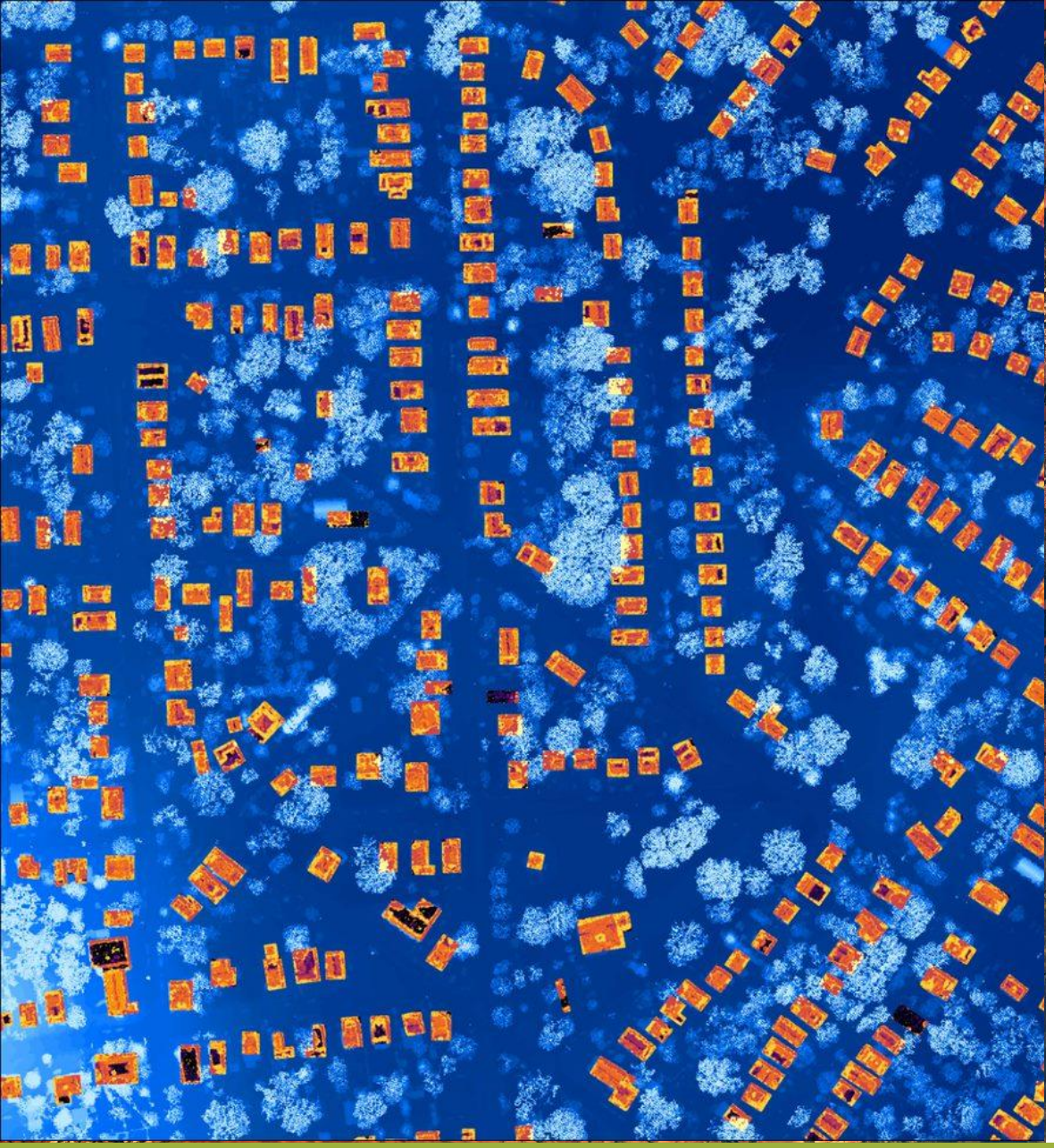


National Aeronautics and Space Administration

Washington DC & Maryland

Energy

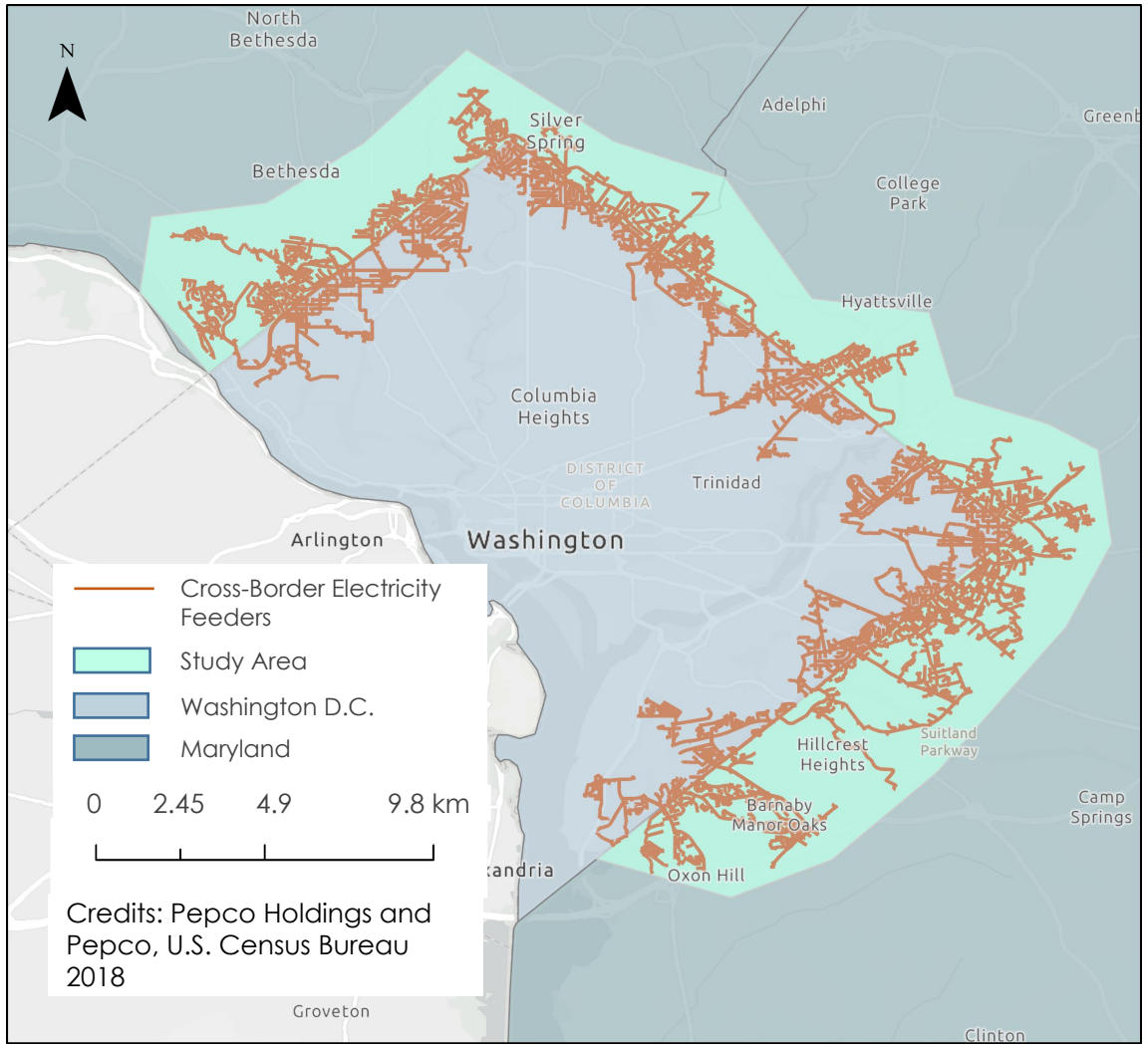
Estimating Solar Potential Using NASA POWER Data to Inform Renewable Energy Policy for Washington DC

Edward Cronin, Ashley Fernando, Jarrett James, and Rupa Kurinchi-Vendhan

Virginia - Langley | Fall 2021

DEVELOP

STUDY AREA & PERIOD



Study Area:

- Prince George's and Montgomery Counties, Maryland
- Focus on select cities on the Maryland and Washington DC border

Study Period:

- LiDAR (2018)
- NASA POWER (2015-2021)
- Building Footprints (2018)

PARTNERS

Washington DC Department of Energy and Environment (DOEE)

Thomas Bartholomew, Branch Chief

Image Credit: DC DOEE

COMMUNITY CONCERNS

ECONOMIC

Solar is cost-efficient and contributes to a growing job market

SOCIAL

Community solar programs make solar accessible to all

POLITICAL

The 2018 CEDC Omnibus Act is moving D.C. to 100% renewable energy by 2032

OBJECTIVES

EVALUATE
Solar Potential for the Study Area

ESTIMATE
Annual Rooftop Solar Potential for Study Area

PROVIDE
Documented Methodology for the DOEE

NASA EARTH OBSERVATIONS

NASA Prediction of Worldwide Energy Resources (POWER)

