

Supplementary Information

Remote Sensing Assessment of Forest Disturbance across Complex Mountainous Terrain: The Pattern and Severity of Impacts of Tropical Cyclone Yasi on Australian Rainforests. *Remote Sensing*, 2014, 6, 5633–5649

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Table S1. Stem Density (for trees with DBH ≥ 10 cm) in US. Gulf Coast (Alabama, Florida, Louisiana, Mississippi and Texas) Forest Ecosystems. Data from the U.S Forest Inventory and Analysis National Program (FIA) [1] using the EVALIDator tool (see report below).

Stand Origin	Ratio Estimate	Sampling Error	Variance
Total	152.331	6.23E-01	8.99E-01
Natural stands	137.104 *	6.64E-01	8.30E-01
Clear evidence of artificial regeneration	220.209	1.40E+00	9.48E+00

* 137.104 trees/acre = 338.51 trees/ha

EVALIDator Version 1.5.1.2a View report:

Area: RSCD=33 EVALID=11001_ ALABAMA 2001;2002;2003;2004;2005;2006;2007;2008;2009;2010#
 RSCD=33 EVALID=121001 FLORIDA 2002;2003;2004;2006;2007;2009;2010#
 RSCD=33 EVALID=221001 LOUISIANA 2001;2002;2003;2004;2005;2008;2009;2010#
 RSCD=33 EVALID=281001 MISSISSIPPI 2006;2009;2010#
 RSCD=33 EVALID=481001 TEXAS 2004;2005;2006;2007;2008;2009;2010#

Numerator: Number of live trees (at least 1 inch d.b.h./d.r.c.), in trees, on forest land

Denominator: Area of forest land, in acres

Classification: Stand origin

No filter used for both numerator and denominator.

Filter used only for numerator: and tree.dia ≥ 3.9 (10 cm)

Figure S1. Total carbon storage map. Total above and belowground biomass and its' uncertainty for the Australian rainforest study area [2,3]. Using these maps, forested areas impacted by Yasi wind speeds ≥ 18 m/s were found to contain between 124 and 264 MgC/ha.

