

GROWTH

June—September 2016

Year 1

Global Relay of Observatories Watching Transients Happen



Caltech

PROJECT OVERVIEW

In 2015, the California Institute of Technology received funding for a Partnerships for International Research and Education (PIRE) from the National Science Foundation (NSF) to develop the Global Relay of Observatories Watching Transients Happen (GROWTH) project. The GROWTH project is intended to advance knowledge and research in astronomy and astrophysics; contribute to education, training, and development of the STEM workforce; and create a collaborative network of scientists and facilities that catalyzes educational and scientific achievements in astronomy and astrophysics.

This newsletter presents information pertaining to the first year of the GROWTH project, including:

- ◆ Year 1 GROWTH Project Participants
- ◆ Year 1 GROWTH Publications
- ◆ 2016 International Graduate & Postdoctoral Internships

Below are the GROWTH project goals:



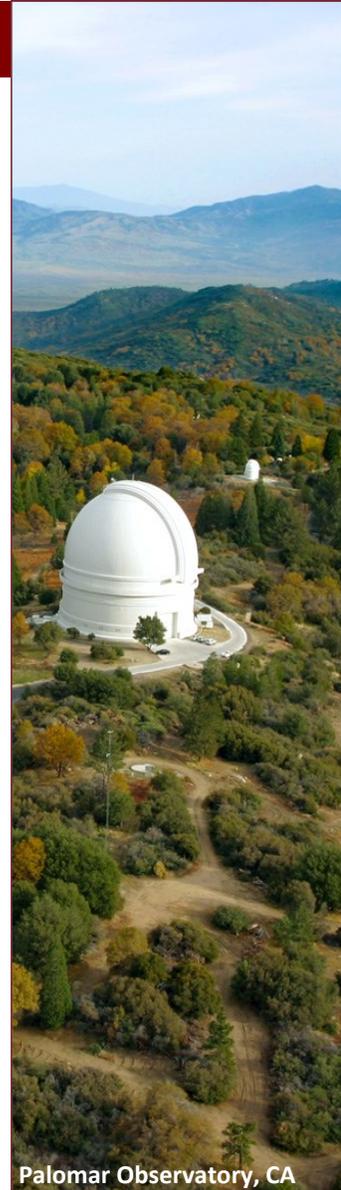
**Goal 1:
Research**



**Goal 2: Education &
Workforce Development**



**Goal 3: Collaboration
Capacity**



Palomar Observatory, CA

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How can the project strengthen potential impact?

How can the project encourage more interinstitutional collaborations (i.e. internships, educational collaborations) both within and outside of participant's country of origin?



YEAR 1 GROWTH PROJECT PARTICIPANTS

The GROWTH project is composed of members from seven nations and thirteen institutions.

Quick facts about project participants

64 Participants	34% Female	33% Graduate students	43% First generation college students	25% From Caltech
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GROWTH Partner Nations

Each partner nation in the project (and that nation's participating institutions) are displayed below. The number of participants from each of the partner nations are also noted.



United States of America (34)
California Institute of Technology (16)
Los Alamos National Laboratory (1)
Pomona College (2)
San Diego State University (3)
University of Maryland, College Park (9)
University of Wisconsin, Milwaukee (3)



Sweden (11)
Oskar Klein Centre,
University of Stockholm



Germany (2)
Humboldt University



India (4)
Indian Institute of Astrophysics (1)
Inter University Centre for
Astronomy and Astrophysics (3)



Japan (9)
Tokyo Institute
of Technology



Taiwan (1)
National Central
University



Israel (3)
Weizmann
Institute of
Science

YEAR 1 GROWTH PUBLICATIONS

Project members publications were used as a proxy measure for assessing international collaborations, showing both frequency of collaboration and extent to which publications involve international partners. In the future, in addition to tracking collaborative publications, the evaluator will assess growth in collaborations through a Social Network Analysis, which will assess the frequency and degree each member of the project is collaborating.

To read the publication network diagram, the partner institutions involved in publications have been mapped on their geolocations. Nodes (dots) depict intuitions and lines depict the collaborations which have occurred between institutions. The more publications on which two institutions have collaborated, the thicker the lines. A color coding for the map is displayed below.

	American Institutions and Intra-American Collaborations
	European Institutions and Intra-European Collaborations
	Asian Institutions and Intra-Asian Collaborations
	American-European Collaborations
	American-Asian Collaborations
	Asian-European Collaborations

YEAR 1 PUBLICATION FINDINGS

- ◆ Stockholm University has frequently and consistently collaborated with institutions in the United States.
- ◆ Institutions in Asia have also frequently collaborated with institutions in the United States.
- ◆ There are lower levels of collaboration between European and Asian institutions.
- ◆ Within the USA, Caltech and University of Maryland have frequently and consistently collaborated together.
- ◆ Taiwanese and German partners are not present in any publication as the projects they are involved in are due to begin in the second year of the project
- ◆ At least one Caltech researcher has collaborated on 20 of the 21 publications.



