ALMA Cycle 5: Selection Statistics

Proposal Review Process

A total of 1661 proposals were submitted in response to the ALMA Cycle 5 Call for Proposals. The proposals were reviewed during a meeting in Antwerp (Belgium) on June 18–23. The review committee consisted of 146 Science Assessors grouped into 18 ALMA Review Panels (ARP) that were distributed across five scientific categories:

1. Cosmology and the high redshift universe (4 panels)
2. Galaxies and galactic nuclei (4 panels)
3. ISM, star formation and astrochemistry (4 panels)
4. Circumstellar disks, exoplanets and the solar system (4 panels)
5. Stellar evolution and the Sun (2 panels).

The Review Panels in Categories 1-4 contained eight Science Assessors each, while the Panels in Category 5 contained nine members each. Science Assessors were selected on the basis of scientific specialization while having a regional affiliation that closely matched the nominal ALMA regional shares of observing time. The full list of Cycle 5 Science Assessors is provided in the Appendix.

The 18 Panel Chairs served on the ALMA Proposal Review Committee (APRC) together with the APRC Chair, Anneila Sargent. The Review Panels conducted the initial scientific reviews and recommended which Large Proposals should be further discussed by the APRC. The APRC conducted the final review to recommend which Large Programs should be scheduled.

The Joint ALMA Observatory (JAO) created an observing queue and assigned a priority grade to each proposal after considering the scientific rank determined from the review process, the share of observing time for each region, and scheduling feasibility. Priority Grade A was assigned to the highest ranked proposals. Grade B was assigned to high ranked proposals while maintaining balance of time across Grade A and B. Grade C was assigned to proposals that oversubscribed the time in a configuration by up to 50%.

Proposal statistics

Of the 1661 proposals submitted, 132 received the highest priority of Grade A, 301 received Grade B, and 262 received Grade C. The Grade A and B proposals requested an estimated 3706 h of execution time on the 12-m Array. Together with the estimated 300-400 h of Cycle 4 Grade A proposals that will be carried forward to Cycle 5, this constitutes the 4000 h of 12-m Array time expected to be available for successful executions in Cycle 5.

The titles, investigators, and abstracts of the Grade A and B projects are available from the ALMA Science Portal. Tables 1 and 2 list the number and requested time for proposals grouped by region and science category, respectively. Table 3 lists the number of Grade A and B projects for different proposal types. Various metrics of the proposal data are presented in the figures.

Twenty-two Large Proposals were submitted in Cycle 5. As recommended by the APRC, the following four Large Programs were scheduled for Cycle 5:

1. *ALMA-IMF: ALMA transforms our view of the origin of stellar masses* (2017.1.01355.L)
   PI: Frederique Motte (EU); co-PIs: Adam Ginsburg (NA), Patricio Sanhueza (EA), and Fabien Louvet (CL)

2. *100,000 Molecular Clouds Across the Main Sequence: GMCs as the Drivers of Galaxy Evolution* (2017.1.00886.L)
   PI: Eva Schinnerer (EU); co-PIs: Adam Leroy (NA), Guillermo Blanc (NA), Erik Rosolowsky (NA), Andreas Schruba (EU), and Annie Hughes (EU)

3. *ALCHEMI: the ALMA Comprehensive High-resolution Extragalactic Molecular Inventory* (2017.1.00161.L)
   PI: Franceso Costagliola (EU); co-PIs Nanase Harada (NA/EA) and Jeffrey Mangum (NA)

4. *ALPINE: The ALMA Large Program to INvestigate CII at Early times* (2017.1.00428.L)
   PI: Olivier Le Fèvre (EU); co-PIs: Andreas Faisst (NA), Daniel Schaerer (EU), John Silverman (EA), Paolo Cassata (CL), Lin Yan (NA), Peter Capak (NA), and Matthieu Bethermin (EU)

Collectively these four Large Programs were assigned 281 h on the 12-m Array, 745 h on the 7-m Array, and 927 h on the Total Power Array, which represents nearly 20% of the total observing time (10,000 h) available across all arrays in Cycle 5.

