

Analysis of COVID-19 Pandemic in USA, using Topological Weighted Centroid (TWC)

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TWC is a data driven geographic model

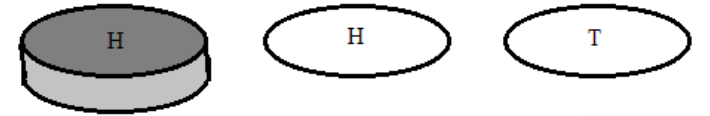
TWC is based on statistical thermodynamics. In TWC approach the Free energy and entropy are optimized

The TWC method includes 5 main algorithms: $TWC - \alpha$, $TWC - \beta$, $TWC - \gamma$, $TWC - \theta$ and $TWC - \iota$.

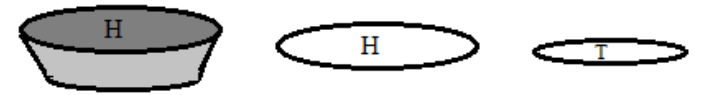
Probability



$$P_{Left} = P_{Right} = \frac{1}{2}$$



$$P_{Left} > \frac{1}{2}, P_{Right} < \frac{1}{2}$$



Probability

$$P_i = P_0 e^{-E_i/KT},$$

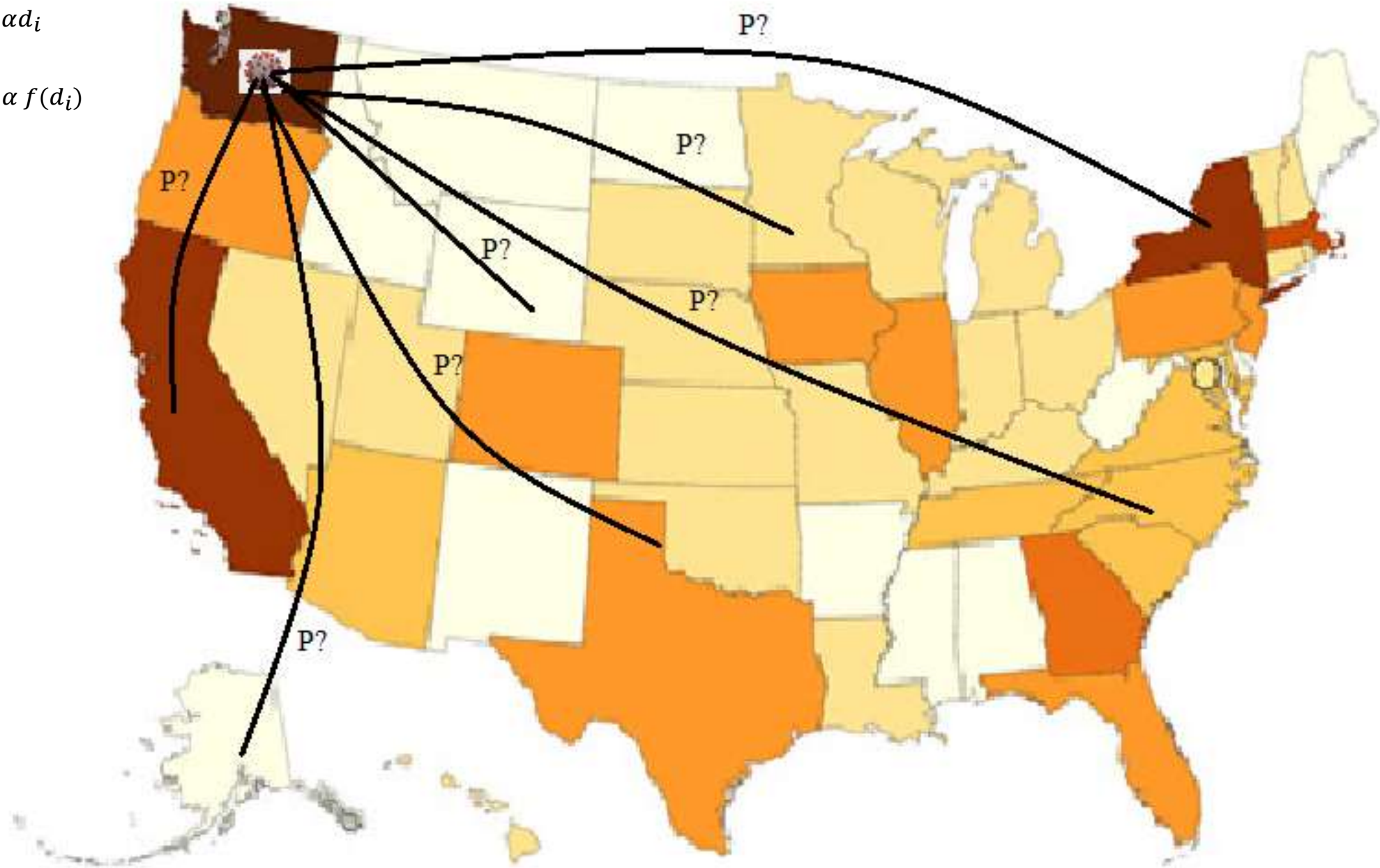
where E is energy T is the absolute temperature and K is Boltzmann constant