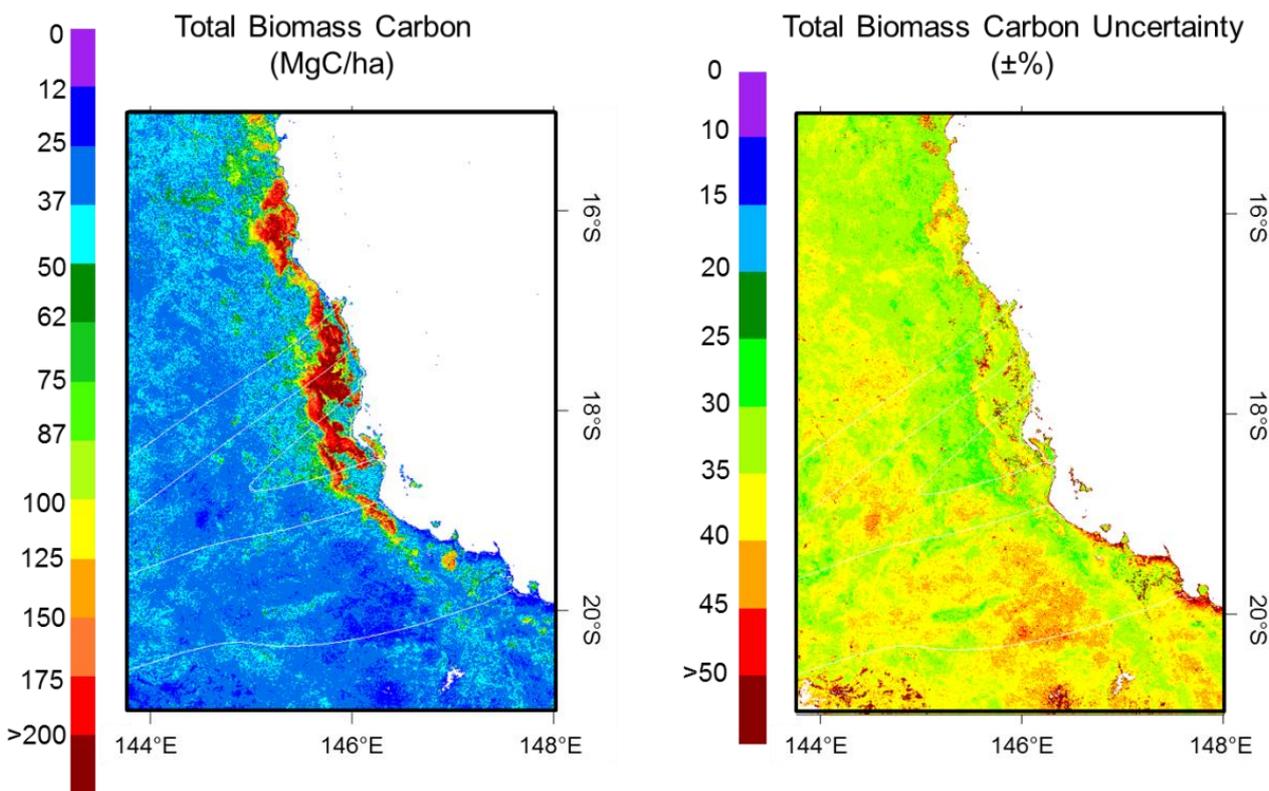


Figure S2. Stem density in rainforested areas affected by Yasi. Inset shows the forested area affected by wind speeds ≥ 18 m/s. Evergreen Broadleaf forests (green areas) were classified using the MODIS Land cover type (MCD12Q1) yearly L3 500 m SIN V005 data (MCD12Q1) for 2009. Three MODIS scenes (h31v10, h31v11 and h32v10) were used to compose this map, which shows the location of the CSIRO permanent plots affected by Yasi (wind ≥ 18 m/s) and the location of the transect used in this study. The table lists the range of stem densities from the CSIRO permanent plot network [4] and from this study’s transect. The range of stem densities varied from 408 to 1080, and this overall stem density range was used in our calculations.

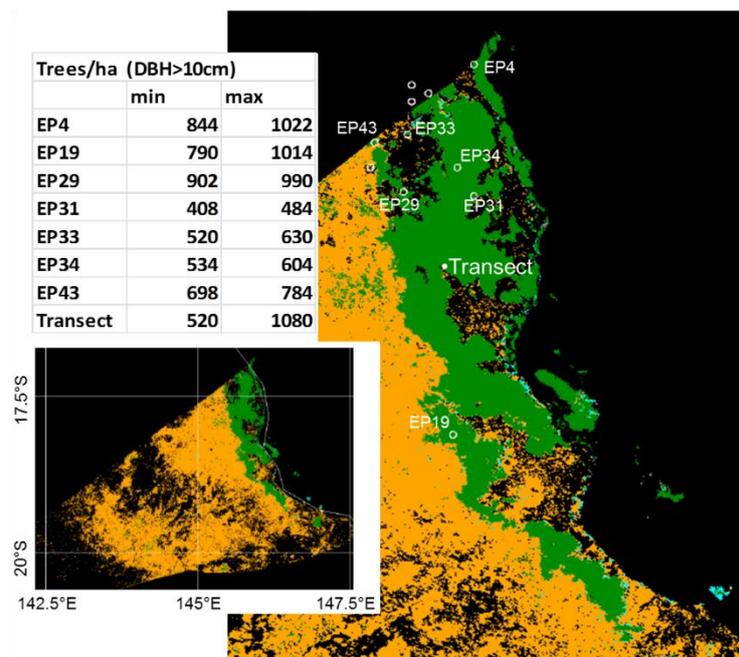


Figure S3. Tree Mortality Map associated with Yasi. (a) Tree mortality (%) and (b) associated standard deviation. The standard errors from all scaling regressions were included and the mortality was calculated after 10,000 interactions per pixel (MODIS- Δ NPV) using a Monte Carlo simulation. Tree mortality was not calculated over forested areas affected by cloud cover (dark green) in either pre or post Yasi images. Water is shown in black and land cover types other than tropical forests are shown in intensities of gray obtained using MCD12Q1.

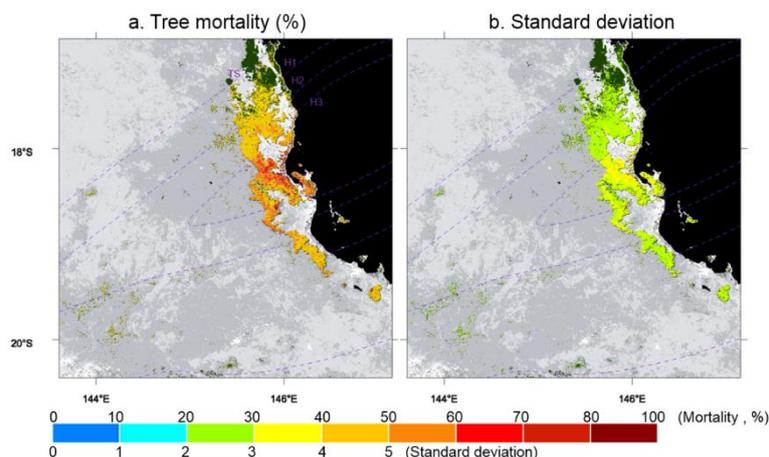


Figure S4. The relationship between field-measured mortality and Landsat Δ NPV in U.S. Gulf Coast forest ecosystems. Sixty plots were established to study the effect of tropical cyclones Katrina, Rita and Gustav, 12 of these plots were located in modified areas and were excluded [5]. The regression was forced to zero for consistence with the present study.

