

# S1 Tropical cyclones that affected banana plantation

**Table S1.1**

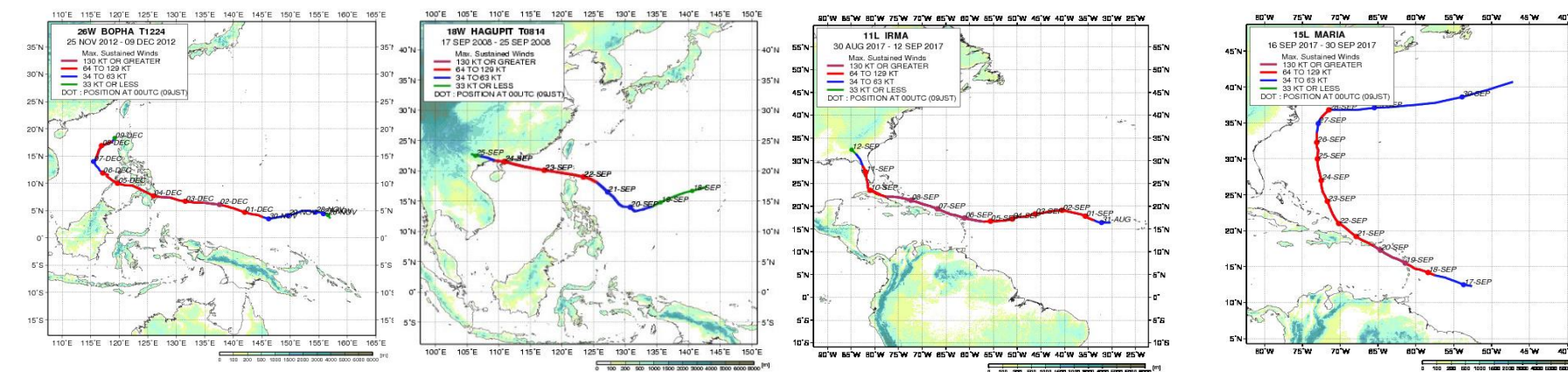
Date	Land of event	Name Cyclone	Basin	Location of plantation	Destroyed ha	Saffir Simpsons Category	Track chart	Maximum Sustained WindSpeed
05/12/2012	The Philippines	Typhoon Pablo (Bopha)	North Western Pacific	The hurricane force winds and flash floods flattened wide swathes of the hillsides of Davao Oriental province and <b>Compostela Valley</b> , the centre of	10000 / 25% loss of all crop production in PH	5	Picture 1	140
1979	Dominica	Hurricane David	North Atlantic	"completely destroyed the country's banana crop"	Full destruction	4	No picture	97
Sep/17	Dominican Republic	Hurricane Irma	North Atlantic	for the three provinces of Monte Cristi, Valverde and Santiago,	25,00%	5	Picture 4	90
Nov/20	Honduras	Hurricane Eta	North Atlantic	Location that did not recover (so were fully destructed: Higuerito and Guachies	51% decrease in supply : 2,800ha of farms, equivalent to 82 per cent of the country's banana acreage	5	Picture 5	149
Aug/07	Martinique	Hurricane Dean	North Atlantic	no specific location, but region small enough to check cyclone track	100% destroyed in all Martinique.	5	Picture 8	90
Aug/07	Guadalupe	Hurricane Dean	North Atlantic	no specific location, but region small enough to check cyclone track	dependent economies of those three states, as well as that of Guadeloupe, destroying between	5	Picture 8	100
Sep/22	Dominican Republic	Hurricane Fiona	North Atlantic	no specific location, but region small enough to check cyclone track	10% of all bananan crop. 80000 tonnes of bananas	4	Picture 9	25
Sep/22	Puerto Rico	Hurricane Fiona	North Atlantic	Guanica fully destructed	100million/About 80 percent of the island's crop value was lost.	4	Picture 9	100
Jan/11	Queensland	Cyclone Yasi	South Pacific	North Queensland	80-90% destroyed in Queensland / 75% of total	4	Picture 10	55
Oct/12	Jamaica	Hurricane Sandy	North Atlantic	St Mary	production in Jamaica only by destroyence of St Mary	5	Picture 11	69
Aug/15	Dominica	Storm Erika	North Atlantic	no specific location, but region small enough to check cyclone track	80 % loss of all crop production	x	Picture 12	40
Aug/12	Dominican republic	Hurricane Isaac	North Atlantic	no specific location, but region small enough to check cyclone track	10	1	Pcture 20	50
Aug/15	Dominican Republic	Storm Erika	North Atlantic	no specific location, but region small enough to check cyclone track	40% destroyed of all crop production	x	Picture 12	45
Oct/98	Honduras	Hurricane Mitch	North Atlantic	no specific location	Full destruction	5	Picture 13	155
Sep/88	Jamaica	Hurricane Gilbert	North Atlantic	no specific location	100% destroyed	5	No picture	160
Aug/80	Jamaica	Hurricane Allen	North Atlantic	no specific location	Full destruction	5	No picture	165

