

# Nowcast

GeoGateway's Nowcast tab consists of useful tools to evaluate earthquake hazard and risk generated by the [Open Hazards Group](#).

Users have the option to choose from

- Global Forecast
  - Heat Map ( $M > 6.5$ , 1 Year)
  - Warm colors represent high risk and cool colors represent low risk
- California Forecast
  - Heat Map ( $M > 5$ , 1 Year)
  - Warm colors represent high risk and cool colors represent low risk
- Display California faults
- Display Global Disaster Alerting Coordination System (GDACS) Data
- Generate Nowcast Plots, resulting in earthquake potential scores

The Open Hazards earthquake forecast is a real-time seismicity-based forecast that computes probabilities in defined spatial areas using the Open Hazards Forecast Model (Donnellan et al., 2021).

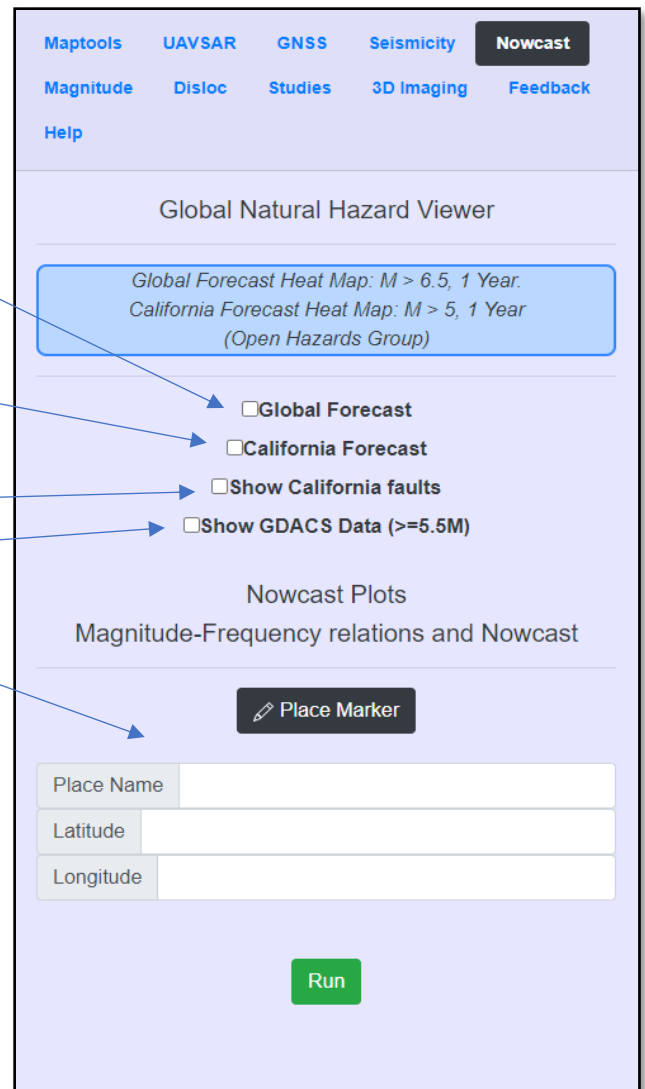


Figure 1: Nowcast tab

By clicking on the “Global Forecast” option, users are able generate a heat map which forecasts magnitudes greater than 6.5 in a year. *Figure 2* displays the risk associated for such forecasts along portions of the coast of Alaska, Canada and northern United States. High risk is represented through warm colors and low risk is represented as cool colors. By clicking on any part of the layer, users are able to see the risk associated with the location of interest.

