

# Solar Irradiance Variance from Average, June-August 2010

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## Summary of Findings

3TIER's monthly solar variance from average maps show the departure from normal of the amount of solar radiation at the Earth's surface, either in the form of Global Horizontal Irradiance (GHI) or Direct Normal Irradiance (DNI). Normal for these maps is defined as the monthly average values based on the period 1997-2009.

As is immediately obvious, solar radiation can vary significantly from month to month, especially for DNI, which is the radiation received by a surface that is perpendicular to the sun's rays at all times. Cloudiness is the main determinant in this month-to-month variance from normal and the patterns observed in the variance maps correlate well with the weather patterns that affected the United States during these months.

June 2010 saw reduced radiation in the Pacific Northwest and in the upper Midwest, associated with an upper-level trough over the northwestern quarter of the country. June 2010 was the wettest June on record in Michigan and near-record rain was experienced in Iowa, Illinois, and Nebraska. The increased cloudiness that accompanied these storms resulted in a lower amount of solar radiation at the surface. At the same time the North Atlantic High delivered sunny and hot weather to the eastern seaboard and southeastern states, resulting in June 2010 being the hottest June on record in Delaware, New Jersey, and North Carolina.

The North Atlantic High persisted during much of July 2010, with continued sunny and hot weather and above average solar radiation in the eastern part of the country. Again, daily maximum temperature records were set in many locations. Hurricane Alex and its aftermath, as well as Tropical Storm Bonnie resulted in above-average precipitation and cloudiness in Texas and the Midwest and consequently below average radiation and temperatures. Coastal California had a persistent marine layer all month as is expressed in the below average radiation along the coast.

In August, temperatures remained above average in much of the country, but solar radiation was higher than average in Texas, the Midwest, New England, part of the eastern seaboard, and the interior Southwest. Although temperatures were above average in much of the Southeast, atmospheric water vapor contents were unusually high in August and this contributed to warm overnight temperatures and greater rainfall. The increased cloudiness led to decreased radiation in that region. Parts of Montana experienced above average rainfall and cloudiness, while temperatures along the California Coast remained below normal due to persistent morning fog.

## 3TIER's Solar Dataset

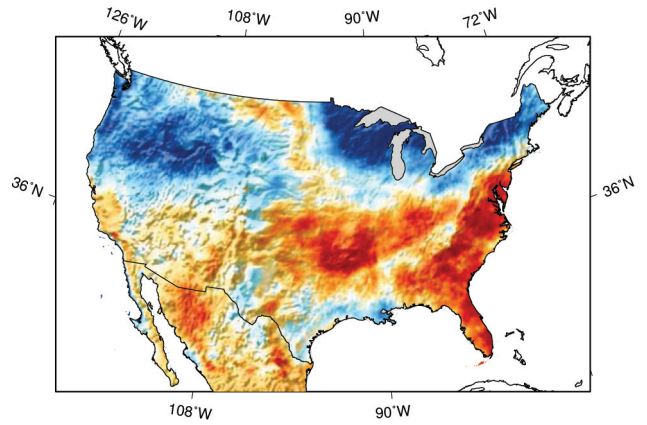
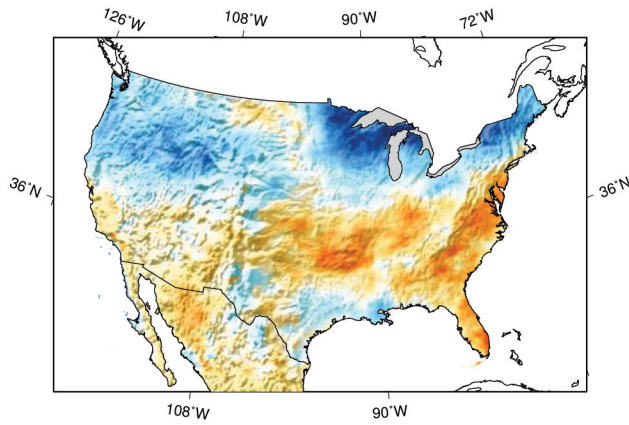
This analysis is based on monthly mean irradiance values from 3TIER's global solar irradiance dataset, the most accurate satellite derived solar dataset that exists today. The dataset is based on 11 to 13 years of half-hourly, high-resolution visible satellite images collected from numerous different geostationary satellites - a significantly longer time period than any other publicly available dataset. The dataset features a 2 arc-minute resolution, 3 to 30 times higher than other publicly available datasets. Satellite imagery was processed using a uniform methodology across the globe based upon a combination of in-house and peer-reviewed research supported by the global atmospheric science community. The dataset has been rigorously validated using over 90 sites throughout the globe. The results show that compared to other available datasets, 3TIER has a similar bias, but significantly lower root mean square errors.