Jun/21	Southern Mexico	Storm Dolores	North Eastern Pacific	Arceo Solis from which 9 000 ha (22 240 acres) of bananas in the state of	supply by 5%: to 513000 ton (FAO)   60 % destroyed in	1	Picture 17	57
Aug/21	Southern Mexico	Hurricane Grace	North Eastern Pacific	Veracruz, Tecolutla	100% destroyed	2	picture 18	110
Aug/21	Eastern Jamaica	Hurricane Grace	North Eastern Pacific	Mary. Also other agricultural loss in Portland was estimated at \$165	plantain sector, the loss to the sector is coming out at about 29	x	picture 18	45
Jul/03	Philippines	Typhoon Imbudo / Haruro	North Western Pacific	San Mariano	98% destroyed	4	Picture 16	130
Mar/21	Australia	Cyclone Niran	South Pacific	Far North Queensland coast	90-100% destroyed	2	Picture 19	65
Mar/06	Australia	TC Larry	South Pacific	Queensland	80-90% of banana crop	5	Picture 14	130

<b>% destroyed</b>	<b>Windspeed m/s (x0.88 Harper, 2010)</b>	<b>Link to Cyclone Track</b>	<b>Additional info on destruction</b>	<b>Link to source</b>
25%	72	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>		<a href="https://www.hurriyetdailynews.com/typhoon-destroys-quarter-of-philippine-banana-crop-36245">https://www.hurriyetdailynews.com/typhoon-destroys-quarter-of-philippine-banana-crop-36245</a> + <a href="https://www.rappler.com/business/17451-pablo-destroys-quarter-of-ph-banana-crop/">https://www.rappler.com/business/17451-pablo-destroys-quarter-of-ph-banana-crop/</a>
100%	50			<a href="https://pdf.sciencedirectassets.com/271787/1-s2.0-S0306919217X0002X/1-s2.0-S030691921630642X/main.pdf?X-Amz-Security-">https://pdf.sciencedirectassets.com/271787/1-s2.0-S0306919217X0002X/1-s2.0-S030691921630642X/main.pdf?X-Amz-Security-</a>
60%	46	<a href="https://reliefweb.int/map/turks-a">https://reliefweb.int/map/turks-a</a>	<a href="https://www.delaat.nl/en/kn">https://www.delaat.nl/en/kn</a>	Varma et al (2020) Mapping the impacts of hurricanes Maria and Irma on banana production area in the Dominican Republic
82%	77	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.itfnet.org/v1/2015/10/dominican-republic-tropical-storm-leaves-behind-a-destroyed-banana-crop/">https://www.itfnet.org/v1/2015/10/dominican-republic-tropical-storm-leaves-behind-a-destroyed-banana-crop/</a>	FAO market review (2022)
100%	46		<a href="https://www.flickr.com/photos/14811420070818/">pgoto: https://www.flickr.com/photos/14811420070818/</a>	<a href="https://www.reuters.com/article/us-storm-dean-bananas-idUSL1861011420070818">https://www.reuters.com/article/us-storm-dean-bananas-idUSL1861011420070818</a>
90%	51	<a href="https://www.liberation.fr/societe">https://www.liberation.fr/societe</a>	<a href="https://www.flickr.com/photos/14811420070818/">High resolution atmospheric and oceanic modelling: Impacts of Hurricane Dean over the</a>	<a href="https://en.wikipedia.org/wiki/Effects_of_Hurricane_Dean_in_the_Lesser_Antilles">https://en.wikipedia.org/wiki/Effects_of_Hurricane_Dean_in_the_Lesser_Antilles</a>
7%	13	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>		<a href="https://www.czapp.com/analyst-insights/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/">https://www.czapp.com/analyst-insights/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/</a>
100%	51	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://pipanews.com/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/">https://pipanews.com/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/</a>	<a href="https://www.npr.org/2022/09/24/1124950315/puerto-rico-plantain-crops-destroyed-hurricane-fiona">https://www.npr.org/2022/09/24/1124950315/puerto-rico-plantain-crops-destroyed-hurricane-fiona</a>
