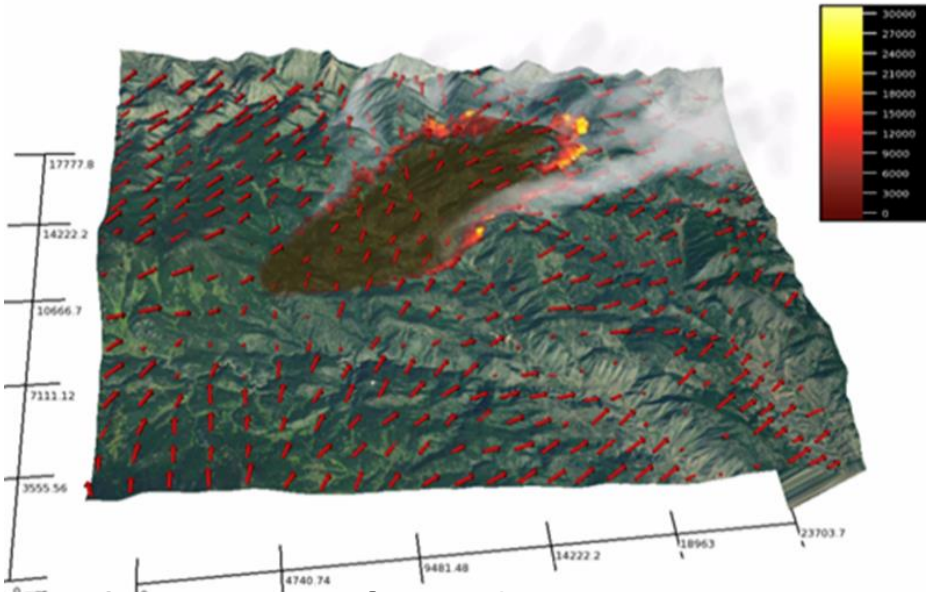
Coupled Weather and Fire Modeling CAWFE Model Development



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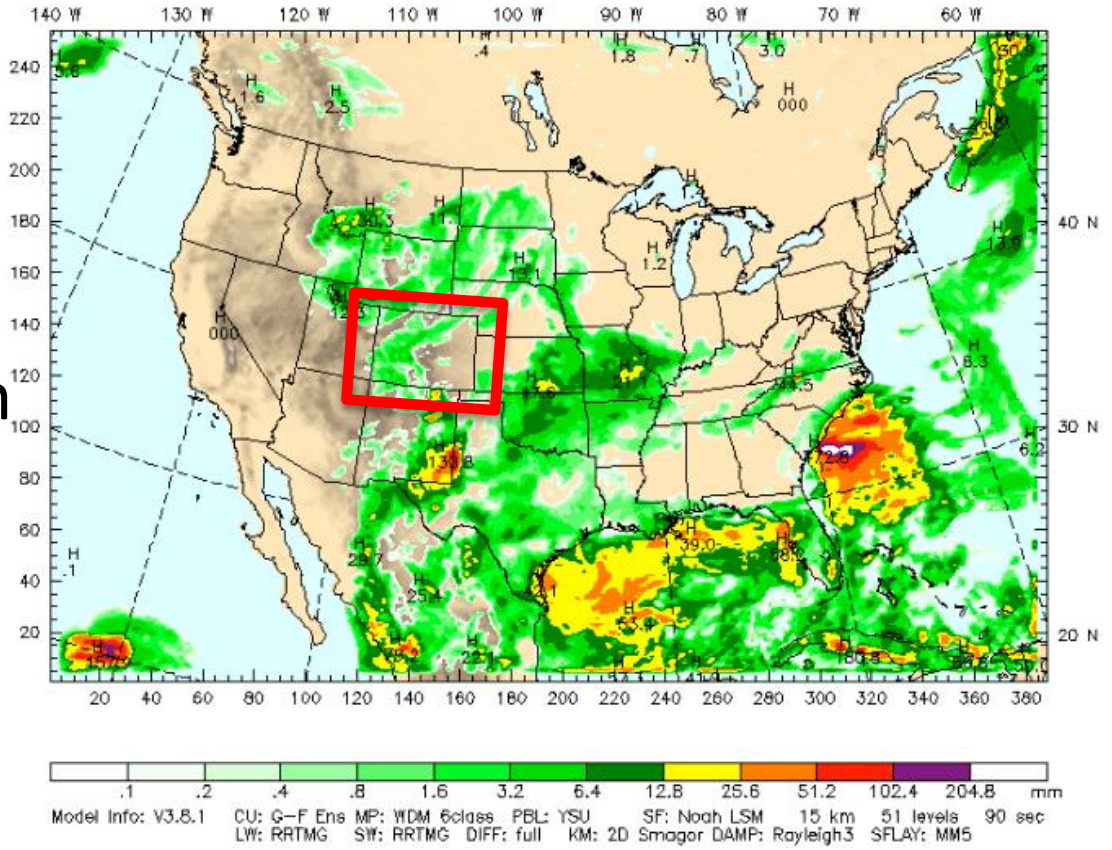
NCAR

COFPS Stakeholders Meeting, January 30, 2017

CAWFE® - Coupled Atmosphere-Wildfire Environment Model

National Center for Environmental Prediction's High Resolution Rapid Refresh (HRRR) model is based on WRF and covers CONUS. We use CAWFE® to downscale from HRRR output and focus on the area of interest (Colorado).



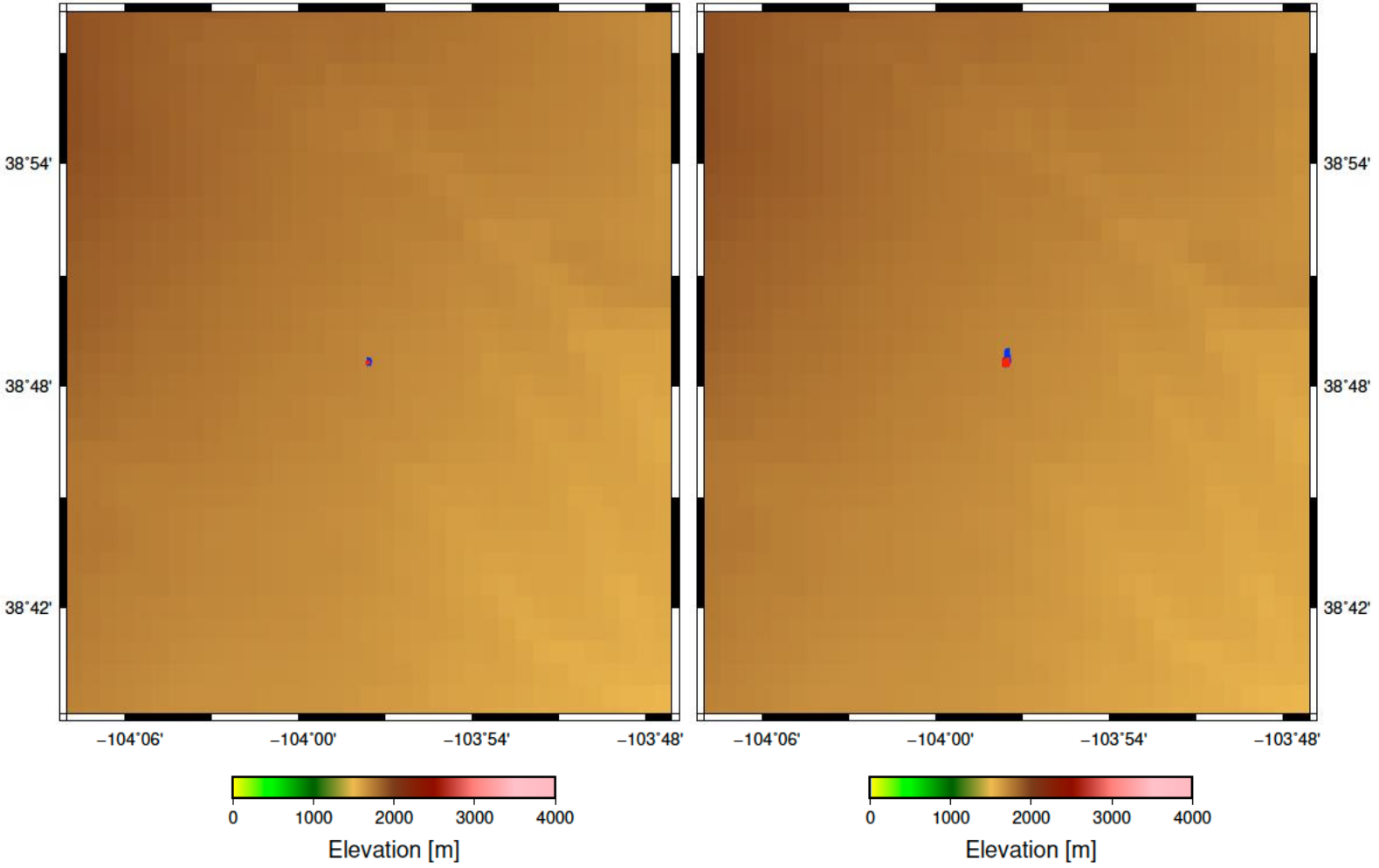
For Short-Term Forecasting We Explored a Possible Nowcasting System

- The goal is to provide a short-term forecast (~3-hour lead time) as fast as possible
- Currently 3-hour lead time high-resolution forecast with 110 m grid cell size takes 40-50 minutes
- Coarser resolution, 1 km grid cell size, can produce 3-hour lead time forecast in about 5 minutes.
- The domain with 1km grid cell size is the same as outer domain used in the CO-FPS operational system:
  - 117 km x 117 km centered on the ignition location

