*Resolution sensitivity analysis for climada applied to*

*landslides and tropical cyclones in San Salvador*

<https://github.com/davidnbresch/climada_module_salvador_demo> February 2016

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# Purpose

Perform sensitivity analysis for different resolutions for two cases, 1) landslides in Las Cañas neighborhood in San Salvador and 2) tropical cyclones in the metropolitan area of San Salvador (AMSS). Analyzed resolutions range from high resolution (~50 meter), mid resolution (~1 km) to low resolution (~10 km).

# Results and Conclusions

We compare different results using high, mid and low geographical resolution from two cases, 1) landslides in Las Cañas neighborhood in San Salvador and 2) tropical cyclones in the metropolitan area of San Salvador (AMSS).

The comparison of results from landslides shows that only with a high resolution accurate results can be achieved. Using mid or even low resolution leads to significantly less accurate results. We overestimate expected damage, while underestimating the benefits of measures. This shows that for an underlying high resolution hazard it is necessary to define the assets on a similar high resolution. The landslide hazard is highly spatially variable and is driven by topography and water accumulation potential.

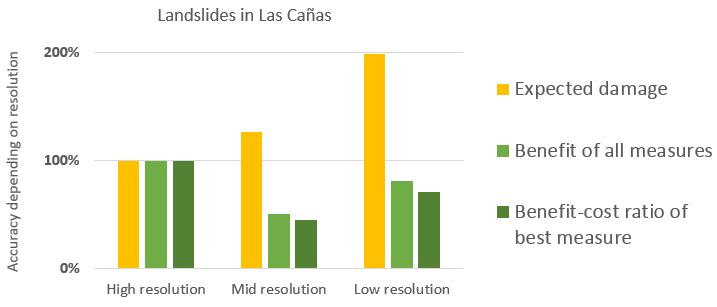


Figure 1: Comparison of expected damage, benefit of all measures and benefit-cost ratio of best measure for landslides in Las Cañas. Accuracy of high resolution results are set to 100%. Using mid resolution in comparison to high resolution leads to overestimation of expected damage (127%) and measures perform weaker (down to 51% and 45%). Using low resolution the results are even more inaccurate. Expected damage rises to almost 200%, while benefit of all measures and benefit-cost ratio of best measure drops to 81% and 71%, respectively.

The comparison of results from tropical cyclones shows that results are almost not affected by geographical resolution of assets. Using mid or low resolution of assets leads to very similar results, both in terms of expected damage and benefit of measures. Wind intensities from tropical cyclones are comparable in the entire AMSS region and do not vary very locally. Therefore we can use mid or low resolution in assets and still calculate accurately results.

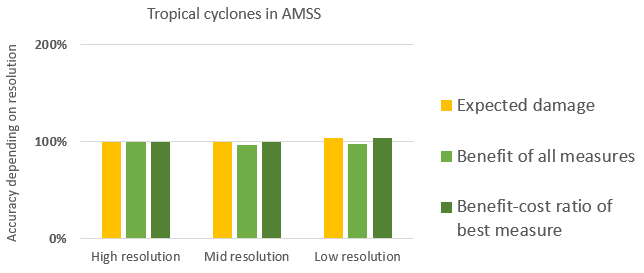


Figure 2: Comparison of expected damage, benefit of all measures and benefit-cost ratio of best measure for tropical cyclones in AMSS. Accuracy of high resolution results are set to 100%. Using mid resolution or even low resolution leads to very similar and therefore still accurate results. Accuracy of results is between 97% and 104%.

# Appendix, all results and maps

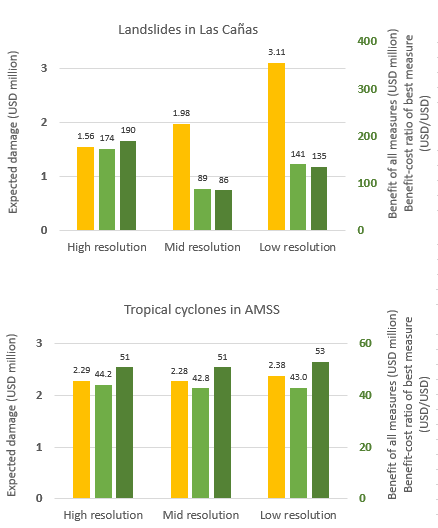


Figure 3: Comparison of expected damage (left y-axis), benefit of all measures and benefit-cost ratio of best measure (right y-axis) for landslides in Las Cañas. Using mid resolution in comparison to high resolution leads to overestimation of expected damage (USD 1.98 million instead of 1.56) and measures perform weaker. Benefit of all measures is down to USD 89 million instead of 174. Using low resolution the results are even more inaccurate. Expected damage rises to USD 3.11 million, while benefit of all measures and benefit-cost ratio of best measure drops to USD 141 and 135 million, respectively.