Table 1. Distribution of Cycle 5 proposals by region

	Chile (CL)	East Asia (EA)	Europe (EU)	North America (NA)	Other	Total
Submitted Proposals						
Number of proposals	91	335	695	492	48	1661
12-m Array time (hours)	975	3778	6384	4568	324	16029
7-m Array time (hours)	591	3013	4106	3411	242	11362
Total Power Array time (hours)	307	2939	2391	1893	42	7572
Subscription rate						
12-m Array (4000 h offered)	2.4	4.2	4.7	3.4	N/A	4.0
7-m Array time (3000 h offered)	2	4.5	4.1	3.4	N/A	3.8
Total Power Array (3000 h offered)	1	4.4	2.4	1.9	N/A	2.5
Grade A & B projects						
Number of proposals	49	88	148	142	6	433
12-m Array time (hours)	364	827	1226	1252	37	3706
7-m Array time (hours)	331	450	574	941	4	2299
Total Power Array time (hours)	88	517	506	741	4	1855
Grade C projects						
Number of proposals	13	49	109	85	6	262
12-m Array time (hours)	156	434	819	685	30	2123
7-m Array time (hours)	44	409	675	276	144	1549
Total Power Array time (hours)	75	349	337	160	0	920

Table 2. Distribution of Cycle 5 proposals by scientific category

	Category 1	Category 2	Category 3	Category 4	Category 5	Total
Submitted Proposals						
Number of proposals	386	354	422	354	145	1661
12-m Array time (hours)	4954	3793	3460	2841	981	16029
7-m Array time (hours)	338	2963	7019	570	472	11362
Total Power Array time (hours)	0	2046	5110	136	280	7572
Grade A & B projects						
Number of proposals	100	102	105	85	41	433
12-m Array time (hours)	1045	1110	747	526	278	3706
7-m Array time (hours)	80	1184	797	158	80	2299
Total Power Array time (hours)	0	1113	656	13	74	1855
Grade C projects						
Number of proposals	60	47	81	53	21	262
12-m Array time (hours)	658	447	517	375	126	2123
7-m Array time (hours)	0	193	1091	167	97	1549
Total Power Array time (hours)	0	10	885	0	25	920

Table 3. Number of proposals and Grade A & B projects by proposal type

Proposal Tye	Number Submitted	Number Grade A & B	Acceptance Rate (%)
All	1661	433	26
ACA (Standalone or with 12-m Array)	347	80	23
ACA Standalone	61	16	26
Large Programs	22	4	18
Polarization	100	30	30
Solar	36	16	44
Solar System	42	16	38
Target of Opportunity	22	11	50
VLBI	15	10	67

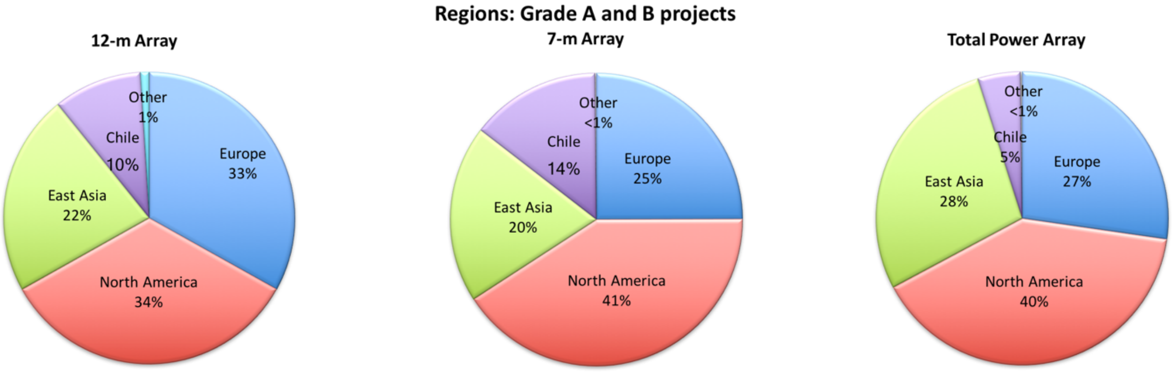

Figure 1. Distribution of the estimated execution time for Cycle 5 Grade A and B projects by region for the 12-m (left), 7-m (center), and Total Power (right) arrays. The results for the 7-m and Total Power arrays include both ACA standalone proposals and proposals requesting the 12-m Array + ACA.

