

ABOUT ME

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PROJECTS

Mid-Infrared LAsEr Heterodyne Instrument (MILAHI) at the top of the Mt. Haleakala, Hawaii

NASA Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft Participating Scientist

Close-up camera onboard Next-generation Japanese Mars orbiter

Ground-based observations of the terrestrial planets at infrared-submillimeter regime

Lunar radar sounder onboard Kaguya spacecraft

Ultraviolet Imaging Spectrometer onboard Nozomi spacecraft

POSITIONS AND APPOINTMENTS

2010- Faculty Assistant Professor, Tohoku University

2009-2010 GCOE Assistant Professor, Tohoku University

2007-2009 Researcher JAXA/Kaguya project, Tohoku University

2003-2004 Employee of a dentsu Inc.

EDUCATIONS

2007 Ph.D., Dept. of Geophysics, Tohoku University

2003 M.S., Dept. of Geophysics, Tohoku University

2001 B.S., Dept. of Geophysics, Tohoku University

PROFESSIONAL MEMBERSHIPS

Japan Geoscience Union

Society of Geomagnetism and Earth, Planetary and Space Sciences

The Japanese Society of Planetary Sciences

American Geophysical Union

AWARDS

2002 American Geophysical Union Student Outstanding Award

FUNDS

2016-2019 JSPS, Scientific Research C (**PI: Nakagawa**, #16K05566)

2013-2016 JSPS, Grant-in-Aid for Young Scientist B (**PI: Nakagawa**, #25800271)

2010-2013 JSPS, Grant-in-Aid for Young Scientist B (**PI: Nakagawa**, #22740320)

2015-2015 Astrobiology Center Program of NINS (**PI: Nakagawa**, #AB271001)

2016-2020 JSPS, Scientific Research A (Co-I, PI: M.Nakamura)

2015-2018 JSPS, Scientific Research B (Co-I, PI: Y. Kasaba)

2015-2018 JSPS, Scientific Research B (Co-I, PI: N. Terada)

2012-2015 JSPS, Scientific Research B (Co-I, PI: Y. Kasaba)

PUBLICATIONS 2003-2016

2016 H. Nakagawa, S. Aoki, H. Sagawa, Y. Kasaba, I. Murata, G. Sonnabend, M. Sornig, S. Okano, J. Kuhn, J. Ritter, M. Kagitani, T. Sakanoi, IR heterodyne spectrometer MILAHI for continuous monitoring observatory of Martian and Venusian atmospheres at Mt.Haleakala, Hawaii, *Planet. Space Sci.*, printing.

2016 Medvedev, A.S., **H. Nakagawa**, C. Mockel, E. Yigit, N.M.Schneider, T. Kuroda, P. Hartogh, K. Terada, N. Terada, K. Seki, N.M. Schneider, S.K. Jain, J.S. Evans, J.I. Deighan, W.E. McClintock, D. Lo, Comparison of density and temperature in the Martian thermosphere from IUVS/MAVEN data and general circulation modeling, *Geophys. Res. Let.*, printing.

2015 Aoki, S., **H. Nakagawa**, H. Sagawa, M. Giuranna, G. Sindoni, A. Aronica, Y. Kasaba, Seasonal variation of the HDO/H₂O ratio in the atmosphere of Mars at the middle of northern spring and beginning of northern summer, *Icarus*, 260, 7-22.

2015 Aoki, S., M. Giuranna, Y. Kasaba, **H. Nakagawa**, G. Sindoni, A. Geminale, V. Formisano, Search for hydrogen peroxide in the Martian atmosphere by the Planetary Fourier Spectrometer onboard Mars Express, *Icarus*, 245, 177-183.

2014 Sakanoi, T., Y. Kasaba, M. Kagitani, **H. Nakagawa**, J. Kuhn, S. Okano, Development of infrared Echelle spectrograph and mid-infrared heterodyne spectrometer on a small telescope at Haleakala, Hawaii for planetary observation, *Pro. SPIE 9147, Ground-based and Airborne Instrumentation for Astronomy V*, 91478D, 10.1117/12.2055877.

2013 Nakagawa, H., N. Hoshino, M. Sornig, Y. Kasaba, G. Sonnabend, D. Stupar, S. Aoki, and I. Murata, Comparison of the general circulation model atmospheric wave simulations with wind observations of Venusian mesosphere, *Icarus*, 225, 840-849.