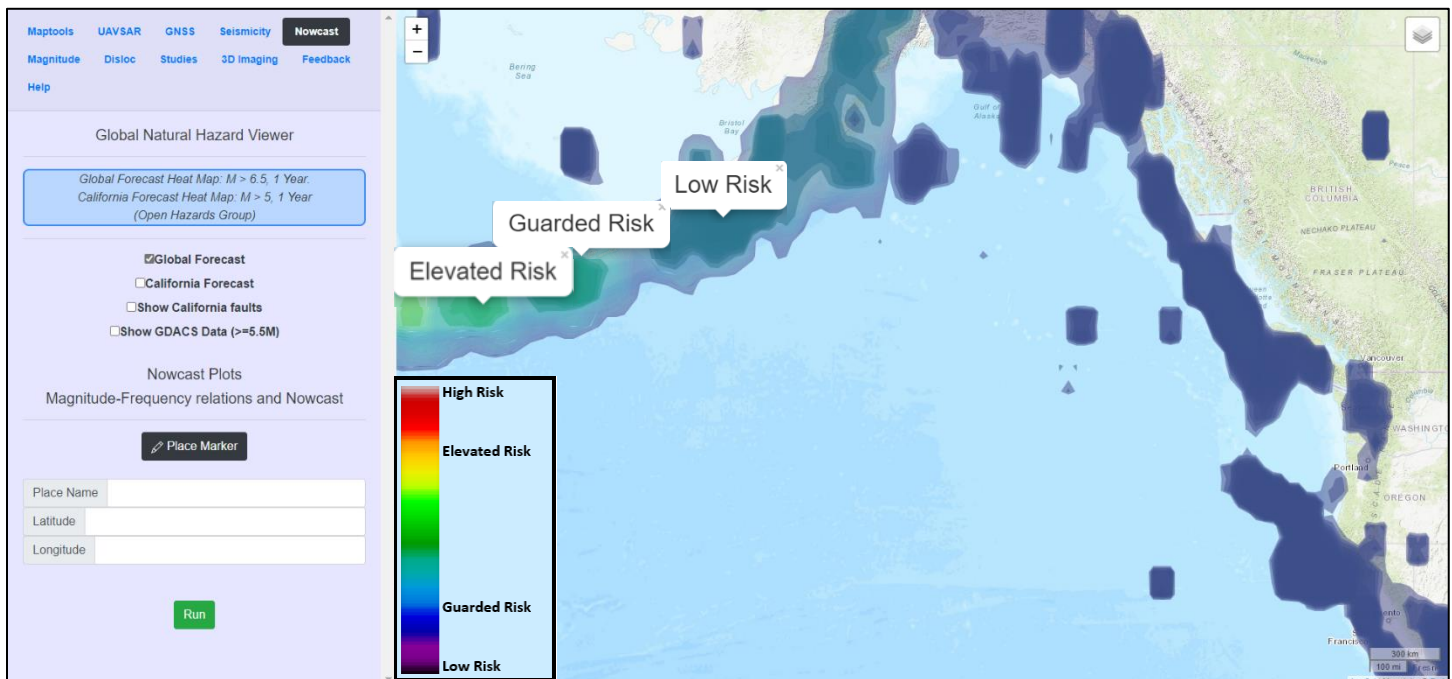


Figure 2: Display of global forecast heat map along the coast of parts of Alaska, Canada, and Northern United States

By clicking on the “California Forecast” option, users are able generate a heat map which forecasts magnitudes greater than 5 in a year. *Figure 3* displays the risk associated for such forest within California and parts of Nevada.

