Golden Globe Race 2018/19
Investigation into causes of dismastings

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Introduction

This report considers the knockdowns sustained by the fleet racing in the 2018/2019 Golden Globe solo around the world yacht race which lead to five dismastings and damage to rigs of contestants. 7 yachts were affected in the Southern Ocean.

The Roaring Forties. A Painting by Gordon Frickers commissioned by Sir Robin Knox-Johnston to commemorate the first solo non-stop round the world race. Recalling the scene, Sir Robin says: "I heard rather than saw this giant wave and climbed the rigging to avoid being swept away. For one brief inglorious moment there was me and two masts in sight, and nothing but ocean in any direction for 2000 miles. A photographer could never have caught the scene." - The forward hatch was open at the time, and it took 3 hours to bail the boat out afterwards

The Race

The rules of the 2018 GGR were simple: sail solo non-stop around the world north of Antarctica, from Les Sables d'Olonne in France and return to the same Vendée port without touching land or receiving outside assistance. The course was the traditional sailing vessel route, entering the Southern Ocean from the Atlantic, and sailing through the Roaring Forty and Furious Fifty latitudes past Australia and around Cape Horn. The boats had to be between 32 and 36 feet long and have a long keel. They had to be of a pre–1988 design but could be built subsequent to that date to the earlier design.

17 boats appeared for the start on 1st July 2018. During their passage through the Southern Ocean 5 of the skippers were knocked down and dismasted. 5 are expected to complete the event. (The 5th placed Finnish sailor Tapio Lehtinen re-crossed the Equator on 9th April and expected to reach the finish later in May)

Overview

The Southern Ocean is the only expanse of ocean that goes all the way around the world with no land in the way The result is that the depressions, which drive the winds and therefore the waves, have nothing to stop their development which leads to the creation of very large waves.

Recent research has shown that it is possible for rogue waves as large as 27+ metres to develop in this ocean. A rogue wave is defined as a wave that is twice the significant wave height, usually steeper and frequently reported as a wall of water. The force of these waves can be extreme. A 12 metre wave has a breaking pressure of about 6 metric tons per square metre, whereas a rogue can produce a pressure of up to 100 metric tons per square metre.

A very interesting United States Coastguard (USCG) study concludes that storm waves are generally not regular or stable, and individual waves do not hold their shape for very long. It indicates that the white water height of a breaking wave will have to be at least half the LOA of the boat for the boat to be rolled. This means that even a comparatively small 6 metre high breaking wave could roll the average boat of 36 feet length.

Thus the larger the boat the less susceptible it is to being rolled. Also, the larger modern boats like Open 60 class yachts are light with large sail areas and can usually outpace a wave which a heavier, smaller yacht cannot do.

The USCG conclusion is that the danger does not come from a normal wave, but

from a breaking wave regardless of the measures being taken to try and restrain the boat. That is not totally supported by some of the evidence from the experience here, although there is agreement on the danger of the breaking wave. The USCG report also suggests that a small boat in a non breaking sea moves more or less with the surface water so will not be struck by the mass of moving water and therefore will be less likely to be capsized. So lying a-hull may work up to the point where the waves start to break. However the water in a breaking wave at its crest moves much faster, and can strike a boat at a speed of as much as 20 knots. This is confirmed by the experience of most reports of knockdowns in this race where the sound of the approaching breaking wave was heard before it struck.

The famous 26 metre rogue wave that struck the Draupner platform on 1st January 1995 has been replicated in the laboratory by Oxford and Edinburgh Universities. The evidence from these tests indicate that when waves are crossing each other at an angle of 120º they could create the occasional giant wave. The conditions for this type of wave occur in the Southern Ocean.

A recent paper published jointly by the National Oceanography Centre and University of Southampton has concluded that Global significant wave heights have increased over the past 30 years but occur less often.

