Glynn Hulley

curriculum vitae

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SHORT BIOGRAPHY

Dr. Glynn Hulley is a physicist in the Earth Surface Science Group in the Earth Science Section at the Jet Propulsion Laboratory. His research is focused on improving our understanding of Earth surface properties, ecosystem and atmospheric processes.

Glynn's research interests are focused on the remote sensing of Earth surface properties using thermal infrared spectroscopy. He is a member of several NASA satellite instrument teams including ECOSTRESS, AIRS, ASTER, MODIS, NPP, and Landsat. 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.

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. Glynn is also lead scientist for two new NASA land surface temperature and emissivity products from the MODIS and VIIRS sensors.

Glynn is also currently working with colleagues to demonstrate a new airborne hyperspectral thermal imager (HyTES) at JPL, and is also helping to develop algorithms and science objectives for the thermal infrared sensor on the HyspIRI Satellite Mission recommended by the National Research Council (NRC) Decadal Survey for Earth Science. He is currently leading the effort to produce Level-2 thermal infrared products from the the ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS), which will offer clues about how Earth's water and carbon cycles affect plant growth and how ecosystems adapt to changes in climate by measuring evapotranspiration, or the loss of water from leaves and soil. He is also actively involved in planning activities and collaborating with other scientists at NASA and other agencies, e.g. NOAA and the European Space Agency (ESA).

EDUCATION

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

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

LANGUAGES

Native:	***English***
Fluent:	***Afrikaans***
Basic:	***Xhosa***

SKILLS

Generic	Advanced user of MS Office applications. Comfortable on Windows, Mac and Linux/Unix platforms.
Programming	Matlab, Python, Fortran, R, Maple, Mathematica, C++
Web	Knowledgeable of, and used, many web architectures; proficient in HTML, Plone, and Latex.
Writing	Comfortable and experienced writing in academic, business, technical and informal styles.

PROFESSIONAL BODIES AND MEMBERSHIPS

2012-2016	***EarthTemp Network,*** *"to stimulate new international collaboration in measuring and understanding the surface temperatures of Earth"* **Active member** and participant in workshops in Edinburgh, UK (2012) and Reading, UK (2014). http://www.earthtemp.net/
2012-present	***GlobTemperature,*** *"a DUE project funded by ESA aiming at distributing Land Surface Temperature products (LST) to the user community"* **Steering committee member**. http://www.globtemperature.info/
2014-present	***ILSTE-WG,*** *" 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 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-present ***LP DAAC User Working Group***, USGS, Sioux Falls, SD.
Active member.

MENTOR/ADVISOR/LEADERSHIP EXPERIENCE

Caltech Postdocs Mentored three Caltech post-docs from 2012 – present who worked in development and research application of the NASA MODIS/VIIRS Land Surface Temperature products.

NASA DEVELOP Mentored five DEVELOP interns at JPL from 2015 – present as part of the ECOSTRESS mission applications and early-adopter program.

International Collaboration Hosted and mentored three 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).

Raytheon Presently working with three Raytheon programmers since 2014 (Robert Freepartner, Nicholas Vance, Munish Sikka) in development of new NASA operational LST products for MODIS and VIIRS sensors.

CONFERENCE SUPPORT

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-convener/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 convener/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 convener/ 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 convener/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 AWARDS

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**

HyspIRI discrimination of plant species and functional types along a strong environmental-temperature gradient, NASA-HyspIRI Preparatory, 10/01/13 - 10/31/16, $150.0 K, **Co-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

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

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 (HyspIRI) thermal infrared algorithm and product development specialist (2007-present)

Hyperspectral Thermal Emission Spectrometer (HyTES) algorithm developer and data analyst (2012-2013)

AWARDS

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 ACTIVITIES

Active participant in a number of sports including tennis, golf, biking, running, and swimming.

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

2018

1. Malakar, N. K., **G. C. Hulley,** K. Laraby, Cook, M., S. Hook, J. Schott, (2018), Methodology and Validation of an Operational Land Surface Temperature Product for Landsat Thermal Data, IEEE TGRS, In Press.

2017

2. **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.