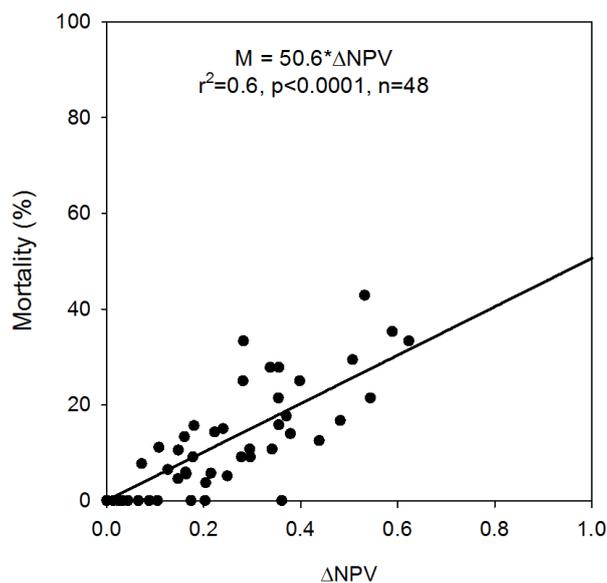
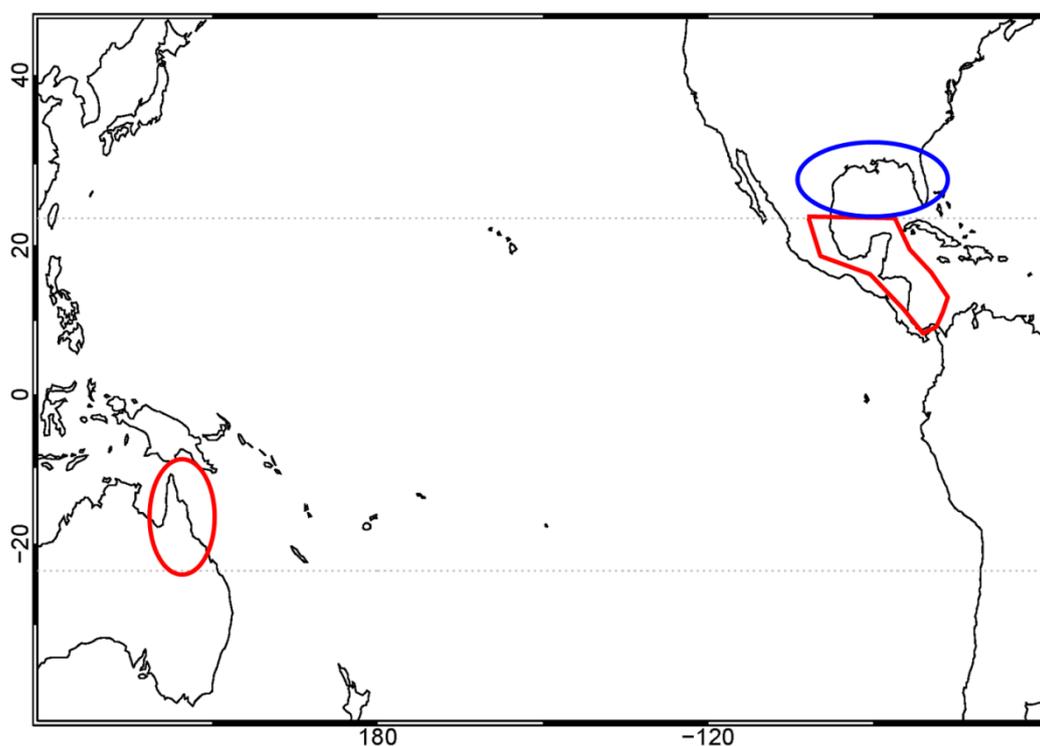


Figure S5. Comparison of hurricane landfalls in tropical (red areas) and subtropical forests (blue area). Individual tropical storms from 1850 to 2011 with wind speeds ≥ 18 m/s at landfall were considered. Hurricane track data from the International Best Track Archive for Climate Stewardship (IBTrACS) [6] was used. The Gulf Coast forest has twice the number of landfall cases than the tropical rainforests in Central America. Central American rainforests had 2.5 more hurricane landfalls than Australian rainforests over this time period.



References

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