

## Glynn Hulley

*curriculum vitae*

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### SHORT BIOGRAPHY

Dr. Glynn Hulley is a physicist in the Carbon Cycle and Ecosystems group at the NASA Jet Propulsion Laboratory. His research interests include multi- and hyperspectral thermal infrared remote sensing of Earth surface properties, urban climate science, and links between heat waves, extreme temperatures and public health. He is principle investigator for the development and validation of standard NASA Land Surface Temperature (LST) and emissivity products for MODIS, VIIRS and Landsat, and is the level-2 thermal lead for the ECOSTRESS mission.

Glynn is currently a member of several NASA satellite instrument teams including ECOSTRESS, MODIS, Suomi-NPP, and Landsat, and has previously worked on both ASTER and AIRS science teams. He has also worked extensively with a new airborne Hyperspectral Thermal Emission Spectrometer (HyTES) developed at JPL in an effort to develop pre-cursor data and to test algorithms and models for future thermal infrared missions such as NASA' Surface Biology and Geology (SBG) designated observable. A key aspect of Glynn's research is the development of new techniques to retrieve surface temperature and spectral emissivity information from thermal remotely sensed data. Algorithms and science products developed by Glynn are widely used by researchers and have been incorporated into commercial packages by NASA and the USGS for public distribution.

In 2010 Glynn completed development of the ASTER Global Emissivity Database (ASTER GED, <http://emissivity.jpl.nasa.gov/aster-ged>) based on millions of ASTER observations of surface emissivity since 2000. ASTER GED is 2,500X more detailed than any previous emissivity products currently produced, and is the most accurate emissivity database currently available for Earth science research. It is currently being used as an absolute reference standard in research conducted by both domestic and foreign research agencies.

### EDUCATION

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- Ph. D.**, Atmospheric Physics, University of Maryland Baltimore County, 2007.
- M. Sc.**, Atmospheric Physics, University of Maryland Baltimore County, 2005.
- B. Sc.**, Computational Physics and Mathematics, Francis Marion University, 2001

### EMPLOYMENT HISTORY

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<b>Oct 2010 to present</b>	<b>Level-IV Research Scientist</b> , Jet Propulsion Laboratory (JPL) California Institute of Technology, 4800 Oak Grove Dr, Pasadena, CA
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<b>Oct 2007 to Sep 2010</b>	<b>Postdoctoral Research Scientist</b> , Jet Propulsion Laboratory (JPL) California Institute of Technology, 4800 Oak Grove Dr, Pasadena, CA
<b>Aug 2003 to May 2005</b>	<b>Graduate Research Assistant</b> , Joint Center for Earth Systems Technology (JCET) University of Maryland Baltimore County (UMBC), Baltimore, MD
<b>Sep 2001 to July 2003</b>	<b>Teaching Assistant</b> , Physics Department, University of Maryland Baltimore County (UMBC), Baltimore, MD
<b>Summer 2001</b>	<b>Visiting scientist</b> , Visiting Student Enrichment Program (VSEP), NASAs Goddard Space Flight Center, Greenbelt, MD

## LANGUAGES

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<b>Native:</b>	<b>English</b>
<b>Fluent:</b>	<b>Afrikaans</b>
<b>Basic:</b>	<b>Xhosa</b>

## SKILLS

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<b>Programming</b>	Matlab, R, Python, Fortran, Maple, Mathematica, basic C++
<b>Web</b>	Knowledgeable of, and used, many web architectures; proficient in HTML, Plone, and Latex.
<b>Writing</b>	Comfortable and experienced writing in academic, business, technical and informal styles.