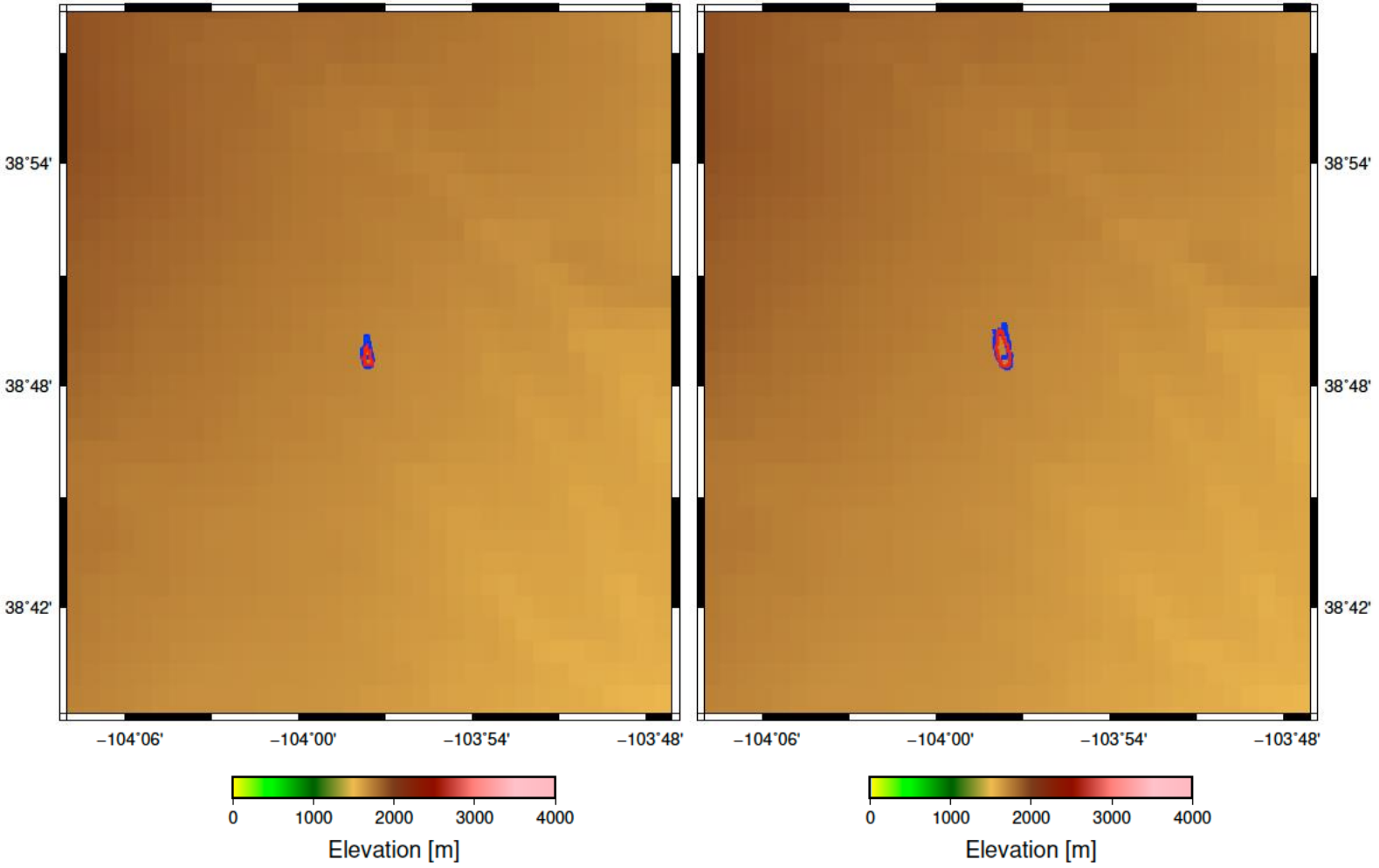
Comparison of nowcasting system forecast to high-resolution forecast

- The goal was to determine if a nowcasting system based on lower resolution forecasts could be effective
- We carried out a study to assess the differences between high-resolution forecast and lower resolution forecast
- This was model to model comparison – not a validation/verification study, results are not based on or compared to observed fires

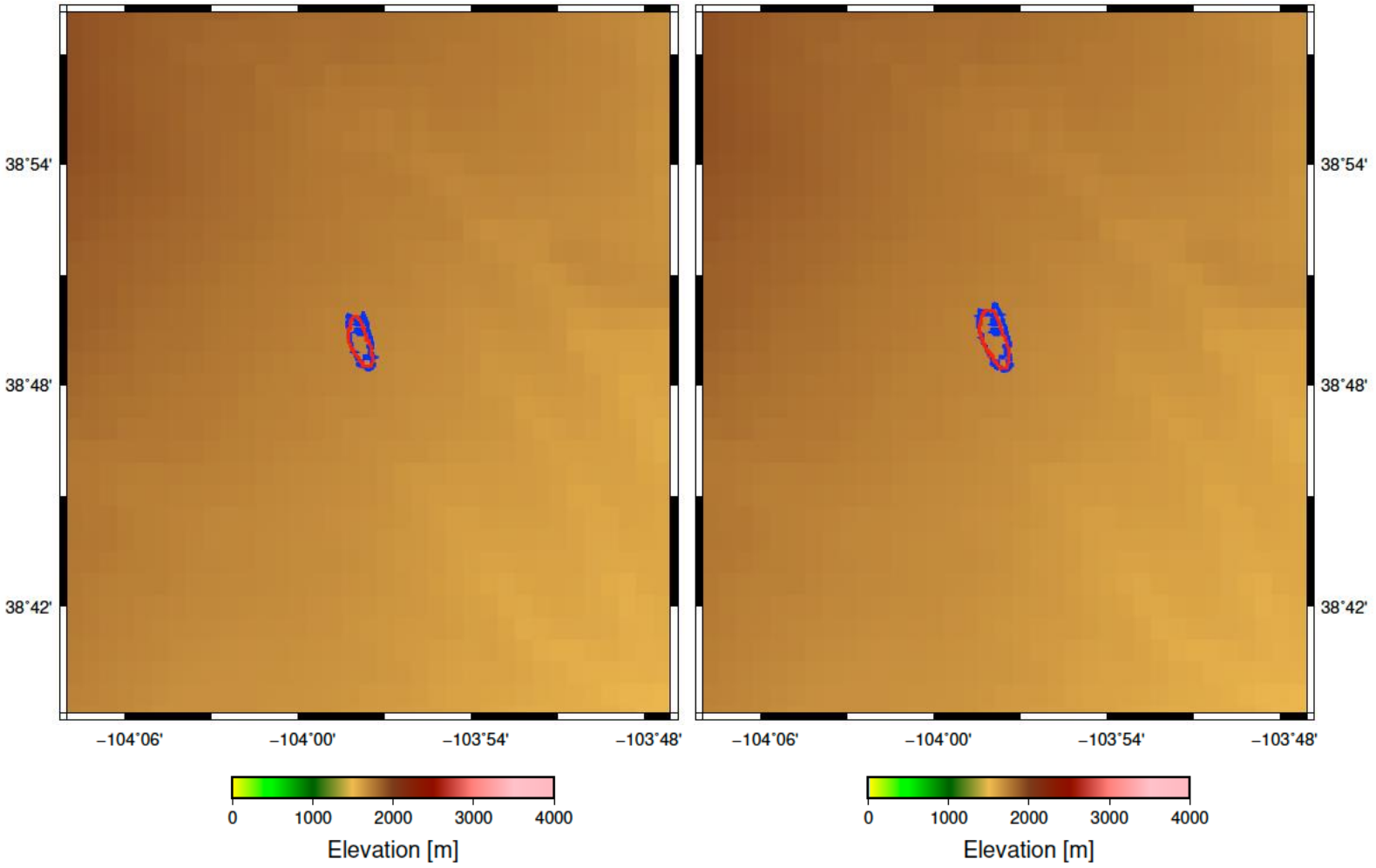
Flat Terrain – Example 1 – Hours 1 and 2



