

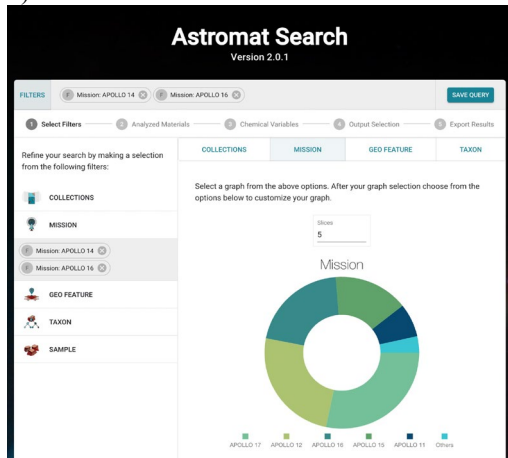
**MAINTAINING MICROSERVICES: APPLICATIONS FOR THE ASTROMATERIALS DATA SYSTEM**

J.D. Figueroa<sup>1</sup>, K. Lehnert<sup>1</sup>, P. Ji<sup>1</sup>, L. Profeta<sup>1</sup>, J. Mays<sup>1</sup>, A. Johansson<sup>1</sup>, L. Song<sup>1</sup>

<sup>1</sup>Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, United States

**Introduction:** The Astromaterials Data System (Astromat) team continues to improve on developing a micro-service architecture as an evolution from multi-layered monolithic legacy applications. In doing so, a reduction in complexity and an ease for scalability, has given the team an opportunity to focus on enhancing user interfaces that place the value of users and communities at the forefront. This presentation will discuss the ongoing challenges and successes in allocating resources to user experience and usability for research applications.

**A Description of Our Current System:** AstroMat is a comprehensive data system for laboratory analytical data generated by the study of astromaterials curated at the NASA Johnson Space Center<sup>[1]</sup>. It is designed as an ecosystem of interconnected applications that provide human- and machine-readable interfaces to the data gathered and managed in AstroMat’s databases<sup>[2]</sup>. Astromat uses an API-driven architecture with isolated applications serving as independent points of contact—with each serving a distinctive purpose. These applications include interfaces for: searching, contributing, exploring, and analyzing data (See Figure 1, for example).

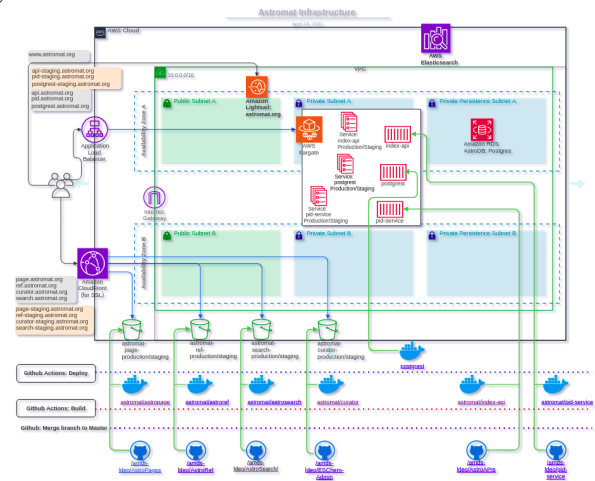


**Figure 1: Search Application, 1 of 5 of the current microservices used by Astromat.**

**Successes and Ongoing Challenges:** Working across applications has presented successes in (1) application single responsibility; (2) distributing levels of abstraction while optimizing workflows; (3) ease of usage and management of modular applications; (4) synchrony with agile development; and (5) freedom to introduce new technologies for independent services.

While the successes are meaningful, the challenges are also worth considering. These are: (1) deviation away from a focused development on a singular technology stack; (2) focused away from a singular de

ployment process; (3) maintaining applications across multiple applications can be duplicative; (4) possible points of failure and thus multiple sources of adaptation; and (5) cost and complexity increases with growing number of services.



**Figure 2: API-based Infrastructure sustaining modular (containerized) applications**

**Conclusion:** Although challenges await at every point of migration, technologies must continue to adapt to meet the novel needs of their communities. Astromat is doing this with a central focus on data interoperability, management and usability.

**References:**

[1] Lehnert, K., Ji, P., Mays, J., Figueroa, J. D., Johansson, A., Profeta, L., Song, L., and Morrison, S. (2020) *The Astromaterials Data System: Advancing Access to Past, Present, and Future Lab Analytical Data of NASA’s Astromaterials Collections*, *European Science Congress*, EPSC2020-918.  
 [2] Ji, P., Lehnert, K., Evans, C. A., and Zeigler, R. A. (2018) *AstroDB- A Data System for Analytical Data of extraterrestrial samples*, *American Geophysical Union, Fall Meeting 2018*, abstract #IN31A-08.