Image Credit: NASA POWER

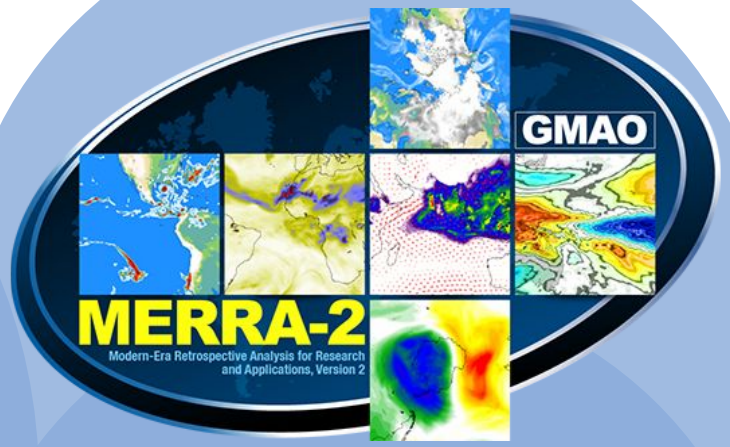


Image Credit: NASA

Image Credit: NASA

DATA ACQUISITION

LiDAR 2018 – Maryland GIS Data Catalog

Solar irradiance data to determine the solar potential for tilted surfaces

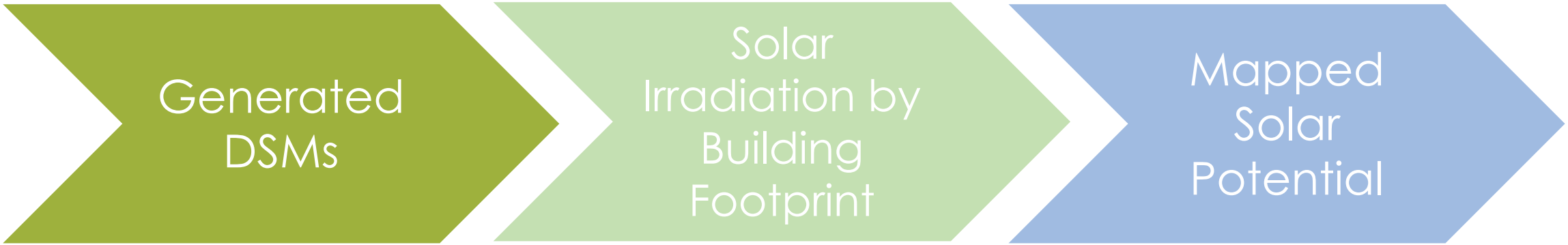
Building Footprints – Maryland GIS Data Catalog

Creating roof segmentation shapefiles

30-year Meteorological and Solar Monthly & Annual Climatologies – NASA POWER

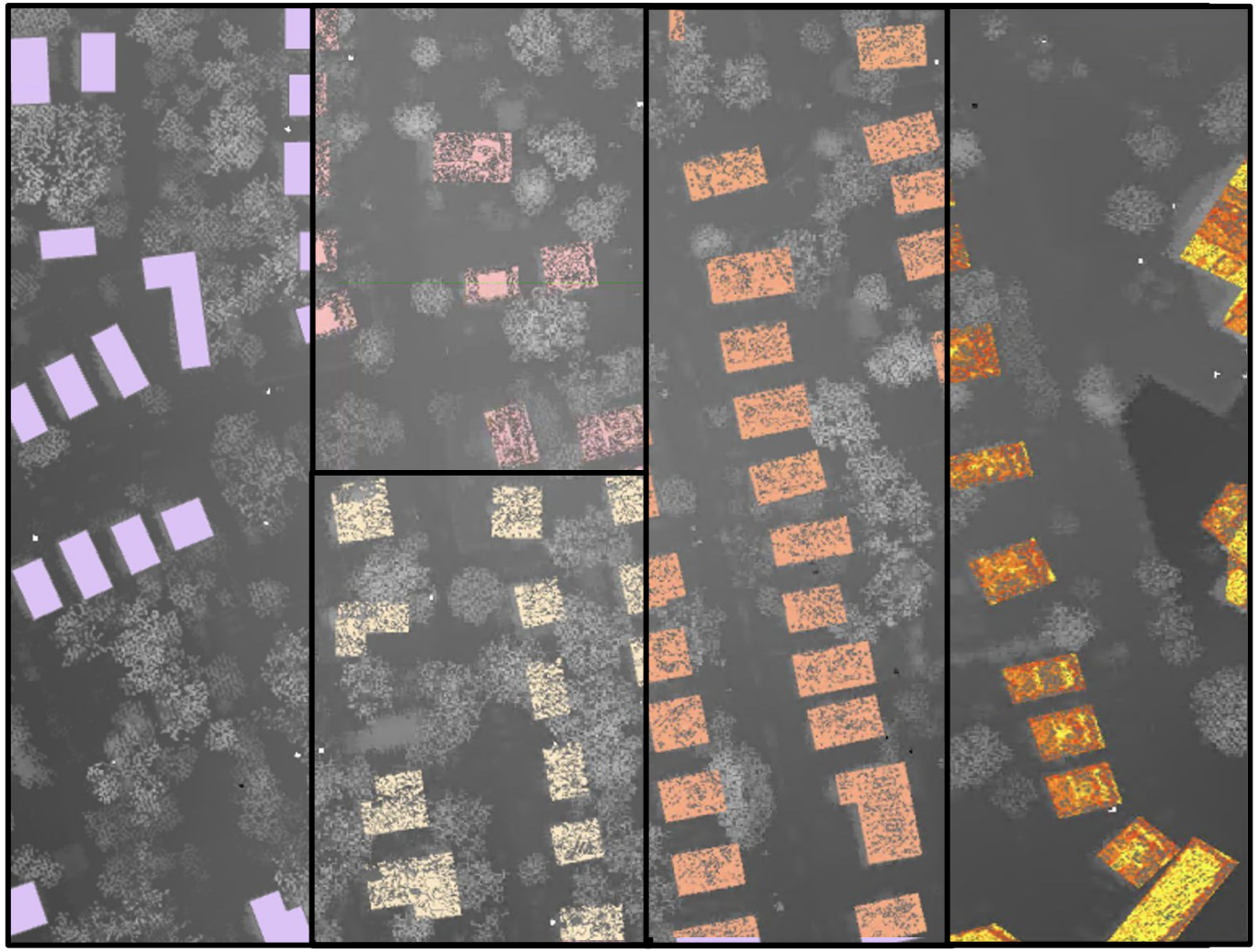
Solar irradiance data to determine the solar potential for tilted surfaces