## PROFESSIONAL BODIES AND MEMBERSHIPS

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<b>2018-present</b>	<b>NASA CEOS Land Product Validation (LPV)</b> , " <i>The mission of the CEOS Land Product Validation (LPV) subgroup is to coordinate the quantitative validation of satellite-derived products.</i> " <a href="https://lpvs.gsfc.nasa.gov/">https://lpvs.gsfc.nasa.gov/</a> <b>Land Surface Temperature and Emissivity validation lead</b>
<b>2012-2016</b>	<b>EarthTemp Network</b> , " <i>to stimulate new international collaboration in measuring and understanding the surface temperatures of Earth</i> " <b>Active member</b> and participant in workshops in Edinburgh, UK (2012) and Reading, UK (2014). <a href="http://www.earthtemp.net/">http://www.earthtemp.net/</a>
<b>2012-2019</b>	<b>GlobTemperature</b> , " <i>a DUE project funded by ESA aiming at distributing Land Surface Temperature products (LST) to the user community</i> " <b>Steering committee member</b> . <a href="http://www.globtemperature.info/">http://www.globtemperature.info/</a>
<b>2014-present</b>	<b>ILSTE-WG</b> , " <i>The International Land Surface Temperature and Emissivity Working Group (ILSTE-WG) aims to provide advice and recommendations to the wider scientific and user communities on the</i>

*best practices for retrieval, validation and exploitation of Land Surface Temperature (LST), Ice Surface Temperature (IST), Lake Surface Water Temperature (LSWT), and Land Surface Emissivity (LSE)."*

**Steering committee member.** <http://ilste-wg.org/>

**2015-2018**      **LP DAAC User Working Group**, USGS, Sioux Falls, SD.  
**Thermal Infrared advisory member**

## MENTOR/ADVISOR/LEADERSHIP EXPERIENCE

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**Postdocs**              Currently mentoring a NPP postdoc from 2021-2024 studying urban climate science. Mentored three Caltech post-docs from 2012 – 2017 who worked in development and research application of the NASA MODIS/VIIRS Land Surface Temperature products.

**NASA DEVELOP**              Mentored 4 DEVELOP interns on a LA urban heating project from Feb-April 2023, and five DEVELOP interns during 2015 as part of the ECOSTRESS mission applications and early-adopter program.

**International Collaboration**              Hosted and mentored international researchers from the Korean Aerospace Research Institute (KARI, 1 year, 2016), University of Valencia (6 months, 2014), and a Fullbright doctoral student from IPMA, Portugal (6 months, 2017).

Currently collaborating with the TRISHNA and LSTM TIR algorithm development teams to ensure consistent products and cal/val with future SBG and Landsat 10 missions.

**Raytheon**                      Employed four Raytheon data technician/programmers since 2014 (Robert Freepartner, Nicholas Vance, Munish Sikka, Tinh La) in development of new NASA operational LST products for MODIS and VIIRS sensors.

## CONFERENCE SESSIONS

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**Dec 2020**                      **Session primary convener/chair, American Geophysical Union (AGU),** December, 2020, Virtual  
Taking the temperature of Earth: challenges, trends, and applications across all Earth surface domains.

**Dec 2019**                      **Session primary convener/chair, American Geophysical Union (AGU),** December, 2019, San Francisco, CA  
Taking the temperature of Earth: challenges, trends, and applications across all Earth surface domains.

**Dec 2017**                      **Session primary convener/chair, American Geophysical Union (AGU),** December, 2017, New Orleans, LA  
Taking the temperature of Earth: challenges, trends, and applications across all Earth surface domains.

**Dec 2016**                      **Session primary convener/chair, American Geophysical Union (AGU),** 12-16 December, 2016, San Francisco, CA.

- Taking the temperature of Earth: challenges, trends, and applications across all Earth surface domains.
- April 2016** *Session co-convenor/co-chair, European Geophysical Union (EGU), 17-22 April, 2016, Vienna, Austria.*  
CL2.02/AS4.10/CR6.6/OS1.22, Taking the temperature of Earth: Variability, trends and applications of observed surface temperature data across all domains of Earth's surface
- Dec 2015** *Session primary convenor/chair, American Geophysical Union (AGU), 14-18 December, 2015, San Francisco, CA.*  
Taking the temperature of Earth: Long term trends and variability across all domains of Earth's surface
- Dec 2014** *Session primary convenor/ chair, American Geophysical Union (AGU), 15-19 December, 2015, San Francisco, CA.*  
Taking the temperature of Earth: Challenges and applications across all Earth surface domains
- Dec 2013** *Session primary convenor/chair, American Geophysical Union (AGU), December, 2015, San Francisco, CA.*  
Taking the temperature of Earth: Challenges and applications across all Earth surface domains

#### NASA PROPOSAL PRINCIPAL INVESTIGATOR AWARDS

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A near real-time VIIRS 375-m Land Surface Temperature (LST) product for Earth science research and applications, TASNPP, 09/02/2021-08/31/2024, \$581 K, **Principal Investigator**

