James A. Sinclair

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Education

2010 - 2014 ***DPhil Atmospheric, Oceanic & Planetary Physics,*** *University of Oxford, Oxford, United Kingdom.*
Thesis title: "Seasonal and interannual variability in Saturn's stratosphere"
Advisor: Prof. Patrick Irwin

2006 - 2010 ***MPhys Astrophysics*** *(1st class), University of St. Andrews, St. Andrews, United Kingdom*
Thesis title: "Impact of stellar model spectra on disc detection"
Advisor: Dr. Christiane Helling

Research Experience

2018-Present ***Research Scientist,*** *Jet Propulsion Laboratory/Caltech, Pasadena, CA, United States.*

- Auroral forcing of Jupiter's stratospheric thermal structure and chemistry from mid-infrared spectroscopy.
- Mid-infrared measurements and analysis of Jupiter's dynamic weather layer to support the Juno mission.
- Non-LTE radiative-transfer modelling of Jupiter's atmosphere.
- Seasonal variability in Saturn's atmosphere.
- Coupling of Neptune's troposphere and stratosphere.
- Influence of comet/asteroid impacts on Jupiter's atmosphere.
- Science collaborator for development of next-generation planetary-science instruments.

2015-2018 ***NASA Postdoctoral Fellow,*** *Jet Propulsion Laboratory/Caltech, Pasadena, CA, United States*
Mentor: Dr. Glenn Orton

- Auroral forcing of Jupiter's stratospheric thermal structure and chemistry from mid-infrared spectroscopy.
- Mid-infrared measurements and analysis of Jupiter's dynamic weather layer to support the Juno mission.
- Retrieval analyses of Voyager and Cassini spectra to derive atmospheric information at Jupiter's poles.

2014-2015 ***Postdoctoral Research Assistant,*** *Atmospheric, Oceanic & Planetary Physics, University of Oxford, Oxford, United Kingdom.*
Supervisors: Prof. Patrick Irwin, Dr. Simon Calcutt

- Forward-model spectra simulations of the Martian atmosphere in nadir, limb and occultation sounding.

- Retrieval analyses of synthetic spectra to test detectability limits of trace gases.
- Channel selection, design and sensitivity of future gas-correlation filter instrument.

2010-2014 ***DPhil Student,*** *Atmospheric, Oceanic & Planetary Physics, University of Oxford, Oxford, United Kingdom.*
Supervisor: Prof. Patrick Irwin

- Retrieval analyses of Voyager and Cassini data to derive maps of Saturn's atmospheric temperature and composition over time.
- Thermal structure, dynamics and chemistry, evolution of Saturn's stratosphere.
- Data mining of the Cassini-CIRS (Composite Infrared Spectrometer) dataset to characterize calibration artefacts.

2010 ***Masters Student,*** *University of St. Andrews, St. Andrews, United Kingdom.*
Supervisor: Dr. Christiane Helling

- Quantitative comparison of synthetic spectra of F, G and K stellar atmospheres.
- Tested the dependence of circumstellar/debris disk detection limits on the model stellar spectra adopted.

2009 ***Summer Research Intern,*** *UK Met. Office, Exeter, United Kingdom.*
Line manager: Dr. Helen Wells

- Data mining and analysis of mountain wave forecast data to understand mountain wave climatology.

2008 ***Summer Student,*** *University of St. Andrews, United Kingdom*
Supervisor: Dr. Christiane Helling

- Computing observational metrics of Jupiter-like exoplanets and brown dwarfs from synthetic spectra.

Mission Experience

2022 – Present ***Uranus Orbiter & Probe Science Exploratory Team***

- Using the results of the Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032 to identify the key science questions to be addressed by a potential/future orbiter and probe mission to Uranus.

2015-Present ***Juno***

- Assisted in development of Earth-based mid-infrared observing program to enhance science return of Juno, which lacks mid-infrared instrumentation.
- Performed analysis of Earth-based mid-infrared images/spectra. Results made available to Juno science teams and presented at numerous workshops and meetings.