INTERNSHIP FINDINGS

- ◆ Overall students described their internship experience favorably, especially in regards to its meaningfulness and intellectual growth.
- ◆ The statement “I feel like my contributions made a difference” was rated with the highest level of agreement and importance, with participants, on average, *strongly agreeing* with the statement and rating it as *extremely important*.

2016 INTERNATIONAL GRADUATE & POSTDOCTORAL INTERNSHIPS

PIRE graduate and postdoctoral fellows have opportunities to further their own research knowledge and skills through participation in international research internships with project members. Student internships took place between November 2015 and August 2016. A total of five students participated in the internship program.

Quick facts about internship evaluation respondents



Participant Internship Experiences

To assess progress made towards goal achievement, students rated their agreement with statements regarding their experiences during their internship, concerning meaningfulness of the internships, intellectual growth, and networking opportunities. Students also ranked the importance of these experiences. The table below is organized from the statement with the highest agreement to the lowest agreement. The color coding of ratings is also shown below.

1.00-1.79	1.80-2.59	2.60-3.39	3.40-4.19	4.20-5.0
Strongly disagree	Disagree	Neither disagree/agree	Agree	Strongly agree
Not important	Slightly important	Somewhat important	Important	Extremely important

	Level of agreement	Level of importance
I feel like my contributions made a difference.	4.75	4.25
I had ample opportunities to use my existing skills in practice.	4.75	4.00
I was assigned tasks that were meaningful to me.	4.25	4.25
I gained confidence in doing research in this field.	4.50	4.00
I was exposed to new ideas.	4.25	3.75
I was intellectually challenged.	4.25	3.75
I learned how to conduct scientific research with international collaborators.	3.75	4.00
I gained a passion for doing research in this field.	3.75	3.75
I had opportunities to work with like-minded people.	4.00	3.50
I had ample opportunities for networking.	4.00	3.25
I learned new ways of approaching my work that were specific to the culture I was visiting.	4.00	3.00
I assumed additional responsibility as my experience increased.	3.75	3.00
I gained a global awareness; expanding my worldview.	3.25	3.25
I felt engaged in the local community.	3.25	3.00

OVERALL FINDINGS & RECOMMENDATIONS

Key Findings

- ◆ The GROWTH project consists of thirteen institutions from seven nations. Most of the institutions in the project are based in the USA (6 out of 13). Sixty-four participants have joined the project in the first year, with a quarter of them coming from Caltech (16). Thirty-three percent of the project's participants are graduate students and 34% are female.
- ◆ The project has published 21 journal articles as of September 2016. A Caltech researcher has appeared as a lead author or a co-author on 20 of the 21 publications.. Stockholm has been an active EU co-author in GROWTH publications while this year Germany didn't appear on any paper as a result of a slow start of their project. The same applies to Taiwan whose work in near-earth asteroids is beginning starting year 2 of GROWTH.
- ◆ Stockholm University is the only European institution that has been on publications. There are no Taiwanese or German researchers present on any of the publications in Year 1. In the USA, Caltech and the University of Maryland have collaborated closely on journal articles. During Year 1, all 21 publications were published in six journals.
- ◆ The most impactful journal the project published in was the *Astrophysical Journal*, which has a Normalized Eigenfactor of 58.3, which translates to it being 58 times as influential as the average journal. *The Astrophysical Journal* is considered the most influential journal in the field of astronomy and astrophysics.
- ◆ Four graduate students and postdocs participated in international research internships through the project and responded to the evaluation survey. These students were mostly female (75%) and were researching newborn supernovae (75%).
- ◆ Students agreed that they had “ample opportunities to use existing skills” and “gained confidence in doing research.”
- ◆ Students neither disagreed nor agreed with statements relating to global awareness or engagement to the local community in which they were studying.
- ◆ Overall, a majority (94%) of students found internships “met their expectations,” “met their needs,” “was a rewarding experience,” and “was valuable to their academic and professional growth.”

Recommendations

- ◆ Continue recruitment and retention of student participants into the project to help foster and bolster the education pipeline in astronomy and astrophysics research.
- ◆ Continue to encourage more participation from European and Asian institutions in project publications. Target high impact journals (as defined by Eigenfactor analysis) to publish research.
- ◆ Promote connection between intern's research and GROWTH project research, so student interns understand how their internship research is aligned intern's area of interest.
- ◆ Communicate connection between internships and the larger project, so student interns understand how their role as an intern fits within larger project vision.
- ◆ Ensure interns stay connected to the PIRE project and continue conducting research with PIRE advisors

Elizabeth McGee
Senior Evaluator
emcgee@smartstartecs.com

Tyler Johnson
Evaluation Associate
tjohnson@smartstartecs.com

SmartStart
Evaluation and Research
4482 Barranca Parkway
Ste 220, Irvine, CA 92604
949-396-6053