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QUESTIONS ON THE ASTROPHYSICAL DATABASES IN THE US

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Abstract. A forum for discussion on the issue of astronomical and astronomy related databases in the United States was held during the SF2A 2025 conference. The aim of this forum was to raise awareness among the astronomical community of the imminent danger threatening several databases used by astronomers, due to attacks on several scientific institutions in the United States, which could lead to more difficult or even closed access to several important databases.

Keywords: Databases, Spectroscopy, Space missions

1 Introduction

Institutional attacks on science in the United States reached alarming levels in the summer of 2025 (Garisto 2025): layoffs of federal research agency employees (particularly at NASA), termination of ongoing contracts for postdocs and doctoral students, restrictive visa policies, etc. Although astronomy is not the primary target, with climatology, biological sciences, and humanities being the most affected, drastic budget cuts at several American universities (Harvard, Columbia, etc.) raise fears of repercussions on support for important databases. In addition, drastic cuts in the 2026 budgets of scientific agencies (National Science Fundation, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, etc.) raise fears of considerable losses in funding for teams in all fields – it should be noted that many NSF contracts also involve Canadian teams, which will also be affected.

2 The challenge of databases at the French and international levels

Despite their strategic importance, databases, like laboratory research in astrophysics more broadly, unfortunately do not receive sufficient support in French astrophysics research to fully meet their specific needs. The reason for that is a relatively low scientific visibility in institutional communications, with lower recognition of support for research careers (promotions, recruitment) or project-based research (the ANR, Agence Nationale de la Recherche, in particular). The CNAP's (Conseil National des Astronomes et Physiciens) National Observation Actions framework is a notable exception, offering a framework that provides valuable human resources support through the service tasks of astronomers –however, the dedicated budget remains modest, and the lack of engineer support staff is worrying for the sustainability of certain databases – *e.g.* the GEISA database (Delahaye et al. 2021). The IAU Laboratory Astrophysics Activities relevant to the IAU Commission B5 has reported in its General Assembly in 2022 a large panorama of the data available to the community (Dubernet et al. 2024). A 2024 NSF report, prior to today's problems, available on the NSF website (Ziurys et al. 2024) provides a global overview of the situation in the fields of atomic and molecular spectroscopy, as well as nuclear physics and solid-state physics. The report estimates that the United States accounts for approximately 50% of these databases.

3 A list of the various databases and domains affected by threats in the US

- *Atomic spectroscopy* (Ralchenko & Kramida 2020): the NIST atomic spectroscopy team has been shut down at NIST in February 2025, but is currently being taken over temporarily by Goddard Space Flight Center. The database is still online at present, but its future remains fragile.

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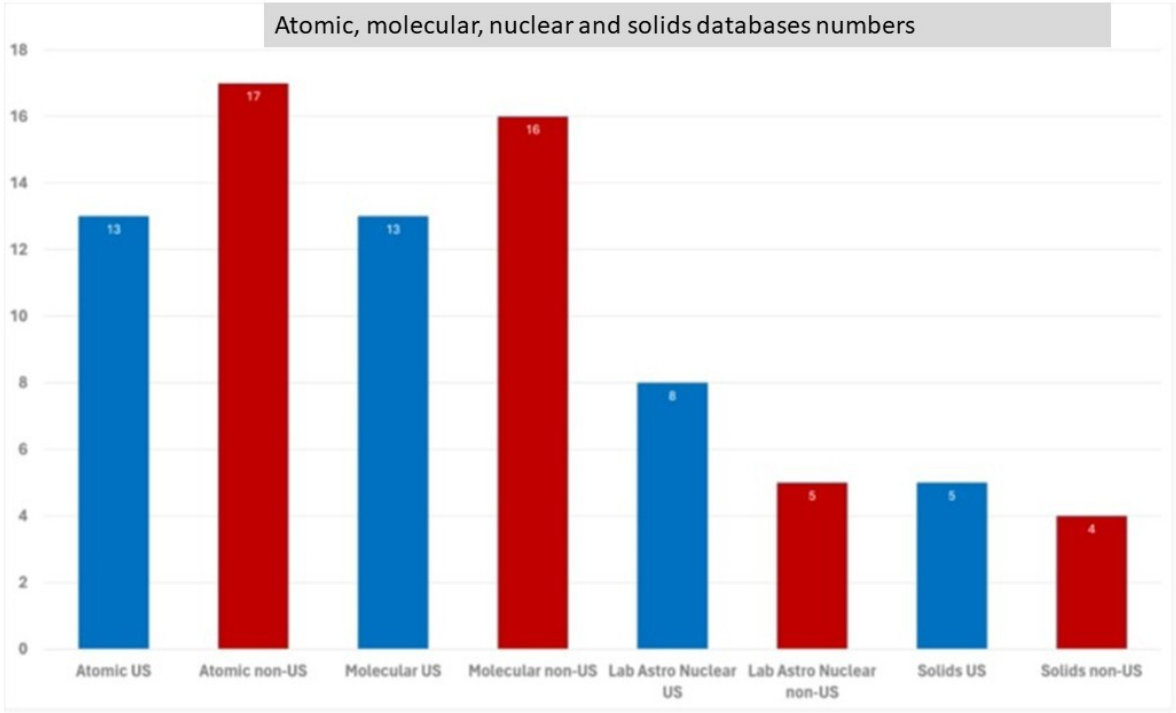