A Unified and Coherent Land Surface Temperature and Emissivity Earth System Data Record (ESDR), NASA-MEaSURES Program, 01/01/14 - 12/31/24, \$4 M, **Science Principal Investigator**

A high spatio-temporal resolution Land Surface Temperature (LST) product for urban environments, NASA LCLUC, 01/01/18 - 01/31/20, \$600 K, **Principal Investigator**

The Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) – NASA EVI, 07/01/14-03/29/20, \$30 mil, **Co-Investigator**

A New MODIS Land Surface Temperature and Spectral Emissivity Product (MOD21) for Earth Science Research, Science of Terra and Aqua - NASA, 08/01/14 - 07/31/17, \$749.5 K, **Principal Investigator**

A Unified VIIRS Land Surface Temperature and Emissivity (LST&E) Product for Earth Science Research and MODIS Continuity, 08/01/14 - 07/31/17, \$788.0 K, **Principal Investigator**

Estimating, validating and conveying measurement differences between land surface temperature and emissivity products from NASA's EOS sensors, NASA-ESDR, 10/01/10 - 09/30/13, \$1.2 M, **Science Principal Investigator**

Improving the VIIRS Land Surface Temperature Product for use as an Earth System Data Record, NASA-NPP, 10/01/10 - 09/30/13, \$367.1 K, **Science Principal Investigator**

A Unified and Coherent Land Surface Temperature and Emissivity Earth System Data Record (ESDR), NASA-MEaSUREs Program, 01/01/14 - 12/31/19, \$850.0 K, **Science Principal Investigator**

## NASA PROJECTS

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The ASTER science team. A near real-time VIIRS 375-m Land Surface Temperature (LST) product for Earth science research and applications (2021 – present).

NASA Surface Biology and Geology (SBG) DO study: TIR science team, thermal modeling, and algorithm development (2020 – present).

NASA/USGS Landsat 10 Architecture Study Team (AST)  
Thermal infrared advisory member for the thermal component of Landsat 10, science and measurement requirements (2019-2021).

The Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) – NASA EVI (2013 – present).

A New VIIRS Land Surface Temperature and Emissivity Environmental Data Record (2014 – present)

A MODIS Land Surface Temperature and Spectral Emissivity product (MOD21) for Earth Science Research (2014-present)

A Unified and Coherent Land Surface Temperature and Emissivity Earth System Data Record (ESDR), NASA-MEaSUREs Program (2014-present)

Atmospheric Infrared Sounder (AIRS) Level-2 Land Surface Temperature and Emissivity testing and validation expert (2007-present)

Advanced Thermal Emission and Reflection Radiometer (ASTER) Thermal Infrared research scientist in development of a global emissivity database (ASTER GED) (2007-present)

Hyperspectral Infrared Imager (HypIRI) thermal infrared algorithm and product development specialist (2007-2017)

Hyperspectral Thermal Emission Spectrometer (HyTES) algorithm developer and data analyst (2012-present)

## AWARDS

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**2022 International Space Station Research Awards Innovation Award** – Earth Observations and Remote Sensing for using ECOSTRESS data to identify impacts of urban heat on disadvantaged communities. Glynn Hulley, Simon Hook and Greg Spotts.

**ECOSTRESS Science Team group achievement award, 2020** For outstanding achievement in advancing the science and applications of ECOSTRESS

**JPL Bonus Award, 2018**, For the first successful deployment of the HyTES instrument as part of the HypIRI-HyTES Hawaii campaign.

**Certificate of recognition team award, 2018**, In recognitions of outstanding science support for ECOSTRESS launch operations.

**JPL Voyager Award, 2016**, in recognition of outstanding efforts in supporting the rapid analysis of HyTES data over the Porter Ranch Methane Leak to help with remediation efforts

**NASA Early Career Achievement Medal, 2014**

**JPL Mariner award, 2014**, For the development of new algorithms for the detection of Methane, Ammonia, Sulfur Dioxide and Nitrogen Dioxide from high spatial resolution HyTES.

**JPL Discovery award, 2014**, HyTES was flown over numerous test sites in the western US. Glynn was responsible for near-real time data processing after completion of the flights.