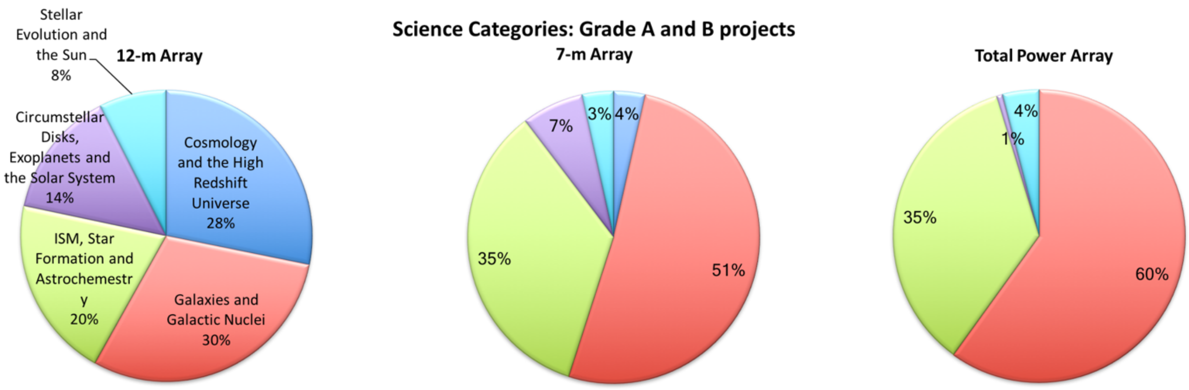

Figure 2. Distribution of the estimated execution time for Cycle 5 Grade A and B projects by science category for the 12-m (left), 7-m (center), and Total Power (right) arrays. The results for the 7-m and Total Power arrays include both ACA standalone proposals and proposals requesting the 12-m Array + ACA.

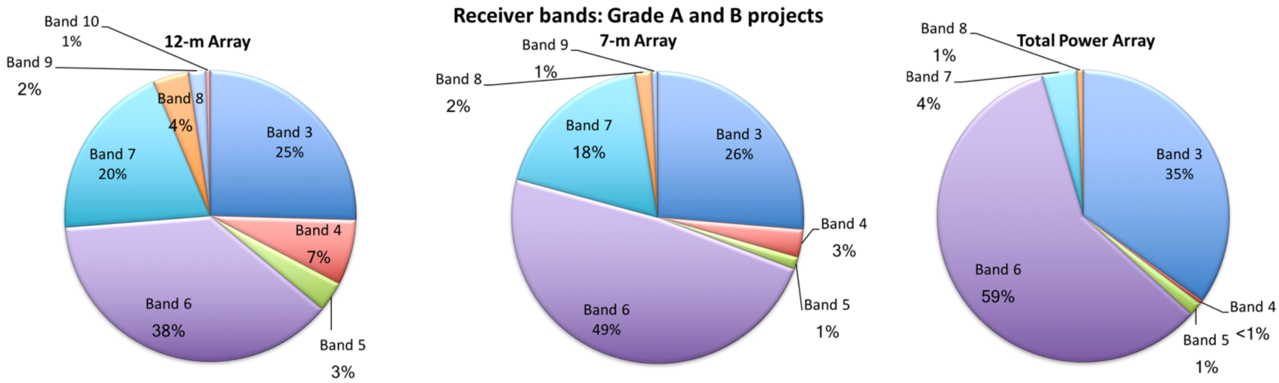

Figure 3. Distribution of the scheduled execution time for Cycle 5 Grade A and B projects by receiver band for the 12-m (left), 7-m Array (center), and Total Power (right) arrays. The results for the 7-m and Total Power arrays include both ACA standalone proposals and proposals requesting the 12-m Array + ACA.