75%	28	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.smh.com.au/news/australian-food-timeline-com-au/cyclone-yasi/">https://www.smh.com.au/news/australian-food-timeline-com-au/cyclone-yasi/</a>	<a href="https://australianfoodtimeline.com.au/cyclone-yasi/">https://australianfoodtimeline.com.au/cyclone-yasi/</a> + + Article Concatenated Hazards: Beer, Abbs, Alves, 2013
85%	35	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.ncbcapitalmarket.com/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/">https://www.ncbcapitalmarket.com/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/</a>	<a href="https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf">https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf</a>
80%	21	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.nhc.noaa.gov/d">https://www.nhc.noaa.gov/d</a>	<a href="https://www.freshfruitportal.com/news/2015/09/01/erika-devastates-dominicas-banana-crop/">https://www.freshfruitportal.com/news/2015/09/01/erika-devastates-dominicas-banana-crop/</a>
10%	26	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.freshfruitportal.com/news/2015/09/01/erika-devastates-dominicas-banana-crop/">https://www.freshfruitportal.com/news/2015/09/01/erika-devastates-dominicas-banana-crop/</a>	<a href="https://www.czapp.com/analyst-insights/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/">https://www.czapp.com/analyst-insights/hurricane-fiona-damages-banana-and-cacao-production-in-dominican-republic/</a>
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100%	82			<a href="https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf">https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf</a>
100%	85	<a href="https://en.wikipedia.org/wiki/Hurricane_Allen">https://en.wikipedia.org/wiki/Hurricane_Allen</a>		<a href="https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf">https://nlj.gov.jm/history-notes/History%20of%20Hurricanes%20and%20Floods%20in%20Jamaica.pdf</a>

60%	29	Sharaku.eorc.jaxa	<a href="https://watchers.news/2021/">https://watchers.news/2021/</a>	FAO market review (2022)
100%	57	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://mexiconewsdaily.com/news/hurricane-grace-ravages-communities-in-veracruz-mexicans-2021-08-31/">https://mexiconewsdaily.com/news/hurricane-grace-ravages-communities-in-veracruz-mexicans-2021-08-31/</a>	<a href="https://www.zenger.news/2021/08/31/hurricane-grace-ravages-communities-in-veracruz-mexicans-2021-08-31/">https://www.zenger.news/2021/08/31/hurricane-grace-ravages-communities-in-veracruz-mexicans-2021-08-31/</a>
29%	23	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://jis.gov.jm/50m-for-b">https://jis.gov.jm/50m-for-b</a>	<a href="https://en.wikipedia.org/wiki/Hurricane_Grace">https://en.wikipedia.org/wiki/Hurricane_Grace</a>
98%	67	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>		Huigen, M. G., & Jens, I. C. (2006) Socio-Economic Impact of Super Typhoon Harurot in San Mariano, Isabela, the Philippines.
90%	33	<a href="https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi">https://sharaku.eorc.jaxa.jp/cgi-bin/typ_db/typ_db.cgi</a>	<a href="https://www.itfnet.org/v1/2021/03/03/cyclone-niran-wipes-out-banana-crops-in-australia/">https://www.itfnet.org/v1/2021/03/03/cyclone-niran-wipes-out-banana-crops-in-australia/</a>	<a href="https://www.theguardian.com/australia-news/2021/mar/03/cyclone-niran-wipes-out-banana-crops-in-australia/">https://www.theguardian.com/australia-news/2021/mar/03/cyclone-niran-wipes-out-banana-crops-in-australia/</a>
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Figure S1.1