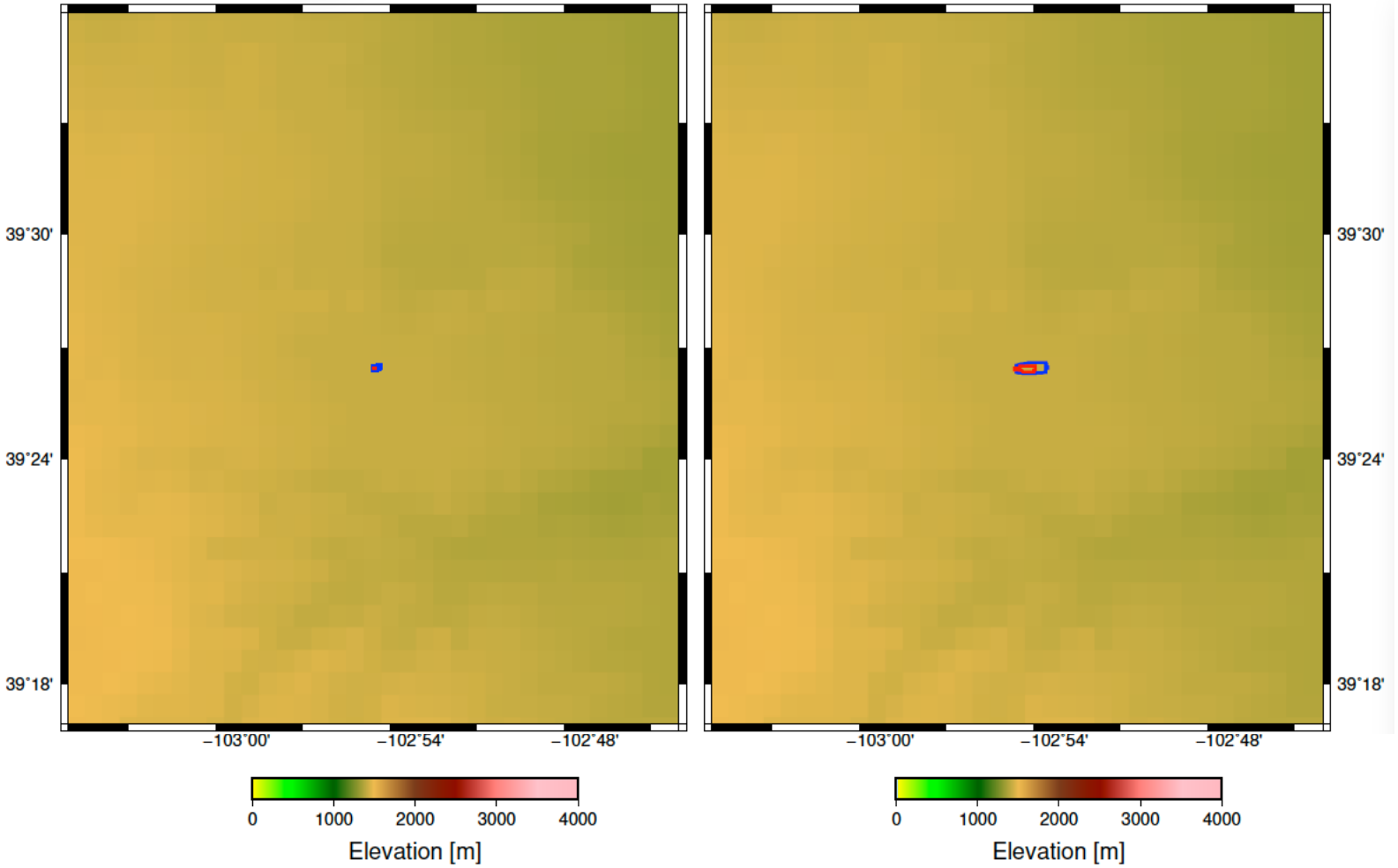
Flat Terrain – Example 1 – Hours 3 and 4



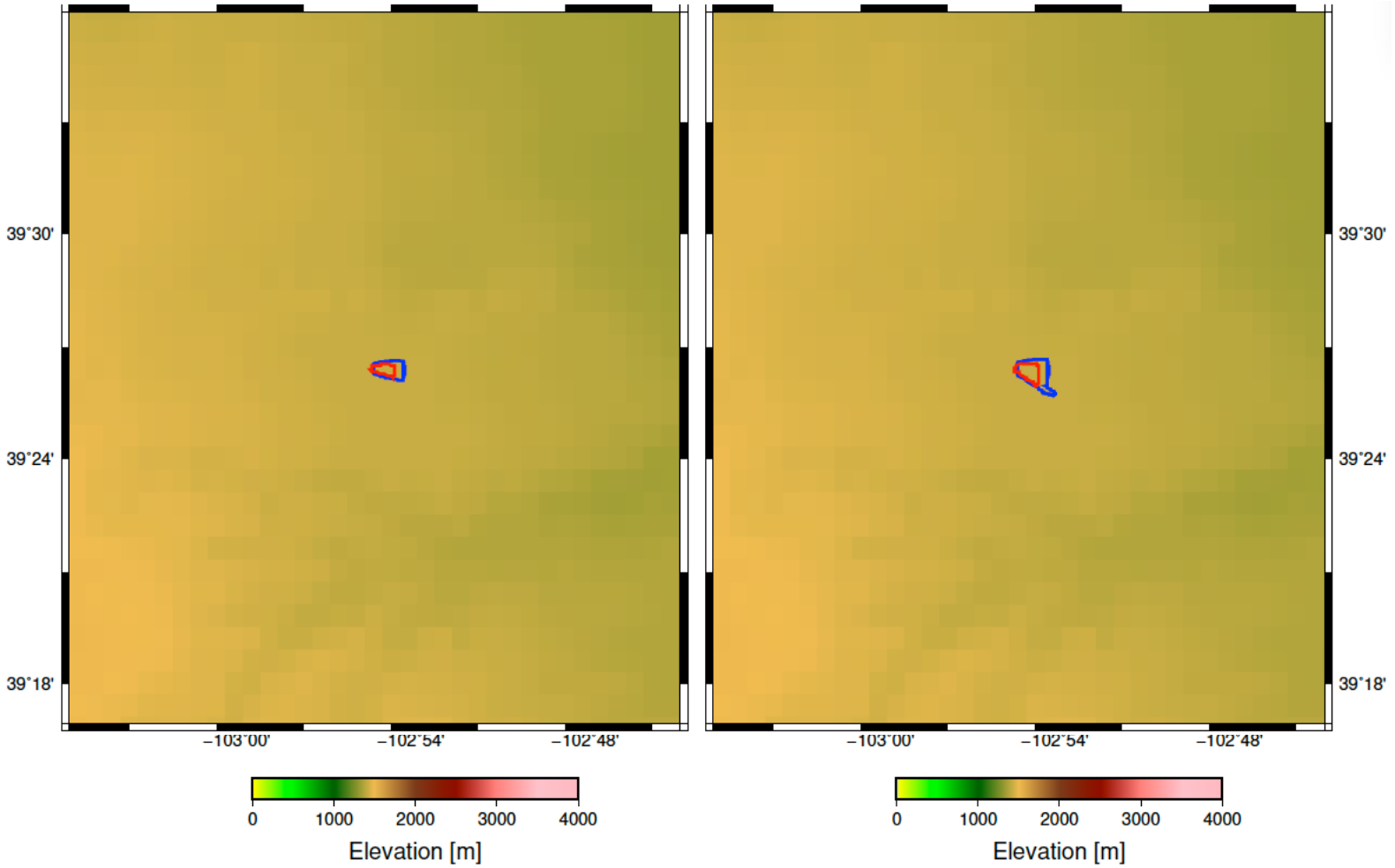
Flat Terrain – Example 1 – Hours 5 and 6