2010-2015 ***Cassini-CIRS (Composite Infrared Spectrometer)***

- Performed quantitative analysis of data to assess improvements to

spectra using different calibration approaches.

- Assisted in Earth-based campaign of mid-infrared observations to support and validate Cassini-CIRS measurements.
- Presented results at outreach events/public talks on a voluntary basis.

Field Experience

2014-Present ***SOFIA observing runs****, August 2018.*

- Designed observing program to perform spectroscopy of Jupiter's high latitudes using the EXES spectrograph on the SOFIA (Stratospheric Observatory for Infrared Astronomy) aircraft.

TEXES observing runs*, December 2014, April 2016, January, March, May, July 2017, February and July 2018.*

- Designed, proposed and awarded several observing programs to perform spectroscopy of Jupiter's poles using the TEXES spectrograph on the Infrared Telescope Facility.
- Developed retrieval algorithm to rapidly process and analyze spectra using high-performance computing.
- Participated in assembly, cryogen cooling and mounting of TEXES on NASA's Infrared Telescope Facility and Gemini-North.

COMICS observing runs*, January 2016, January, February, May, September 2017, April, May, August 2018, May 2019*

- Designed, proposed and awarded several observing programs to measure mid-infrared images and low-resolution spectra of Jupiter using the COMICS instrument on the Subaru telescope.
- Developed data reduction tool to process and calibrate low-resolution COMICS spectra.

2012-2013 ***CELESTE observing runs****, March 2012, April 2013.*

- Participated in assembly, cryogen cooling and mounting of Celeste spectrograph on NASA's Infrared Telescope.
- Produced data reduction tool to process and calibrate IRTF-CELESTE spectra of Saturn.

Community Service

- Peer reviewer for journals including Icarus, Geophysical Research Letters, Journal of Quantitative Spectroscopy and Radiative Transfer, Planetary Science Journal, Nature and Nature Astronomy.
- Scientific Organizing Committee, Division of Planetary Sciences 2021 meeting.
- Previously served on the National Optical Astronomy Observatories (NOAO) Solar System Telescope Allocation Committee (TAC) and Keck Solar System TAC.
- Served as review panelist and external reviewer for several NASA ROSES and NESSF calls.
- Served as judge for American Geophysical Union's Outstanding Student Presentation Award.

Professional Memberships.

- American Astronomical Society, Division of Planetary Sciences
- American Geophysical Union
- European Geophysical Union

Awards

- NASA Group Achievement Medal, CIRS, Cassini Composite Infrared Spectrometer Team, 2018.
- NASA Group Achievement Medal, Composite Infrared Spectrometer Investigation Team, 2018.
- British Interplanetary Society Sir Arthur Clarke Award, 2018.
- JPL Voyager Award, 2018.
- Magnetospheres of Outer Planets meeting Travel award, 2017.
- Lady Margaret Hall Student Travel Award, 2012.
- Europlanet Student Travel Award, 2011.