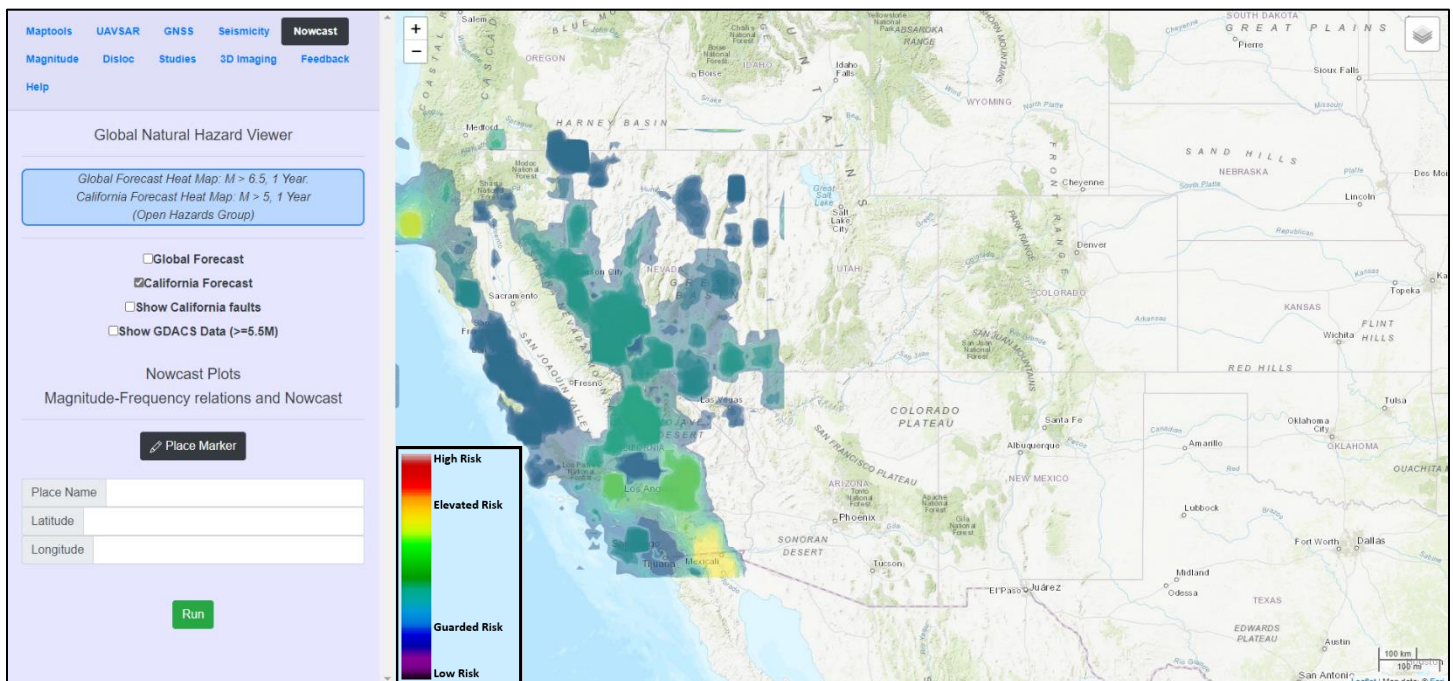


Figure 3: Display of California forecast heat map within California and parts of Nevada

By clicking on “show GDACS Data ( $\geq 5.5M$ )” option, Global Disaster Alerting Coordination System (GDACS) data for earthquakes greater than or equal to 5.5 is displayed. *Figure 4* displays GDACS data off the coast of Fiji.