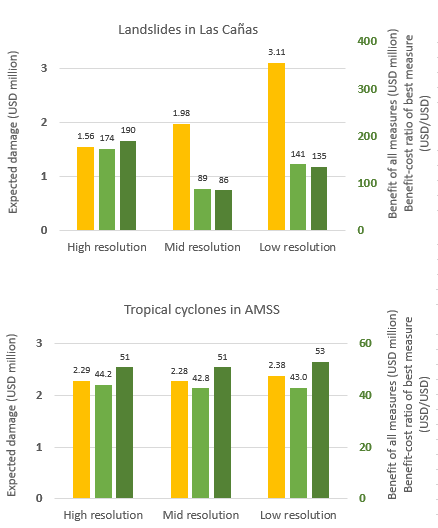
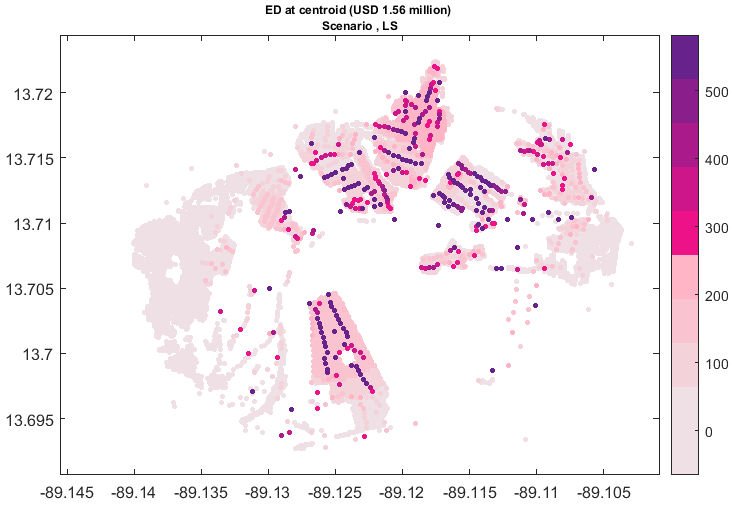
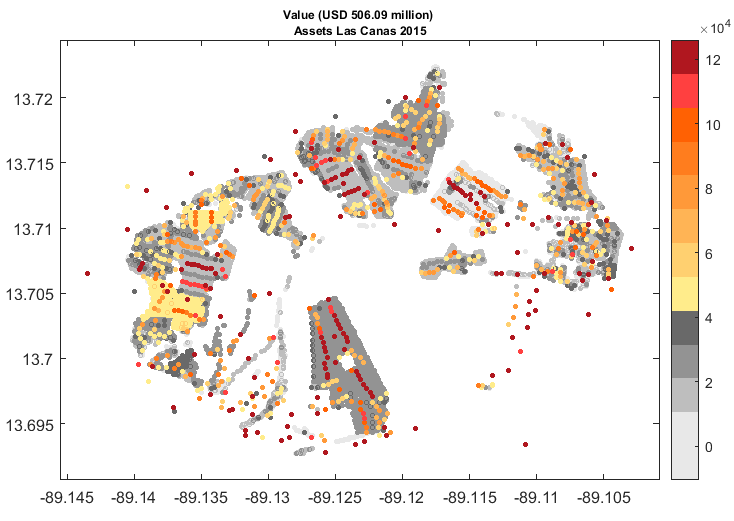
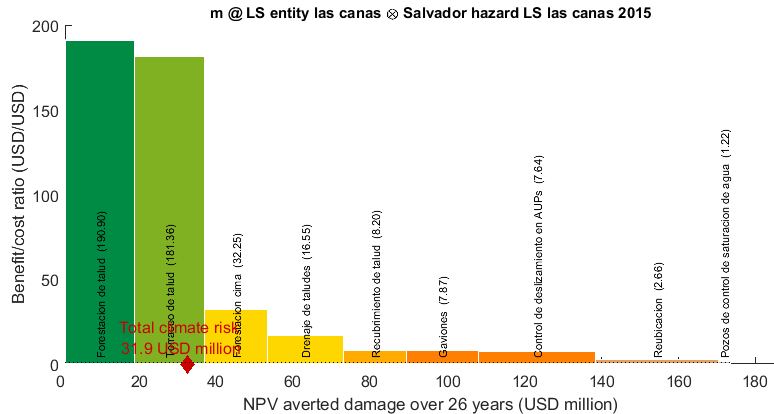


