

FOREIGN NATIONALS EMPLOYED AND STUDYING IN THE FIELD OF PLANETARY RESEARCH IN THE UNITED STATES, AND RECOMMENDATIONS FOR SUPPORTING THIS GROUP.

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Overview – Numbers of Foreign Nationals: The US is a world-leader in immigrant opportunities, and thus, foreign nationals (FNs) make up a significant proportion of those employed and studying in the US. A FN is a person without US citizenship or lawful permanent residency (LPRs). In the 2019–2020 academic year, there were 1,075,496 international students studying at US colleges/universities [1].

Context – FN Contributions: Immigrants to the US have earned 40% of the Nobel Prizes won by researchers at American institutions in chemistry, medicine and physics since 2000 [2]. Further, ~25% of the founders of the \$1 billion US startup companies came to the US as international students [2]. Moreover, for every 8 international students, ~3 US jobs are created/supported in supporting industries [1].

In ‘AGU supports international students’ (2020), the American Geophysical Union (AGU) stated that “By encouraging diversity in everything from cultures to experiences, society benefits... Our science is better with more diverse viewpoints. Global collaboration is essential...” [3]. The American Astronomical Society (AAS) issued a statement on visa suspensions (2020): “The innumerable contributions that foreign-born individuals make to the culture and scientific progress of the United States should be self-evident to even a casual observer. We can’t imagine a day without positive and fruitful interactions.” [4].

Demographic Data – Overall Trend: The authors searched for data about the numbers of FNs engaged in planetary research as employees of, or students at, US institutions. We could find no overarching source of such data. While the ‘2011 Survey of the Planetary Science Workforce’ recorded various demographic data, national origin/citizenship was not included [5]. In 2018, the AGU published some membership demographic data (gender and career stage), and the continent of origin of the 2017-2018 Union awards/medals/prizes selection committees, but did not include information about FNs in the US [6]. We also found no data about FNs in DPS meeting surveys [7].

Thus, we sourced data from different individual sources on an ad hoc basis. While this data lacks standardization, noticeable trends do appear:

- The proportion of FNs tends to increase from undergraduate to graduate level.

- The proportion of FNs peaks at the postdoc level. In some institutions, the proportion of FN postdocs is greater than US persons postdocs.
- The proportion of FNs decreases at faculty level, and we interpret based on our lived experience that this is due to: (1) by the time FNs reach faculty level, many have gained LPR status and/or citizenship, which are processes that take many years, and (2) other FNs in pre-faculty positions, such as postdocs, leave the US for opportunities in another country or their home country.

Demographic Data – Issues: As discussed in the previous section, the demographic data is lacking in standardization and availability. Some institutions had a wealth of data easily accessible, others had some data available on request and in others data were not available. Thus, there is a need for the compilation and dissemination of centralized and standardized data that is collected from the entire planetary community. The first step to better supporting and serving the FN population is to know who is a part of the community, and to get a clearer picture of how many members of the US planetary research workforce are FNs. From the data we have been able to acquire, and from our own lived experience, we predict that a significant portion of the workforce are FNs, especially when former FNs are taken into account.

Effects of the COVID-19 Pandemic: Multiple challenges have arisen for all members of the planetary workforce because of the pandemic. The FN subset of this community is no different. In particular, some FNs, particularly those from Asia, face stigma and harassment related to the pandemic. In 2019/2020, the percentage change of total international scholars in the US decreased by 9.6%, and in 2020/2021, there was an unprecedented decrease of 30.7% (Fig.) [8]. We interpret that this decrease is mainly due to the pressures and negative effects of the pandemic.

For visa holders, visa applicants, and green card applicants, pre-existing concerns about application processing times and eligibility requirements were intensified by delays due to pandemic-related pressures on the immigration workforce, and by the issuance of a series of orders, proclamations and rules by the US government that negatively impacted FNs in the US

[e.g., 4]. While an administration change and court rulings have negated many of these, the immigration landscape continues to be complex, expensive and subject to change with little notice.

Travel restrictions and bans also put immense stress on FNs in the US. It continues to be difficult for FNs to visit family members outside of the US, even in emergency situations. Anecdotal evidence indicates that a prevalent concern amongst FNs is how travel restrictions (e.g., mandatory quarantines), and the related issues of maintaining employment and immigration status, would affect their ability to visit a close family member abroad with a serious illness.