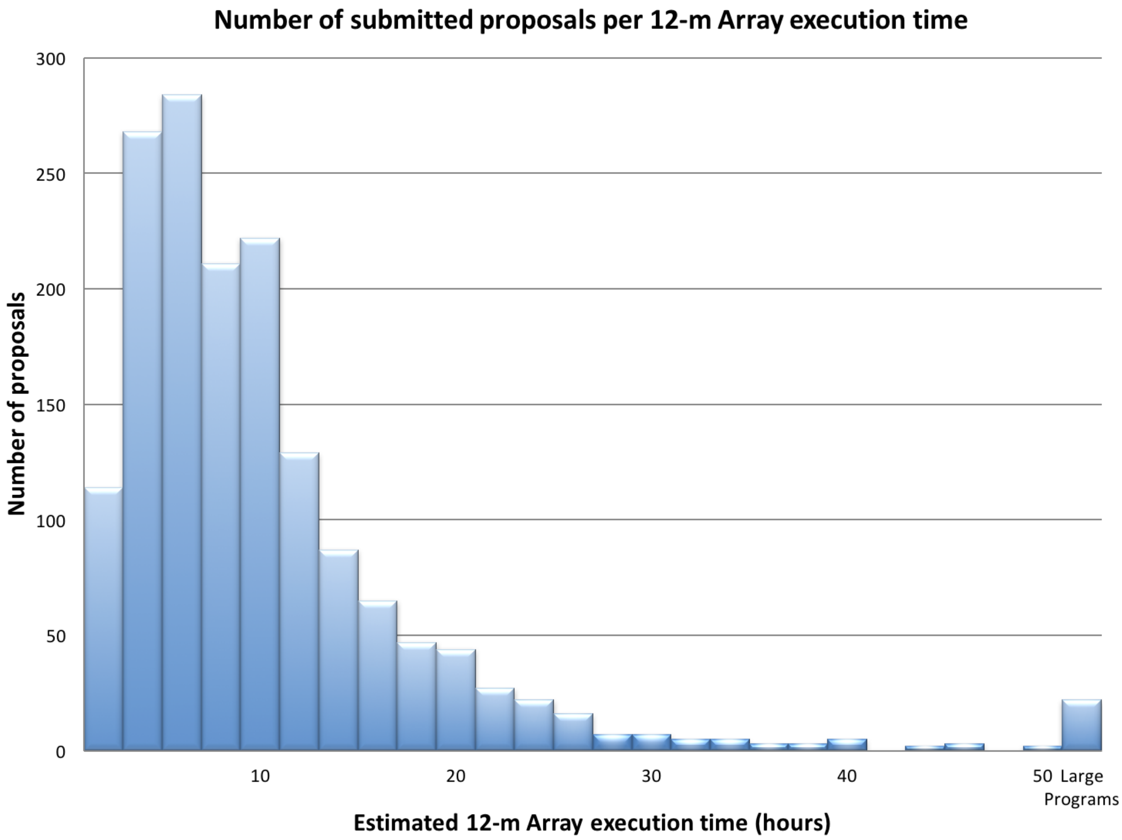

Figure 4. Number of proposals submitted as a function of the estimated 12-m Array execution time.