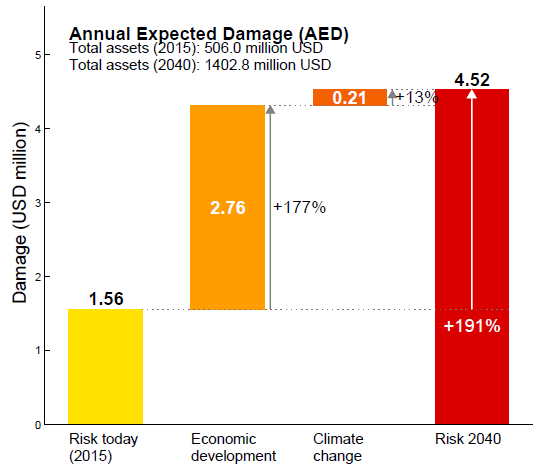
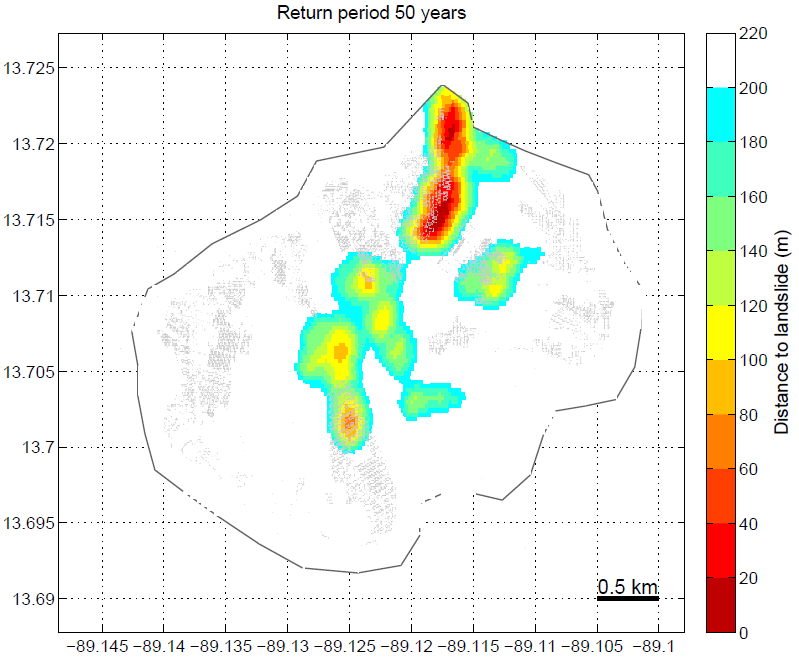
Figure 4: Comparison of expected damage (left y-axis), benefit of all measures and benefit-cost ratio of best measure (right y-axis) for tropical cyclones in AMSS. Using mid resolution or even low resolution leads to very similar and therefore still accurate results. Expected damage varies from USD 2.29 to 2.28 and 2.38 million. Benefit of all measures range from USD 44.2 to 42.8 and 43.0 million. Cost-benefit ratio of the best measure is 51 USD/USD, and 51 and 53, respectively.