The 2018 Golden Globe Race Experiences

Are Wiig (NOR) OE32 *Olleanna*

Heavy storm some 600 miles south of the Cape of Good Hope, self steering broke so hand steered from 0500 with steep breaking waves and occasional cross seas. Tried putting out warps and an anchor but felt the boat was too sluggish, so thought better to haul them in and hand steer. By afternoon the wind was easing and the seas less aggressive so decided to try and repair his steering gear. Whilst doing this, a wave came from the port side and capsized the boat. It remained upside down for a short while before righting itself but the mast had broken. Are set up a jury rig which he had created and tested before and sailed his boat, without assistance, to Cape Town.

Gregor McGuckin (IRE) Alan Hill designed Biscay 36 Masthead Ketch *Hanley Energy Endurance.*

Position at the time, approx 80 miles west of Abhilash Tomy. 1st Knockdown Wind 50 knots NNW, waves 5-7 metres, small headsail set and some 300 metres of warp streamed as a bight, but the length was adjusted to control the

restraint and allow sufficient speed for steerage. He tried the Series Drogue but found it did not work for his boat. In his 2nd Knockdown, bare poles, Wind SSW 70 Knots. He streamed warps as before with waves 8-10 metres from NNW, 12-16 metres from SSW. 3rd Knockdown, but no masts left in similar conditions to 2nd.
He was sailing down swell in all three knockdowns, but found the boat would default to beam on and then be very difficult to turn down wind/wave again. The second Knockdown was in a cross sea. The third, difficult to explain as the drogue was streamed from the bow so hove to.

Abhilash Tomy (IND) Atkins designed "Eric" *Suhaili* replica *Thuriya*

32 feet 5 inches hull length *Thuriya*. A sistership to *Suhaili*
Position at time 40 S 075E. Wind estimated 75 knots NNW becoming SSW (A typical front passage). In waves NW'ly becoming SW'ly, a cross sea 12 to 15 metres high developed. The boat was lying under bare poles beam on to confused waves with no sea anchor or warps deployed, and eventually suffering a number of knockdowns, which led to it being dismasted.

Mark Slats (NED) Holman & Pye Rustler 36 *Ohpen Maverick*

Same storm as Gregor and Abhilash but further east. Was hand steering with a storm jib when he heard their reports of being dismasted and put out ropes from either quarter, but not a bight. Was hit by a large wave, which damaged his access hatch and came to the conclusion that it would be safer to go faster and reduce the impact of the following waves So decided to steer and recovered the ropes. At some point his boat swept round in front of a wave causing it to be knocked down. His mast held.

Jean-Luc Van Den Heede (FRA) Holman & Pye Rustler 36 *Matmut*

Whilst steering a course for Cape Horn, approx 120º True with a SW wind. His wind vane was holding the direction to within 20º either side of this course. Thinks the knockdown was a result of the boat slewing round beam on. He found his boat felt safe when going downwind/wave and points out the dangers of getting beam on No warps or drogue streamed. Does not like drogues as they are very hard to recover.

Susie Goodall (GBR) Holman & Pye Rustler 36 *DHL Starlight*
Was using a Jordan series drogue at the time the boat was pitch-poled. For several hours the sailing was fantastic, even in that sea state. It was unbelievably confused and messy, but the drogue did a great job of keeping the stern into the biggest swell and wind. The drogue was still there just before the boat pitch-poled, and the suspicion is that the drogue hawser snapped as a breaking wave broke, somersaulting the boat.

