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Marcella Massardi - The ALMA Science Archive development and the ARI-L project

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In the ALMA 2030 development roadmap a crucial role is assigned to the evolution of the ALMA Science Archive to improve the user experience and maximize the scientific exploitation of ALMA data. To date, the Archive accounts for 10 cycles of data summing up to 1.4 PB of raw data and images representative of the data content that cover all the possible science categories from solar observations to cosmology. Most of the data are still unpublished: the ALMA Science Archive is a gold mine for archival users! The expected telescope upgrade will constitute a huge challenge in the archival data management. In view of the next decade telescope development, several upgrades have already been applied to improve the Archive features and offer easy access and experience to the miners. In this talk I will present some of the already available features and examples of their application to science cases. In particular, I will focus on the results of the Additional Representative Images for Legacy (ARI-L) project that has been a European Development project for ALMA Upgrade leaded by the Italian node of the EU ARC. It increased the legacy value of the ALMA Science Archive by bringing the reduction level of ALMA data from Cycles 2-4 close to that of data from more recent Cycles processed for imaging with the ALMA Pipeline. The project produced, assessed the quality of, and delivered to the ALMA Science Archive more than 300000 images for more than 88.5% of the observational datasets from Cycles 2 to 4 processable with the ALMA Pipeline that were missing pipeline-generated images. ARI-L products are certified for quality and can be downloaded from the ALMA Science Archive as “external products”. The ARI-L project documentation and website are publicly available through the ALMA science portal (<https://almascience.org/alma-data/aril>).