## Part 1: Landslides in Las Cañas

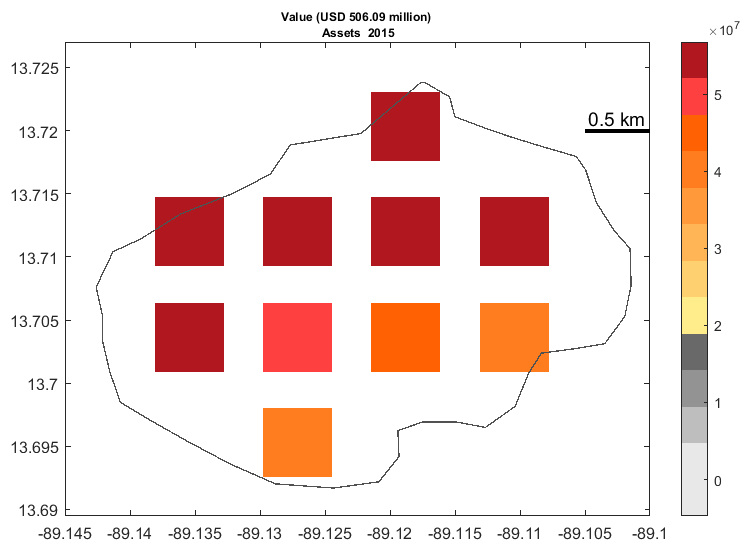
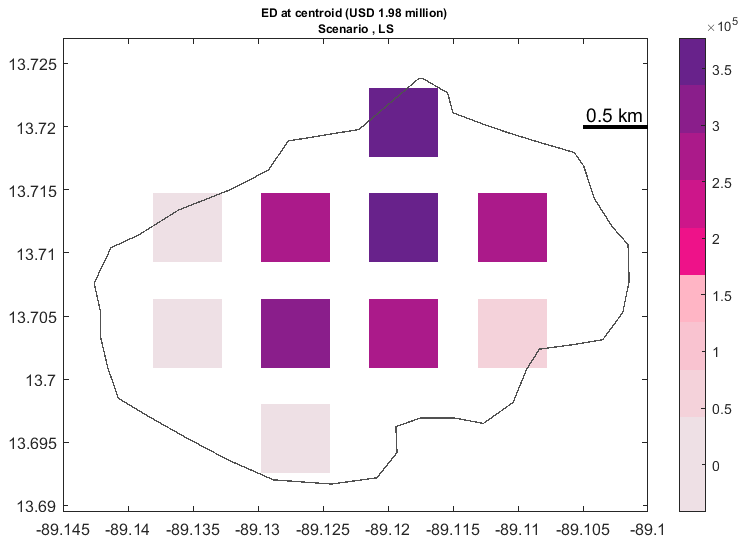
Assets, Expected damage and benefit: High resolution (~50 meters)