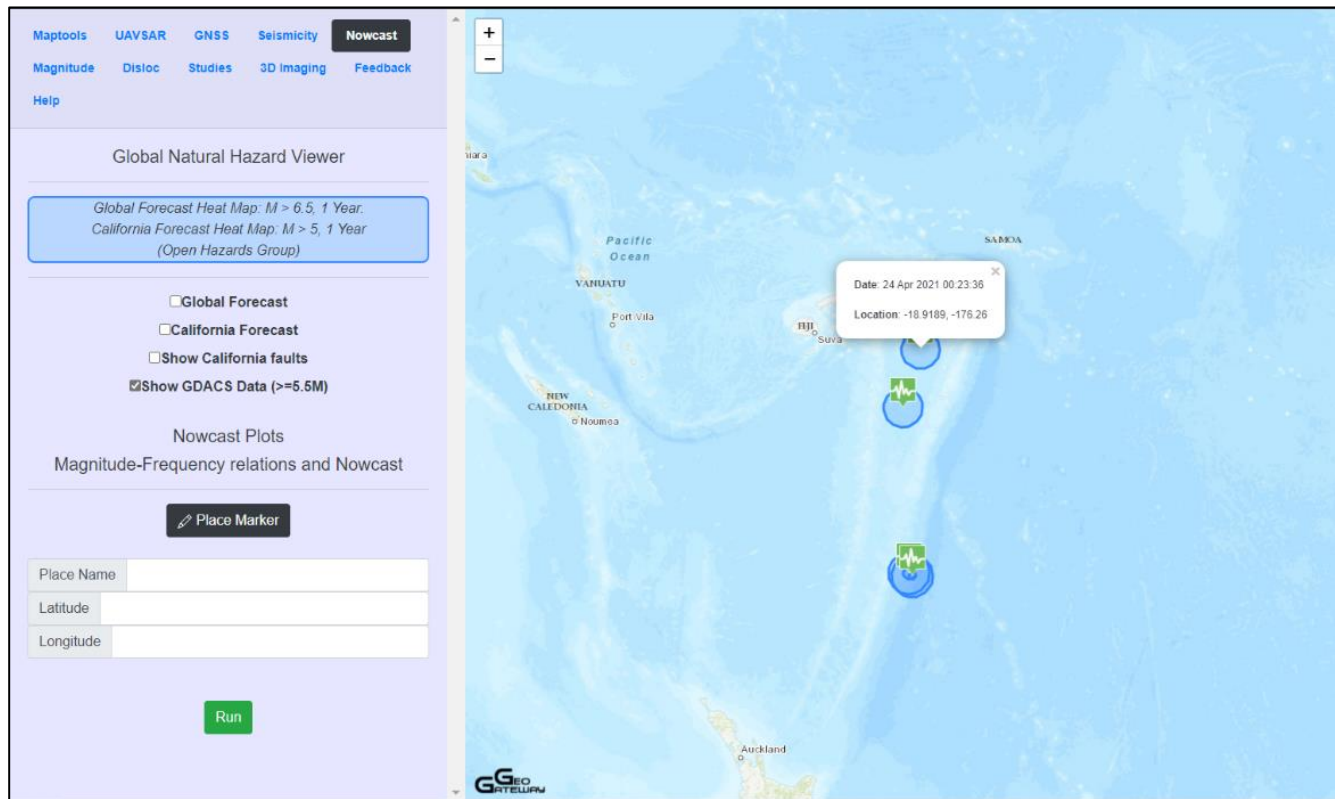


Figure 4: Global Disaster Altering Coordination System data off the coast of Fiji

The second section of the tab allows for users to generate Nowcast Plots pertaining to the potential score that characterizes the current state of progress of a defined geographic region through its normal earthquake “cycle.” Nowcasting is the prediction of the present, the very future and the very recent past, and it uses proxy data to estimate the current dynamical state of a driven complex system such as earthquakes, neural networks, or the financial markets (Donnellan et al., 2021).

Seismic nowcasting uses counts of small earthquakes as proxy data to determine the natural time. The count of small earthquakes since the last large earthquake is the natural time that has elapsed in the last large earthquake. The proxy data allows for an estimate of the current dynamical state of an earthquake fault system.