2013 Sornig, M., G. Sonnabend, D. Stupar, P. Kroetz, **H. Nakagawa**, and I. Mueller-Wodarg, Venus' upper atmospheric dynamical structure from ground-based observations shortly before and after Venus' inferior conjunction 2009, *Icarus*, 225, 828-839.

2011 Kobayashi, T., J.H. Kim, S.R. Lee, A. Kumamoto, **H. Nakagawa**, S. Oshigami, H. Oya, Y. Yamaguchi, A. Yamaji, and T. Ono, Synthetic Aperture Radar Processing of Kaguya Lunar Radar Sounder Data for Lunar Subsurface Imaging, *Geoscience and Remote Sensing*, 99, 1-14.

2009 Oshigami, S., Y. Yamaguchi, A. Yamaji, T. Ono, A. Kumamoto, T. Kobayashi, and **H. Nakagawa**, Distribution of the subsurface reflectors of the western nearside maria observed from Kaguya Lunar Radar Sounder, *Geophys. Res. Let.*, 36, L18202, doi:10.1029/2009GL03985.

2009 Ono, T., K. Kumamoto, **H. Nakagawa**, Y. Yamaguchi, S. Oshigami, A. Yamaji, T. Kobayashi, Y. Kasahara, and H. Oya, Lunar radar sounder observations subsurface stratifications under the nearside maria of the Moon, *Science*, 323, 5916, 909-912.

2009 Nakagawa, H., Y. Kasaba, H. Maezawa, A. Hashimoto, H. Sagawa, I. Murata, S. Okano, S. Aoki, R. Mizuno, N. Moribe, A. Mizuno, M. Momose, T. Ohnishi, and N. Mizuno, Search of SO₂ in the Martian atmosphere by ground-based submillimeter observation, *Planet. Space Sci.*, 57, 2123.

2009 Nakagawa, H., H. Fukunishi, S. Watanabe, Y. Takahashi, M. Taguchi, and R. Lallement, Latitudinal dependence of the solar wind density derived from remote sensing measurements using interplanetary Lyman alpha emission from 1999 to 2002, *Earth, Planets and Space*, 61, 3, 373-382.

2008 Nakagawa, H., M. Bzowski, A. Yamazaki, H. Fukunishi, S. Watanabe, Y. Takahashi, M. Taguchi, I. Yoshikawa, K. Shiomi, and M. Nakamura, UV optical measurements of the Nozomi spacecraft interpreted with a two-component LIC-flow model, *Astron. and Astrophys.*, 491, 29-41.

2003 Nakagawa H., H. Fukunishi, Y. Takahashi, S. Watanabe, M. Taguchi, J.L. Bertaux, R. Lallement, and E. Quemerais, Solar cycle dependence of interplanetary Lyman alpha emission and solar wind anisotropies derived from NOZOMI/UVS and SOHO/SWAN observations, *J. Geophys. Res.*, 108, A10, 8035-8047.

BOOKS

2009 小島正宜, 中川広務, シリーズ現代の天文学, Vol.10 太陽, 9.8章 太陽圏, 日本評論社.

OTHRES

2013 佐川英夫, 中川広務, 前澤裕之, 「ALMAを利用した太陽系天体観測セミナー」開催報告, 日本惑星科学会誌遊星人.

2010 笠羽康正, 中川広務, 青木翔平, 村田功, 坂野井健, 岡野章一, 中間赤外域高分散分光, 光学, 39, 12, 595-597.

2009 熊本篤志, 小野高幸, 中川広務, 山口靖, 押上祥子, 山路敦, 小林敬生, 笠原也, 大家寛, 「かぐや」搭載月レーダーサウンダー (LRS) による月地下探査及び自然波動観測, 日本惑星科学会誌遊星人, 18, no1, p18.

2009 寺田直樹, 松岡彩子, 関華奈子, 山崎敦, 二穴喜文, 横田勝一郎, 斎藤義文, 中川広務, 笠羽康正, 橘省吾, 尾川順子, 佐藤毅彦, MELOSワーキンググループ, MELOS火星複合探査の科学検討 MELOSが挑む「火星大気散逸・大気進化科学」, 日本惑星科学会誌遊星人, 18, no2, p73.