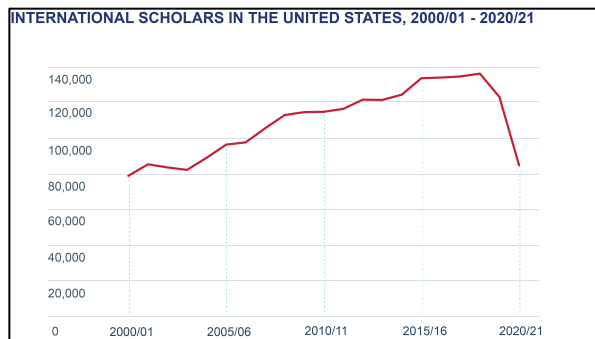


Fig.: International scholars in the US, 2000-2021 [8].

Recommendations: In order for the US planetary workforce to keep attracting and retaining FN talent, especially in a world still largely consumed by the COVID-19 pandemic, we suggest how institutions, organizations and individuals can continue, and enhance, their support of FNs:

1. *Evidence.* As demonstrated by our search for demographic data, there is a great need for the compilation and dissemination of centralized and standardized data. This is particularly timely in the context of the unprecedented decrease in total international scholars in the US (Fig.) [8]. Was there a similar dramatic decrease in the planetary workforce, and if so, is this number recovering in 2022?

Broad questions about immigration status (e.g., Are you a foreign national employed by/studying at a US institution?) could be included in surveys about the demographics of the planetary research workforce, which are already collecting data about gender, race, ethnicity, etc. For example, conference surveys and/or the demographic questions that are included in NASA NSPIRES could include broad questions about current and past immigration status. Survey questions that elucidate the particular issues faced by FNs would also be particularly helpful to those seeking to support this group. Surveys would need to explain how this potentially sensitive data would remain anonymous.

2. *Engagement.* We support institutions continuing their advocacy on behalf of FNs, and suggest it be

advertised even more widely amongst the planetary community. We also encourage institutions to ensure that all of their employees (especially those in management) understand the laws and rules relating to FN access (both physical and information access) to maximize both law/rule adherence and FN inclusion. We also support the establishment, or expansion, of international offices, which provide vital expert assistance to FNs about complex immigration policies, and focused employee/student groups, which provide advocacy and support networks.

Moreover, we ask the organizers of many of the new initiatives to embed early career scientists in active NASA mission teams to reconsider only opening these programs to US citizens and LPRs. These programs are excellent opportunities for early career scientists to get unparalleled experience and contacts with active NASA missions, and the exclusion of FN participants disadvantages the FN community, many of whom will stay to work in the US (see Demographic Data). While we acknowledge the significant concerns about sharing restricted information (e.g., ITAR) with FNs, in the authors' experiences, ITAR-restricted information is rarely shared at science team meetings, and agreements can be put in place for FNs to attend. We understand that this would place additional administrative burdens on the program organizers, and suggest that the number of FN participants could be capped to account for this additional work effort.

3. *Edicts.* Official statements from societies such as the AGU and AAS [e.g., 3, 4], serve several purposes: (i) they inform their audiences about the issues faced by FNs; (ii) they provide information about how individuals can support the cause of FNs; and (iii) by acknowledging the issues FNs face in a broad forum, they provide support and exposure to the FN community. We recommend such statements continue to be issued, and that they be shared even more widely.

4. *Empathy.* We ask that organizations, institutions and individuals within the planetary research community have empathy for their FN colleagues, and a general understanding of the issues faced by FNs in planetary research in the US. To learn about these issues, we recommend visiting the resources referenced here, and asking your FN co-workers/students how they can best be supported.

References: [1] NAFSA (2020) <https://tinyurl.com/y4bp2f6p>. [2] NAFSA (2018) <https://tinyurl.com/yxkdw5pp>. [3] Lozier, S. and Bell, R. (2020) <https://tinyurl.com/y6geca06>. [4] Szkody, P. (2020) <https://tinyurl.com/y4c9497b>. [5] White, S., Raymond, Y. and Ivie, R. <https://tinyurl.com/y4vx5r4h>. [6] AGU (2017/2018) <https://tinyurl.com/y6ts7v3g>. [7] DPS Subcommittee on Professional Culture & Climate (2020) <https://tinyurl.com/y3nswsdp>. [8] Institute of International Education (2021) <https://tinyurl.com/2y65jemh>.