**JPL Team Award**, for support as co-investigator in winning the ECOSTRESS EVI-2 proposal, September, 2014

**JPL Team Award**, algorithm development and near-real time processing of data from the second Hyperspectral Thermal Emission Spectrometer (HyTES) Science campaign, August 2014

**JPL Team Award**, successful first deployment of the airborne Hyperspectral Thermal Emission Spectrometer (HyTES), August 2012

Top five best reviewer for **IEEE** Transactions on Geoscience and Remote Sensing Letters (TGRS), 2010

**UMBC Class of 2007 Exceptional Graduates**

Outstanding Student Paper Award, AGU, Baltimore, MD, 2006

Physics Award for best student, 2001, Francis Marion University

Presidents List of Distinguished Students, 1998 - 2001, Francis Marion University

## EXTRACURRICULAR LEADERSHIP ACTIVITIES

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Private pilot, Aero Association of Caltech (AACIT), 2016 – present.  
Aircraft maintenance director and member of the AACIT board.

Francis Marion University NCAA Tennis Team, 1998 - 2001

- Team captain, 2000 - 2002
- Academic All American, 2000 and 2002
- Loren Mason MVP award for 1999 and 2000 seasons

UMBC Cricket Club, Baltimore MD, 2004 - 2006

- Vice president, 2005
- Team captain, 2006

## PEER-REVIEWED PUBLICATIONS

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### 2023

1. Shreevastava, A., **G. C. Hulley**, J. Thompson (2023). Algorithms for detecting elevated temperature features for the NASA Surface Biology and Geology (SBG) designated observable. Part 1: Detection, *Journal of Geophysical Research-Biogeosciences*, in review.
2. Shreevastava, A., C. Raymond, **G. C. Hulley**, (2023). Contrasting intra-urban signatures of moist and dry heatwaves in Southern California, *Natural Hazards and Earth System Sciences*, in review.

### 2022

3. Cawse-Nicholson, K., Raiho, A.M., Thompson, D.R., **Hulley, G.C.**, Miller, C.E., Miner, K.R., Poulter, B., Schimel, D., Schneider, F.D., Townsend, P.A., & Zareh, S.K. (2022). Intrinsic Dimensionality as a Metric for the Impact of Mission Design Parameters. *Journal of Geophysical Research-Biogeosciences*, 127
4. Fahlen, J.E., Brodrick, P.G., Thompson, D.R., Herman, R.L., **Hulley, G.**, Cawse-Nicholson, K., Green, R.O., Green, J.J., Hook, S.J., & Miller, C.E. (2021). Joint VSWIR-TIR retrievals of earth's surface and atmosphere. *Remote Sensing of Environment*, 267
5. Gustine, R.N., Lee, C.M., Halverson, G.H., Acuna, S.C., Cawse-Nicholson, K.A., **Hulley, G.C.**, & Hestir, E.L. (2022). Using ECOSTRESS to Observe and Model Diurnal Variability in Water Temperature Conditions in the San Francisco Estuary. *Ieee Transactions on Geoscience and Remote Sensing*, 60
6. Halverson, G.H., Lee, C.M., Hestir, E.L., **Hulley, G.C.**, Cawse-Nicholson, K., Hook, S.J., Bergamaschi, B.A., Acuna, S., Tufillaro, N.B., Radocinski, R.G., Rivera, G., & Sommer, T.R. (2022). Decline in Thermal Habitat Conditions for the Endangered Delta Smelt as Seen from Landsat Satellites (1985-2019). *Environmental Science & Technology*, 56, 185-193

