

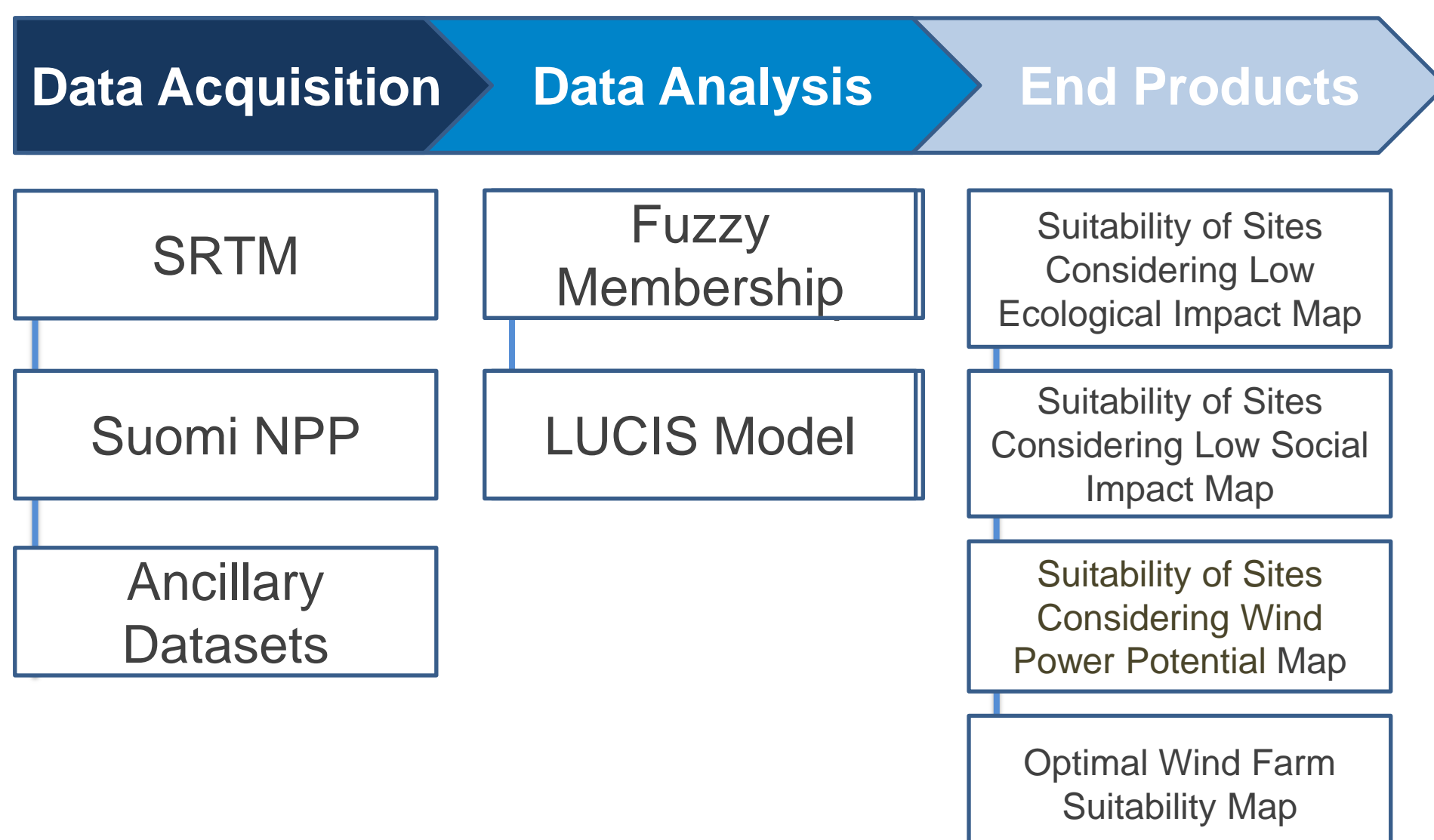
Identifying Optimal Site Location for Wind Energy Farms Considering Ecological and Social Impacts

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Overview

With the increasing cost and declining availability of fossil fuels, renewable energy, specifically wind power, has become one of the fastest growing sources of energy in New Mexico. To assist with the goals set by the state's Renewables Standard Portfolio established in 2004, the NASA DEVELOP team created three Optimal Wind Farm Suitability maps that consider social impact, ecological impact, and power production efficiency. The team utilized datasets from February 2013 – May 2018 that show vulnerable species, average wind patterns, and US Air Force Base locations. These three maps were combined into a final suitability map for optimal wind farm placement.