3. 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

4. **Hulley, G. C.,** Duren, R. M., Hopkins, F. M., Hook, S. J., Vance, N., Guillevic, P., Johnson, W. R., Eng, B. T., Mihaly, J. M., Jovanovic, V. M., Chazanoff, S. L., Staniszewski, Z. K., Kuai, L., Worden, J., Frankenberg, C., Rivera, G., Aubrey, A. D., Miller, C. E., Malakar, N. K., Sánchez Tomás, J. M., and Holmes, K. T.: High spatial resolution imaging of methane and other trace gases with the airborne Hyperspectral Thermal Emission Spectrometer (HyTES), Atmos. Meas. Tech., 9, 2393–2408, 2016.

5. Hook, S.J., **G. C. Hulley**, W.R. Johnson, B. Eng, J. Mihaly, S. Chazanoff, N. Vance, Z. Staniszewski, G. Rivera, K.T. Holmes and P. Guillevic, (2016), The

Hyperspectral Thermal Emission Spectrometer (HyTES) – A New Hyperspectral Thermal Infrared Airborne Imager for Earth Science, Rem. Sens. Environ., in press.

6. Kuai, L., J.R. Worden, K. Li, **G. C. Hulley**, F.M. Hopkins, C.E. Miller, S.J. Hooks, R.M. Duren, A.D. Aubrey (2016), Characterization of anthropogenic methane plumes with the Hyperspectral Thermal Emission Spectrometer (HyTES): a retrieval method and error analysis, Atmos. Meas. Tech., 9, 3165-3173

7. Frankenberg, F., A.K. Thorpe, D.R. Thompson, **G. Hulley**, E.A. Kort, N. Vance, J. Borchardt, T. Krings, K. Gerilowski, C. Sweeney, S. Conley, B.D. Bue, A.D. Aubrey, S. Hook, R.O. Green, (2016), Airborne methane remote measurements reveal heavytail flux distribution in Four Corners region, Proc. Natl. Acad. Sci., 113 (35), 9734-9739

8. Islam, T. **G. C. Hulley**, N. Malakar, R. Radocinski, S. Hook, P. Guillevic (2016), A physics-based algorithm for the simultaneous retrieval of land surface temperature and emissivity from VIIRS thermal infrared data, *IEEE Transactions on Geoscience and Remote Sensing, 55, 563-576*

9. Malakar, N.K., and **G. C. Hulley**, (2016), A Water Vapor Scaling Model for Improved Land Surface Temperature and Emissivity Separation of MODIS Thermal Infrared Data, *Remote Sensing of Environment*, 182, 252-264

2015

10. **Hulley, G.**, Hook S.J, Abbott, E., Malakar, N., Islam, T., Abrams, M., (2015), The ASTER Global Emissivity Dataset (ASTER GED): Mapping Earth's emissivity at 100 meter spatial resolution, *Geophysical Research Letters*, 42, doi:10.1002/2015GL065564.

11. Hochberg, E. J., Roberts, D.A., Dennison, P.E, **Hulley, G.C.,** (2015), Special issue on the Hyperspectral Infrared Imager (HyspIRI): Emerging Science in terrestrial and aquatic ecology, radiation balance and hazards, *Rem. Sens. Environ.*, 167 (1-5)

12. Abrams, M., Tsu, H., **Hulley, G.**, Iwao, K., Pieri, D., Cudahy, T. (2015), The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) after fifteen years: Review of global products*, Int. Journal of Applied Earth Observation and Geoinformation*, 38 (202-301).

13. Grigsby, S.P., **Hulley, G.C.,** Roberts D.A., Scheele, C., Ustin S.L, Alsina, M.M (2015), Remote Sensing of Environment, 167, 53-63.

14. Roberts, D.A., Dennison, P.E., Roth K.L., Dudley, K., and **G. Hulley** (2015), Relationships between dominant plant species, fractional cover and Land Surface Temperature in a Mediterranean ecosystem, *Remote Sensing of Environement,* 167, 152-167.

2014

15. Kahn, B. H., Kahn, B. H., F. W. Irion, V. T. Dang, E. M. Manning, S. L. Nasiri, C. M. Naud, J. Blaisdell, M. M. Schreier, Q. Yue, K. W. Bowman, E. J. Fetzer, **G. C. Hulley**, K. N. Liou, D. Lubin, S. C. Ou, J. Susskind, Y. Takano, B. Tian, and J. Worden (2014), The Atmospheric Infrared Sounder Version 6 cloud products, *Atmos. Chem. Phys.*, 14, 399-426.