OUTREACH

TBD

PROCEEDINGS

- 2015** Kasaba, Y., S. Aoki, **H. Nakagawa**, M. Giuranna, O. Korabev, Commitment to European Mars Missions via Infrared Spectroscopic sciences, Symposium on Planetary Science 2015, 2015.
- 2015** **H. Nakagawa**, H. Sagawa, S. Aoki, K. Takami, Y. Kasaba, I. Murata, Scientific capabilities and measurement sensitivities of the IR heterodyne spectroscopy, Symposium on Planetary Science 2015, 2015.
- 2015** Sato, Y., Y. Kasaba, M. Giuranna, S. Aoki, **H. Nakagawa**, T. Kuroda, Spectral observation of mesospheric CO₂ ice clouds in the Martian mid-low latitude using onboard Mars Express, Symposium on Planetary Science 2015, 2015.
- 2014** Aoki, S., **H. Nakagawa**, I. Murata and Y. Kasaba, Mid-Infrared Laser Heterodyne Instrument (MILaHI): for sensitive search of trace gases on Mars, Proceedings of European Planetary Science Congress.
- 2014** Aoki, S., M. Giuranna, **H. Nakagawa**, H. Sagawa, A. Aronica, Y. Kasaba, Seasonal variation of HDO/H₂O ratio in the atmosphere of Mars observed by SUBARU/IRCS and MEX/PFS, European Planetary Science Congress.
- 2014** Sato, Y., Y. Kasaba, M. Giuranna, S. Aoki, **H. Nakagawa**, T. Kuroda, Observation of CO₂ ice cloud in the Martian mesosphere using PFS onboard Mars Express, European Planetary Science Congress.
- 2014** **H. Nakagawa**, Y. Kasaba, S. Aoki, I. Murata, S. Okano, G. Sonnabend, Observing plan for continuous monitoring of planetary atmosphere using IR heterodyne instrument 2014, Symposium on Planetary Science.
- 2014** 中川広務, 山崎敦, 塩谷圭吾, 田口真, 坂野井健, 寺田直樹, 関華奈子, 松岡彩子, 惑星大気散逸光学撮像観測のための迷光除去システムの基礎開発, 第13回宇宙科学シンポジウム.
- 2013** **H. Nakagawa**, S. Aoki, Y. Kasaba, I. Murata, G. Sonnabend, S. Okano, Study of planetary atmosphere using continuous monitoring by Mid-Infrared LAser Heterodyne Instrument (MILaHI), European Planetary Science Congress.
- 2013** Aoki, S., **H. Nakagawa**, Y. Kasaba, H. Sagawa, M. Giuranna, CH₄ and HDO/H₂O distributions on Mars observed by SUBARU/IRCS, Symposium on Planetary Science 2013, 2013.
- 2013** Kasaba, Y., T. Sakanoi, M. Kagitani, **H. Nakagawa**, T. Obara, I. Scholl, J. Kuhn, S. Okano, Development of the telescope dedicated to the observations of planets and exoplanets at Haleakala, Hawaii, Symposium on Planetary Science 2013, 2013.
- 2013** **H. Nakagawa**, S. Aoki, Y. Kasaba, I. Murata, S. Okano, External cavity for QCL installed in IR heterodyne spectroscopy, Symposium on Planetary Science 2013, 2013.
- 2013** Sakanoi, T., M. Kagitani, T. Obara, S. Okano, Y. Kasaba, **H. Nakagawa**, Current status of movement of the 60cm telescope to Haleakala, Hawaii, Symposium on Planetary Science 2013, 2013.
- 2013** 中川広務, 青木翔平, 笠羽康正, 村田功, 赤外レーザヘテロダイン分光器広帯域化のための外部共振器開発, 第27回大気圏シンポジウム, 2013.
- 2013** 中川広務, 山崎敦, 塩谷圭吾, 田口真, 坂野井健, 寺田直樹, 関華奈子, 松岡彩子, 惑星大気散逸光学撮像観測のための迷光除去システムの基礎開発, 第13回宇宙科学シンポジウム, 2013.