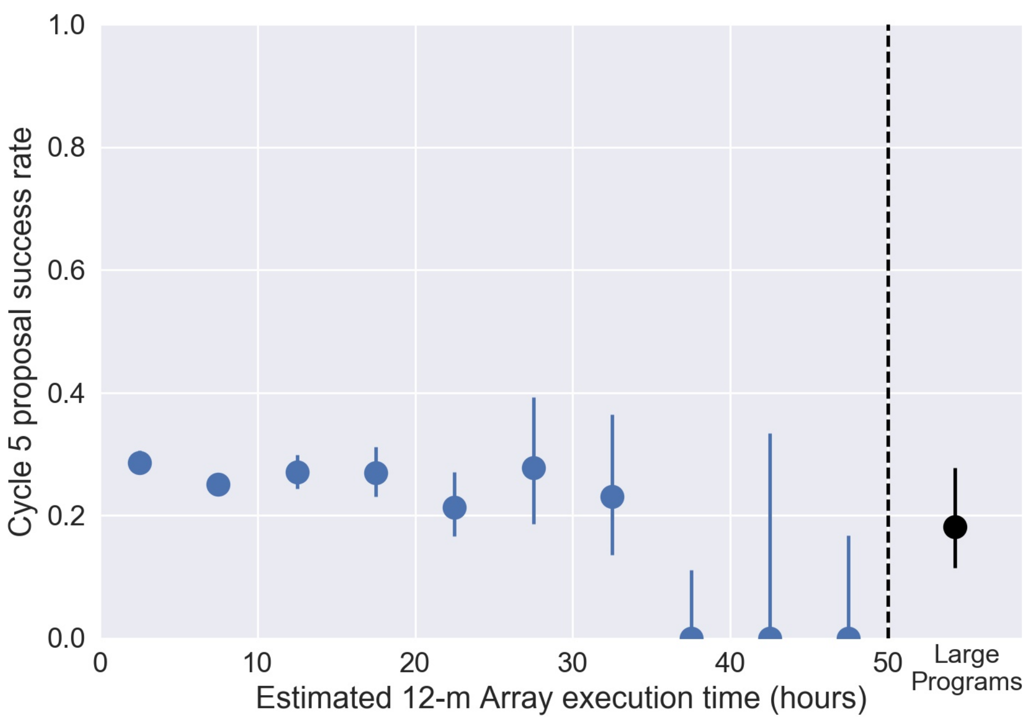

Figure 5. The fraction of proposals (with 1σ confidence intervals) that are assigned priority Grade A and B as a function of the estimated 12-m Array execution time.

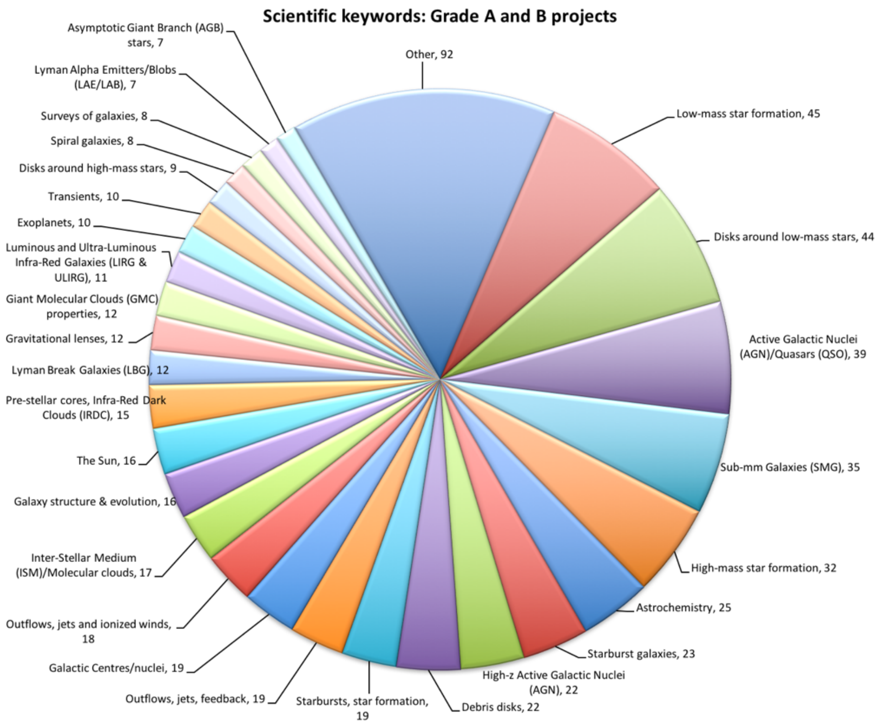

Figure 6. Breakdown of the Grade A and B projects by scientific keyword, across all ALMA scientific categories. For each science keyword, the number of proposals in which it is selected is indicated.