7. Hu, T., Mallick, K., **Hulley, G.C.**, Planells, L.P., Gottsche, F.M., Schlerf, M., Hitzelberger, P., Didry, Y., Szantoi, Z., Alonso, I., Sobrino, J.A., Skokovic, D., Roujean, J.L., Boulet, G., Gamet, P., & Hook, S. (2022). Continental-scale evaluation of three ECOSTRESS land surface temperature products over Europe and Africa: Temperature-based validation and cross-satellite comparison. *Remote Sensing of Environment*, 282
8. Parazoo, N.C., Coleman, R.W., Yadav, V., Stavros, E.N., **Hulley, G.**, & Hutyra, L. (2022). Diverse biosphere influence on carbon and heat in mixed urban Mediterranean landscape revealed by high resolution thermal and optical remote sensing. *Science of the Total Environment*, 806
9. **Hulley, G.**, B. Dousset, (2022), Heatwaves trends and spatiotemporal dynamic in urban agglomeration: Los Angeles 2002-2019, *Nature Scientific Reports*, in prep.
10. Halverson, G.H., Lee, C.M., Hestir, E.L., **Hulley, G.C.**, Cawse-Nicholson, K., Hook, S.J., Bergamaschi, B.A., Acuna, S., Tufillaro, N.B., Radocinski, R.G., Rivera, G., & Sommer, T.R. (2022). Decline in Thermal Habitat Conditions for the Endangered Delta Smelt as Seen from Landsat Satellites (1985-2019). *Environmental Science & Technology*, 56, 185-193
11. Gustine, R.N., Lee, C.M., Halverson, G.H., Acuna, S.C., Cawse-Nicholson, K.A., **Hulley, G.C.**, & Hestir, E.L. (2022). Using ECOSTRESS to Observe and Model Diurnal Variability in Water Temperature Conditions in the San Francisco Estuary. *Ieee Transactions on Geoscience and Remote Sensing*, 60

## 2021

1. **Hulley, G.C.**, Goettsche, F., Rivera, G., Hook, S., Freepartner, R., Radocinski, R., Martin, M., Cawse-Nicholson, K., Johnson, W., (2021), Validation and quality assessment of the ECOSTRESS level-2 land surface temperature and emissivity product, *IEEE TGRS.*, 60.
2. Anderson, M.C., Yang, Y., Xue, J., Knipper, K.R., Yang, Y., Gao, F., Hain, C.R., Kustas, W.P., Cawse-Nicholson, K., **Hulley, G.**, Fisher, J.B., Alfieri, J.G., Meyers, T.P., Prueger, J., Baldocchi, D.D., & Rey-Sanchez, C. (2021). Interoperability of ECOSTRESS and Landsat for mapping evapotranspiration time series at sub-field scales. *Remote Sensing of Environment*, 252
3. Loveless, M.; Borbas, E.E.; Knuteson, R.; Cawse-Nicholson, K.; **Hulley, G.**; Hook, S. Climatology of the Combined ASTER MODIS Emissivity over Land (CAMEL) Version 2. *Remote Sens.* 2021, 13, 111. <https://doi.org/10.3390/rs13010111>
4. Cawse-Nicholson, K., Anderson, M.C., Yang, Y., Yang, Y., Hook, S.J., Fisher, J.B., Halverson, **G., Hulley, G.C.**, Hain, C., Baldocchi, D.D., Brunzell, N.A., Desai, A.R., Griffis, T.J., & Novick, K.A. (2021). Evaluation of a CONUS-Wide ECOSTRESS DisALEXI Evapotranspiration Product. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 14, 10117-10133



5. Chen, W., Pinker, R.T., Ma, Y.T., **Hulley, G.**, Borbas, E., Islam, T., Cawse-Nicholson, K.A., Hook, S., Hain, C., & Basara, J. (2021). Land Surface Temperature from GOES-East and GOES-West. *Journal of Atmospheric and Oceanic Technology*, 38, 843-858
6. Cawse-Nicholson, K., Townsend, P.A., Schimel, D., Assiri, A.M., Blake, P.L., Buongiorno, M.F., Campbell, P., Carmon, N., Casey, K.A., Correa-Pabon, R.E., Dahlin, K.M., Dashti, H., Dennison, P.E., Dierssen, H., Erickson, A., Fisher, J.B., Frouin, R., Gatebe, C.K., Gholizadeh, H., Gierach, M., Glenn, N.F., Goodman, J.A., Griffith, D.M., Guild, L., Hakkenberg, C.R., Hochberg, E.J., Holmes, T.R.H., Hu, C.M., **Hulley, G.**, Huemmrich, K.F., Kudela, R.M., Kokaly, R.F., Lee, C.M., Martin, R., Miller, C.E., Moses, W.J., Muller-Karger, F.E., Ortiz, J.D., Otis, D.B., Pahlevan, N., Painter, T.H., Pavlick, R., Poulter, B., Qi, Y., Realmuto, V.J., Roberts, D., Schaepman, M.E., Schneider, F.D., Schwandner, F.M., Serbin, S.P., Shiklomanov, A.N., Stavros, E.N., Thompson, D.R., Torres-Perez, J.L., Turpie, K.R., Tzortziou, M., Ustin, S., Yu, Q., Yusup, Y., Zhang, Q.Y., & Grp, S.A.W. (2021b). NASA's surface biology and geology designated observable: A perspective on surface imaging algorithms. *Remote Sensing of Environment*, 257