- 2012, Aoki S., **H. Nakagawa**, Y. Kasaba, M. Giuranna, A. Geminale, G. Sindoni, H. Sagawa, J. Mendrok, Y. Kasai, V. Formisano, Study of trace gases in the Martian atmosphere: Ground-based observation using SUBARU/IRCS and development of radiative transfer model for MEX/PFS limb observation, European Planetary Science Congress 2012, 2012.
- 2012, Giuranna, M., A. Geminale, A. Aronica, G. Sonnabend, M. Sornig, S. Aoki, Y. Kasaba, **H. Nakagawa**, G. Villanueva, M. Mumma, Methane on Mars: PFS and VLT, Keck, IRTF, SUBARU joint observations campaigns, European Planetary Science Congress 2012, 2012.
- 2012, Kuroda, M., Y. Kasaba, I. Murata, **H. Nakagawa**, T. Kuroda, P. Drossart, G. Piccioni, Latitudinal cloud characteristics in the Venusian northern high-latitude region evaluated from VEX/VIRTIS observations, European Planetary Science Congress 2012, 2012.
- 2012, Kuroda, T., H. Sagawa, **H. Nakagawa**, Y. Kasai, N. Terada, Y. Kasaba, Modeling and observations of the atmospheric water cycle and isotopic fractionation on Mars, European Planetary Science Congress 2012, 2012.
- 2012, **Nakagawa, H.**, S. Aoki, M. Kuroda, Y. Kasaba, I. Murata, G. Sonnabend, S. Okano, Mid-Infrared LAser Heterodyne Instrument (MILAH) for dedicated telescope, PLANETS at the top of the Mt.Haleakala, Hawaii, GCOE symposium 2012, 2012.
- 2012, Aoki S., **H. Nakagawa**, H. Sagawa, A. Geminale, M. Giuranna, V. Formisano, J. Mendrok, G. Sindoni, Y. Kasai, Y. Kasaba, Search for CH₄ on Mars with SUBARU/IRCS and MEX/PFS limb data: Preliminary results from the observations on January 2012 and validation of the radiative transfer modeling for PFS limb observations, Symposium on Planetary Science 2012, 2012.
- 2012, Kasaba, Y., **H. Nakagawa**, S. Aoki, I. Murata, S. Okano, Y. Kasai, H. Sagawa, Trial of infrared high-spectral resolution spectroscopy for Mars and Planets: Current studies in Tohoku Univ., Symposium on Planetary Science 2012, 2012.
- 2012, Kuroda, M., Y. Kasaba, I. Murata, **H. Nakagawa**, P. Drossart, Venusian cloud structure in the northern high-latitude region estimated from VEX/VIRTIS-H data, Symposium on Planetary Science 2012, 2012.
- 2011 **中川広務**, 青木翔平, 黒田壮大, 笠羽康正, 村田功, 岡野章一, ハレアカラ山頂惑星観測専用高分解能中間赤外ヘテロダイナミクス分光, 第12回宇宙研シンポジウム.
- 2011 **中川広務**, 青木翔平, 黒田壮大, 笠羽康正, 村田功, G. Sonnabend, 岡野章一, 超高分解能中間赤外ヘテロダイナミクス分光装置の開発現場, 第25回大気圏シンポジウム.
- 2011 Aoki, S., Y. Kasaba, M. Giuranna, A. Geminale, G. Sindoni, **H. Nakagawa**, Y. Kasai, I. Murata, D. Grassi, V. Formisano, Detection of hydrogen peroxide (H₂O₂) in the Martian atmosphere with MEX/PFS, EPSC-DPS Joint Meeting 2011, 2011.
- 2011 **H. Nakagawa**, S. Aoki, M. Kuroda, Y. Kasaba, I. Murata, S. Okano, Mid-infrared heterodyne spectroscopy dedicated to observation of planet at Haleakala, Hawaii, EPSC-DPS Joint Meeting 2011, 2011.
- 2011 Aoki, S., Y. Kasaba, M. Giuranna, A. Geminale, G. Sindoni, **H. Nakagawa**, I. Murata, V. Formisano, Search of H₂O₂ in the Martian atmosphere by MEX/PFS: Global average, Annual variation, and Seasonal variation, The International Symposium on Planetary Science 2011, 2011.
- 2011 **Nakagawa, H.**, M. Sornig, N. Hoshino, G. Sonnabend, D. Stupar, Y. Kasaba, S. Aoki, I. Murata, S. Okano, Daily variations of mesospheric wind on Venus using IR heterodyne spectroscopy, The International Symposium on Planetary Science 2011, 2011.
- 2011 笠井康子, 佐川英夫, 黒田剛史, **中川広務**, 笠羽康正, 前澤裕之, 真鍋武, 石山洋平, 落合啓, 西堀俊幸, U. Frisk, F. Sheele, J. Urban, D. Murtagh, P. Hartogh, MELOS気象オービターサブミリ波放射計(FIRE), 第25回大気圏シンポジウム, 2011.