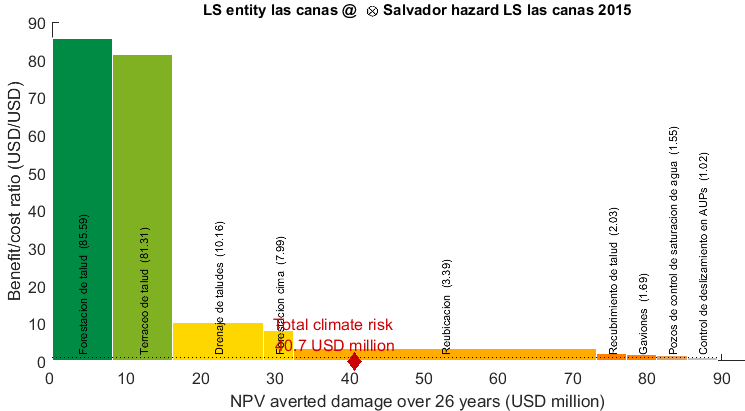




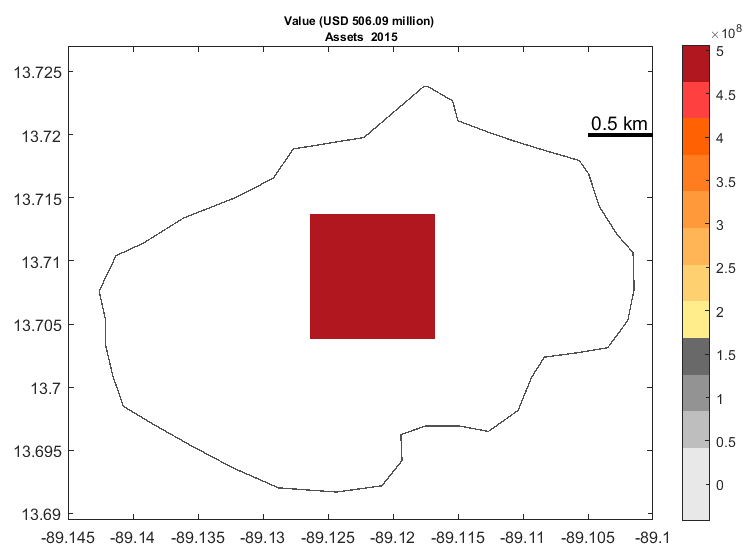
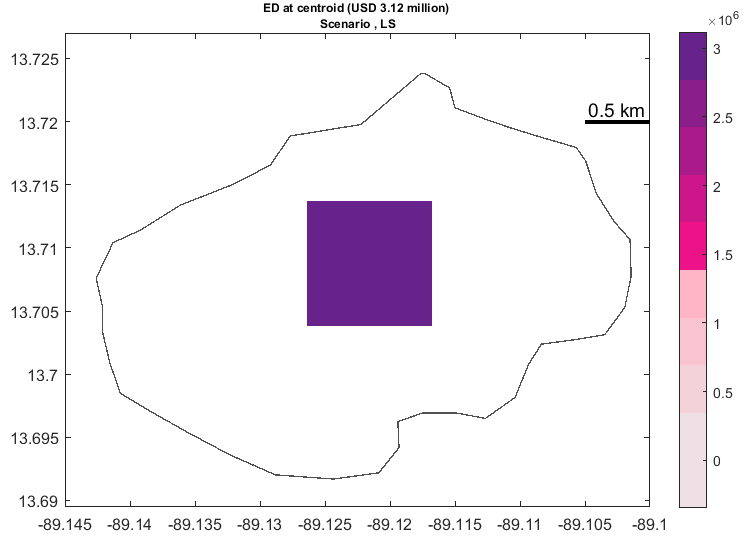
 

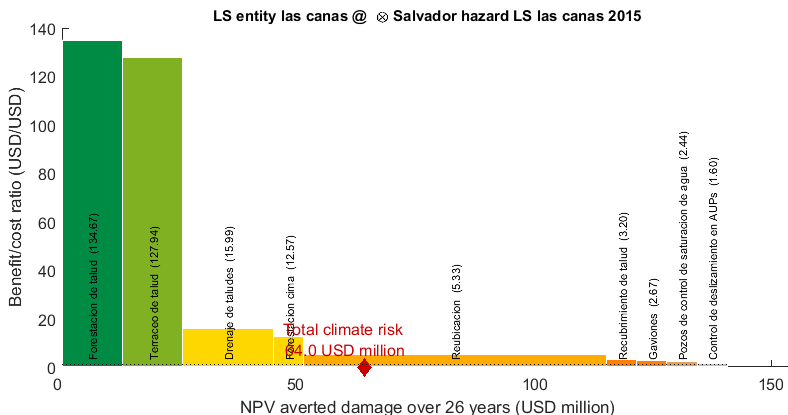
Assets, Expected damage and benefit: Mid resolution (~1 km)