Flat Terrain – Example 2 – Hours 1 and 2



Flat Terrain – Example 2 – Hours 3 and 4



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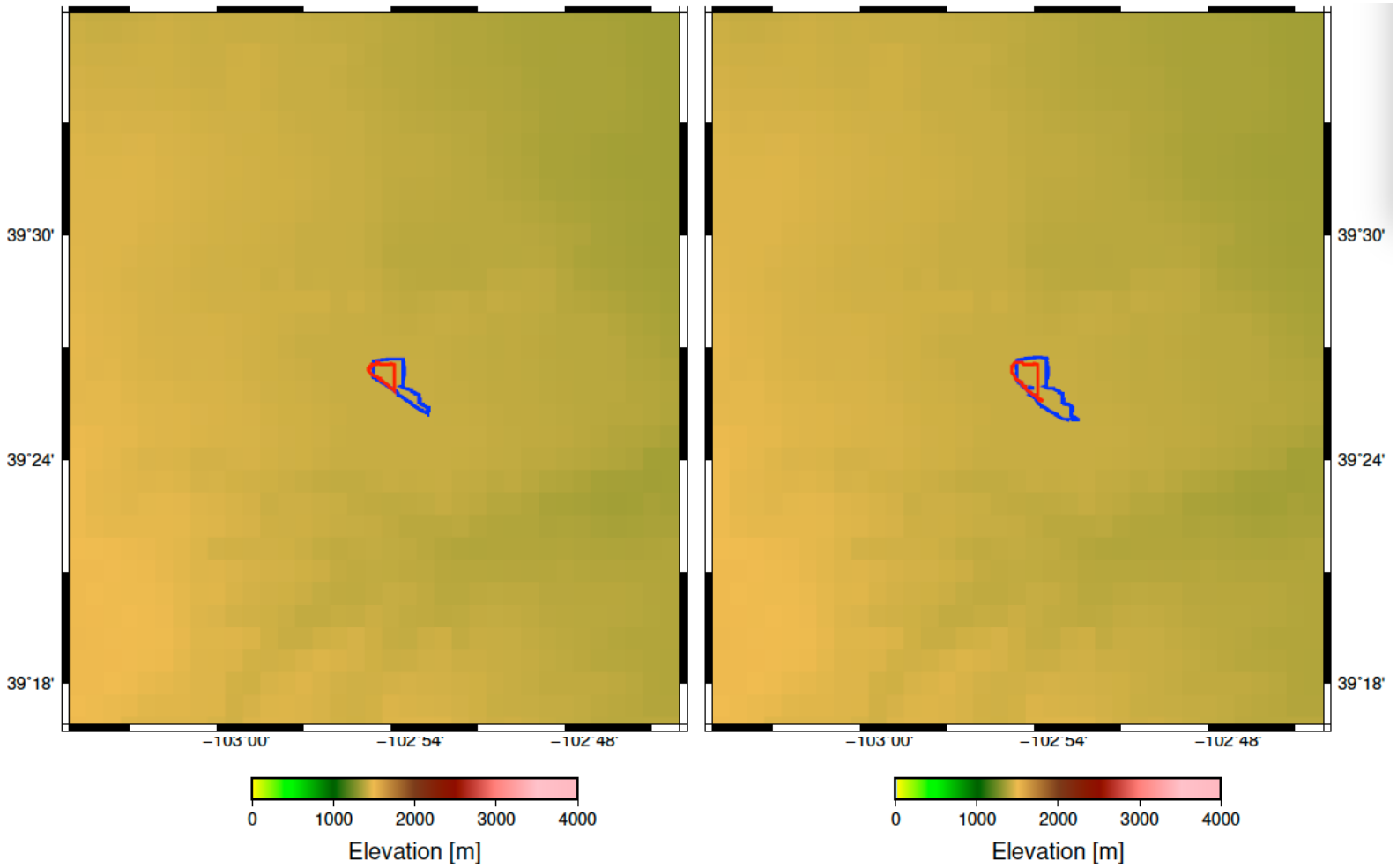
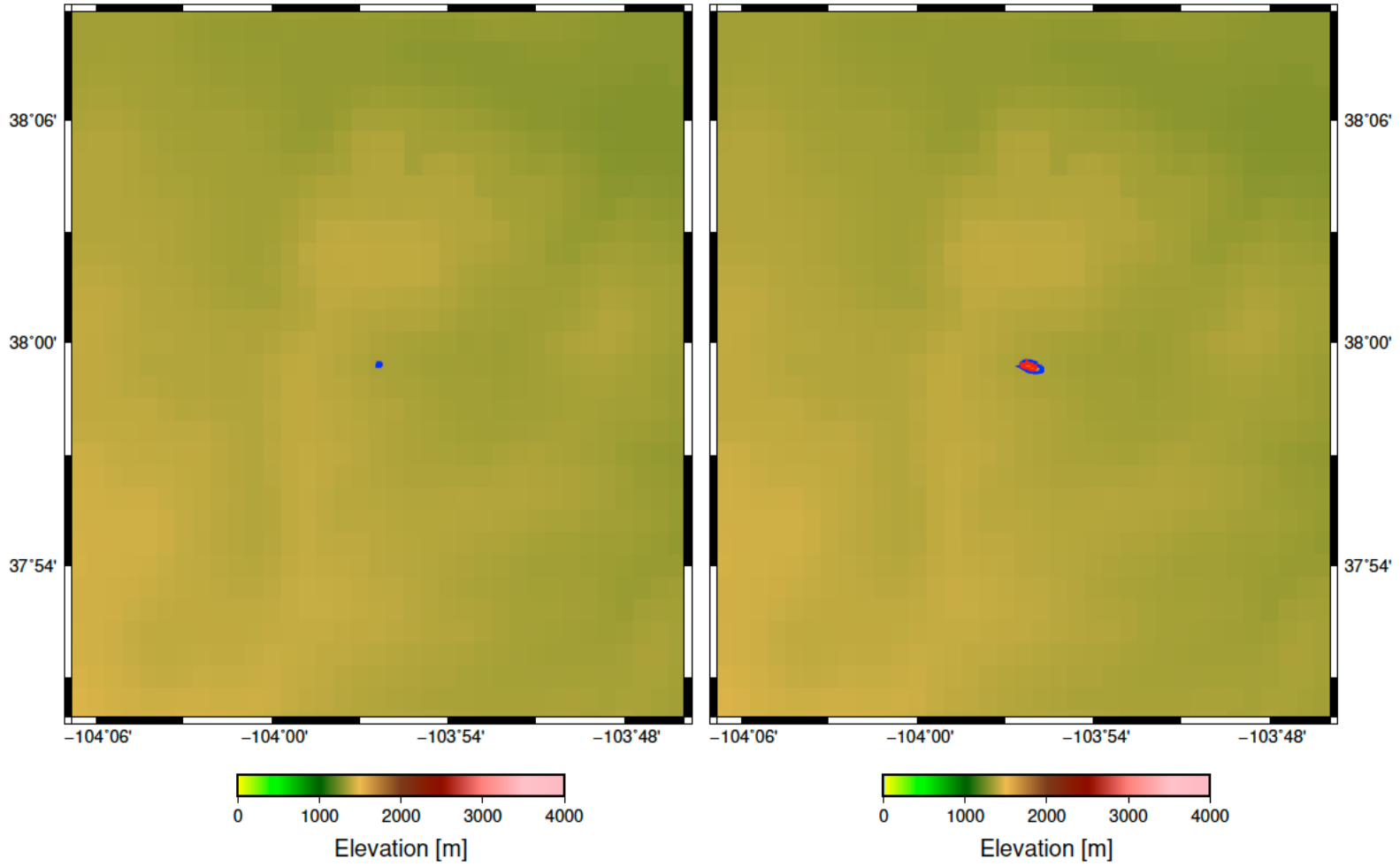
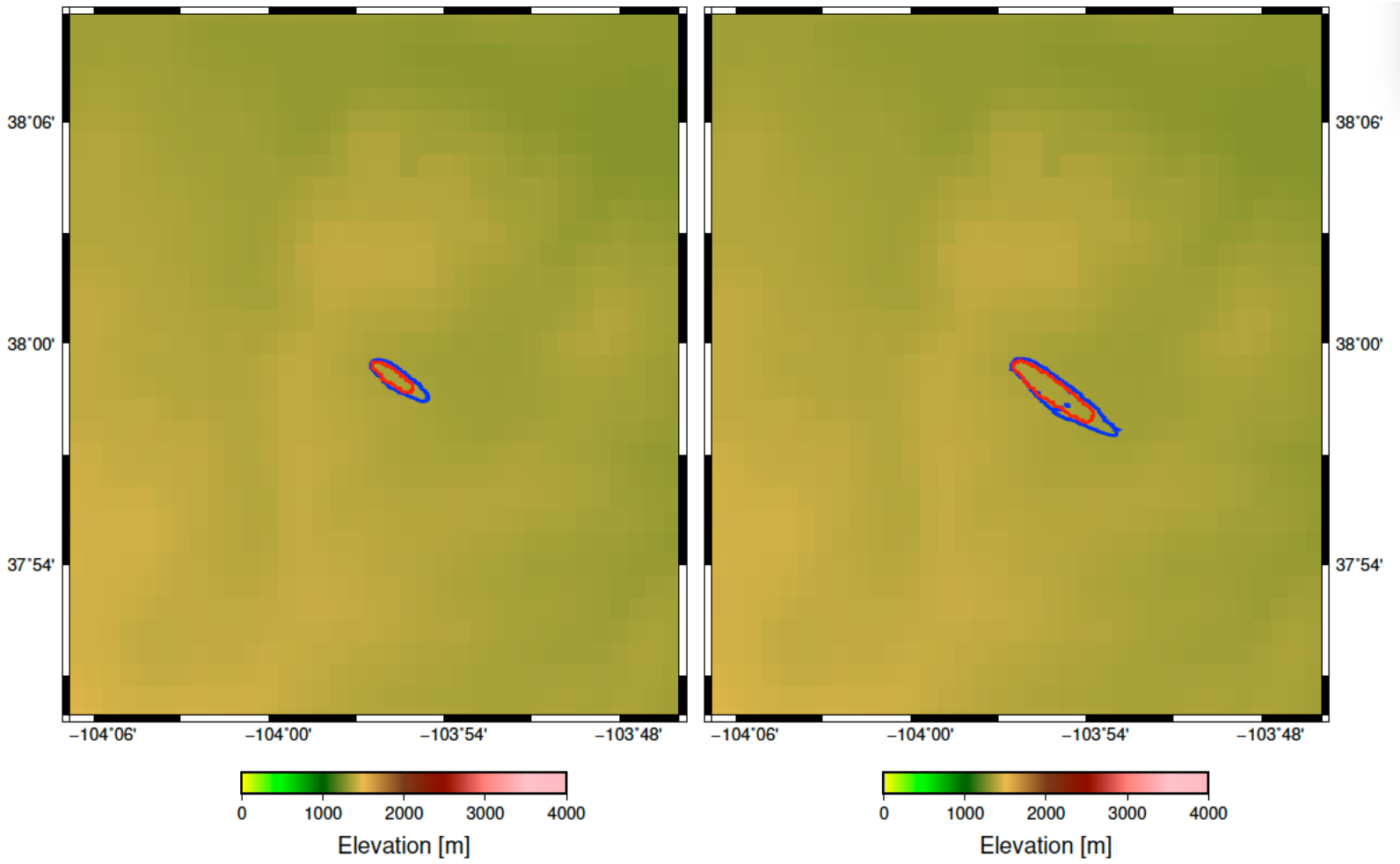