- 2011 中川広務, M. Sornig, 星野直哉, G. Sonnabend, D. Stupar, 笠羽康正, 青木翔平, 村田功, 岡野章一, 高波長分散分光観測によって得られた金星中間圏風速場の日変化, 第25回大気シンポジウム, 2011.
- 2011 前澤裕之, 中川広務, 笠羽康正, 笠井康子, 佐川英夫, ALMA惑星大気観測ワーキンググループ, アタカマ大型ミリ・サブミリ波干渉計による惑星大気観測, 第25回大気シンポジウム, 2011.
- 2010 Aoki, S., Y. Kasaba, H. Nakagawa, I. Murata, V. Formisano, M. Giuranna, A. Geminalo, Strong oxidizer in the Martian atmosphere observed by MEX/PFS, European Geosciences Union General Assembly, Austria, MAY 2010.
- 2010 H. Nakagawa, Y. Kasaba, S. Aoki, I. Murata, H. Maezawa, S. Okano, H. Sagawa, Y. Kasai, High spectral resolution observations of Martian atmosphere in infrared-submillimetre range from ground-based instruments, European Geosciences Union General Assembly, 2010.
- 2010 Aoki, S., Y. Kasaba, H. Nakagawa, I. Murata, V. Formisano, M. Giuranna, A. Geminalo, Oxidant component in the Martian atmosphere observed by MEX/PFS, 38th COSPAR Scientific Assembly 2010, 2010.
- 2010 H. Nakagawa, Y. Kasaba, S. Aoki, I. Murata, S. Okano, H. Maezawa, H. Sagawa, Y. Kasai, Searches for volcanic or crustal gas in the recent Martian atmosphere by ground-based observation, 38th COSPAR Scientific Assembly 2010, 2010.
- 2010 笠羽康正, 中川広務, 青木翔平, 上野宗孝, 村田功, 坂野井健, 岡野章一, 佐藤毅彦, 高分散分光観測による微量組成成分を軸とした火星大気研究, 第10回宇宙科学シンポジウム, 2010.
- 2010 中川広務, 笠羽康正, 青木翔平, 村田功, 岡野章一, 前澤裕之, 佐川英夫, 笠井康子, 火星大気進化解明に向けた赤外・サブミリ波高分散分光観測, 第10回宇宙科学シンポジウム, 2010.
- 2010 青木翔平, 笠羽康正, 中川広務, 村田功, V. Formisano, A. Geminalo, M. Giuranna, MEX/PFSデータ解析による火星大気内微量大気酸化成分の時間変動, 第24回大気圏シンポジウム, 2010.
- 2010 中川広務, 笠羽康正, 青木翔平, 村田功, 岡野章一, 前澤裕之, 佐川英夫, 笠井康子, 火星大気進化解明に向けた赤外・サブミリ波高分散分光観測, 第24回大気圏シンポジウム, 2010.
- 2010 青木翔平, 笠羽康正, 中川広務, 村田功, V. Formisano, A. Geminalo, M. Giuranna, MEX/PFSデータ解析による火星大気内微量大気酸化成分の時間変動, 第11回惑星圏研究会, 2010.
- 2009 橋本明, 笠羽康正, 中川広務, 村田功, 岡野章一, 青木翔平, 高出力赤外レーザーを用いた惑星探査用高分散分光システムの基礎開発, 第10回惑星圏研究会, 2009.
- 2009 熊本篤志, 小野高幸, 中川広務, 山口靖, 押上洋子, 山路敦, 小林敬生, 笠原也, 大家寛, かぐや月レーダサウンダーによる月地下探査・自然電波観測, 第10回惑星圏研究会, 2009.
- 2009 中川広務, 笠羽康正, 橋本明, 前澤裕之, 村田功, 岡野章一, 青木翔平, 寺田直樹, 火星大気進化解明に向けた衛星・地上からの高分散分光観測, 第10回惑星圏研究会, 2009.
- 2009 笠羽康正, 中川広務, 村田功, 岡野章一, 橋本明, 青木翔平, 宇野健, 坂野井健, 高分散分光観測による惑星観測: 東北大の観測状況および将来装置開発, 第23回大気圏シンポジウム, 2009.
- 2009 中川広務, 笠羽康正, 橋本明, 村田功, 岡野章一, 青木翔平, 前澤裕之, 水野亮, 大西利和, 水野範和, 森部那由多, 百瀬宗武, ASTEチーム, 高分散分光観測による地球型惑星の大気ダイナミクス・組成変動の研究, 第9回宇宙科学シンポジウム, 2009.
- 2009 Nakagawa, H., Y. Kasaba, A. Hashimoto, I. Murata, S. Okano, H. Maezawa, Study of martian atmospheres by mid-infrared and submillimetre high-spectral resolution measurements: A search for SO₂ in the martian atmosphere, and development of the tunable heterodyne infrared spectrometer, European Geosciences Union General Assembly 2009, 2009.

