Establishing conclusive evidence of hydration on solar system bodies is a key step in gaining a better understanding of our solar system’s evolution and present composition. This pursuit should not only be focused on planetary scale objects, but also on minor planets and asteroids.

**Background**

Vesta’s Oppia crater sits along the southern edge of a large depression within an area of Vesta believed to be devoid of any noteworthy hydration features [1]. However, Oppia crater itself and its associated ejecta have a strong hydration feature which has not been well understood [2]. The question the authors hope to answer is how Oppia crater developed this perplexing hydration feature.

**Materials and Methods**

To investigate Oppia crater’s hydration feature, an analysis was conducted of the 2.8µm absorption band depth which is heavily absorbed by water molecules and hydroxyl (OH⁻) [3] through Arizona State University’s JMARS software [4] to develop surface plots directed radially inward from Oppia crater’s rim to its center. An additional analysis compared Oppia’s 2.8µm surface hydration to the subsurface hydrogen abundance inferred from neutron measurements. This was done to delineate between hydration in the first few millimeters of regolith and deeper-seated hydration.

**Results**

Spectral analysis of Oppia crater showed a correlation between the hydration feature and proximity to the crater. Displaying an increase along with elevation to the crater rim. Comparative analysis of surface and deep hydration (Figure d.) shows that Oppia crater’s hydration feature is strongest close to the surface. Suggesting an impactor deposited hydrated material as ejecta over the region which lacked previous hydration.

**Conclusions**

Our results found that the inequal distribution of ejecta along Oppia crater’s northwestern region is best explained by an oblique impactor, as these are the most common impact events, however further impact modeling is needed to verify this. As Oppia crater’s hydration feature is within the first few millimeters, we found this to be best explained by the region around Oppia lacking hydration prior to the impact, which indicates this feature was formed from a hydrated impactor. This is evident because if Oppia crater had an endogenous hydration feature, then the basin of the crater would likely have a stronger hydration feature; however, its feature is only observed within the ejecta. Oppia crater has been shown to have a unique hydration feature that deserves further scientific exploration. Future investigation to determine the source of Oppia crater’s hydration may focus on surveying craters near to Oppia of similar depth in order to determine if the region around Oppia has an endogenous hydration feature which was exposed by impacts.

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**Author Contributions**

Dominic Alfinito developed the research topic, conducted the data analysis, and designed this poster. Dr. Parvathy Prem provided data sets, research sources, feedback, and editing recommendations.