Research Grants

2022	***NASA ROSES Solar System Observations,*** "All Eyes on Jupiter: Exploring Atmospheric Variability with Thermal-Infrared Observations Supporting Juno and JWST", P. I. Glenn Orton
2021	***James Webb Space Telescope Cycle 1,*** "Dynamics and temporal variability in the Atmosphere of Neptune", P. I. Glenn Orton ***James Webb Space Telescope Cycle 1,*** "Analysis of GTO Observations of Neptune by the MIRI instrument", P. I. Glenn Orton ***James Webb Space Telescope Cycle 1,*** "Analysis of GTO Observations of Uranus by the MIRI instrument", P. I. Glenn Orton
2020	***NASA ROSES Cassini Data Analysis Program,*** "An Investigation of Saturn's Clouds and Dynamics with a Simultaneous Analysis of CIRS, VIMS and Radar/Radiometer Data", P. I. Mark Hofstadter ***NASA ROSES Solar System Observations,*** "Stratospheric conditions at Jupiter's poles during the extended Juno mission", P. I. James Sinclair
2019	***SOFIA Cycle 8 Award,*** "Evolution of heating and chemistry at Jupiter's high latitudes", P.I. Sinclair, JPL. ***NASA ROSES Cassini Data Analysis Program,*** "An investigation of Jupiter's UV Great Dark Spot and High Latitude Stratospheric Features", P.I. Robert West, JPL. ***Keck PI Data Award,*** "Uranus from Equinox to Mid-Spring:Tropospheric Temperatures, Seasonal Changes, and Emerging Rings", P.I. Sinclair, JPL.
2018	***SOFIA Cycle 7 Award,*** "Auroral-related heating and chemistry at Jupiter's high latitudes", P.I. Sinclair, JPL. ***Raise The Bar*** grant for participating in the NOAO TAC and to improve excellence within JPL's Science division, JPL. ***Keck PI Data Award,*** "Mid-Infrared imaging of Jupiter and Saturn", P.I. Sinclair, JPL. ***NASA ROSES Rosetta Data Analysis Program***, "Radiative coupling of gas and dust in the coma of comet 67P", P.I. Mark Hofstadter ***NASA ROSES Solar System Observations,*** "Tracking variability in Jupiter's Atmosphere: Support for the Juno mission", P. I. Glenn Orton.
2017	***NASA ROSES Solar System Observations,*** "High-temporal cadence measurements of Jupiter's Stratospheric Heating and Chemistry During the Juno mission from Subaru-COMICS and SOFIA-EXES", Science P.I. Sinclair, JPL.

	Keck PI Data Award, "Characterising Saturn's northern hemisphere during Cassini's Grand Finale using Subaru-COMICS", P.I. Sinclair, JPL

Mentoring & Teaching

2022	***SURF (Summer Undergraduate Research Fellowship) intern mentor:*** Catherine Deng
2018-Present	***Co-Mentor to JPL Postdocs:*** Emma Dahl, Fachreddin Tabataba-Vakili, Rohini Giles