## 2020

1. **Hulley, G. C.**, Dousset, B., Kahn, B. H., (2020), Rising trends in heatwave metrics across Southern California, *Earth's Future*, *Earth's Future*, 8, e2020EF001480. <https://doi.org/10.1029/2020EF001480>
2. Coleman, R.W.; Stavros, N.; **Hulley, G.**; Parazoo, N. Comparison of Thermal Infrared-Derived Maps of Irrigated and Non-Irrigated Vegetation in Urban and Non-Urban Areas of Southern California. *Remote Sens.* 2020, 12, 4102. <https://doi.org/10.3390/rs12244102>
3. Fisher, J. B., Lee, B., Purdy, A. J., Halverson, G. H., Dohlen, M. B., Cawse-Nicholson, K., **Hulley, G.** et al. (2020). ECOSTRESS: NASA's Next Generation Mission to measure evapotranspiration from the International Space Station. *Water Resources Research*, 56, e2019WR026058. <https://doi.org/10.1029/2019WR026058>
4. Hook, S.J., Cawse-Nicholson, K., Barsi, J., Radocinski, R., **Hulley, G.C.**, Johnson, W.R., Rivera, G., Markham, B., (2020), In-Flight Validation of the ECOSTRESS, Landsats 7 and 8 Thermal Infrared Spectral Channels Using the Lake Tahoe CA/NV and Salton Sea CA Automated Validation Sites, *IEEE Trans. Geo. Rem. Sens.*, Volume: 58 Issue: 2 Pages: 1294-1302 DOI: 10.1109/TGRS.2019.2945701
5. Mushkin, A., Gillespie, A.R., Abbott, E.A., Batbaatar, J. **Hulley, G.**, Tan, H., Tratt, D., Buckland, K.N., (2020), Validation of ASTER Emissivity Retrieval Using the Mako Airborne TIR Imaging Spectrometer at the Algodones Dune Field in Southern California, USA, *Remote Sens.* 2020, 12, 815; doi:10.3390/rs12050815
6. Ermida, S., Trigo, I.F., **Hulley, G.**, DaCamara, C., (2020), A multi-sensor approach to retrieve emissivity angular dependence over desert regions, *Rem. Sens. Environ.*, 237, p. 111559

**2019**

1. **Hulley, G.**, Shivers, S., Wetherley, E., Cudd, R., (2019), New ECOSTRESS and MODIS Land Surface Temperature Data Reveal Fine-Scale Heat Vulnerability in Cities: A Case Study for Los Angeles County, California, REMOTE SENSING Volume: 11 Issue: 18 Article Number: 2136 DOI: 10.3390/rs11182136
2. Schimel, D., Schneider, F.D., Bloom, A., Bowman, K., Cawse-Nicholson, K., Elder, C., Ferraz, A., Fisher, J., **Hulley, G.**, Liu, J.J., Magney, T., Meyer, V., Miller, C., Parazoo, N., Pavlick, R., Podest, E., Saatchi, S., Stavros, N., Keller, M., Townsend, P., Zheng, T., & Participants, J.C.E. (2019). Flux towers in the sky: global ecology from space. *New Phytologist*, 224, 570-584
- 3.
4. Meerdink, S., Roberts, D., **Hulley, G.**, Gader, P., Pisek, J., Adamson, K., & Hook, S. J. (2019). Plant species' spectral emissivity and temperature using the hyperspectral thermal emission spectrometer (HyTES) sensor. *Remote Sensing of Environment*, 224, 421-435.
5. Schimel, D., Schneider, F. D., & JPL Carbon and Ecosystem Participants. (2019). Flux towers in the sky: global ecology from space. *New Phytologist*, 224(2), 570-584.
6. Kim, Y., Malakar, N., **Hulley, G.**, & Hook, S. (2019). Surface Temperature Retrieval from MASTER Mid-wave Infrared Single Channel Data Using Radiative Transfer Model. *Korean Journal of Remote Sensing*, 35(1), 151-162.
7. Pinker, R.T., Ma, Y.T., Chen, W., **Hulley, G.**, Borbas, E. Islam, T. Hain, C., Cawse-Nicholson, K., Hook, S., Basara, J., (2019), Towards a Unified and Coherent Land Surface Temperature Earth System Data Record from Geostationary Satellites, REMOTE SENSING Volume: 11 Issue: 12 Article Number: 1399 DOI: 10.3390/rs11121399
8. Kuai, L., Kalashnikova, O.V., Hopkins, F.M., **Hulley, G.C.**, Lee, H.Y., Garay, M.J., Duren, R.M., Worden, J.R., Hook, S.J., (2019), Quantification of Ammonia Emissions With High Spatial Resolution Thermal Infrared Observations From the Hyperspectral Thermal Emission Spectrometer (HyTES) Airborne Instrument, IEEE JOURNAL OF SELECTED TOPICS IN APPLIED EARTH OBSERVATIONS AND REMOTE SENSING Volume: 12 Issue: 12 Pages: 4798-4812 DOI: 10.1109/JSTARS.2019.2918093
9. Mattar, C., A. Santamaria-Artigas, F. Ponzoni, CT Pinto, C. Barrientos, **G. Hulley**, (2019), Atacama Field Campaign: laboratory and in-situ measurements for remote sensing applications, *Int. Journal Digital Earth*, 12(1), pp. 43-61