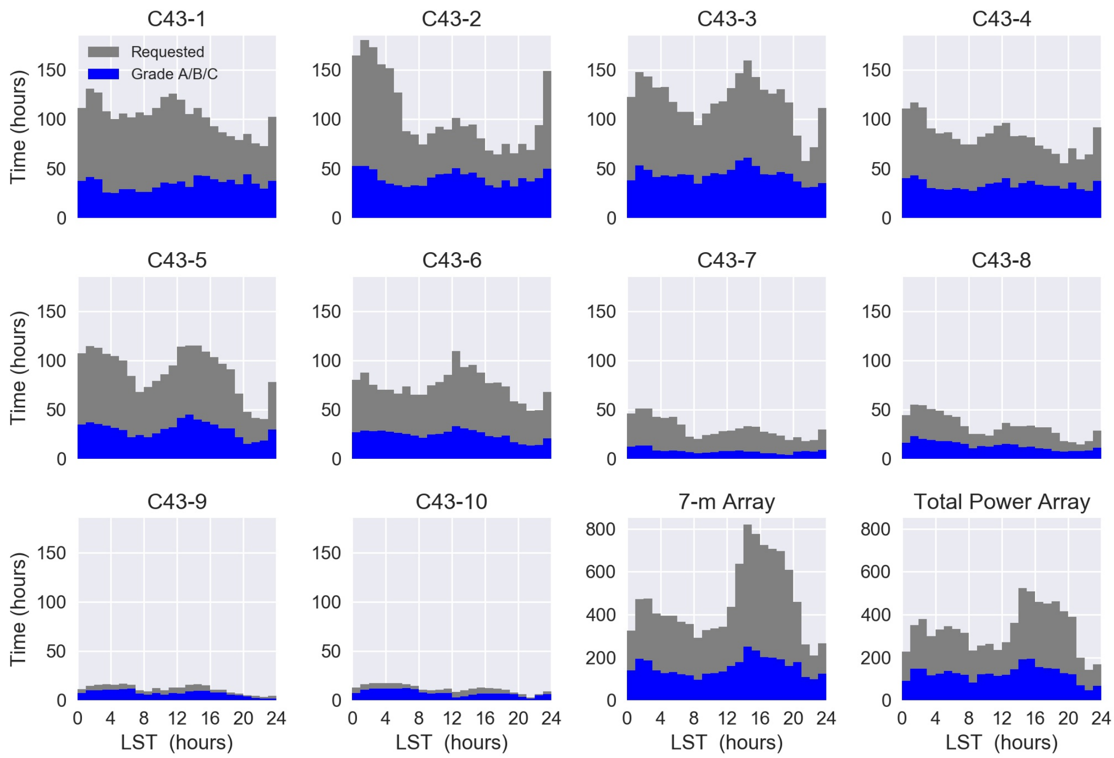

Figure 7. Distribution of estimated execution time in Cycle 5 proposals for all proposals (gray) and proposals assigned Grade A, B, or C (blue). .The figure does not include the carry forward for unfinished Cycle 4 Grade A proposals, which will be primarily in configurations C43-1, C43-2, C43-8, and C43-9.

Appendix: Cycle 5 APRC and ARP members

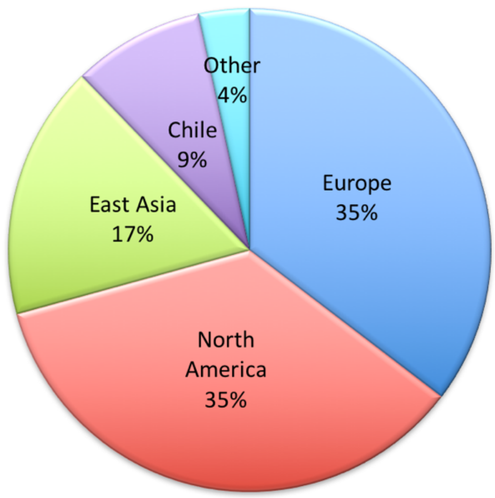

Figure 8. Regional distribution of the Cycle 5 APRC and ARP members

APRC chair:

Anneila Sargent	California Institute of Technology (USA)

APRC and ARP members:

Jose Afonso	Instituto de Astrofísica e Ciências do Espaço (Portugal)
Sean Andrews	Harvard-Smithsonian Center for Astrophysics (USA)
Manuel Aravena	Universidad Diego Portales (Chile)
Roberto Assef	Universidad Diego Portales (Chile)
Maarten Baes	Ghent University (Belgium)
Franz Bauer	Catolica of Chile, Pontifica University (Chile)
Rachel Bezanson	Princeton University (USA)
Geoffrey Blake	California Institute of Technology (USA)
Frederic Boone	Toulouse Observatory (France)
Médéric Boquien	University of Antofagasta (Chile)
Marusa Bradac	California, Davis, University of (USA)
Elias Brinks	Hertfordshire, University of (United Kingdom)
Claudio Caceres	Andres Bello, University (Chile)
Daniela Calzetti	Massachusetts at Amherst, University of (USA)
Paola Caselli	Max-Planck-Institute for Extraterrestrial Physics (Germany)
Tzu-Ching Chang	Academia Sinica (Taiwan)
Ranga Chary	California Institute of Technology (USA)
Aeree Chung	Yonsei University (South Korea)
Cathie Clarke	Cambridge, University of (United Kingdom)
Kristen Coppin	Hertfordshire, University of (United Kingdom)
Diane Cormier	CEA Saclay (France)
Claudia Cyganowski	St. Andrews, University of (United Kingdom)
Elisabete da Cunha	Australia National University (Australia)
Emanuele Daddi	CEA Saclay (France)