2015-2018	***Masters Student Co-Advisor:*** Josh Fernandes (Cal State Long Beach)
	Co-Mentor to JPL Interns: Ryan Chan, Emma Dahl, Richard McKee, Zade Akras, Vivian Bai, Shanna Mastoon, Edgar Chakryan, Angela Burke, Matthew Wittal, Alex Su, Christina Vides, Adrian Hy, Joshua Serrano, Daniel Xu, Meera Krishnamoorthy, Raiyan Seede, Jason Simon, Anna Payne, Josh Fernandes, Malavika Venkatesan, Sarang Mittal, Mona El Morsy
2011-2013	***Lab Demonstrator,*** Atmospheric Physics course, University of Oxford.
2012-2013	***Private Physics Tutor*** for Simon Hills

Peer-reviewed publications

- **Sinclair, J. A.,** Greathouse, T. K., Giles, R. S., Lacy, J., Moses, J. I., Hue, V., Grodent, D., Bonfond, B., Tao, C., Cavalié, T., Dahl, E. K., Orton, G. S., Fletcher, L. N., Irwin, P. G. J., 2023. A high spatial and spectral resolution study of Jupiter's mid-infrared auroral emissions and their response to a solar wind compression. Planetary Science Journal Planetary Science Journal 4, 76.
- **Sinclair, J. A.,** Lisse, C. M., Orton, G. S., Krishnamoorthy, M., Fletcher, L. N., Hora, J., Palotai, C., Hayward, T., 2023. A retrospective analysis of mid-infrared observations of the Comet D/Shoemaker-Levy 9 and Wesley impacts on Jupiter. Icarus 394, id.115404.
- Blake, J. S. D., Fletcher, L. N., Orton, G. S., Antuñano, A., Roman, M. T., Kasaba, Y., Fujiyoshi, T., Melin, H., Bardet, D., **Sinclair, J. A.**, Es-Sayeh, M., 2023. Saturn's seasonal variability from four decades of ground-based mid-infrared observations. Icarus 392, id. 115347.
- Orton, G. S., Antuñano, A., Fletcher, L. N., **Sinclair, J. A.,** Momary, T. W., Fujiyoshi, T., Yanamandra-Fisher, P., Donnelly, P. T., Greco, J. J., Payne, A. V., Boydstun, K. A., Wakefield, L. E., 2023. Unexpected long-term variability in Jupiter's tropospheric temperatures. Nature Astronomy 7, 190-197.
- Giles, R. S., Hue, V., Greathouse, T. K., Gladstone, G. R., Kammer, J. A., Versteeg, M. H., Bonfond, B., Grodent, C., Gérard, J.-C., **Sinclair, J. A.,** Bolton, S. J., Levin, S. M., 2023. Enhanced C2H2 absorption with Jupiter's southern auroral oval from Juno UVS observations. Journal of Geophysical Research: Planets 128, id. E2022JE007610.
- Moses, J. I., Brown, Z. L., Koskinen, T. T., Fletcher, L. N., Serigano, J., Guerlet, S., Moore, L., Waite, J. H., Ben-Jaffel, L., Galand, M., Chadney, J. M., Hörst, S. M., **Sinclair, J. A.,** Vuitton, V., Müller-Wodarg, I., 2023. Saturn's atmospheric response to the large influx of ring material inferred from Cassini INMS measurements. Icarus 391, id. 115328.