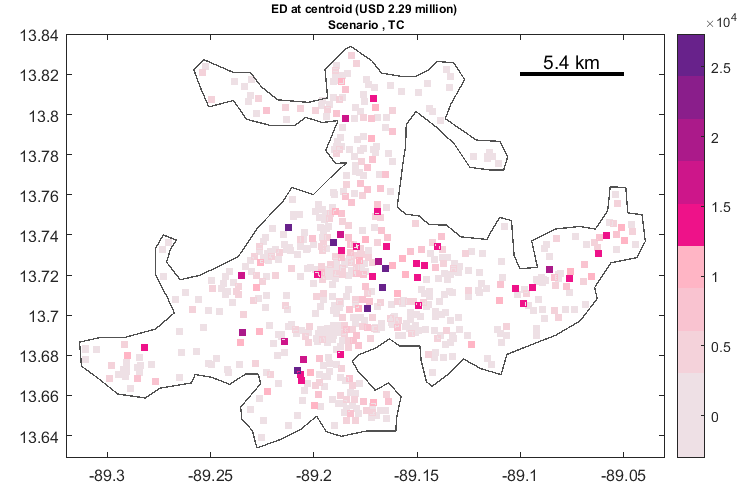
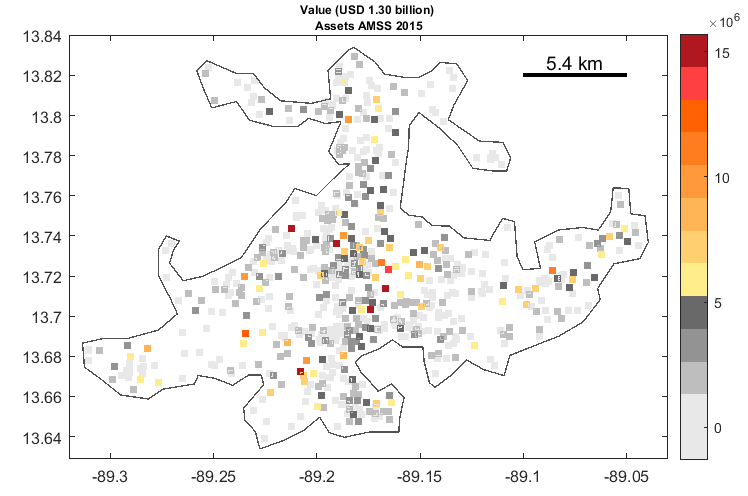
Assets, Expected damage and benefit: Low resolution (~10 km)

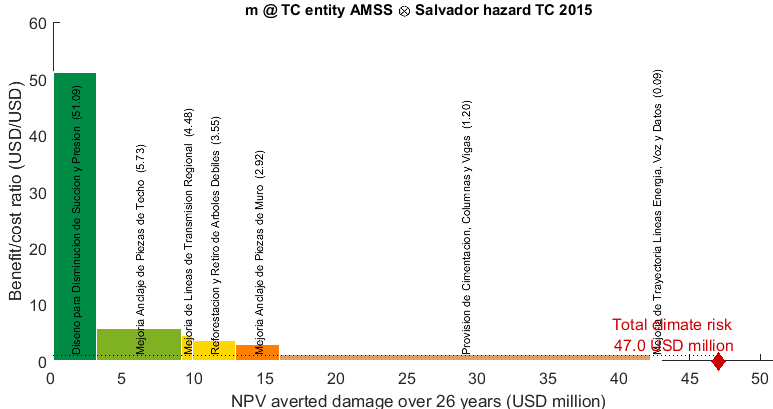
 

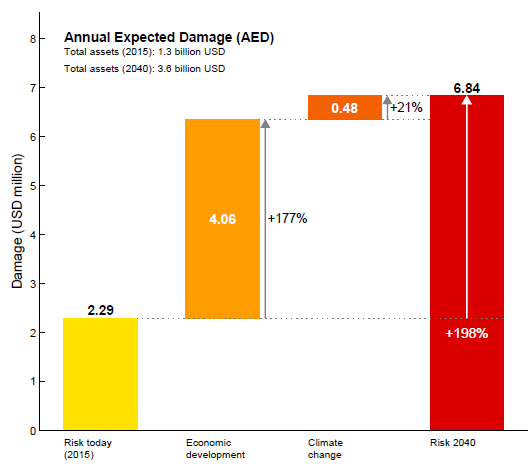
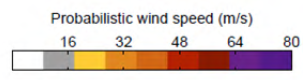
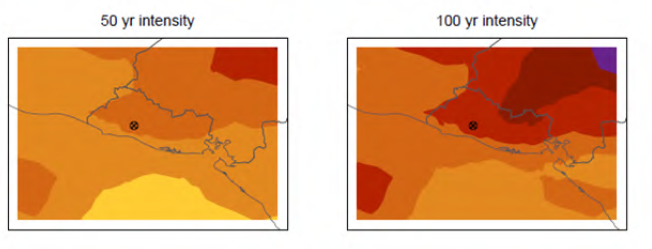
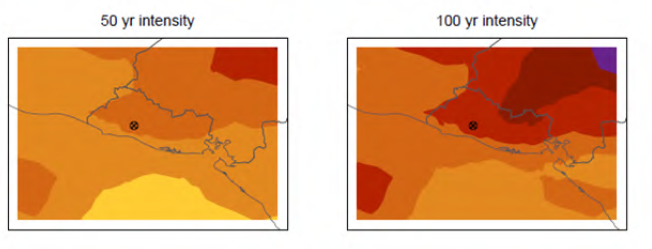