Fig. 1. *The number of existing databases per laboratory astrophysics subject area at US (in red) and non-US institutions (in blue). Figure from (Ziurys et al. 2024)* `https://nsf-gov-resources.nsf.gov/files/latf-report-r.pdf`

- *Molecular spectroscopy* (Gordon et al. 2022): HITRAN - developed at the Center for Astronomy under the auspices of Harvard University and the Smithsonian Institute. The molecular spectroscopy team led by Iouli Gordon has made the Hitran database available online. It is of primary importance for astronomers studying planetary and exoplanetary atmospheres (including Earth), and summarizes the efforts of decades of scientists in astronomy and spectroscopy.
- *NASA archives : Planetary Data Science (PDS), National Space Science Data Center (NSSDC), Mikulski Archive for Space Telescope (MAST)*: these very large archives are still open access today, but could be threatened in the long term. Awareness has been raised at ESA level, and discussions must be held at European level to find solutions (a communication during the SF2A workshop has been made for ESA archives: the ESA Astrophysics Archive User Group has recommended that ESA make a copy of data of interest).
- *Shared-access software*: one example mentioned during SF2A forum is the Common Astronomy Software Applications from NRAO (National Radio Astrnomy Observatory), which is the main software library for processing and analyzing radio interferometric data, particularly at the VLA. Other examples are software provided by NASA centers (GSFC, JPL) for ephemeris or exoplanets databases.
- *Astrophysics Data System (ADS)*: operated by Harvard's Center for Astrophysics, although no restrictions have been noted to date, this database of scientific publications is a daily tool for all astronomy researchers, and its deterioration would be a considerable loss for astronomy. Recent news is that ADS will abandon SciX (the upgrade for all areas of physics, and most of the associated new developments). Incidentally, they will not be able to continue maintaining the UAT (Unified Astronomy Thesaurus: `https://uat.astrothesaurus.org` (Frey & Accomazzi 2018).

- *ArXiv*: a pre-publication database operated by Cornell University, could also be at risk in the medium-long term.

A survey by the French Ministiry of Education and Research was circulated recently, and can be used as a basis for identifying risk situations. A similar list, limited to planetary science but with a European scope, has been distributed on OpenPlanetary/Slack, Europlanet/Discord, and Planetary Research/Mattermost: `https://share.obspm.fr/s/8HoHXPMZKgRgG4z`.

4 Situation in France, and possible responses

- Requests to national programs, possibly through annual calls for research proposals from CNES (to be discussed with CNES). A database component could be included in a general support framework.

- Involvement of CNAP National Observation Services in ANO5 (Service Tasks), CDOS (Observation and Service Data Centers), Research Infrastructures (DataTerra and Centre de Données Astronomiques de Strasbourg for the CNRS Institut National des Sciences de l'Univers)

- Space databases (space physics, space meteorology): the Centre de Données de Physique des Plasmas (CDPP) could play a role to be defined in this context. For larger databases (planetology, small bodies or space missions), apart from an alert system, international coordination (CNES/ESA) would be required given the size of the databases.

- Targeted actions within teams (outside SNO)

Three successive stages are to be expected in order to begin to bring answers to the difficulties :

1. Level 1: preservation with preventive storage at teams level : this stage is currently reachable with the involvement of the community - a coordination of the efforts is needed to avoid unnecessary duplication.

2. Level 2: provision of access with minimal interfaces/expertise at national level- this task would require in general agreements with original providers, according to the planned licensing agreement.

3. Level 3: mirror & interfaces with standard interfaces/expertise at national and international levels: this seems out of reach with the current budget devoted to archive science, and a dedicated effort from agency support would be needed to engage this task.

Step 1 is an emergency action. It is essential to keep records of who did what, where the data is located, and to limit duplication. The IVOA registry could make it possible to keep these records (but this remains to be confirmed). Beyond simple preservation, all these actions require human resources and expertise, and therefore dialogue with the supervisory authorities to identify needs and implement them.

5 Conclusions

While the assessment of database issues in astronomy with a US component has begun to be developed, the problems raised are far-reaching and will require significant international mobilization to be addressed effectively. The awareness of the community, demonstrated in particular at the SF2A 2025 workshop in Toulouse, must be translated into concrete action at the national level implying regulatory bodies, international meetings, and dissemination of information. Constructive discussion can be fruitful only if managed at a national and international level, taking into account a moving and difficult context, in particular for international collaborations. The implication of science organization at political level is therefore essential in order to obtain a collective and coordinated response.

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