- Roman, M., Fletcher, L. N., Orton, G. S., Greathouse, T. K., Moses, J. I., Rowe-Gurney, Naomi, Irwin, P. G. J., Antuñano, A., **Sinclair, J.,** Kasaba, Yasumasa, Fujiyoshi, T., de Pater, I., Hammel, H. B., 2022. Subseasonal Variation in Neptune's Mid-Infrared Emission. Planetary Science Journal 3, id.78.
- Cavalie, T., Benhami, B., Hue, V., Moreno, R., Lellouch, E., Fouchet, T., Hartogh, P., Rezac, L., Greathouse, T. K., **Sinclair, J. A.**, Dobrijevic, M., Billebaud, F., Jarchow, C., 2021. 'First direct measurement of auroral and equatorial jets in the stratosphere of Jupiter'. Astronomy & Astrophysics 647, L8.
- Dahl, E. K., Chanover, N. J., Orton, G. S., Baines, K. H., Sinclair, J. A., Volez, D. G., Wijerathna, E. A., Strycker, P. D., Irwin, P. G. J., 2021. 'Vertical structure and color of Jovian latitudinal cloud bands during the Juno era', The Planetary Science Journal 2, id.16.
- **Sinclair, J. A**., Greathouse, T. K., Giles, R. S., Antunano, A., Moses, J. I., Fouchet, T., Bezard, B., Tao, C., Martin-Torres, J., Clark, G. B., Grodent, D., Orton, G. S., Hue, V., Fletcher, L. N., Irwin, P. G. J., 2020. Spatial variations in the altitude of the CH4 homopause at Jupiter's Mid-to-High Latitudes, as Constrained from IRTF-TEXES spectra'. The Planetary Science Journal 1., id.85.
- Orton, G. S., Tabataba-Vakili, F., Eichstadt, G., Rogers, J., Hansen, C. J., Momary, T. W., Ingersoll, A. P., Brueshaber, S., Wong, M. H., Simon, A. A., Fletcher, L. N., Ravine, M., Caplinger, M., Smith, D., Bolton, S. J., Levin, S. M., **Sinclair, J. A.,** Thepenier, C., Nicholson, H., Anthony, A., 2020. 'A survey of small-scale waves and wave-like phenomena in Jupiter's atmosphere detected by JunoCam'. Journal of Geophysical Research 125, e06369.
- **Sinclair, J. A.,** Orton, G. S., Fletcher, L. N., Roman, M., de Pater, I., Encrenaz, T., Hammel, H. B., Giles, R. S., Velusamy, T., Moses, J. I., Irwin, P. G. J., Momary, T. W., Rowe-Gurney, N., Tabataba-Vakili, F., 2020. 'Spatial structure in Neptune's 7.90-µm stratospheric CH_4 emission, as measured by VLT-VISIR'. Icarus 345, 113748.
- Tabataba-Vakili, F., Rogers, J. H., Eichstadt, G., Orton, G. S., Hansen, C. J., Momary, T. W., **Sinclair, J. A.**, Giles, R. S., Caplinger, M. A., Ravine, M. A., Bolton, S. J., 2020. 'Long-term tracking of circumpolar cyclones on Jupiter from polar observations with JunoCam', Icarus 335, 113405.
- De Pater, I., Sault, R. J., Moeckel, C., Moulet, A., Wong, M. H., Goullaud, C., DeBoer, D., Butler, B. J., Bjoraker, G., Adamkovics, M., Consentino, R., Donnelly, P. T., Fletcher, L. N., Kasaba, Y., Orton, G. S., Rogers, J. H., **Sinclair, J. A**., Eric Villard, 2019. 'First ALMA Millimeter-wavelength maps of Jupiters, with a multiwavelength study of convection', The Astronomical Journal 158, 4.
- **Sinclair, J. A.,** Moses, J. I., Hue, V., Greathouse, T. K., Orton, G. S., Fletcher, L. N., Irwin P. G. J., 2019b. 'Jupiter's auroral-related stratospheric heating and chemistry III: Abundances of C_2H_4, CH_3C_2H, C_4H_2 and C_6H_6 from Voyager-IRIS and Cassini-CIRS, Icarus 328, 176-193.
- **Sinclair, J. A.,** Orton, G. S., Fernandes, J., Kasaba, Y., Sato, T. M., Fujiyoshi, T., Tao, C., Vogt, M. F., Grodent, D., Bonfond, B., Moses, J. I., Greathouse, T. K., Dunn, W., Giles, R. S., Tabataba-Vakili, F., Fletcher, L. N., Irwin, P. G. J., 2019a. 'A brightening of Jupiter's auroral 7.80-µm CH_4 emission during a solar-wind compression', Nature Astronomy 3, 607-613.
- Ge, Huazhi; Zhang, Xi; Fletcher, Leigh N.; Orton, Glenn S.; **Sinclair, James**; Fernandes, Josh; Momary, Tom; Kasaba, Yasumasa; Sato, Takao M.; Fujiyoshi, Takuya, 2019. 'Rotational light curves of Jupiter from UV to mid-infrared and implications for brown dwarfs and exoplanets', Astronomy Journal 157:89, https://doi.org/10.3847/1538-