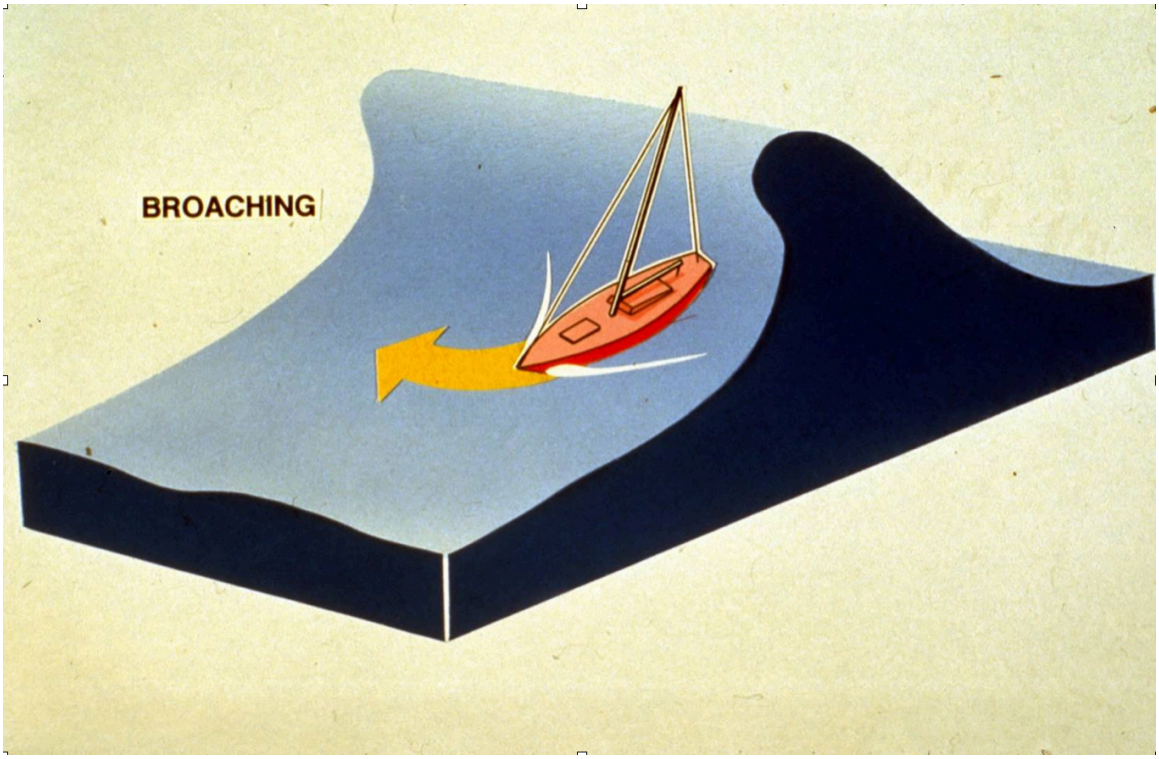
Subsequently it was found that the drogue hawser had parted at its knot.
Susie thinks that her pitch-poling might have been caused by the fact that the hawser snapping acted as a sort of slingshot, propelling the stern forwards at even more force than if it hadn't been held to the drogue. Susie mentions that a couple of seconds before the wave struck her boat, the howling of the wind through her rigging stopped. This might indicate that the wave was large enough to shelter the boat; in which case it must have been huge and steep. Her thought was that the violence of the wave to cause a pitch poling indicates it was no ordinary wave.

Loïc Lepage (FRA) Nicholson 32 *Laaland* October 20th
Dismasting 400 miles SW of Cape Leeuwin caused by a fractured rigging wire not a knock down. Mast released but evidently holed the boat. Picked up by a cargo vessel on the 22nd October.

Istvan Kopar (USA) Tradewind 35 *Puffin*
Experienced 12 storms with winds above 50 knots in all. He steered in bad weather. Kept sail on, trysail and storm jib. Felt his boat was safest with the wind on the beam or broad reach. He had tried streaming an anchor on 50 to 100 metres and felt it stabilised the boat. Continued sailing.
No drogue but has streamed lines astern. Tended to steer in really bad weather and keep speed on to provide control. Had a number of Knockdowns, Indian Ocean, south of New Zealand,1000 miles west of Chile, and in the South Atlantic 1000 miles form the Falklands. The worst one came from the port quarter. Continued sailing.