Methodology



Conclusions

- NASA Earth observations can address potential land use conflicts when conducting wind farm site suitability.
- Determining highly suitable areas for wind farms in New Mexico is difficult because there are many variables to consider, but there are highly suitable areas dispersed around the state.
- Fuzzy Logic and the LUCIS Model can identify areas potentially suitable for wind farm development, and suitability is impacted greatly the factors chosen such as Air Force Base locations, wind density, and lesser-prairie chicken and golden eagle distribution.
- Site suitability maps shared by the project partners with the public can facilitate conversation between various stakeholders regarding policy making and development.

Acknowledgements

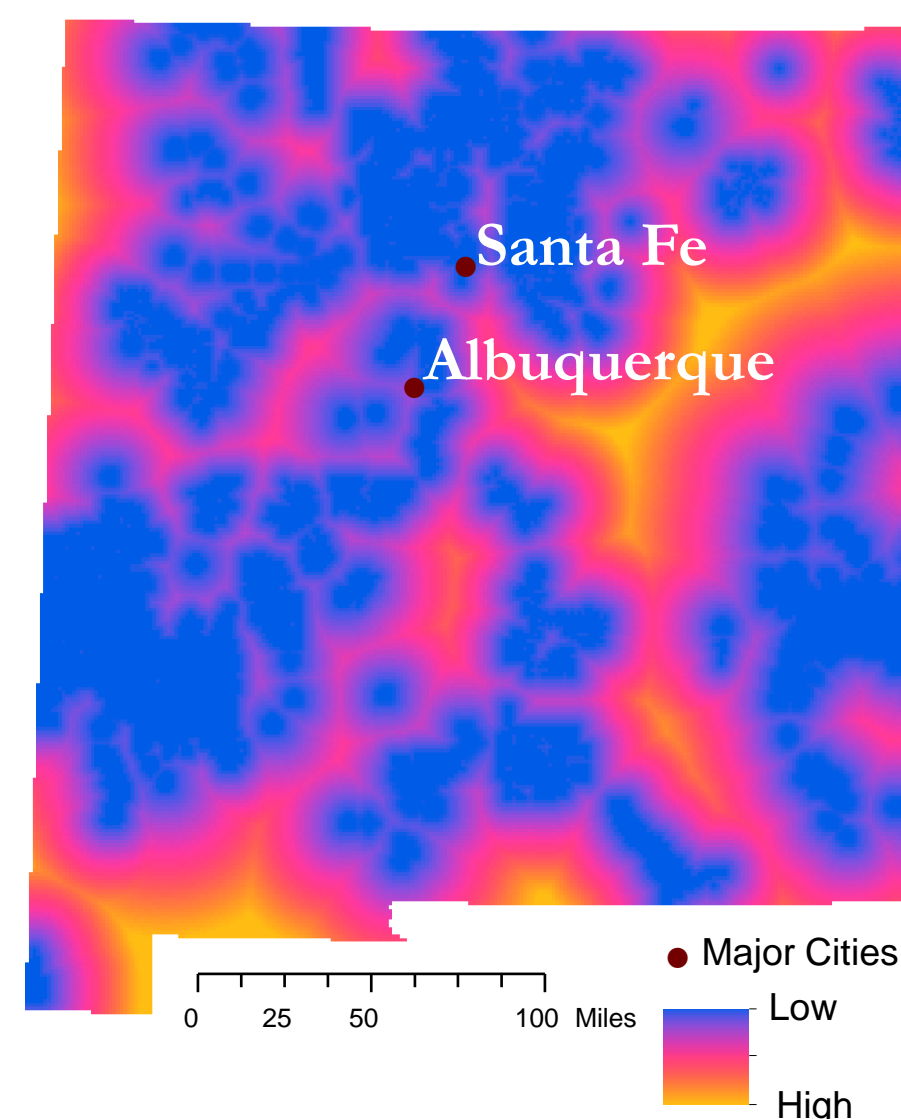
Dr. Jeffrey Luvall (NASA Marshall Space Flight Center), Dr. Robert Griffin (University of Alabama in Huntsville), Leigh Sinclair (University of Alabama in Huntsville), Maggi Klug (University of Alabama in Huntsville), Helen Baldwin (NASA DEVELOP), Mercedes Bartkovich (NASA DEVELOP), Jeremy Lewis (New Mexico Energy, Minerals & Natural Resources Department, Energy Conservation & Management Division), Robi Robichaud (National Renewable Energy Laboratory), Ronald Kellermueller (New Mexico Department of Game & Fish)