DATA PROCESSING



DATA PROCESSING

DSMs → Slope & Aspect → Dissolve → Potential



RESULTS


0.01 0.03 0.05 0.1 km
3987 – 4834 kW
4834 – 7160 kW
7160 – 13286 kW
13286 – 22113 kW
22113 – 53168 kW
Credits: NASA POWER, Maryland iMap Data Catalog, Maryland Statewide LiDAR Download Tool

CONCLUSION

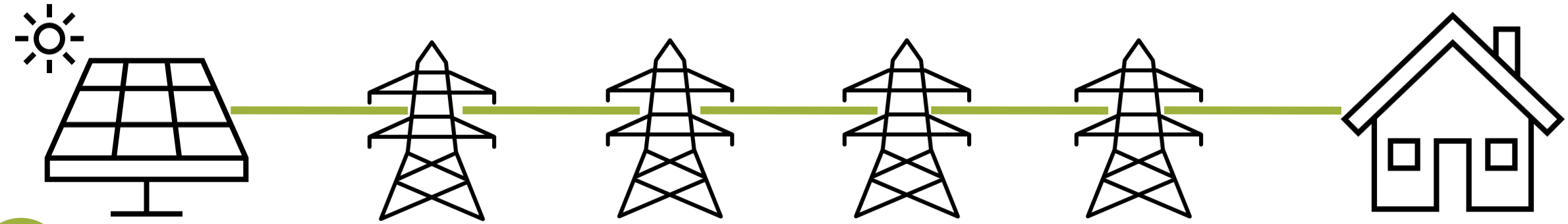
Roughly

242 GW

would supply nearly

1,703 buildings

with power each year.



LIMITATIONS

Lack of Spatial Precision and Inaccuracies in LiDAR Data

Lack of Spatial Precision of Building Footprint Data

Physical Uncertainties in NASA POWER DATA

Computational Limits

FUTURE WORK

- Apply our Methodology to the **Entire Study Area**
- Comprehensive Analysis of **Grayspace**
- Assign Potential to Each **Roof Segment**
- Model the **Socioeconomic Distribution**

ACKNOWLEDGEMENTS

DEVELOP

We gratefully acknowledge **Dr. Kenton Ross (NASA Langley Research Center)** and **Dr. Paul Stackhouse (NASA Langley Research Center)** for their contributions to this work as science advisors, **Thomas Bartholomew (Branch Chief of the Washington DC DOEE)** for his role as a partner, and **Adriana LeCompte (DEVELOP LaRC Fellow)** for her coordination between the team and the DEVELOP program.

This material is based upon work supported by NASA through contract NNL16AA05C. Any mention of a commercial product, service, or activity in this material does not constitute NASA endorsement. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration and partner organizations.