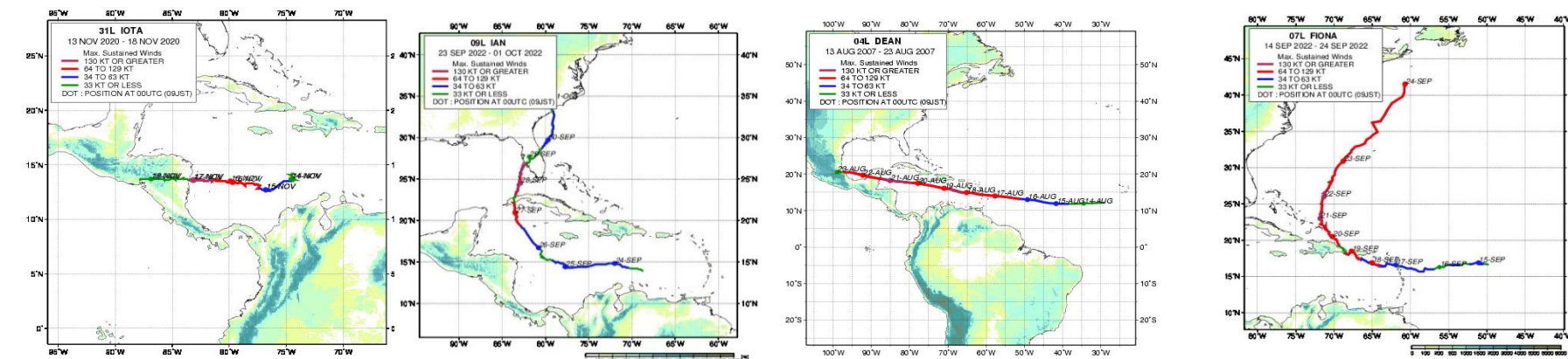


Picture 1: Bopha Track Chart

Picture 2: Hagupit Track Chart

Picture 3: Irma Track Chart

Picture 4: Maria Track Chart

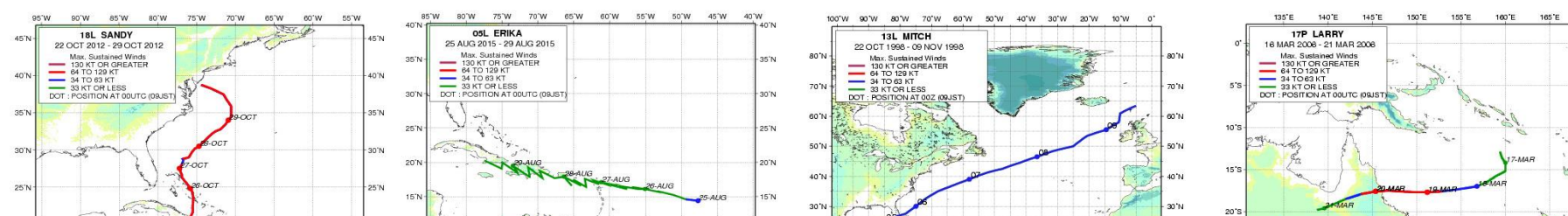


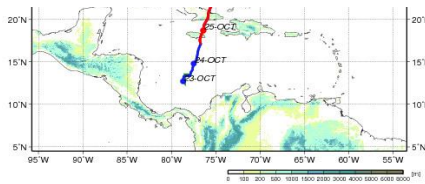
Picture 6: Iota Track Chart

Picture 7: Ian Track Chart

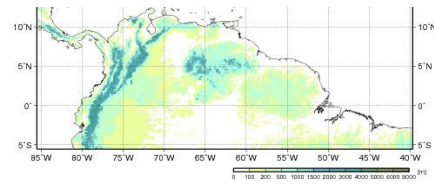
Picture 8: Dean Track Chart

Picture 9: Fiona Track Chart

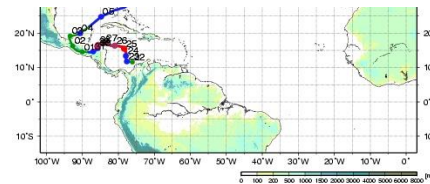




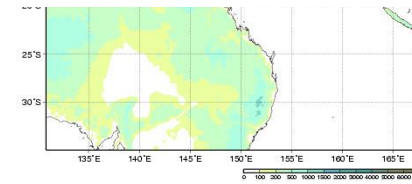
Picture 11: Sandy Track Chart



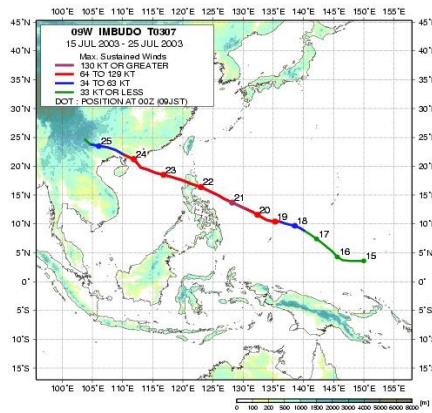
Picture 12: Erika Track Chart



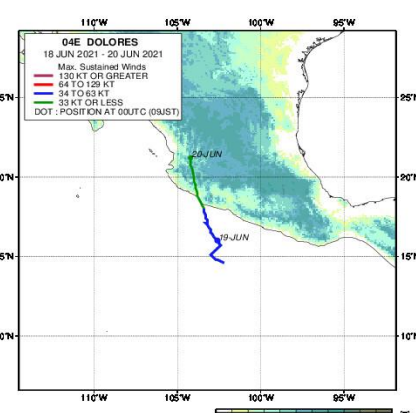
Picture 13: Mitch Track Chart



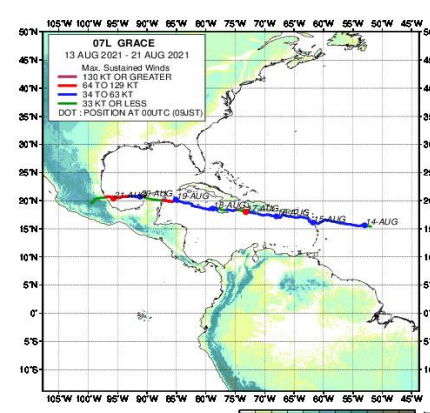
Picture 14: Larry Track Chart



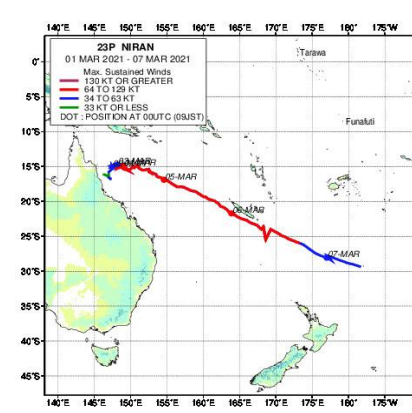
