Beyond data discovery - enhancing space physics VOs with analysis and visualization capabilities

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Emerging VOs in the space physics community are now expected to make great strides in assisting scientists with the difficult task of discovering increasingly diverse and distributed data. With the data discovery hurdle now nearly behind us, the next and larger hurdle of data unification looms ahead. How can the many diverse resources discovered by a VO be analyzed in a single context? We present a mechanism for efficiently unifying datasets which contain similar science content but have different format and access characteristics. The focus of our technique and of this paper is the use of what we call data interfaces, which capture the semantic content for each space physics science data type as an abstract application programming interface (API). We present the core motivations behind the use of data interfaces, as well as an existing implementation called DataShop (http://sd-www.jhuapl.edu/datashop) which currently offers analysis and visualization capability for many space physics datasets.