16. Guillevic, P. C., Biard, J., **Hulley, G. C.**, Privette, J. L., Hook, S. J., Olioso, A., Göttsche, F.-M., Radocinski, R., Román, M. O., Yu, Y., and Csiszar I. (2014). Validation of Land Surface Temperature products derived from the Visible Infrared Imager Radiometer Suite (VIIRS) using ground-based and heritage satellite measurements. *Remote Sensing of Environment*, 154 (2014) 19–37, doi: 10.1016/j.rse.2014.08.013.

17. Ermida, S.L, Trigo, I. F., DaCamara, C.C, Gottsche, F.M, Olesen, F.S, **Hulley, G.C.**, (2014), Validation of remotely sensed surface temperature over an oak woodland landscape - The problem of viewing and illumination geometries, Rem. Sens. Environ., 148 (16-27)

18. Jimenez-Munoz, J.C., Sobrino, J.A., Mattar, C., **Hulley, G.**, Gottsche, F., (2014), Temperature and Emissivity Separation from MSG/SEVIRI Data, IEEE. Trans. Geos. Rem. Sens., DOI: 10.1109/TGRS.2013.2293791

19. **Hulley, G.,** S. Veraverbeke, S. Hook, (2014), Thermal-based techniques for land cover change detection using a new dynamic MODIS multispectral emissivity product (MOD21), *Rem. Sens. Environ*, 140, p755-765

2013

20. Merchant, C. J., Matthiesen, S., Rayner, N. A., Remedios, J. J., Jones, P. D., Olesen, F., Trewin, B., Thorne, P. W., Auchmann, R., Corlett, G. K., Guillevic, P. C., and **Hulley, G. C.**: The surface temperatures of Earth: steps towards integrated understanding of variability and change, *Geosci. Instrum. Method. Data Syst.*, 2, 305-321, doi:10.5194/gi-2-305-2013, 2013.

21. Guillevic, P.C., Bork-Unkelbach, A., Gottsche, F.M., **Hulley, G.**, Gastellu-Etchegorry, J.P., Olesen, F.S., & Privette, J.L. (2013). Directional Viewing Effects on Satellite Land Surface Temperature Products Over Sparse Vegetation Canopies-A Multisensor Analysis. *IEEE Geoscience and Remote Sensing Letters, 10*, 1464-1468

2012

22. **Hulley, G. C.,** T. Hughes, and S. J. Hook (2012), Quantifying Uncertainties in Land Surface Temperature (LST) and Emissivity Retrievals from ASTER and MODIS Thermal Infrared Data, J. Geophys. Res. Lett, 117, D23113, doi:10.1029/2012JD018506.

23. **Hulley, G. C.**, and S. J. Hook (2012), A radiance-based method for estimating uncertainties in the Atmospheric Infrared Sounder (AIRS) land surface temperature product, J. Geophys. Res. Lett, 117, D20117, doi:10.1029/2012JD019102.

24. Göttsche, F. M., and **G. C. Hulley,** (2012), Validation of six satellite-retrieved land surface emissivity products over two land cover types in a hyper-arid region, Rem. Sens. Environ., 124, 149-158.

25. Veraverbeke, S., S. Hook and **G. Hulley**, (2012), An alternative spectral index for rapid fire severity assessments, Rem. Sens. Environ., 123, 72-80.

2011

26. **Hulley, G.C.**, S.J. Hook & P. Schneider, (2011), Optimized split-window coefficients for deriving surface temperatures from inland water bodies, *Remote Sensing of Environment*, 115, 3758-3769

27. Gillespie, A.R., E.A. Abbott, L. Gilson, **G. Hulley**, J.C. Jimenez-Munoz, and J.A. Sobrino, (2011), Residual errors in ASTER temperature and emissivity standard products AST08 and AST05, Remote Sensing of Environment, doi:10.1016/j.rse.2011.09.007

28. Roberts, D.A., D. A. Quattrochi, **G. C. Hulley**, S.J. Hook, and R.O. Green, (2011), Synergies between VSWIR and TIR data for the urban environment: An evaluation of the potential for the Hyperspectral Infrared Imager (HyspIRI) Decadal Survey mission, *Remote Sensing of Environment.*

2010

29. **Hulley, G. C.,** and S. J. Hook, (2010), Generating Consistent Land Surface Temperature and Emissivity Products Between ASTER and MODIS Data for Earth Science Research, IEEE Trans. Geos. Rem. Sens., DOI: 10.1109/TGRS.2010.2063034.

30. **Hulley, G. C.**, S. J. Hook, and A. M. Baldridge, (2010), Investigating the Effects of Soil Moisture on Thermal Infrared Land Surface Temperature and Emissiv- ity Using Satellite Retrievals and Laboratory Measurements, Remote Sensing of Environment, 114, 1480-1493.