- 2008 Nakagawa, H.**, T. Ono, A. Kumamoto, T. Kobayashi, Y. Yamaguchi, S. Oshigami, A. Yamaji, H. Oya, Lunar global feature of HF radar reflected from near-surface derived from Kaguya/LRS, American Geophysical Union 2008 Fall Meeting, #31B-1408, 2008.
- 2008 中川広務**, 笠羽康正, 橋本明, 前澤裕之, 水野亮, 岡野章一, SO₂ and vertical profiles of the molecular gas in the upper atmosphere on Mars: Preliminary results, 大気圏シンポジウム, 2008.
- 2008 笠羽康正, 中川広務**, 橋本明, 岡野章一, 村田功, 坂野井健, 山崎敦, 田口真, 量子化スケードレーザによる惑星探査用中間赤外高分散分光システムの基礎開発, 宇宙科学シンポジウム, 2008.
- 2008 中川広務**, 小野高幸, 熊本篤志, KAGUYA/LRS observations of man-made radio emissions, 宇宙科学シンポジウム, 2008.
- 2008 中川広務**, 笠羽康正, 橋本明, 前澤裕之, 水野亮, 岡野章一, Submillimeter observation of SO₂, isotope of CO on Mars, 惑星圏研究会, 2008.
- 2008 中川広務**, 小野高幸, 熊本篤志, 小林敬生, 山路敦, 山口靖, 押上洋子, KAGUYA/LRSによって得られた月全球におけるHF帯サウンダ反射エコー特性, 月・惑星シンポジウム, 2008.
- 2008 Ono, T.**, A. Kumamoto, Y. Yamaguchi, A. Yamaji, T. Kobayashi, Y. Kasahara, **H. Nakagawa**, S. Oshigami, H. Oya, Initial results of the Lunar Radar Sounder (LRS) experiment on-board the KAGUYA(Selene) spacecraft, Lunar and Planetary Science, 1572, 2008.
- 2005 Nakagawa, H.**, H. Fukunishi, S. Watanabe, M. Taguchi, Y. Takahashi, A. Yamazaki, The secondary flow of interstellar neutral hydrogen, Eos Trans. AGU, 86(50), Fall Meet. Suppl., #SH51A-1189, 2005.
- 2004 Nakagawa, H.**, H. Fukunishi, S. Watanabe, M. Taguchi, Y. Takahashi, J.L. Bertaux, E. Quemerais, R. Lallement, Latitudinal dependence of solar proton flux derived from interplanetary Lyman alpha emission, Eos Trans. AGU, 85(49), Fall Meet. Suppl., #SH31A-1147, 2004.
- 2002 Nakagawa, H.**, H. Fukunishi, S. Watanabe, M. Taguchi, Y. Takahashi, J.L. Bertaux, E. Quemerais, R. Lallement, Studying the solar wind by simultaneous observations of the interplanetary Lyman alpha background with NOZOMI/IUVS and SOHO/SWAN, Eos Trans. AGU, 83(47), Fall Meet. Suppl., F1162, 2002.