3881/aafba7

- Giles, R. S., Orton, G. S., Stephens, A. W., Wong, M. H., Irwin, P. G. J., **Sinclair, J. A.**, Tabataba-Vakili, F., 'Wave Activity in Jupiter's North Equatorial Belt From Near-Infrared Reflectivity Observations', Geophysical Research Letters, https://doi.org/10.1029/2018GL081858
- Fletcher, L. N.; Orton, G. S.; **Sinclair, J. A.**; Guerlet, S.; Read, P. L.; Antuñano, A.; Achterberg, R. K.; Flasar, F. M.; Irwin, P. G. J.; Bjoraker, G. L.; Hurley, J.; Hesman, B. E.; Segura, M.; Gorius, N.; Mamoutkine, A.; Calcutt, S. B., 2018, 'A hexagon in Saturn's northern stratosphere surrounding the emerging summertime polar vortex', Nature Communications 9, 3564, https://doi.org/ 10.1038/s41467-018-06017-3
- Hue, V., Hersant, F., Cavalie, T., Dobrijevic, M., **Sinclair J. A.,** Photochemistry, mixing and transport in Jupiter's stratosphere constrained by Cassini, *Icarus* 307: 106-123, 2018.
- Melin, H., Fletcher, L. N., Donnelly, P. T., Greathouse, T. K., Lacy, J. H., Orton, G. S., Giles, R. S., **Sinclair, J. A.**, Irwin, P. G. J., 2018. 'Assessing the long-term variability of acetylene and ethane in the stratosphere of Jupiter', Icarus 305, 301-313.
- **Sinclair, J. A.,** Orton G. S., Greathouse, T. K., Fletcher, L. N., Moses, J. I., Hue, V., Irwin, P. G. J., "Jupiter's auroral-related stratospheric heating and chemistry II: analysis of IRTF-TEXES spectra measured in December 2014", Icarus 300, 305-326.
- Giles, R. S., Fletcher, L. N., Irwin, P. G. J., Orton, G. S., **Sinclair, J. A.,** "Ammonia in Jupiter's Troposphere from High-Resolution 5 um spectroscopy", Geophysical Research Letters 44, 10838-10844.
- Dunn, W., Btanduardi-Raymont, G., Ray, L., Jackman, C., Kraft, R. Elsner, R., Rae, I. J., Yao, Z., Vogt, M., Jones, G., Gladstone, G., Orton, G. S., **Sinclair, J.**, Ford, P., Graham, G., Caro-Carretero, R., Coates, A., The Independent Pulsations of Jupiter's Northern and Southern X-ray Auroras, *Nature Astronomy* 1: 758-764, 2017.
- Fletcher, L. N., Orton, G. S., **Sinclair, J. A**., Donnelly, P., Melin, H., Rogers, J. H., Greathouse, T. K., Kasaba, Y., Fujiyoshi, T., Sato, T. M., Fernandes, J., Irwin, P. G. J., Giles, R. S., Simon, A. A., Wong, M. H., Vedovato, M., Jupiter's North Equatorial Belt expansion and thermal wave activity ahead of Juno's arrival, *Geophysical Research Letters* 44, doi:10.1002/2017GL073383
- **Sinclair, J. A.,** Orton G. S., Greathouse, T. K., Fletcher, L. N., Moses, J. I., Hue, V., Irwin, P. G. J., Melin, H., Giles, R. S., 'Stratospheric warming of Jupiter's southern auroral region from 2014 to 2016', *Geophysical Research Letters* 44(11), 5345-5354, 2017b.
- **Sinclair, J. A.,** Orton, G. S., Greathouse, T. K., Fletcher, L. N., Moses, J. I., Hue, V., Irwin, P. G. J., 'Jupiter's auroral-related heating and chemistry I: Analysis of Voyager-IRIS and Cassini-CIRS spectra', *Icarus* 292, 182-207, 2017a.
- Fletcher, L. N., Greathouse, T. K., Orton, G. S., **Sinclair, J. A**., Giles, R. S., Irwin, P. G. J., Ecrenaz, T., Mid-infrared mapping of Jupiter's temperatures, aerosol opacity and chemical distributions with IRTF/TEXES, *Icarus* 278, 128-161, 2016.
- Moses, Julianne I.; Armstrong, Eleanor S.; Fletcher, Leigh N.; Friedson, A. James; Irwin, Patrick G. J.**; Sinclair, James A.;** Hesman, Brigette E., Evolution of stratospheric chemistry in the Saturn storm beacon region, *Icarus* 261, 149-168, 2015.
- **Sinclair, J. A.**; Irwin, P. G. J.; Calcutt, S. B.; Wilson, E. L., On the detectability of trace chemical species in the martian atmosphere using gas correlation filter radiometry, *Icarus* 260, 103-127, 2015.
- Fletcher, Leigh N.; Irwin, P. G. J.; **Sinclair, J. A.**; Orton, G. S.; Giles, R. S.; Hurley, J.;

Gorius, N.; Achterberg, R. K.; Hesman, B. E.; Bjoraker, G. L., Seasonal evolution of Saturn's polar temperatures and composition, *Icarus* 250, 131-153, 2015.