2009

31. Schneider, P., S. J. Hook, R. G. Radocinski, G. K. Corlett, **G. C. Hulley**, S. G. Schladow, and T. E. Steissberg, (2009), Satellite observations indicate rapid warming trend for lakes in California and Nevada, Geophys. Res. Lett., 36, L22402, doi:10.1029/2009GL040846

32. **Hulley, G. C.**, S. J. Hook, E. Manning, S-Y Lee, and E. Fetzer, (2009), Validation of the Atmospheric Infrared Sounder (AIRS) Version 5 Land Surface Emissivity Product over the Namib and Kalahari Deserts, Journal of Geophys. Res. Atmos., 114, D19104.

33. **Hulley, G. C.**, S. J. Hook, and A. M. Baldridge, (2009), Validation of the North American ASTER Land Surface Emissivity Database (NAALSED) version 2.0 using pseudo-invariant sand dune sites, Remote Sens. Environ, 113, 2224-2233

34. **Hulley, G. C.,** and S. J. Hook (2009), The North American ASTER Land Surface Emissivity Database (NAALSED) Version 2.0, Remote Sens. Environ, 113, 1967-1975

35. **Hulley, G. C.,** and S. J. Hook (2009), Intercomparison of versions 4, 4.1 and 5 of the MODIS Land Surface Temperature and Emissivity Products and validation with laboratory measurements of sand samples from the Namib desert, Namibia, Remote Sens. Environ, 113, 1313-1318

2008

36. **Hulley, G.,** S. J. Hook, (2008), ASTER Land Surface Emissivity Database of California and Nevada, Geophys. Res. Lett., 35, L13401, doi:10.1029/2008GL034507

37. **Hulley, G.,** S. J. Hook, (2008), A New Methodology for Cloud Detection and Classification with Advanced Spaceborne Thermal Emission and Reflection Ra- diometer (ASTER) Data, Geophys. Res. Lett., 35, L16812, doi:10.1029/2008GL034664

2007

38. **Hulley, G.,** E. C. Pavlis, (2007), A global study on the effects of atmospheric refractivity gradients on the analysis of Satellite Laser Ranging (SLR) data. **J.** Geophys. Res., 112, B06417, doi:10.1029/2006JB004834

RECENT CONFERENCE PRESENTATIONS

Hulley, G. C., T. Islam, N. Malakar, (2015), MODIS and VIIRS Land Surface Temperature and Emissivity: A Consistent and High Quality Continuity Data Record, American Geophysical Union, San Francisco, CA, December 2015

Hulley, G.C., (2015), ECOSTRESS Level-Products, Processing, Simulated Data, Cal/Val, 2015 HyspIRI Science and Applications Workshop, Pasadena, CA, 13-15 October 2015.

Hulley, G. C., N. Malakar, T. Islam, S. Hook, P. Guillevic (2015), Land Surface Temperature and Emissivity (LST&E) products for MODIS and VIIRS Continuity, MODIS/VIIRS Science Team meeting, Silver Spring, MD, 19-22 May, 2015

Hulley, G.C., S.J. Hook, R. Duren, A. Aubrey, P. Guillevic, (2014), Detection and spatial mapping of anthropogenic methane plumes with the Hyperspectral Thermal Emission Spectrometer (HyTES), American Geophysical Union, San Francisco, CA, December 2014

Hulley, G.C., (2014), ECOSTRESS L1/L2 Algorithm and Product Development, 2014 HyspIRI Science and Applications Workshop, Pasadena, CA, October 2014.

Hulley, G.C., S.J. Hook, P. Guillevic, (2014), A Unified MODIS Land Surface Temperature Earth System Data Record, RAQRS 2014, Valencia, Spain.

Hulley, G.C., S.J. Hook, T.J. Hughes, (2012), A Unified MODIS Land Surface Temperature Earth System Data Record, American Geophysical Union, Fall Meeting, San Francisco, CA, 3-7 December, 2012

Hulley, G.C, T.J. Hughes, S.J. Hook, (2012), A Unified MODIS Land Surface Temperature Earth System Data Record, EarthTemp LST Workshop, Edinburgh, Scotland, 25-27 June, 2012

SCIENCE PRODUCT DOCUMENTS AND DELIVERABLES

ECOSTRESS

Hulley, G. C., Hook, S. J., (2015), ECOSTRESS Level-2 Land Surface Temperature and Emissivity Algorithm Theoretical Basis Document (ATBD), JPL, Jet Propulsion Laboratory, California Institute of Technology, Feb 2015.