$$P_{Total} = P_{Left} + P_{Right} = 1$$

$P(\text{distance})$

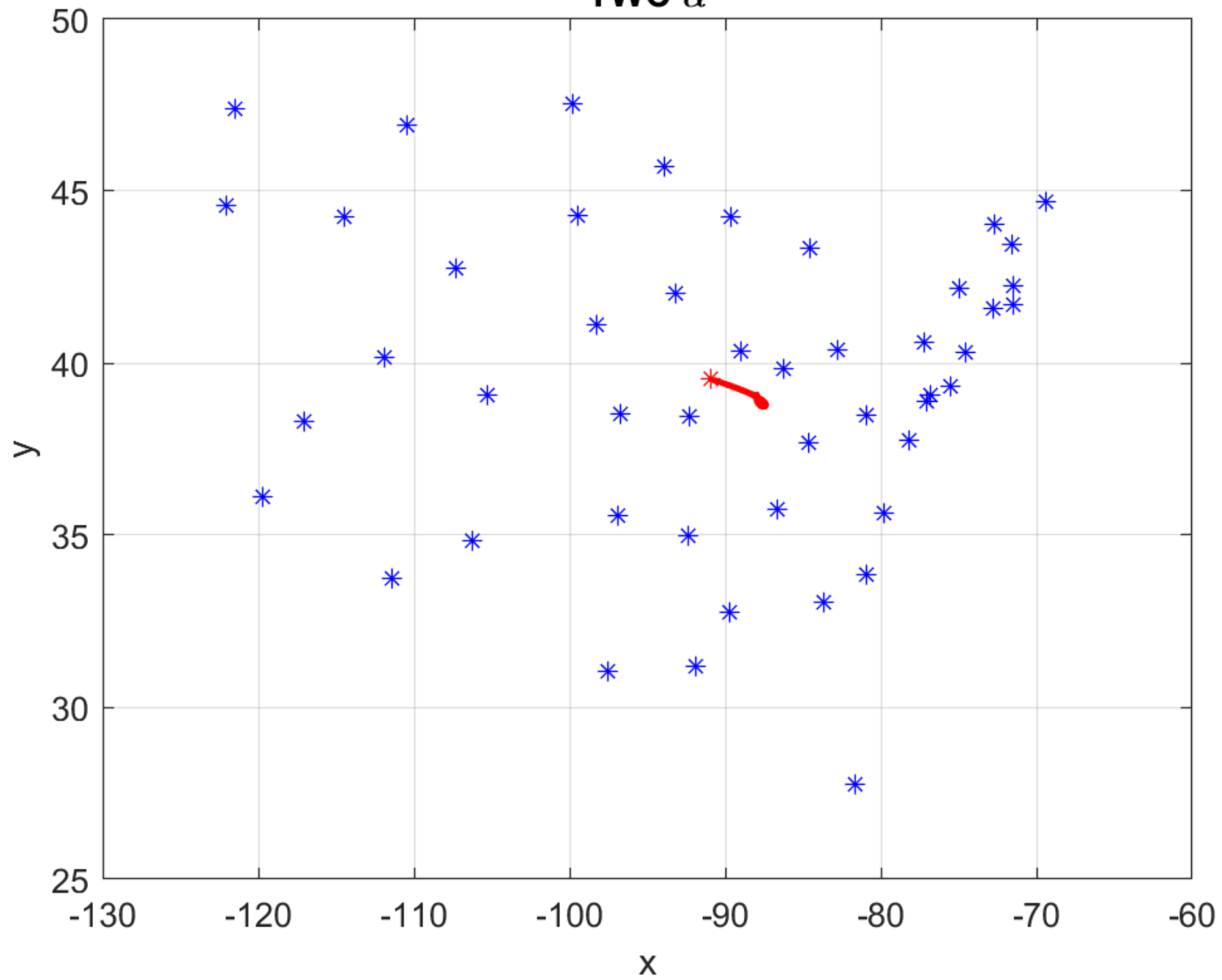
$$P_i = P_0 e^{-\alpha d_i}$$

$$P_i = P_0 e^{-\alpha f(d_i)}$$

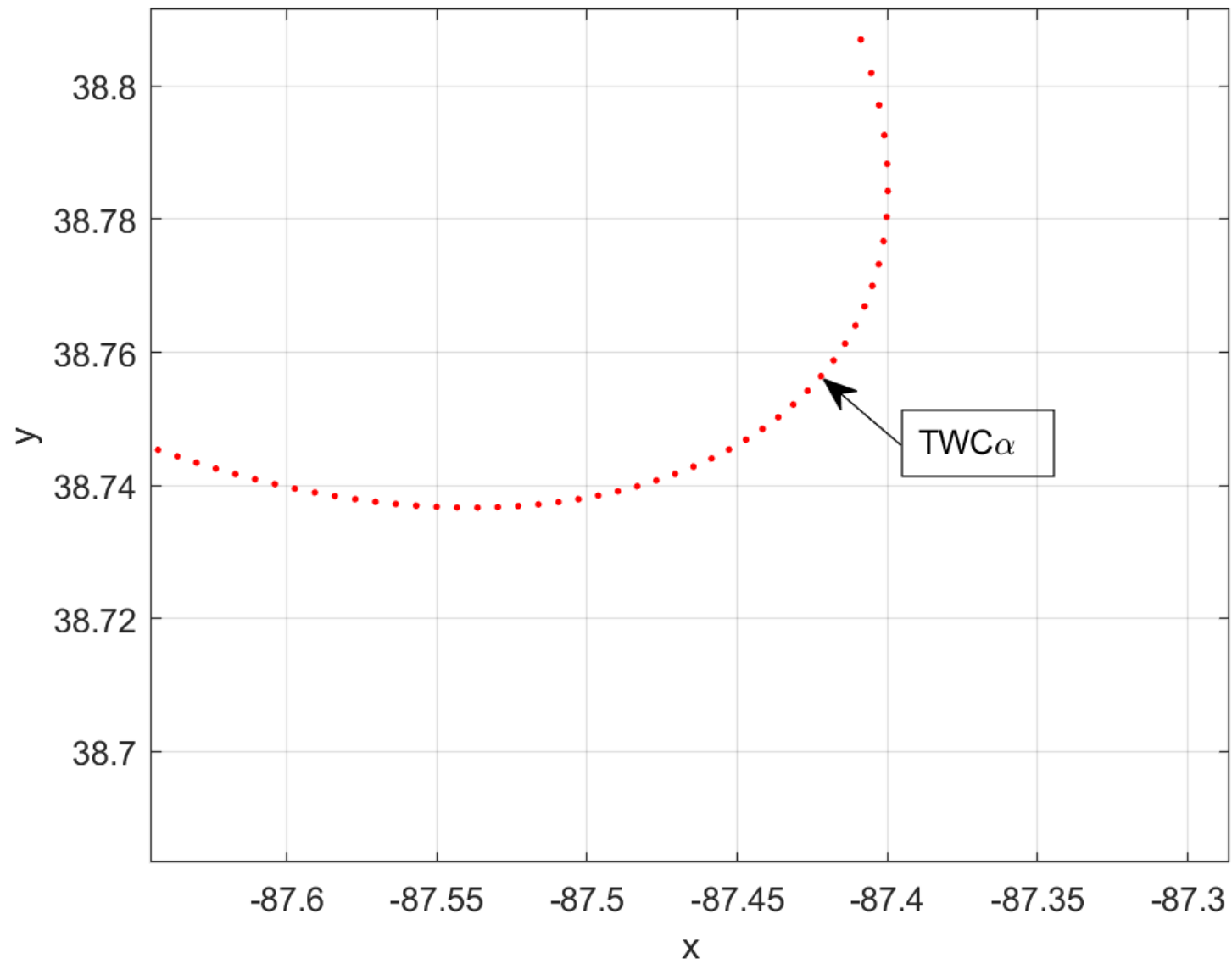


To use an analogy, suppose the activities of a group of Corona Virus “Terrorists” (CVT) with a data distribution are reported. The TWC algorithms use the reported data and predict from where would the impetus arise to produce the data as exhibited by the reported values.

