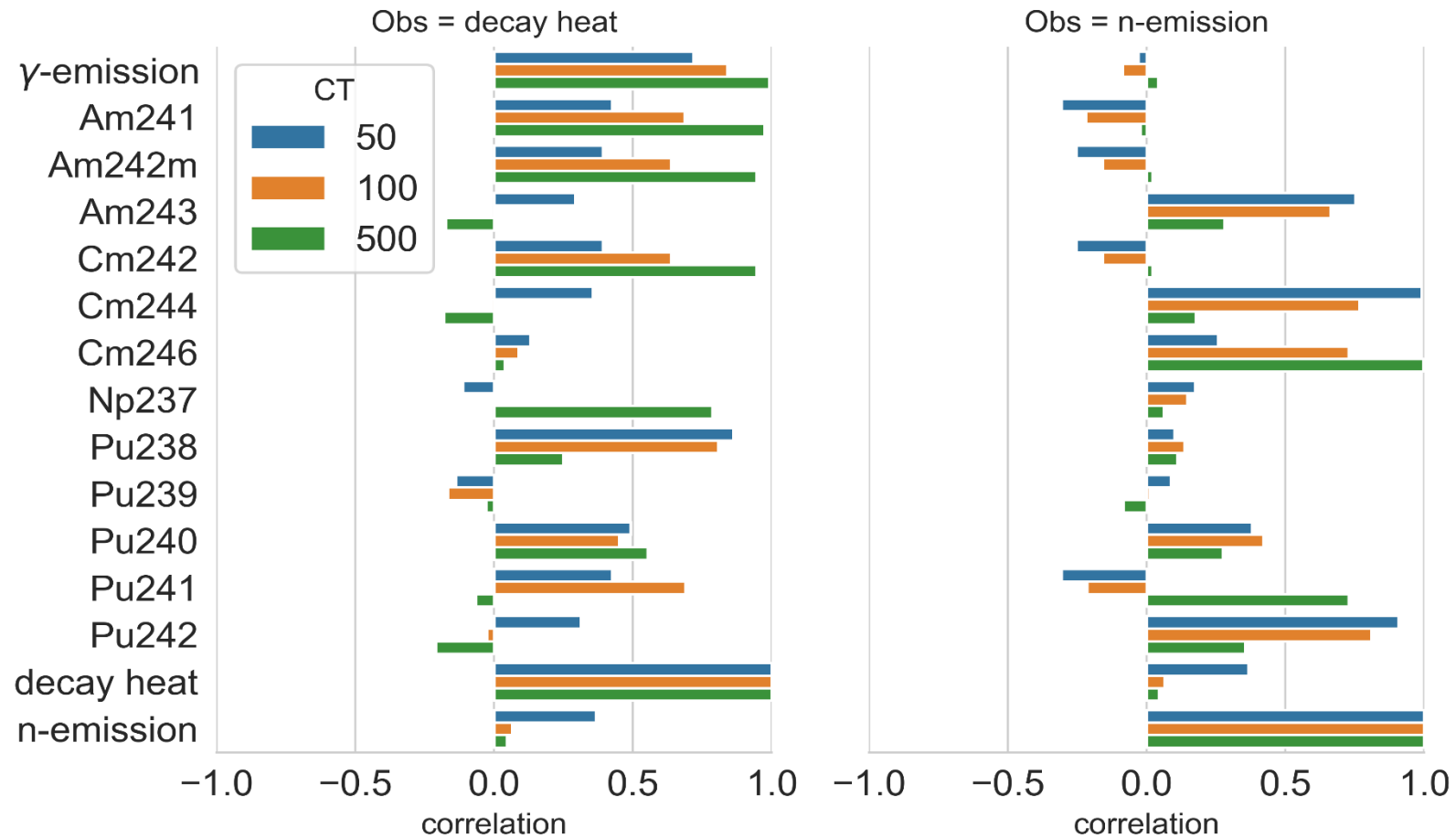


- $Dk_{\infty}$  with respect to ENDF/B-VIII.0 stays more or less constant with burn-up, except for JEFF-3.3.
- The JEFF-3.3 results show a huge burn up effect compared to all other ND libraries.
- Delta of +450 pcm at BU=0 and -500 pcm at end of 2<sup>nd</sup> cycle is observed wrt ENDF/B-VIII.0.

R. Ichou *et al.* "VESTA 2.2 burn-up calculations using JEFF-3.3". JEFDOC-2000

Paper PHYSOR 2020:  
R. Ichou, B. Dechenaux. "On the validation of VESTA 2.2.0 using SFCOMPO chemical assay data"

# Sensitivities & correlations



L. Fiorito *et al.* "Sensitivity analysis for actinides cross section data in burnup calculations". Accepted in ANS M&C2021

# Takeaways

- **Use of depletion benchmarks in V&V can give us insight to different ND trends**
- Time dependent
  - Sensitivities & correlations change over time
- Correlations might differ from criticality cases



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