Objectives

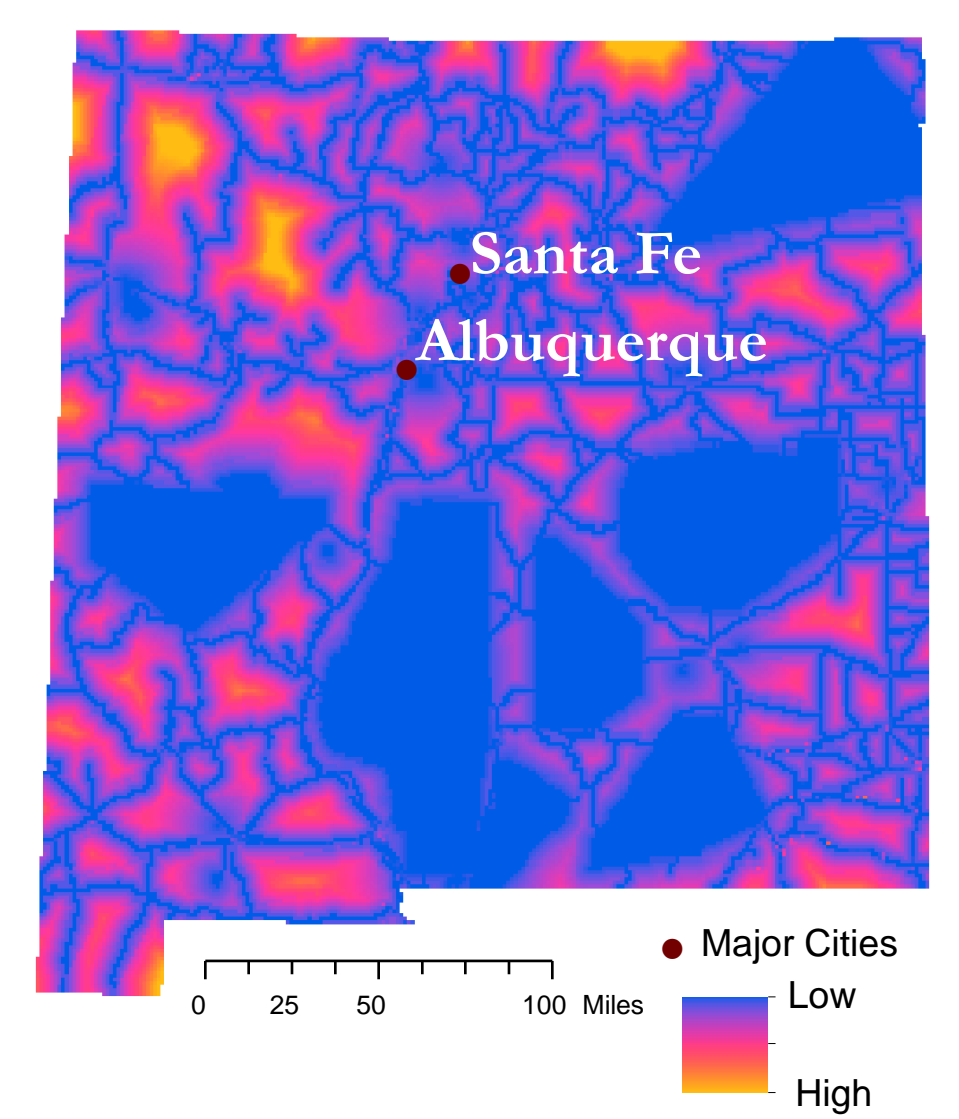
- Showcase** SRTM v4 and Suomi NPP VIIRS Day Night Band through site suitability analysis of possible locations for wind farm development
- Assess** wind farm site suitability based on social factors such as Air Force bases, protected lands, and densely populated areas
- Determine** site suitability based on ecological factors such as distribution of the golden eagle and lesser-prairie chicken
- Identify** areas with the greatest wind power potential based on factors such as wind speed and elevation