TWC α

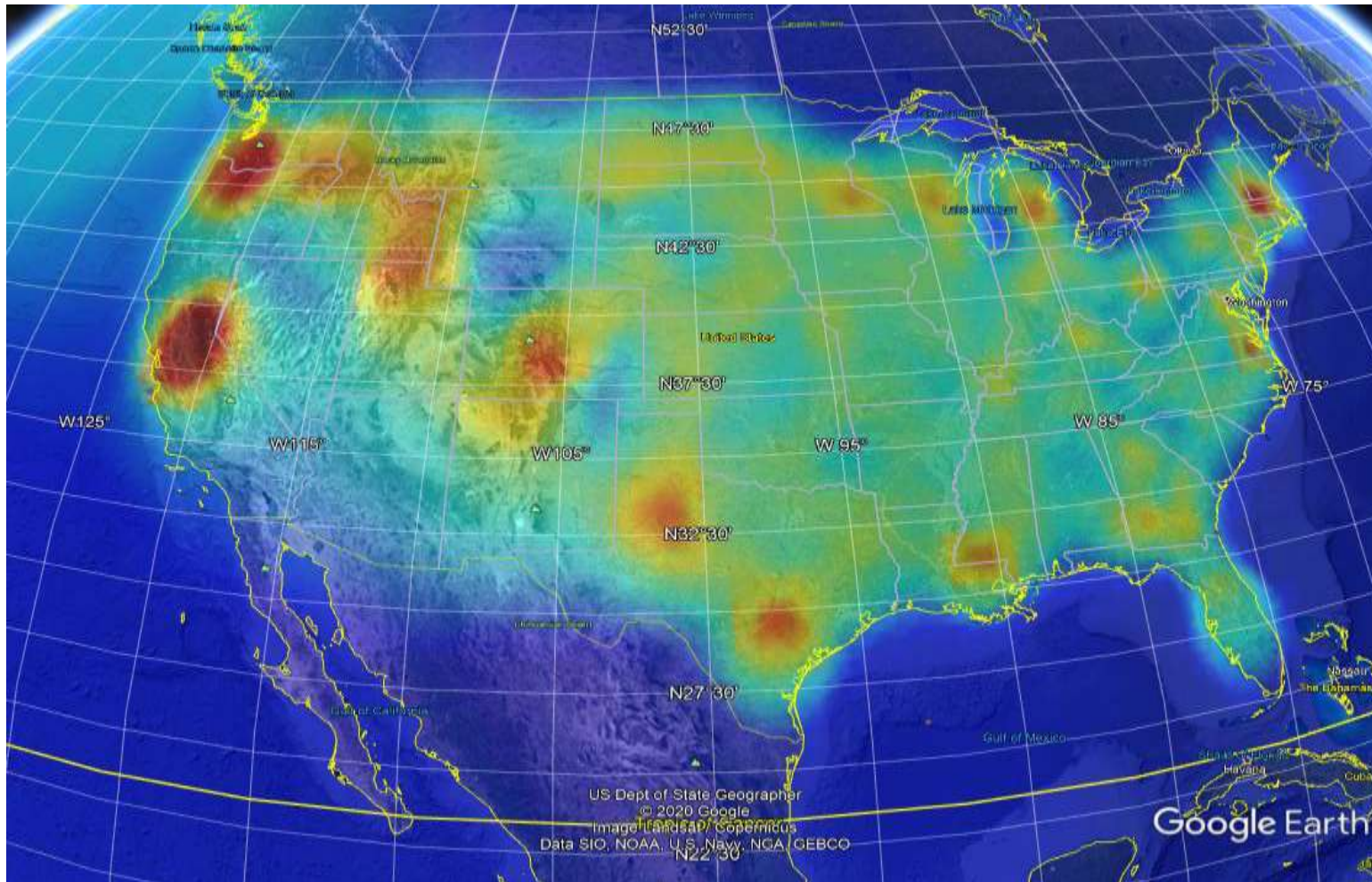


TWC α

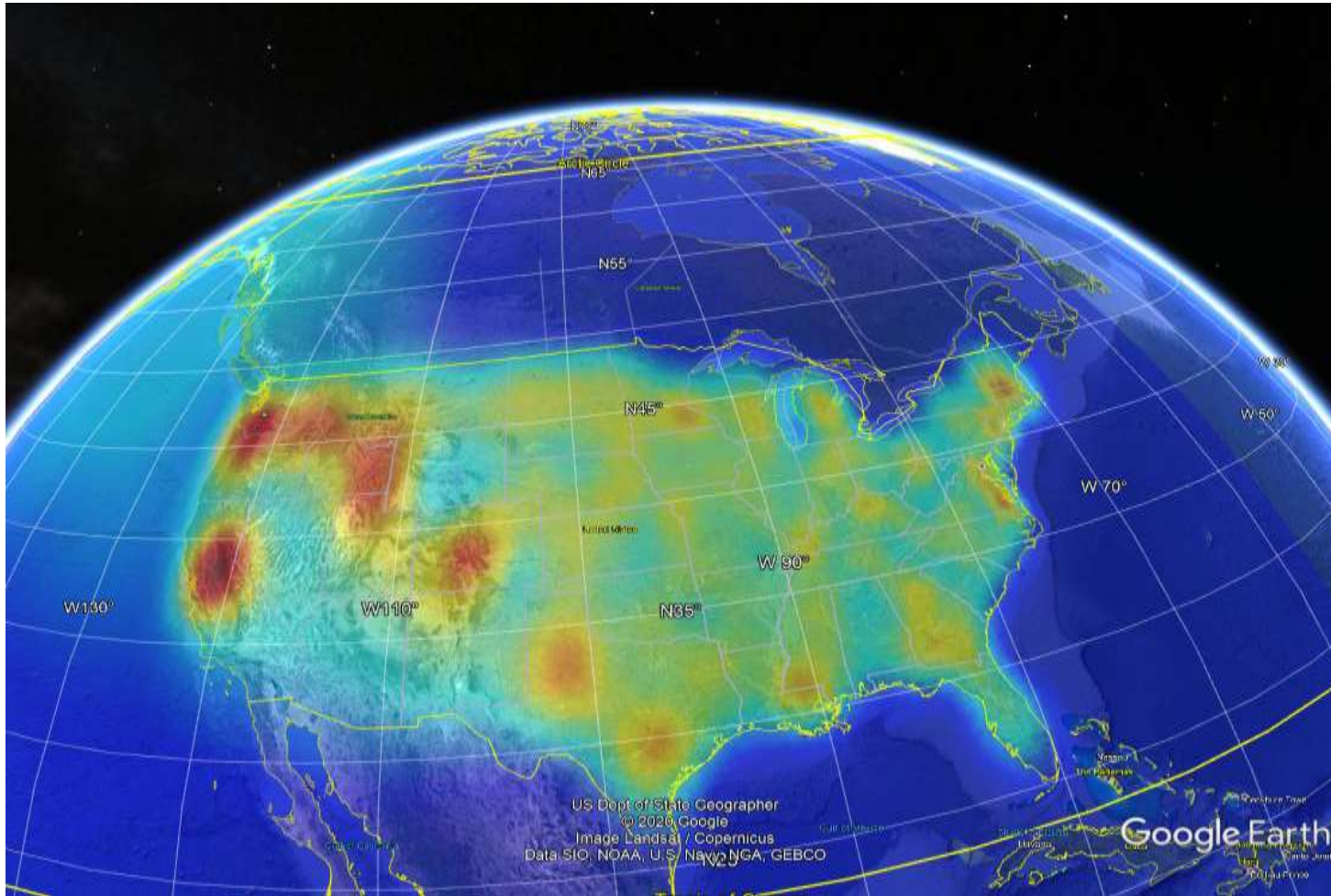


TWC-Windowing

In this TWC analysis $N = 3146$, $K = 50$ and $\frac{N}{K} \cong P = 62$ are used.



The result of $TWC - \alpha$ based on COVID-19 in USA on March 26, 2020



The result of $TWC - \beta$ based on COVID-19 in USA on March 26, 2020.

References

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