Flat Terrain – Example 3 – Hours 1 and 2



Flat Terrain – Example 3 – Hours 3 and 4



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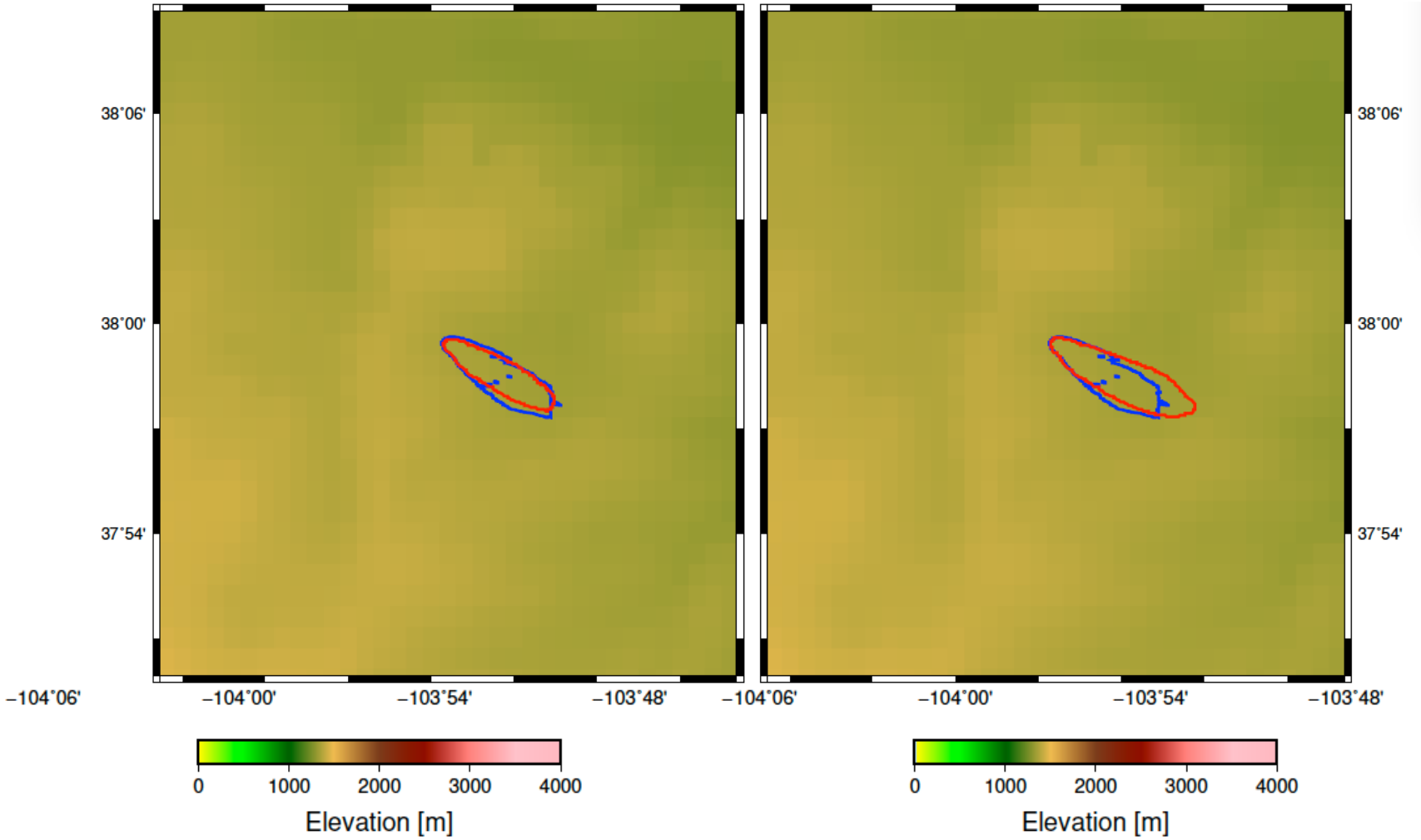
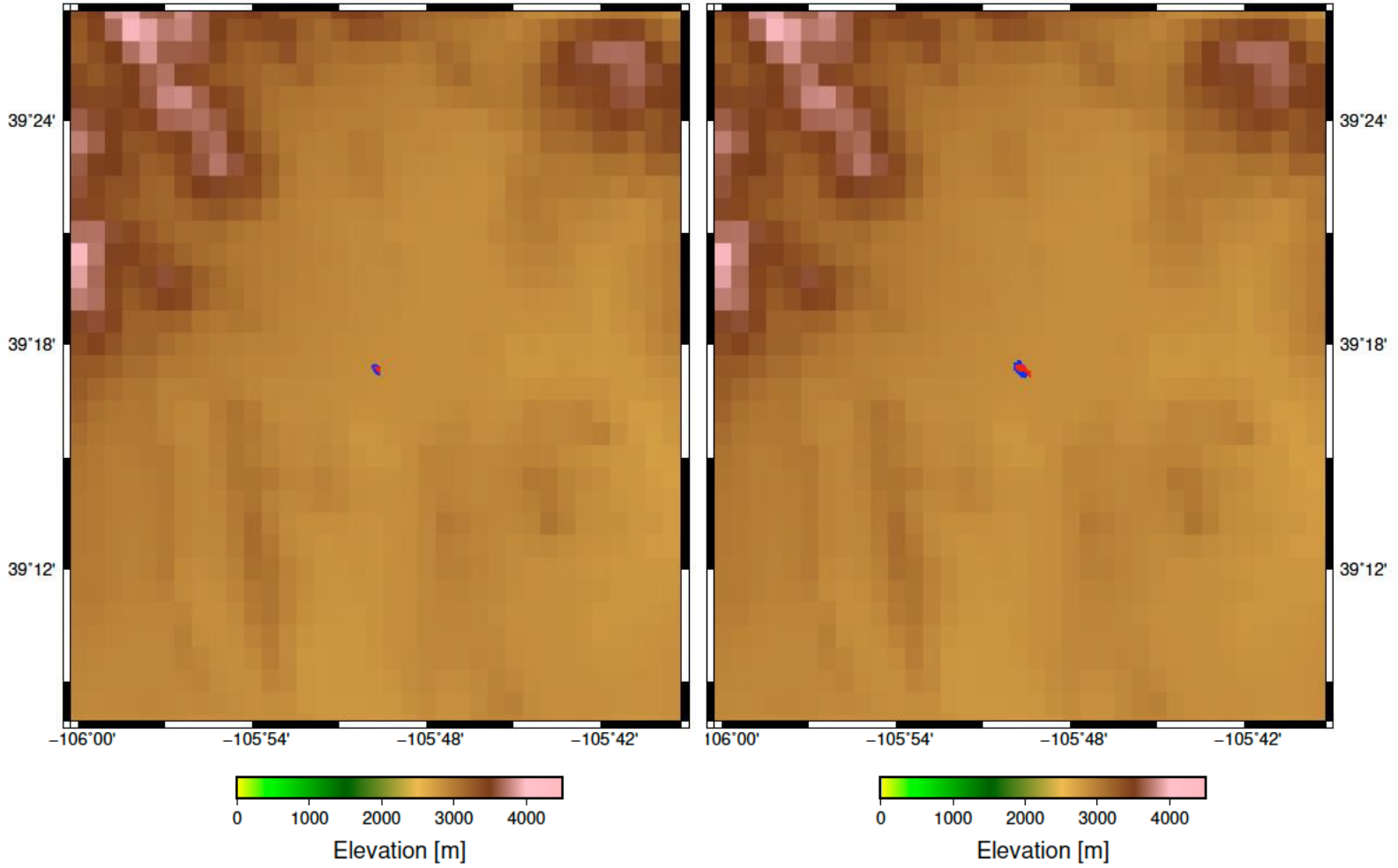
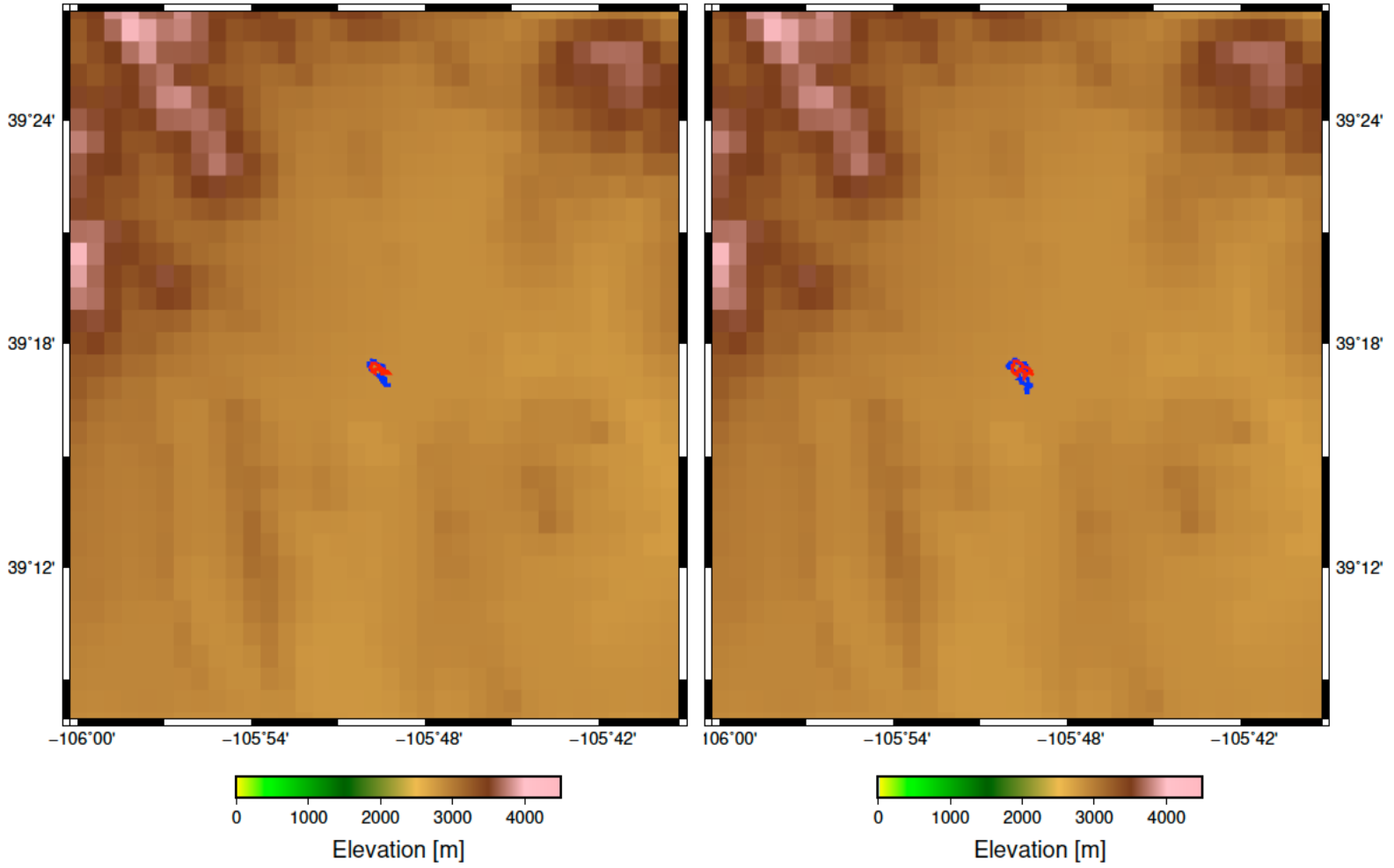


