Eucrites are igneous rocks belonging to a magmatic series of meteorites: Howardite-Eucrite-Diogenite (HED). They are basaltic achondrites and are among the oldest known volcanic rocks in the solar system [1]. They resulted from early magmatic activity on 4-Vesta [1, 2]. Recent studies have demonstrated an excess in $^{26}$Mg in eucrites [3-5], implying that they can be dated by this isotopic system. Usually, they are considered to be all contemporaneous and are dated by whole rock isochrons.

Our previous results obtained on seven eucrites show that only five of them have an excess in $^{26}$Mg that is fully resolvable [6]. These results suggest that not all eucrites have the same crystallization age or some may have been perturbed by secondary processes such as metamorphism before or after $^{26}$Al was extinct. In this case, dating these meteorites with internal isochrons is more appropriate. Currently, only a few studies have investigated internal isochrons in suitable eucrites [5, 7].

We performed mineral separation on three eucrites: Y-792510, a highly metamorphosed eucrite [8], Y-793591, an basaltic eucrite and Y-980433, a cumulate eucrite. Three different mineral fractions were obtained: plagioclase, pyroxene and a mixed fraction. Previous ages calculated on those three eucrites were anchored to the ages of two well-known CAIs. However, recent studies have shown that not all CAIs have the same age [9-11]. Internal isochrons on Y-792510, Y-793591 and Y-980433 eucrites indicate an age of 4558.36 (±0.97), 4562.02 (±0.83) and 4558.61 (±0.48) million years (Ma) respectively when using the Efremovka (E60) CAI age [9] as the anchor value. If we use the Allende type B CAI as the anchor value [11], the eucrite ages are older, giving ages of 4559.34 (±1.01), 4562.99 (±0.87) and 4559.58 (±0.54) Ma respectively.

Independent of anchor issues, these results can be interpreted in terms of magmatic activity on 4-Vesta. The age obtained on the Y-793591 eucrite is similar to the age obtained on the whole rock isochrons (4563.23 ± 1.01 Ma anchored with E60 CAI) and corresponds to the crystallization of this eucrite. The younger age obtained on Y-980433 cumulative eucrite indicate that some inner parts of 4-Vesta took ~ 7 Ma to cool below the closing temperature of the Al-Mg isotopic system. In the case of the highly metamorphic but non-cumulative Y-792510 eucrite, the younger age could correspond to an episode of metamorphism that disturbed the $^{26}$Al-$^{26}$Mg isotopic system. This study reveals a complex magmatic history on 4-Vesta, even though better constrained anchor values are needed.