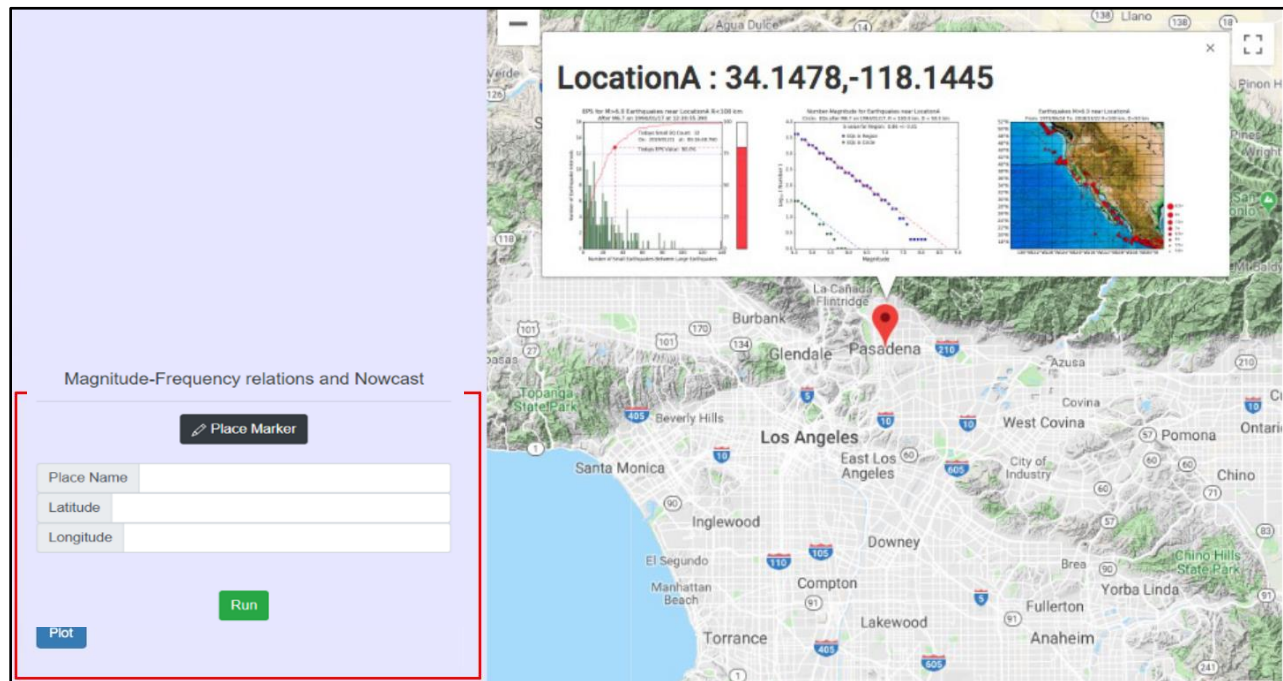


Figure 5: Nowcast plots for LocationA

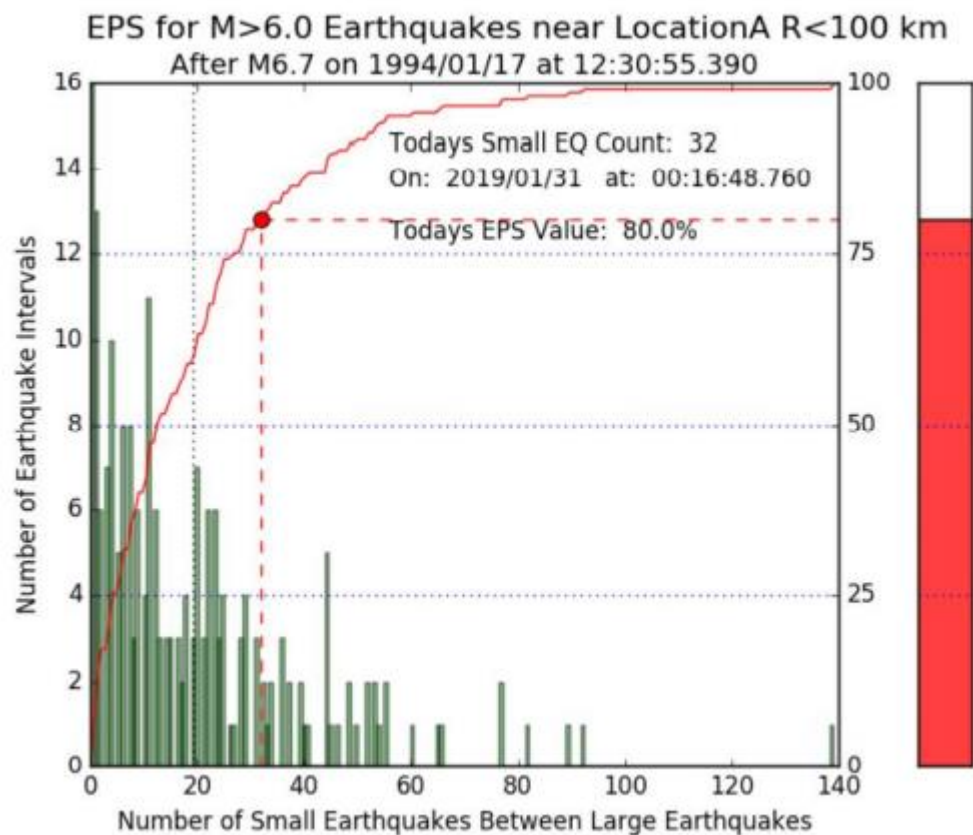


Figure 6: Earthquake Potential Score for LocationA (Pasadena, CA)

The Earthquake Potential Score (EPS) data for the chosen location, in this case "LocationA" can be viewed.

$$EPS = P\{n \leq n(t)\}$$

$P$  = Cumulative Distribution Function (CDF) of small earthquakes occurring between large earthquakes

$n(t)$  = the number of small earthquakes since the last large earthquake

$n$  = small earthquakes since the last large earthquake.

EPS values for *figure 6* portray magnitudes greater than  $M = 6$ , 100 km within the specified region.