- Fletcher, Leigh N.; Greathouse, T. K.; Orton, G. S.; Irwin, P. G. J.; Mousis, O.; **Sinclair, J.** A.; Giles, R. S., The origin of nitrogen on Jupiter and Saturn from the 15N/14N ratio, *Icarus* 238, 170-190, 2014.
- **Sinclair, J. A.**, Irwin, P. G. J., Fletcher, L. N., Greathouse, T. K., Guerlet, S., Hurley, J., Merlet, C., From Voyager-IRIS to Cassini-CIRS: Interannual variability in Saturn's stratosphere?, *Icarus* 233, 281-292, 2014.
- **Sinclair, J. A.**, Irwin, P. G. J., Fletcher, L. N., Moses, J. I., Greathouse, T. K., Friedson, A. J., Hesman, B., Hurley, J., Merlet, C., Seasonal variations of temperature, acetylene and ethane in Saturn's atmosphere from 2005 to 2010, as observed by Cassini-CIRS, *Icarus*, 225, 257-271, 2013.
- Hurley, J., Fletcher, L. N., Irwin, P. G. J., Calcutt, S. B., **Sinclair, J. A.**, Merlet, C., Latitudinal variations of upper tropospheric NH3 on Saturn from Cassini/CIRS far-infrared measurements, *P & SS* 73(1), 347-363, 2012.
- Fletcher, L. N., Hesman, B. E., Achterberg, R. K., Irwin, P. G. J., Bjoraker, G., Gorius, N., Hurley, J., **Sinclair, J.**, Orton, G. S., Legarreta, J., García-Melendo, E., Sánchez-Lavega, A., Read, P. L., Simon-Miller, A. A., Flasar, F. M., The origin and evolution of Saturn's 2011-2012 stratospheric vortex, *Icarus*, 221(2), 560-586, 2012.
- Hurley, J., Irwin, P. G. J., Fletcher, L. N., Moses, J. I., Hesman, B., **Sinclair, J.** Merlet, C., Observations of upper tropospheric acetylene on Saturn: no apparent correlation with 2000 km-sized thunderstorms, *P & SS*, 65(1), 21-37, 2012.
- **Sinclair, J. A.**, Helling, Ch., Greaves, J. S., The impact of stellar model spectra in disc detection, *MNRAS*, 409(1), L49-L53.

First-author conference abstracts and seminars

- **American Geophysical Union**, Chicago, IL, December 2022. "Spatial and temporal variations in the CH4 homopause altitude at Jupiter's mid-to-high latitudes", abstract id. #SM46B-06.
- **American Geophysical Union**, Chicago, IL, December 2022. "An analysis of near-simultaneous visible, infrared and microwave observations of Saturn's clouds", abstract id. #P22D-2115.
- **NEMESIS Users Workshop**, Oxford, United Kingdom, July 2022. "Plans for non-LTE modeling of Jupiter'.
- **American Geophysical Union,** New Orleans, LA, December 2021. "Spatial and temporal variations in the CH4 homopause altitude at Jupiter's mid-to-high latitudes". abstract id. #P25D-2186.
- **European Planetary Science Congress 2021,** Virtual, September 2021. "The 2009 Wesley impact: Asteroidal or Cometary", A076-03, id. EPSC2021-140.
- **COSPAR**, Virtual, January 2021. "On the location of the CH4 homopause at Jupiter's mid-to-high latitudes", abstract B5.1-0008-21.
- American Geophysical Union, Virtual, December 2020. "Constraints on the height of the CH4 homopause from an analysis of IRTF-TEXES spectra", abstract id 719131
- **Ice Giant Systems 2020,** London, UK, January 2020. "Spatial structure in Neptune's stratospheric CH4 emission, as observed by VLT-VISIR".