Tapio Lehtinen (FIN) Gaia 36 *Asteria*
Experienced no severe storms and never went over more than 45º. Feels his low freeboard had something to do with that, or the amount of weed and gooseneck barnacles which gave his boat greater drag.. Never used a drogue or warps and found his boat most safe at 30 degrees off directly downwind, but tended to steer in those conditions from his inside steering position. Feels a deck stepped mast is safer. Continued sailing

Uku Randmaa (EST) Holman & Pye Rustler 36 *One and All*
Four Knockdowns in storms. He took off all sail and put warps out astern in all but the third knockdown. On the 4th occasion 1,000 miles from the Falklands in the South Atlantic, he had them streamed out, because the wind was from the north and he was trying to reduce the distance he was being pushed back. Prefers to have some sail up to keep the boat moving downwind and usually stays on deck to assist the weather vane. Continued sailing.



A yacht beginning to broach before a large following wave

Experiences of the use or lack of use of drogues or warps

Robin Knox-Johnston. Eric 32 *Suhaili* 1968/9 Golden Globe Race. No warp or drogue when knocked down. No damage to rig. After warps deployed no further serious knock downs.

Shane Freeman (AUS) Tradewind 35 *Mushka*. West of Cape Horn during delivery voyage from Australia to start. No warps or drogue when knocked down. Dismasted. Boat abandoned

Are Wiig OE32 *Olleanna.* No warps or drogue set when knocked down. Wind easing at the time. Dismasted. Made port

Gregor McGuckin Biscay 36 *Hanley Energy Endurance.* Warps streamed when knocked down. Dismasted. Boat abandoned

Abhilash Tomy Eric 32 *Thuriya*. No warps or drogues when knocked down. Dismasted. Boat abandoned

Marc Slats Rustler 36 *Ohpen Maverick*. No warps or drogues when knocked down. No damage to rig. Completed voyage

Loïc Lepage Nicholson 32 *Laaland*. Rigging broke and mast collapsed. Boat abandoned

Jean-Luc Van Den Heede Rustler 36 *Matmut* No warps or drogue set when knocked down. Mast damaged. Completed Voyage.

Susie Goodall Rustler 36 *DHL Starlight.* Drogue deployed but appears its hawser parted causing yacht to pitch-pole. Dismasted. Boat abandoned

Istvan Kopar. Tradewind 35 *Puffin* Kept sail on in storms but still suffered Knock Downs and felt his boat was safest when the wind was from the beam to the quarter. Did not use drogues or warps.

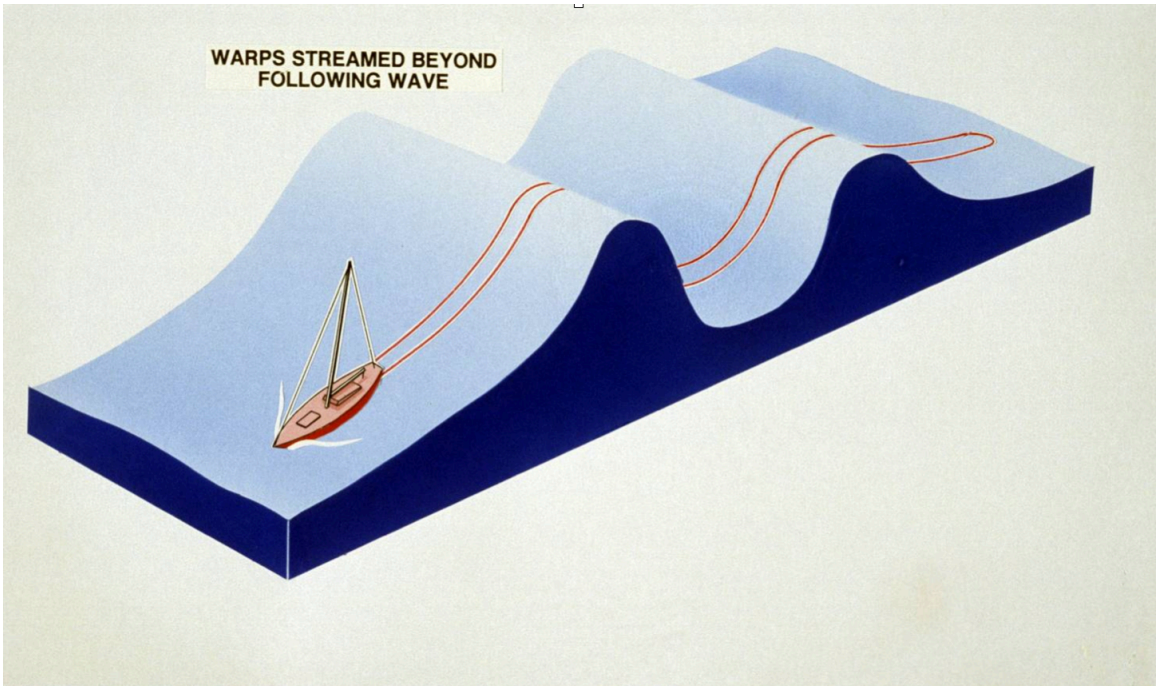
Tapio Lehtinen. Gaia 36 *Asteria* No knock downs