## Part 2: Tropical cyclones

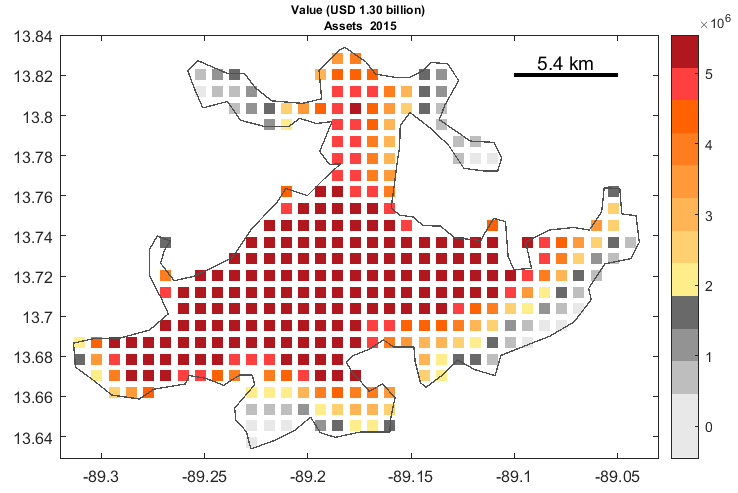
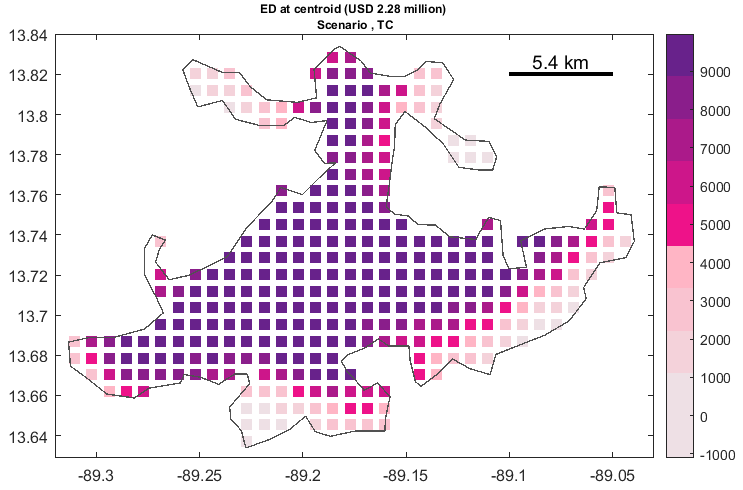
Assets, Expected damage and benefit: High resolution (<1 km)

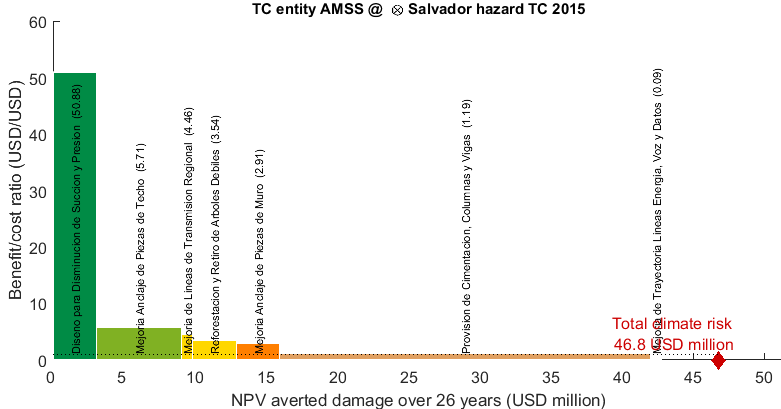




Assets, Expected damage and benefit: Mid resolution (~1 km)



Assets, Expected damage and benefit: Low resolution (~10 km)

