# Update of the CIELO U238 resonance evaluation to improve LWR performance with burnup and LEU lattice criticality

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New U-235 and U-238 evaluations [1-3] were undertaken within the OECD/NEA Data Bank CIELO Project [4] and were adopted for the ENDF/B-VIII.0 library, which was released in 2018 [5]. Since then, several reports and publications were released that showed serious discrepancies with the light water reactor (LWR) performance of the previous ENDF/B-VII.1 library [6] in criticality studies as the function of the burnup, e.g., see Ref. [7]. A slight increase of the LWR reactivity was observed at the Beginning of Cycle (BOC) with a severe lost of reactivity at large burnups observed for the ENDF/B-VIII.0 library. Sensitivity studies showed some compensation effects at the BOC, but uniquely identified the U-238 evaluation as the responsible for the reactivity loss [7].

In this work we focused on studying changes in resonance cross sections of U-238 that may improve the observed trend as a function of burnup. It was found that capture cross section from 0.1eV up to 10eV was reduced in ENDF/B-VIII.0 evaluation by about 2% [,4,5,9] compared to the ENDF/B-VII.1 evaluation [6,10] as shown in Figure 1.

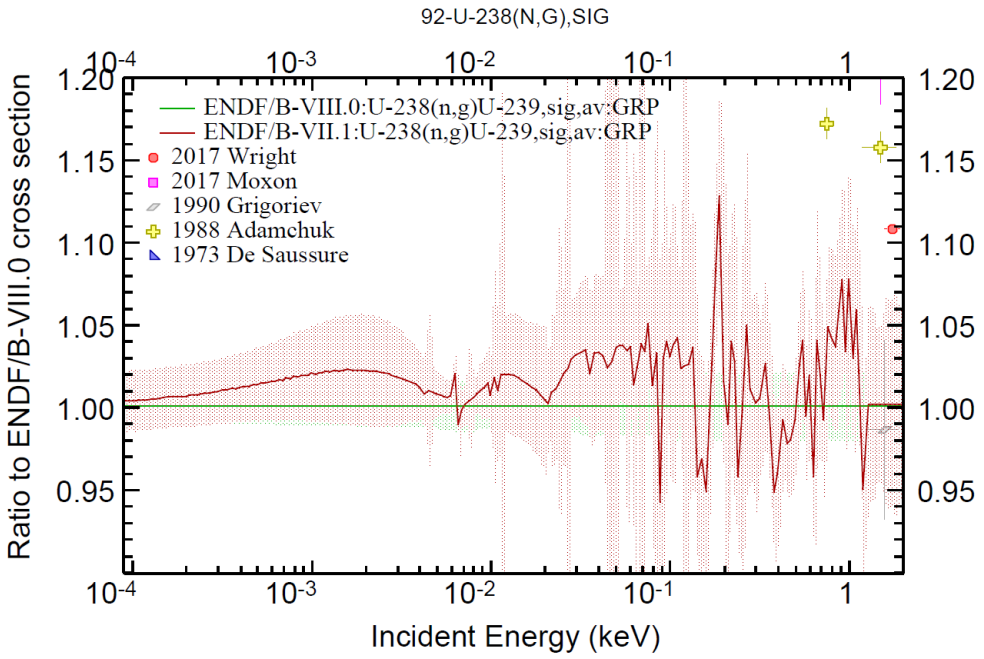


Figure 1. ENDF/B-VII.1 to ENDF/B-VIII.0 capture cross-section ratio in the resonance region.

The observed changes may explain the burnup trend as lower capture cross sections in U-238 below 10eV leads to increased criticality at the BOC, but lower capture above 100 eV results in lower criticality at higher burnup due to the reduced production of Pu-239. There is a new solution proposed by Japanese colleagues for the JENDL-5 library [11]. There is also a new RRR ev;uatin proposed by EC

JRC Geel colleagues. We would like to compare different solutions to check the impact on burnup as well as on LEU lattice criticality.


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