Results

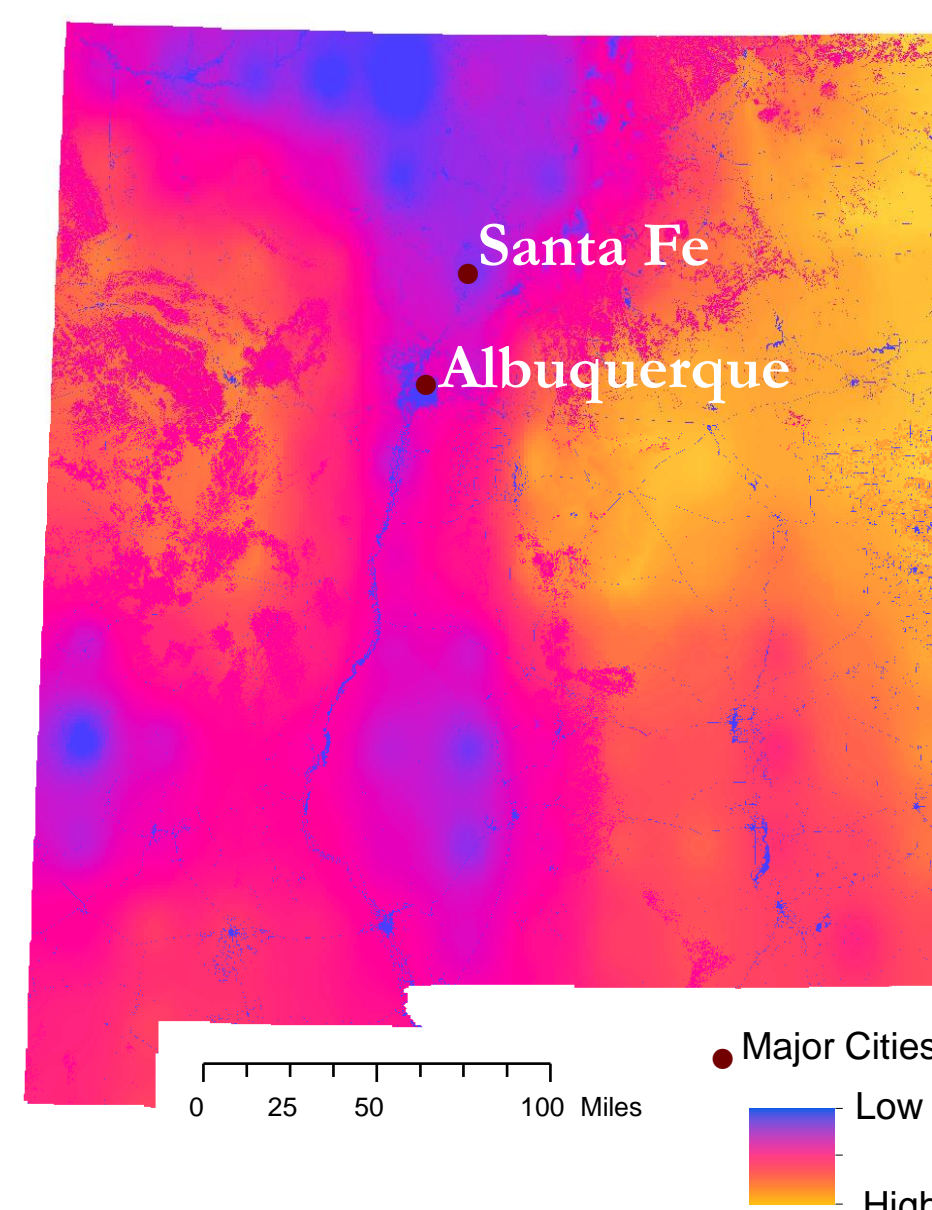
Suitability of Sites Considering Low Ecological Impact



Suitability of Sites Considering Low Social Impact



Suitability of Sites Considering Wind Power Potential



Optimal Wind Farm Site Suitability