Complex Terrain – Example 1 – Hours 1 and 2



Complex Terrain – Example 1 – Hours 3 and 4



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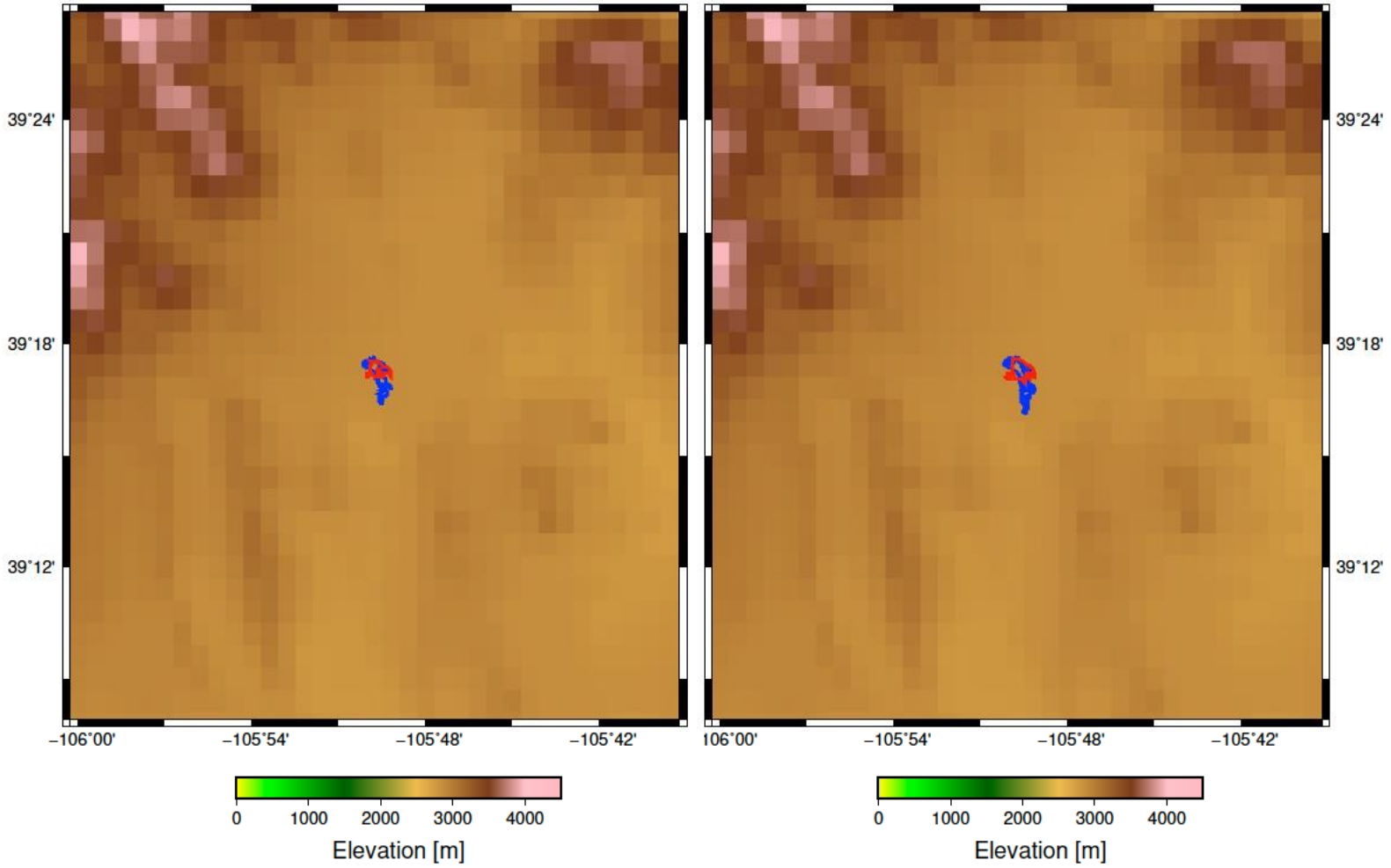
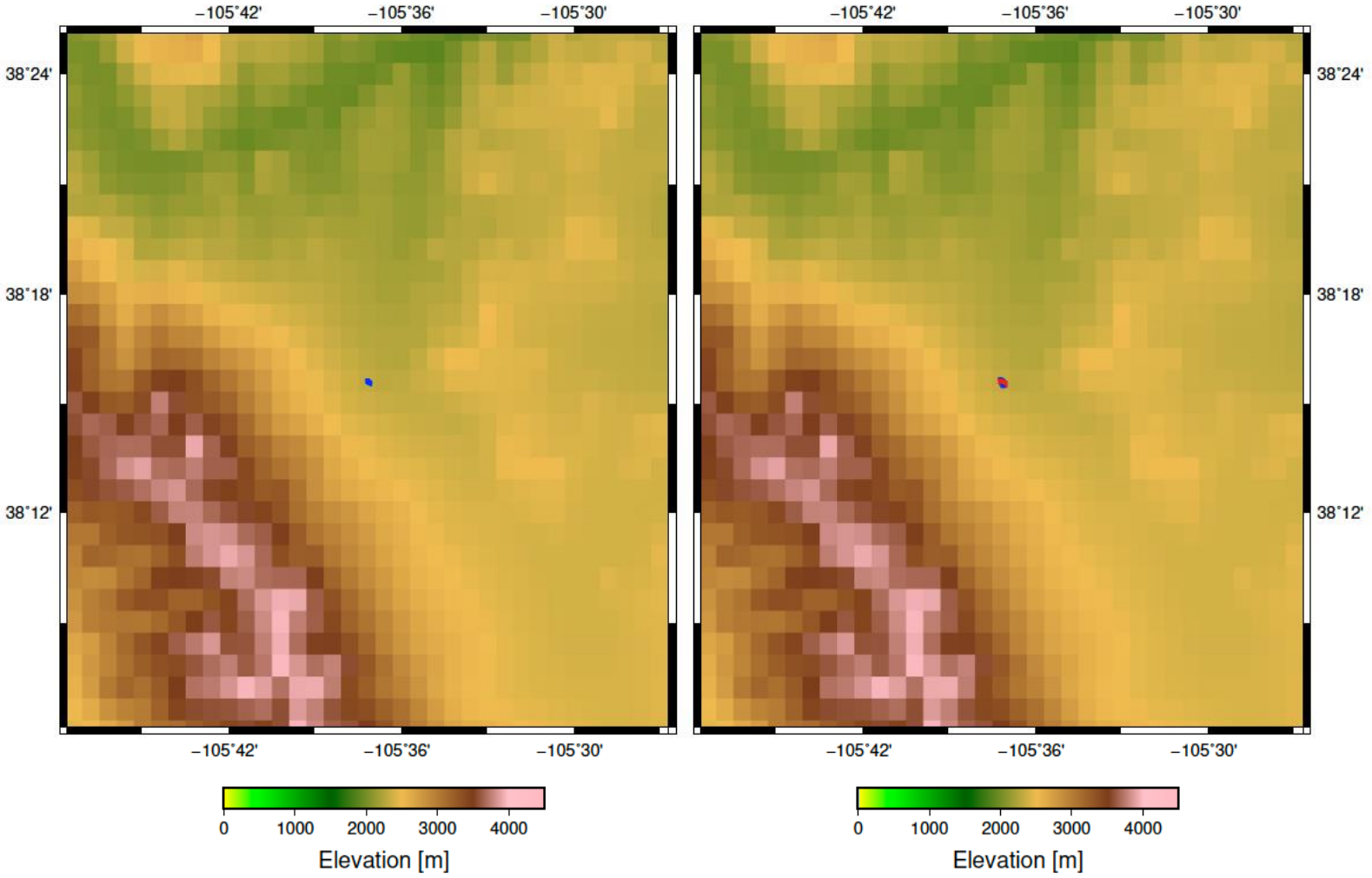
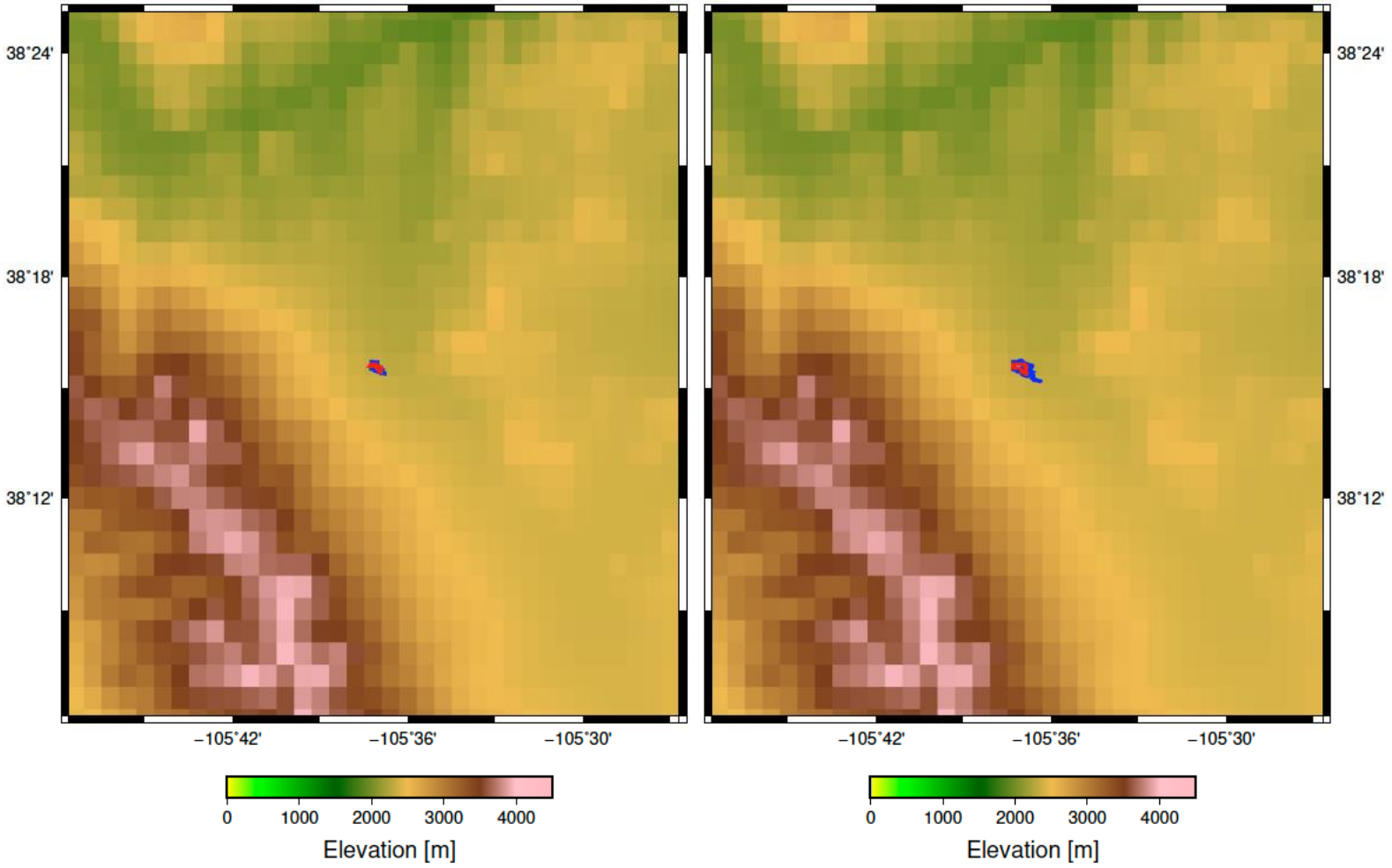