The figure portrays that the small earthquakes count for today is 32 and the EPS Value is 80.0%.

*Figure 7's* data displays "Number-Magnitude" statistics. The blue squares represent all the earthquakes  $\geq 3$  and the lower green circles show earthquakes  $3 \leq X < 6.5$ .

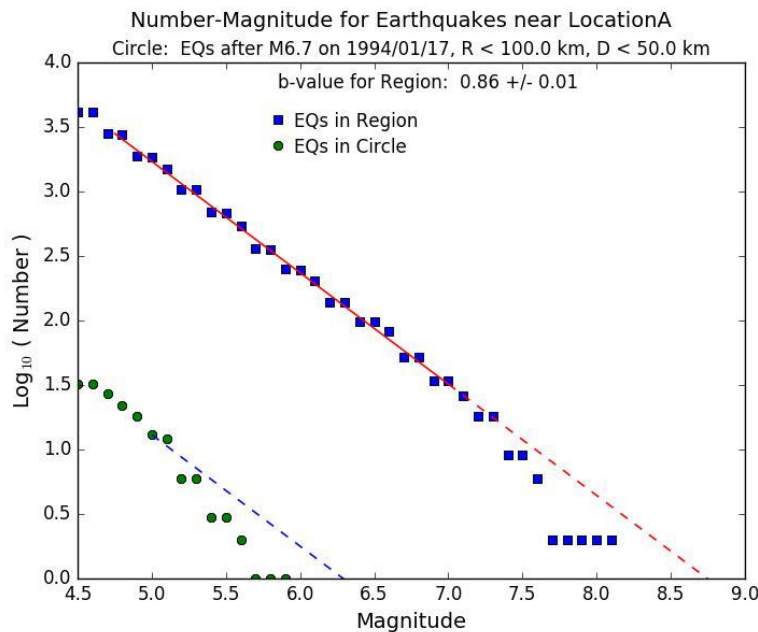


Figure 7: Number-Magnitude for Earthquakes near LocationA (Pasadena, CA)

The last figure located on the far right displays a map of earthquakes with a magnitude  $\geq 6.0$  near San Bernardino as of 1970 to 2018. The blue circle centered on San Bernardino has a radius equal to 100 km.