Picture 16: Imbudo Track Chart



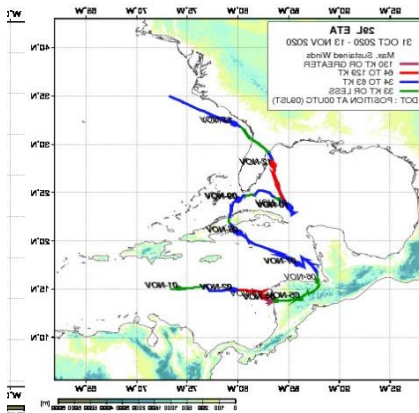
Picture 17: Dolores Track Chart



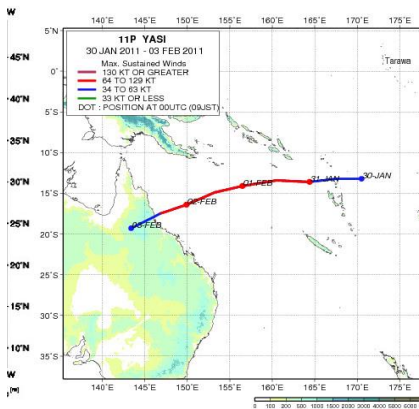
Picture 18: Grace Track Chart



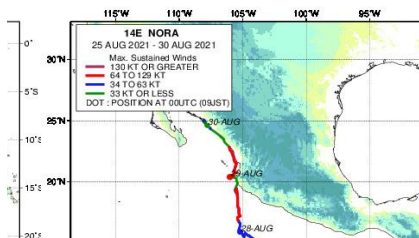
Picture 19: Niran Track Chart

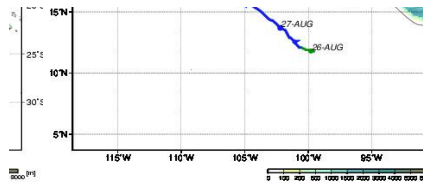


Picture 5: Eta Track Chart

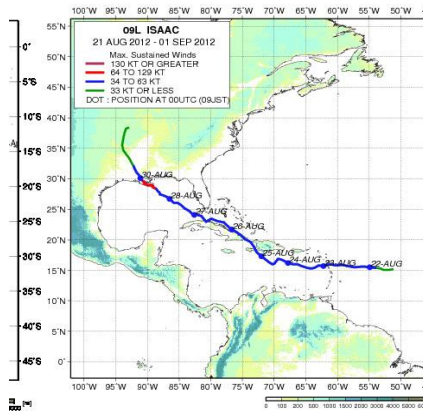


Picture 10: Yasi Track Chart





Picture 15: Nora Track Chart



Picture 20: Hurrican Isaac TrackCh

**Table S1.2**

Country	% destroyed	windspeed (m/s)	x 0.88 (Harper, 2010)
Dominican Republic	7%	13	11,3
Dominica	80%	21	18,1
Eastern Jamaica	29%	23	20,4
Dominican Republic	40%	23	20,4
Dominican republic	10%	26	22,6
Queensland	75%	28	24,9
Southern Mexico	60%	29	25,8
Australia	90%	33	29,4
Jamaica	85%	35	30,8
Dominican Republic	60%	46	40,5
Martinique	100%	46	40,7
Dominica	100%	50	43,9
Guadalope	90%	51	45,3
Puerto Rico	100%	51	45,3
Southern Mexico	100%	57	49,8
Australia	85%	67	58,9
Philipines	98%	67	58,9
The Philippines	100%	72	63,4
Honduras (hieguerto en Huegi)	100%	77	67,5
Honduras	100%	80	70,2
Jamaica	100%	82	72,4
Jamaica	100%	85	74,7

**Table S1.4**

Windspeed interval	Average damage	Saffir Simpson	Damage level
0-10	0%	No	No Damage
10-25	40%	No	Severe damage
26-43	79%	1-3	Major damage
44>	97%	3-5	Complete

**Table S1.3**

Input variable	Input variable2	Damage ratio
v1	d1	7%
v2	d2	80%
v3	d3	29%
v4	d4	40%
v5	d5	10%
v6	d6	75%
v7	d7	60%
v8	d8	90%
v9	d9	85%
v10	d10	60%
v11	d11	100%
v12	d12	100%
v13	d13	90%
v14	d14	100%
v15	d15	100%
v16	d16	85%
v17	d17	98%
v18	d18	100%
v19	d19	100%
v20	d20	100%
v21	d21	100%
v22	d22	100%