

**FOREIGN NATIONALS EMPLOYED AND STUDYING IN PLANETARY RESEARCH IN THE UNITED STATES, AND RECOMMENDATIONS FOR SUPPORTING THIS GROUP.** J.E.C. Scully<sup>1</sup>, G. Cerretti<sup>1</sup>, A. Viswanathan<sup>1</sup>, J.K. Steckloff<sup>2</sup>, C. Richey<sup>1</sup>, A. Probst<sup>1</sup>, G. Poh<sup>3</sup>, M. Melwani Daswani<sup>1</sup>, C.L. McLeod<sup>4</sup>, X. Mao<sup>5</sup>, R. Lillis<sup>6</sup>, N. Kumari<sup>7</sup>, H. Kraus<sup>1</sup>, T. Hoogenboom<sup>8</sup>, H. Hay<sup>1</sup>, T.A. Goudge<sup>9</sup>, E.C. Fayolle<sup>1</sup>, C.M. Elder<sup>1</sup>, S. Diniega<sup>1</sup>, S. Daftry<sup>1</sup>, P.K. Byrne<sup>10</sup>, S.M. Brooks<sup>1</sup>, J.G. Blank<sup>11</sup>, P. Becerra<sup>12</sup>, S. Bandyopadhyay<sup>1</sup>. <sup>1</sup>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA (jennifer.e.scully@jpl.nasa.gov), <sup>2</sup>Planetary Science Institute, Tucson, AZ, USA, <sup>3</sup>Goddard Space Flight Center, Greenbelt, MD, USA, <sup>4</sup>Miami University, OH, USA, <sup>5</sup>Washington University, St. Louis, MO, USA, <sup>6</sup>University of California Berkeley, CA, USA, <sup>7</sup>Stony Brook University, NY, USA, <sup>8</sup>Astra Nova School, Rancho Palas Verdes, CA, USA, <sup>9</sup>The University of Texas at Austin, TX, USA, <sup>10</sup>North Carolina State University, Raleigh, NC, U.S., <sup>11</sup>Blue Marble Space Institute of Science, Livermore, CA, USA, <sup>12</sup>University of Bern, Bern, Switzerland. (Reverse alphabetization of co-authors from third onwards)

### Overview and Context:

**Numbers of foreign nationals (FNs).** The United States is seen as a world-leader in immigrant opportunities, and thus, FNs make up a significant proportion of those employed and studying in the U.S. A FN is a person without U.S. citizenship or lawful permanent residency (i.e., green card holders, who share many, but not all, rights with citizens). In the 2019–2020 academic year, there were 1,075,496 international students studying at U.S. colleges/universities [1]. For example, in 2005, 90% of Asian (by race) science and engineering postdoctoral assistants in the U.S. were FNs [2].

**FN contributions.** The NAFSA: Association of International Educators reports that immigrants to the U.S. have earned 40% of the Nobel Prizes won by researchers at American institutions in chemistry, medicine and physics since 2000 [3]. In 2016, all U.S. winners of the economics and science Nobel Prizes were immigrants [3]. Further, ~25% of the founders of the \$1 billion U.S. startup companies came to the U.S. as international students [3]. Moreover, for every eight international students, approximately three U.S. jobs are created/supported in higher education, accommodation, dining, retail, transportation, telecommunications and health insurance [1]. As such, the ~1 million international students studying at U.S. colleges and universities in 2019–2020 contributed ~\$39 billion to the U.S. economy, and supported ~416,000 jobs [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. We think bigger and achieve better by working together. Our science is better with more diverse viewpoints. Global collaboration is essential...” [4]. The American Astronomical Society also issued the statement ‘President’s Message 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.” [5].

**FNs in Planetary Research:** In compiling this abstract, we searched for demographic data about the numbers of FNs engaged in planetary research either as employees of, or students at, U.S. institutions. We found

a National Science Foundation (NSF) National Center for Science and Engineering Statistics (NCSES) dataset, which showed that in 2018 and 2017, the majority of postdocs and graduate students working in, or studying, science and engineering disciplines related to planetary studies and space research were FNs [6] (Fig. 1). However, this data does not specifically list planetary research, it only appears to be available for 2018 and 2017, and does not include professional employees [6].

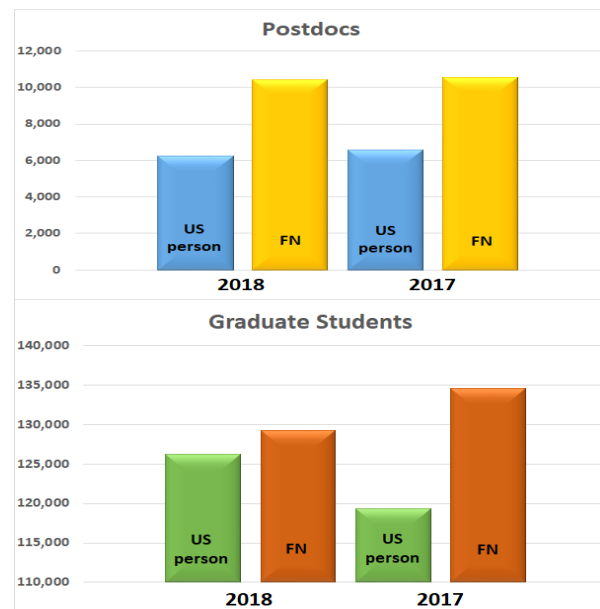


Fig. 1: NSF-NCSES data comparing the number of postdocs and graduate students that are U.S. persons (citizens/green card holders) or FNs (foreign nationals).