Complex Terrain – Example 2 – Hours 1 and 2



Complex Terrain – Example 2 – Hours 3 and 4



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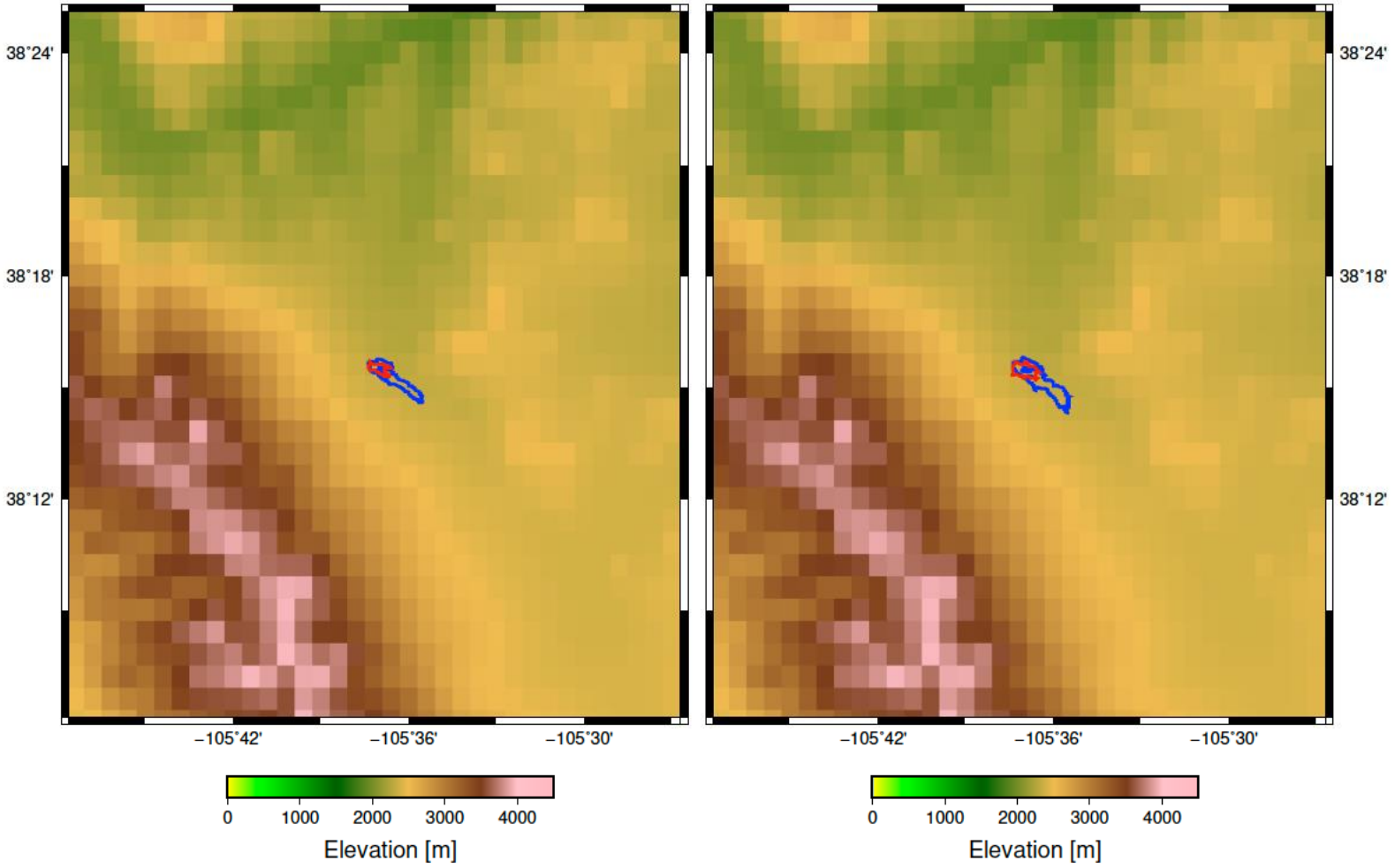

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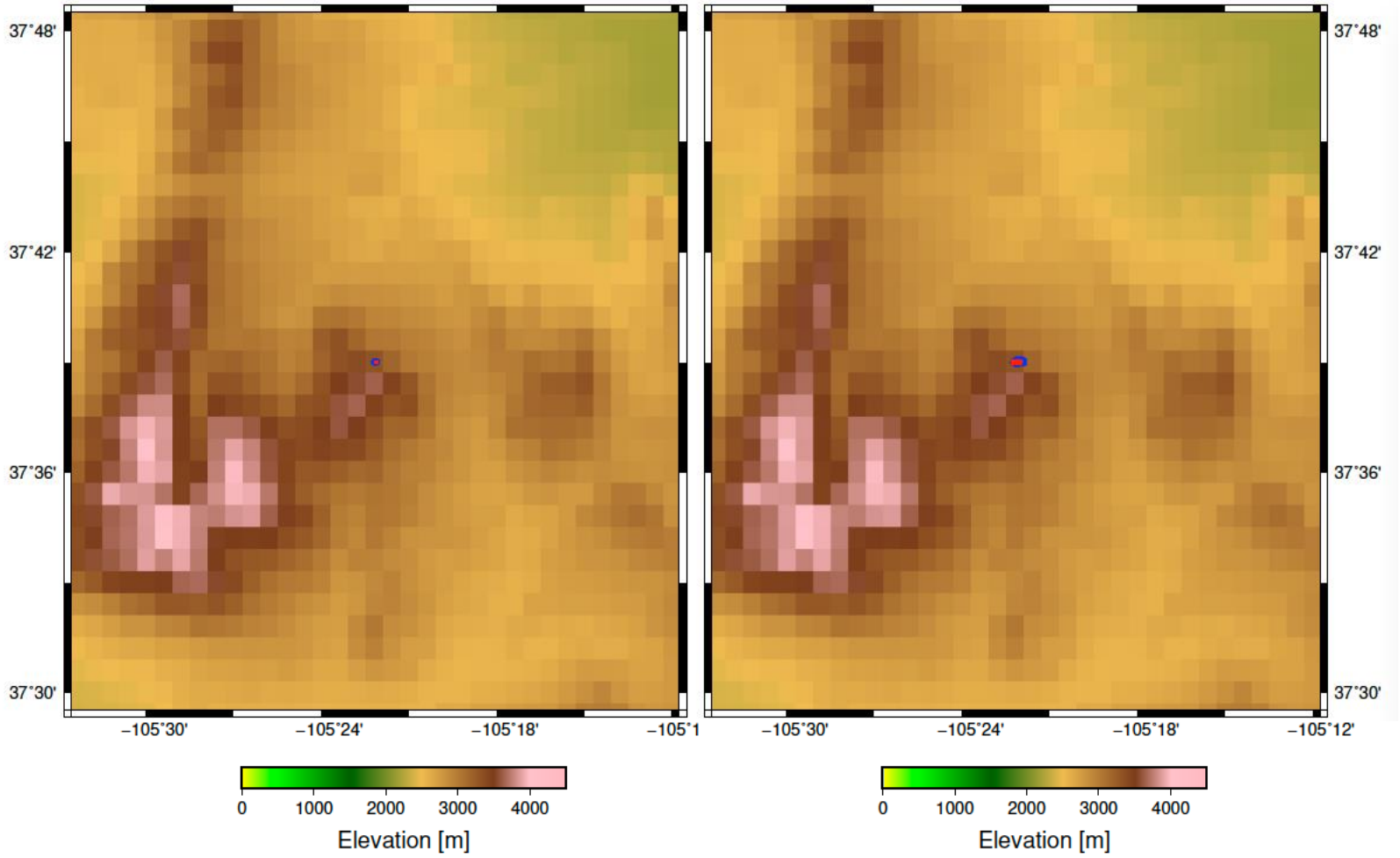