Imke de Pater	California, Berkeley, University of (USA)
Tanio Diaz-Santos	Universidad Diego Portales (Chile)
Mark Dickinson	National Optical Astronomy Observatory (USA)
Ana Duarte Cabral	Cardiff University (United Kingdom)
Michael Dunham	Harvard-Smithsonian Center for Astrophysics (USA)
Anne Dutrey	Bordeaux Observatory (France)
Ken Ebisawa	Japan Aerospace Exploration Agency (Japan)
Duncan Farrah	Virginia Polytechnic Institute & State University (USA)
Davide Fedele	INAF (Italy)
Yanga Fernandez	Central Florida, University of (USA)
Jacqueline Fischer	Naval Research Laboratory (USA)
Gregory Fleishman	New Jersey Institute of Technology (USA)
Dale Gary	New Jersey Institute of Technology (USA)
Uma Gorti	National Aeronautics and Space Administration (USA)
Jane Greaves	Cardiff University (United Kingdom)
Pin-Gao Gu	Academia Sinica (Taiwan)
Antoine Gusdorf	ENS, Paris (France)
Graham Harper	Colorado at Boulder, Univ of (USA)
Jennifer Hatchell	Exeter, University of (United Kingdom)
Mark Heyer	Massachusetts at Amherst, University of (USA)
James Higdon	Georgia Southern University (USA)
Tomoya Hirota	National Astronomical Observatory of Japan (Japan)
Martin Houde	Western Ontario, University of (Canada)
Charles Hull	Harvard-Smithsonian Center for Astrophysics (USA)
Edo Ibar	Valparaiso, University of (Chile)
Masatoshi Imanishi	National Astronomical Observatory of Japan (Japan)
Nick Indriolo	Space Telescope Science Institute (USA)
Akio Inoue	Osaka Sangyo University (Japan)
Andrea Isella	Rice University (USA)
Pascale Jablonka	Lausanne, Technical Federal School (EPFL) (Switzerland)
Knud Jahnke	Max-Planck-Institute for Astronomy (Germany)
Izaskun Jimenez-Serra	Queen Mary, University of London (United Kingdom)
Kelsey Johnson	Virginia, University of (USA)
Jes Jorgensen	Copenhagen, University of (Denmark)
Kay Justtanont	Chalmers University of Technology (Sweden)
Jouni Kainulainen	Max-Planck-Institute for Astronomy (Germany)
Paul Kalas	California, Berkeley, University of (USA)
Inga Kamp	University of Groningen (Netherlands)
Hyosun Kim	Academia Sinica (Taiwan)
Stefan Kimeswenger	Catolica of the North, University (Chile)
Pamela Klaassen	UK ATC (United Kingdom)
Kirsten Knudsen	Chalmers University of Technology (Sweden)
Tadayuki Kodama	Tohoku University (Japan)
Shinya Komugi	Kogakuin University (Japan)
Agnes Kospal	Max-Planck-Institute for Astronomy (Germany)