**2018**

1. Feltz, M., E. Borbas, R. Knuteson, **G. Hulley**, S. Hook, (2018), The Combined ASTER and MODIS Emissivity over Land (CAMEL) Global Broadband Infrared Emissivity Product, *Remote Sensing*, 10 (7), DOI: 10.3390/rs10071027
2. Veraverbeke, S., P. Dennison, I. Gitas, **G. Hulley**, O. Kalashnikova, T. Katagis, L. Kuai, R. Meng, D. Roberts, N. Stavros, (2018), Hyperspectral remote

- sensing of fire: State-of-the-art and future perspectives, *Rem. Sens. Environ.*, 216, pp. 105-121, DOI: 10.1016/j.rse.2018.06.020
3. Malakar, N. K., **G. C. Hulley**, K. Laraby, Cook, M., S. Hook, J. Schott, (2018), An Operational Land Surface Temperature Product for Landsat Thermal Data: Methodology and Validation, *IEEE TGRS*, 56 (10), pp. 5715-5735, DOI: 10.1109/TGRS.2018.2824828
  4. Veraverbeke, Sander, P. Dennison, I. Gitas, **G. Hulley**, O. Kalashnikova, T. Katagis, L. Kuai, R. Meng, D. Roberts, N. Stavros. (2018). Hyperspectral remote sensing of fire: State-of-the-art and future perspectives. *Remote Sensing of Environment*. 216. 10.1016/j.rse.2018.06.020.
  5. Borbas, E. **G. Hulley**, M. Feltz, R. Knuteson, S. Hook (2018), The Combined ASTER MODIS Emissivity over Land (CAMEL) Part 1: Methodology and High Spectral Resolution Application, *Remote Sensing*, 10, 643, doi:10.3390/rs10040643
  6. Feltz, M., E. Borbas, R. Knuteson, **G. Hulley**, S. Hook, (2018), The Combined ASTER MODIS Emissivity over Land (CAMEL) Part 2: Uncertainty and Validation, *Remote Sensing*, 10, 664, doi:10.3390/rs100506664

## 2017

1. **Hulley, G. C.**, Malakar, N., Islam, T., Freepartner, R, (2017), NASA's MODIS and VIIRS Land Surface Temperature and Emissivity Products: A Consistent and High Quality Earth System Data Record, *IEEE TGRS*, DOI: 10.1109/JSTARS.2017.2779330.
2. Trinh, R. C., C. G. Fichot, M. M. Gierach, B. Holt, N. K. Malakar, **G. C. Hulley**, J. Smith, (2017), Application of Landsat 8 for Monitoring Impacts of Wastewater Discharge on Coastal Water Quality. *Front. Mar. Sci.* 4:329. doi: 10.3389/fmars.2017.00329

## 2016

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