3TIER's solar dataset is updated monthly, now covering 1997 to present, and forms the basis of all of 3TIER's solar prospecting and assessment products. For more information please visit: <http://www.3tier.com/en/products/solar/>

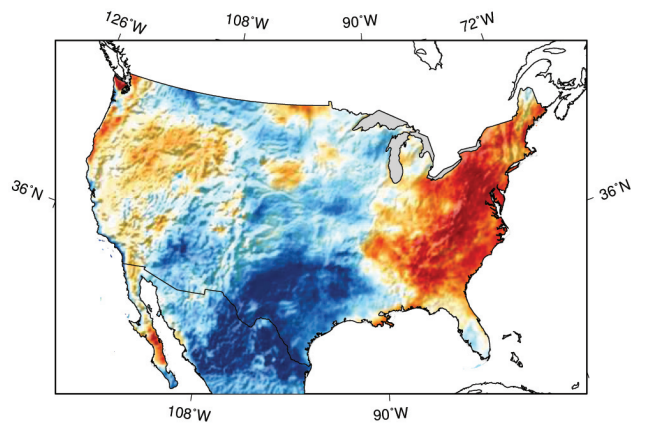
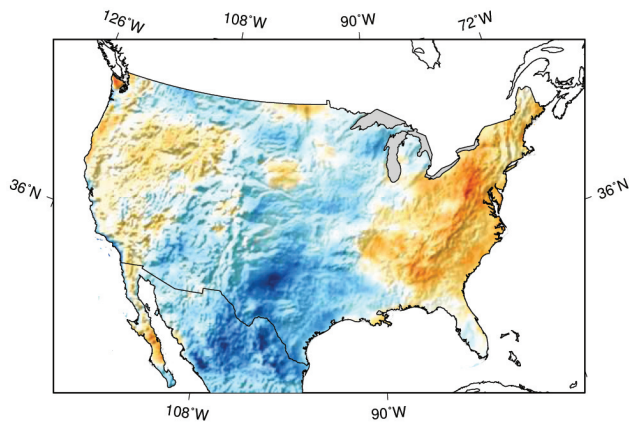
# GHI

# DNI

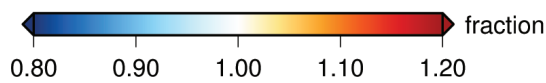
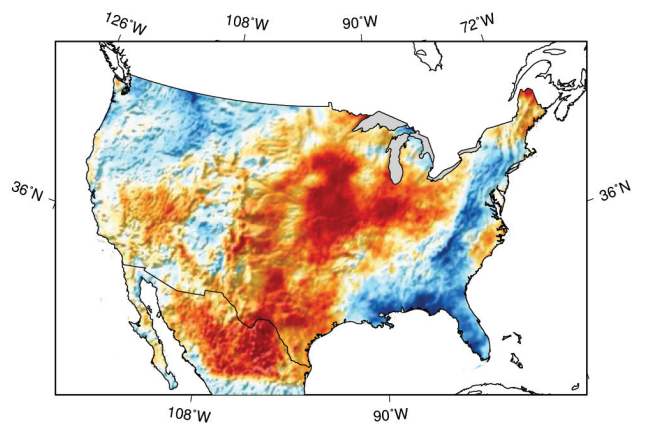
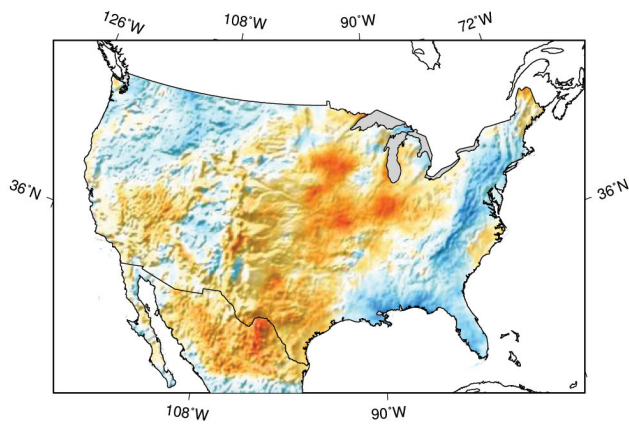
June



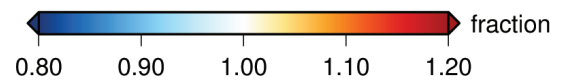
July



August



Global Horizontal Irradiance (GHI) Anomaly



Direct Normal Irradiance (DNI) Anomaly