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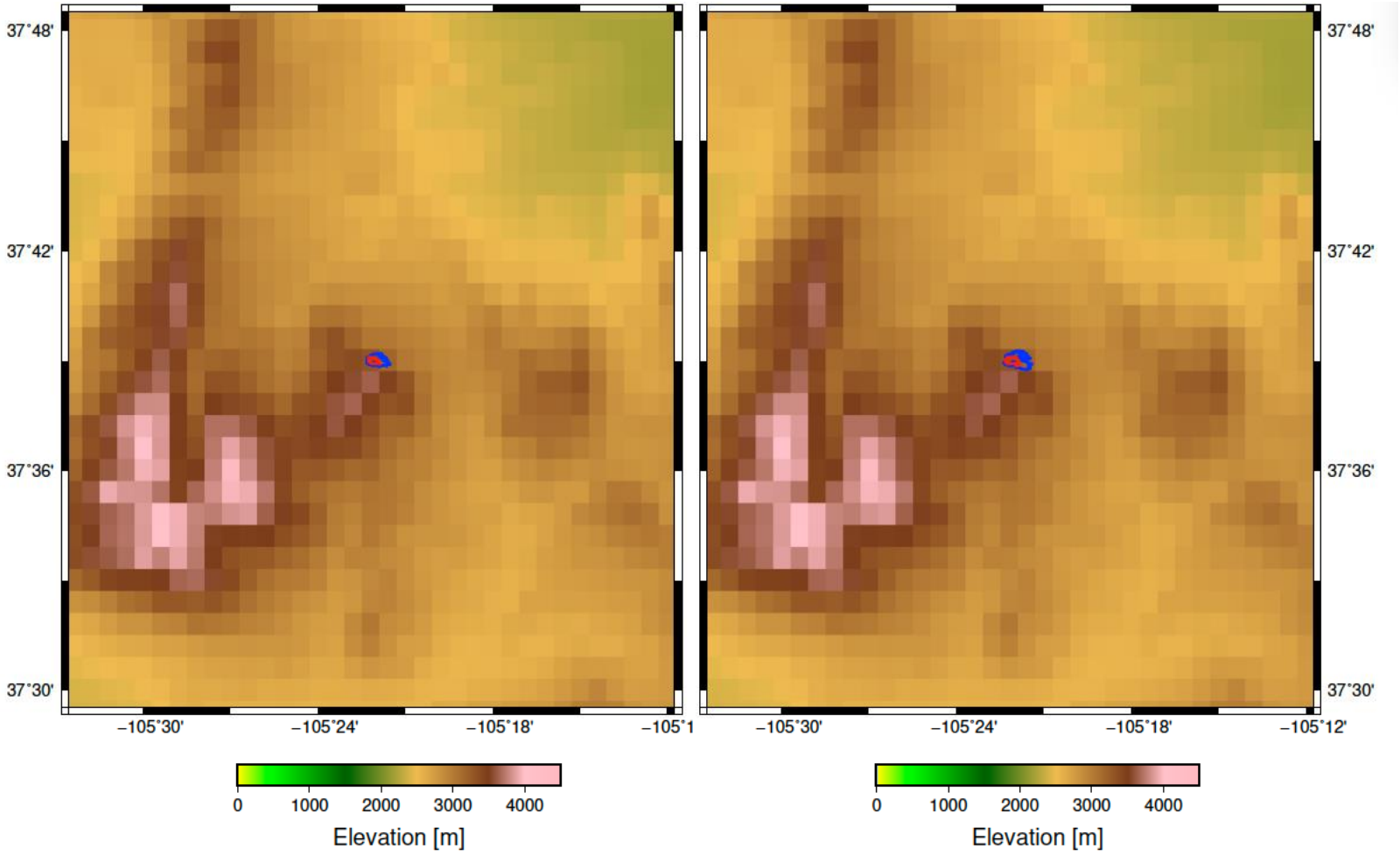

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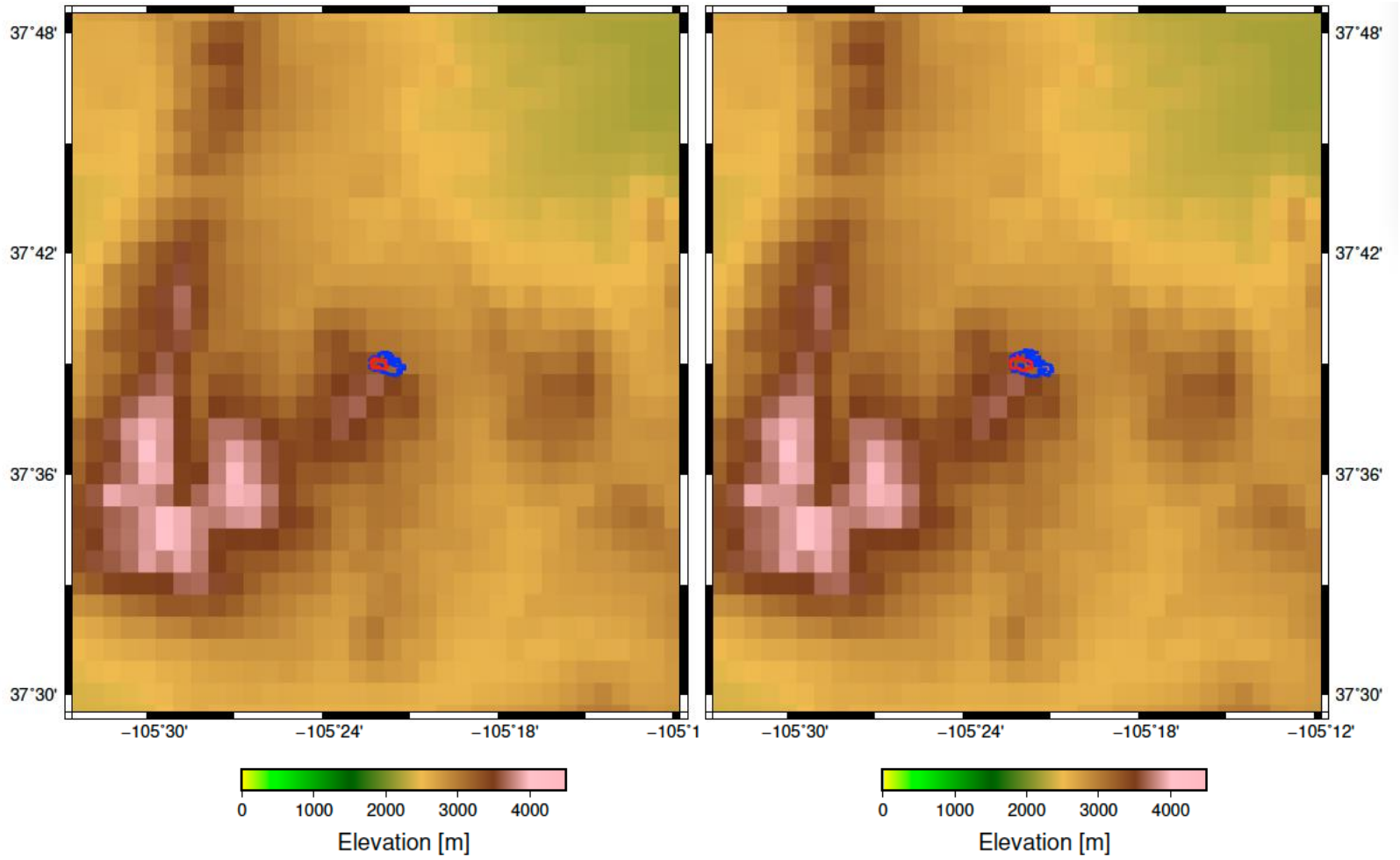

Summary

- Comparison with the high-resolution simulations shows that for the 2-3 hour lead time coarser-resolution simulations produce similar results
- In flat terrain the differences between coarser-resolution and high-resolution simulation is smaller than in complex terrain
- Coarser-resolution simulation with 1km grid cell size could be used in a nowcasting system