Yi-Jehng Kuan	National Taiwan Normal University (Taiwan)
Guilaine Lagache	Paris-Sud University (France)
Claudia Lagos	International Centre for Radio Astronomy Research (Australia)
Shih-Ping Lai	National Tsing-Hua University (Taiwan)
Luisa Lara	Astrophysical Institute of Andalucia (Spain)
Jeong-Eun Lee	Kyung Hee University (South Korea)
Chang Won Lee	Korea Astronomy and Space Science Institute (South Korea)
Jorrit Leenaarts	Stockholm University (Sweden)
Lihwai Lin	Academia Sinica (Taiwan)
Maria Loukitcheva	New Jersey Institute of Technology (USA)
Claudia Maraston	Portsmouth, University of (United Kingdom)
Diego Mardones	Chile, University of (Chile)
Dan Marrone	Arizona, University of (USA)
Anaelle Maury	CEA Saclay (France)
Karin Menendez-Delmestre	Rio de Janeiro, Federal University of (Brazil)
Elisabeth Mills	San Jose State University (USA)
Ivelina Momcheva	Space Telescope Science Institute (USA)
Munetake Momose	Ibaraki University (Japan)
Kentaro Motohara	University of Tokyo (Japan)
Lee Mundy	Maryland, University of (USA)
Takayuki Muto	Kogakuin University (Japan)
Tohru Nagao	Ehime University (Japan)
Naomasa Nakai	University of Tsukuba (Japan)
Hiroyuki Nakanishi	Kagoshima University (Japan)
Jun-ichi Nakashima	Ural Federal University (Russia)
Nicole Nesvadba	Spatial Astrophysical Institute (France)
Stella Offner	Massachusetts at Amherst, University of (USA)
Masatoshi Ohishi	National Astronomical Observatory of Japan (Japan)
Monica Orienti	INAF (Italy)
Olja Panic	Leeds, The University of (United Kingdom)
Jenny Patience	Arizona State University (USA)
Laura Perez	Chile, University of (Chile)
Sebastian Perez	Chile, University of (Chile)
Ismael Perez-Fournon	Astrophysical Institute of Canarias (Spain)
Jaime Pineda	Max-Planck-Institute for Extraterrestrial Physics (Germany)
Rene Plume	Calgary, University of (Canada)
Paola Popesso	Excellence Cluster Universe (Germany)
Bettina Posselt	Pennsylvania State University (USA)
Jose Prieto	Universidad Diego Portales (Chile)
Cristina Ramos Almeida	Astrophysical Institute of Canarias (Spain)
Aki Roberge	National Aeronautics and Space Administration (USA)
Hideo Sagawa	Kyoto Sangyo University (Japan)
Raghvendra Sahai	California Institute of Technology (USA)
Masao Saito	National Astronomical Observatory of Japan (Japan)

Kazushi Sakamoto	Academia Sinica (Taiwan)
Colette Salyk	Vassar College (USA)
Claudia Scarlata	Minnesota, University of (USA)
Brigitte Schmieder	Paris Observatory (France)
Marta Sewilo	National Aeronautics and Space Administration (USA)
Hsien Shang	Academia Sinica (Taiwan)
Hiroshi Shibai	Osaka University (Japan)
Gordon Stacey	Cornell University (USA)
Snezana Stanimirovic	Wisconsin at Madison, University of (USA)
Thaisa Storchi-Bergmann	Rio Grande do Sul, Federal University of (Brazil)
Eckhard Sturm	Max-Planck-Institute for Extraterrestrial Physics (Germany)
Amelia Stutz	Concepcion, University of (Chile)
Carmen Sánchez Contreras	Centro de astrobiología (INTA-CSIC) (Spain)
Susan Terebey	California State University, Los Angeles (USA)
Tomoka Tosaki	Joetsu University of Education (Japan)
Kim-Vy Tran	Texas A&M University (USA)
Junko Ueda	Harvard-Smithsonian Center for Astrophysics (USA)
Esko Valtaoja	Turku, University of (Finland)
Hans Van Winckel	Leuven, Catholic University (Belgium)
Bram Venemans	Max-Planck-Institute for Astronomy (Germany)
Serena Viti	London, University of (United Kingdom)
Catherine Walsh	Leeds, The University of (United Kingdom)
Natalie Webb	Institut de Recherche en Astrophysique et Planétologie (France)
Tracy Webb	McGill University (Canada)
Sven Wedemeyer	Oslo, University of (Norway)
Sebastian Wolf	Kiel University (Germany)
Tony Wong	Illinois at Urbana-Champaign, University of (USA)
Toru Yamada	Institute of Space and Astronautical Science (Japan)
Lisa Young	New Mexico Tech (USA)
Luis Zapata	Mexico, National Autonomous University of (Mexico)
Maria Rosa Zapatero Osorio	Centro de astrobiología (INTA-CSIC) (Spain)
Lucy Ziurys	Arizona, University of (USA)
Laura Zschaechner	Max-Planck-Institute for Astronomy (Germany)