While the ‘2011 Survey of the Planetary Science Workforce’ recorded data about gender, race and ethnicity, questions about national origin and citizenship did not appear to be included [7]. In 2018, the AGU published 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 U.S. [8]. We found no data about FNs in the surveys following the Division of Planetary Sciences (DPS) meetings, which are analyzed by the Subcommittee on Professional Culture and Climate [9].

If any readers of this abstract are aware of demographic data about FNs employed by and/or studying at U.S. institutions, we would be grateful to hear from you!

**Current issues faced by FNs:** The year 2020 was incredibly difficult for the planetary research community, because of professional and personal challenges resulting from the COVID-19 pandemic and pressing social justice issues. The FN subset of this community was no different. Moreover, some FNs, particularly those from Asia, faced stigma, negative associations, and harassment related to 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 U.S. government that negatively impacted FNs in the U.S. [e.g., 5]. While an administration change [e.g., 10] and court rulings [e.g., 11] may negate many of these orders, proclamations and rules, the immigration landscape continues to be complex, expensive and subject to change with little notice.

Travel restrictions and bans [e.g., 12, 13] have put immense stress on FNs working and/or studying in the U.S. While non-essential travel is not currently advised for any trips (domestic/international), travel restrictions and bans make it especially difficult for FNs to visit family members outside of the U.S. Anecdotal evidence indicates that a prevalent concern amongst U.S.-based FNs is how the current landscape of travel restrictions and bans, and the associated effects related to maintaining employment and immigration status, would affect their ability to visit a close family member in the event of a serious illness. Even in the absence of emergency situations, many FNs have been isolated from their immediate families overseas since the start of the pandemic, with no near-term prospect for international visits becoming commonplace once again.

**Recommendations:** We suggest below how institutions, organizations and individuals can continue to, and enhance, their support of FNs:

**Evidence:** As demonstrated by our search for demographic data about the numbers of FNs engaged in planetary research either as employees of, or students at, U.S. institutions, there is a great need for the compilation, and/or dissemination, of such data. Broad questions about immigration status (e.g., Are you a foreign national?) could be included in surveys about the demographics of the planetary research workforce, which are already collecting data about gender, race, ethnicity, etc. In addition to demographic data, survey questions that elucidate the particular issues faced by FNs would be particularly helpful to those seeking to support this group. Any such survey would need to explain how answers would remain anonymous, and

provide other such assurances about the collection of such potentially sensitive data.

**Engagement:** We support the continued advocacy by institutions and organizations on behalf of FNs, and suggest it be advertised even more widely amongst the planetary research community. We also encourage institutions to ensure that all of their employees (especially those in management) understand the laws, rules and policies relating to FN access (both physical and information access) to maximize both law/rule/policy adherence and FN inclusion. We also support the establishment, or expansion, of 'International Offices' within individual institutions, which provide vital expert assistance and advice to FNs about complex immigration policies and applications.

**Edicts:** The statements from the AGU and AAS [e.g., 4, 5], and from many other professional societies and institutions, serve several purposes: (1) they inform their audiences about the issues faced by FNs; (2) they provide information about how individuals can support the cause of FNs; and (3) by acknowledging the issues FNs face in a broad forum, they provide support and exposure to the FN community. We recommend the issuance of such statements be continued, and that they be disseminated even more widely.

**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 U.S. To learn about these issues, we recommend visiting the resources referenced below, and/or asking your FN co-workers/students if there is anything they would like to share about their experiences, and how they can best be supported.

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**References:** [1] NAFSA (2020) <https://tinyurl.com/y4bp2f6p>. [2] Nelson, D. J. and Brammer, C. N. (2007) <https://tinyurl.com/yvxb5yqc>. [3] NAFSA (2018) <https://tinyurl.com/yxkdw5pp>. [4] Lozier, S. and Bell, R. (2020) <https://tinyurl.com/y6gecaof>. [5] Szkody, P. (2020) <https://tinyurl.com/y4c9497b>. [6] NSF (2017–2018) <https://tinyurl.com/y45wbdg7>. [7] White, S., Raymond, Y. and Ivie, R. <https://tinyurl.com/y4vx5r4h>. [8] AGU (2017/2018) <https://tinyurl.com/y6ts7v3g>. [9] DPS Subcommittee on Professional Culture & Climate (2020) <https://tinyurl.com/y3nswsdp>. [10] Presidents' Alliance on Higher Education and Immigration (2020) <https://tinyurl.com/y2tkplov>. [11] Presidents' Alliance on Higher Education and Immigration (2020) <https://tinyurl.com/yvb97mqc>. [12] NAFSA (2020) <https://tinyurl.com/y26kn6he>. [13] Todoran, C. and Peterson, C. (2019) <https://doi.org/10.1177/1028315319861344>.