- **American Geophysical Union**, San Francisco, CA, December 2019. "IRTF-TEXES observations of stratospheric CH_3 and CH_4 emission at Jupiter's high latitudes".
- **Invited seminar**, National Astronomical Observatory of Japan, Hilo, HI, October 2019, "A brightening of Jupiter's auroral CH4 emission during a solar-wind compression".
- **American Geophysical Union**, Washington DC, December 2018. "Mid-infrared measurements of Jupiter's auroral regions during perijoves 11 – 15", abstract #P33F-3892
- **European Planetary Science Congress,** Berlin, Germany, September 2018, "Short and long-term variability of Jupiter's auroral stratosphere", abstract id.EPSC2018-463.
- **COSPAR,** Pasadena, CA, July 2018, "Spatial structure in Neptune's stratospheric CH_4 emission, as measured by VLT-VISIR", 42nd COSPAR Scientific Assembly, Abstract B5.4-5.18
- **Magnetospheres of the Outer Planets,** Boulder, CO, July 2018, "Gemini-TEXES mid-infrared spectral observations of Jupiter's auroral regions: comparison with ultraviolet and near-infrared observations", poster #16.
- **American Geophysical Union,** New Orleans, LA, December 2017, "High spatial and spectral resolution measurements of Jupiter's auroral regions using Gemini-North-TEXES", P24A-08.
- **American Astronomical Society's Division of Planetary Sciences**, Provo, UT, October 2017, "Solar wind control of stratospheric temperatures in Jupiter's auroral regions?", 211.02.
- **Magnetospheres of the Outer Planets,** Uppsala, Sweden, June 2017, "Evolution and morphology of Jupiter's auroral-related stratospheric heating".
- **Invited seminar,** University of Leicester, Leicester, United Kingdom, June 2017. . "Understanding Jupiter's auroral-related heating and chemistry from mid-infrared spectroscopy".
- **European Geophysical Union,** Vienna, Austria, April 2017, "Variability of Jupiter's stratospheric-auroral heating during the Juno mission, as measured by TEXES", EGU2017-10369.
- **Invited seminar**, Gemini observatory, Hilo, HI, March 2017. "Understanding Jupiter's auroral-related heating and chemistry from mid-infrared spectroscopy".
- **American Geophysical Union Fall Meeting,** San Francisco CA, December 2016, "Evolution of Jupiter's auroral-related stratospheric heating and chemistry", P33C-2149.
- **European Planetary Science Congress & Division of Planetary Sciences,** Pasadena CA, October 2016, "Evolution of Jupiter's auroral-related stratospheric heating and chemistry", 402.01.
- **Workshop on Jupiter's Aurora: Anticipating Juno's arrival,** LASP, University of Colorado, Boulder CO**,** March 2016, "Jupiter's auroral heating and chemistry from IRTF-TEXES and Cassini-CIRS observations".
- **Division of Planetary Sciences,** Washington DC, November 2015, "Jupiter's auroral-related heating from IRTF-TEXES observations", 311.13.
- **European Planetary Science Congress,** Nantes, France, September 2015, "Stratospheric temperature and composition of Jupiter's polar aurora from IRTF-TEXES", EPSC2015-374.
- **European Planetary Science Congress,** Nantes, France, September 2015, "On the

detectability of Martian trace gas species from gas correlation filter radiometry", EPSC2015-376.

- **Cassini PSG meeting,** Caltech, Pasadena, CA, June 2015, "Seasonal and interannual variability in Saturn's stratosphere from Voyager-IRIS and Cassini-CIRS".
- **Invited seminar,** Caltech, Pasadena, CA, May 2015, "Seasonal and interannual variability in Saturn's stratosphere from Voyager-IRIS and Cassini-CIRS".
- **Invited seminar,** University of California Los Angeles, Los Angeles, CA, May 2015, "Seasonal and interannual variability in Saturn's stratosphere from Voyager-IRIS and Cassini-CIRS".
- **International Workshop on Instrumentation for Planetary Missions**, Goddard Space Flight Center, Greenbelt, MD, November 2014, 'On the detection of trace gas species in the Martian atmosphere using gas correlation filter radiometry".
- **Invited seminar**, University of Oxford, Oxford, United Kingdom, May 2014, "Seasonal and interannual variability in Saturn's stratosphere from Voyager-IRIS and Cassini-CIRS".
- **European Planetary Science Congress,** London, United Kingdom, September 2013, "Interannual variability in Saturn's stratosphere from Voyager-IRIS and Cassini-CIRS observations", EPSC2013-35.
- **Division of Planetary Science,** Reno NV, October 2012, "Seasonal variations in temperature, acetylene and ethane in Saturn's stratosphere", 500.03.
- **European Planetary Science Congress & Division of Planetary Sciences**, Nantes, France, 2011, "Seasonal variations in hydrocarbons on Saturn from Cassini-CIRS", EPSC-DPS2011-5