Hulley, G. C., Hook, S. J., (2016), ECOSTRESS Level-2 Cloud Detection Algorithm Theoretical Basis Document (ATBD), JPL, Jet Propulsion Laboratory, California Institute of Technology, Feb 2016.

Hulley, G. C., Hook, S. J., (2016), ECOSTRESS Level-2 Product Specification Document (ASD), JPL, Jet Propulsion Laboratory, California Institute of Technology, Feb 2016.

Hulley, G. C., Hook, S. J., (2016), ECOSTRESS Level-2 PGE-PCS Interface Memo, JPL, Jet Propulsion Laboratory, California Institute of Technology, May 2016.

HyTES

Hulley, G. C., S. Hook, W. Johnson, P. Guillevic, N. Malakar, (2016), Hyperspectral Thermal Emission Spectrometer (HyTES) Level-2 Land Surface Temperature and Emissivity Algorithm Theoretical Basis Document, JPL Publication XX, Jet Propulsion Laboratory, California Institute of Technology, May 2016.

Hulley, G. C., N. Vance, L. Kuai, S. Hook (2016), Hyperspectral Thermal Emission Spectrometer (HyTES) L3 Data Product Guide, JPL Publication XX, Jet Propulsion Laboratory, California Institute of Technology, May 2016.

HySPIRI

Hulley, G. C., and S. J. Hook, (2012), HyspIRI Cloud Mask Detection Algorithm Theoretical Basis Document, JPL Publication 12-15, Jet Propulsion Laboratory, California Institute of Technology, Oct 2012.

http://hyspiri.jpl.nasa.gov/downloads/Algorithm_Theoretical_Basis/HyspIRI_CloudMask_v0-5_121023_pmb_gchv1.pdf

Hulley, G. C., and S. J. Hook, (2011), HyspIRI Level-2 Thermal Infrared (TIR) Surface Radiance Algorithm Theoretical Basis Document, JPL Publication 11-1, Jet Propulsion Laboratory, California Institute of Technology, April 2011.

http://hyspiri.jpl.nasa.gov/downloads/Algorithm_Theoretical_Basis/HyspIRI_L2_Surface_Radiance_JPL_Pub_11-1.pdf

Hulley, G. C., and S. J. Hook, (2011), HyspIRI Level-2 Thermal Infrared (TIR) Land Surface Temperature and Emissivity Algorithm Theoretical Basis Document, JPL Publication 11-5, Jet Propulsion Laboratory, California Institute of Technology, May 2011.

http://hyspiri.jpl.nasa.gov/downloads/Algorithm_Theoretical_Basis/HyspIRI_L2

_Surface_Temperature_Emissivity_JPL_Pub_11-5_10102011.pdf

Ramsey, M. C., Realmuto, V. J., **Hulley, G. C.,** and S. J. Hook, (2012), HyspIRI Thermal Infrared (TIR) Band Study Report, JPL Publication 12-16, Jet Propulsion Laboratory, California Institute of Technology, Oct 2012.

http://hyspiri.jpl.nasa.gov/downloads/reports_whitepapers/HyspIRI_TIR_Band_Report_gchv1_VJRv1_pmbv1_MSRv2_1.pdf

MODIS

Hulley, G. C., N. Malakar, S. J. Hook, and T. Hughes (2012), MODIS MOD21 Land Surface Temperature and Emissivity Algorithm Theoretical Basis Document, JPL Publication 12-17, Jet Propulsion Laboratory, California Institute of Technology, Aug 2012.

Hulley, G. C., R. Freepartner, N. Malakar, S. Sarkar, (2016), MODIS MOD21 Land Surface Temperature and Emissivity Users Guide Collection 6, Jet Propulsion Laboratory, California Institute of Technology, May 2016.

VIIRS

Hulley, G. C., T. Islam, N. Malakar, (2016), VIIRS Land Surface Temperature and Emissivity Algorithm Theoretical Basis Document, Jet Propulsion Laboratory, California Institute of Technology, Feb 2016.

Hulley, G. C., R. Freepartner, T. Islam, (2016), VIIRS Land Surface Temperature and Emissivity Users Guide, Jet Propulsion Laboratory, California Institute of Technology, June 2016.

BOOK CHAPTERS

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