Uku Randmaa Rustler 36 *One and All.* 4 knockdowns. Ropes trailed for first two but nothing for the second two. Completed the voyage.

Previous Experience of Knock downs.

Bernard Moitessier. *Joshua.* 39 foot steel ketch
Moitessier described one storm in the Southern Ocean as an 'end of the world gale experienced during a voyage in 1966 from Tahiti to Spain via Cape Horn. For six days he and his wife endured hurricane strength winds, which threw up enormous waves – 'breakers 150-200 metres long, breaking without interruption.' Moitessier employed all his trailing lines and sea anchor to slow their progress but *Joshua* still came within an ace of capsizing.
He looked up how the Argentine sailor Vito Dumas had coped during his solo circumnavigation via the three great Capes aboard his 31ft double-ended ketch *Legh II* back in 1943/4. Dumas stated 'To escape the fury of the sea, keep up your speed.'
There was no way Moitessier could reel in the warps or sea anchor, so he cut them free, and *Joshua* became liberated, responding to any touch to the helm to take the breaking waves on her quarter.

Robin Knox-Johnston. *Suhaili* A Wm. Atkins Eric 32ft 5 inches hull (Norwegian stern)
Original Sunday Times Golden Globe Race 1968.
Indian Ocean, 40 degrees south. Large seas, perhaps 10 metres, lying a-hull. The increased size of the waves began to batter the boat and it was clear that serious damage would result if some other position relative to the waves was not found quickly. A Sea anchor (Drogue) was carried but not deployed as its hawser had tangled with its tripping line making it difficult to recover. Eventually a 720 foot warp was deployed in the form of a bight with both ends secured to the King Post forward and lead out through the mooring Bitts aft. The boat swung round stern to the waves immediately and lay comfortably although the occasional wave broke over the deck. This system worked for the next 3 ½ months in the Southern Ocean without the boat broaching. Interestingly, the rope, 2 inch circumference polypropylene, stretched as much as a foot at the Bitts when a wave pushed the boat forward, but the drag of the rest of the rope held. Subsequently *Suhaili* was dismasted in mid-Atlantic during another voyage when there were difficulties putting out the warp.



Shane Freeman Tradewind 35 *Mushka*. Lost his boat in the Southern Ocean on the way to the start of the 2018 GGR.

Knocked Down(s) took place - Lat 51' 45"S ; Long 85' 04W (about 600 nm WNW of Cape Horn; 450 nm off the west coast of Chile). Sailing under storm jib Wind strength – 35 knots gusting to 45 kts. Conditions thru the day were 40 knots to 50 knots. However wind strength was forecast to moderate overnight and was moderating

Wind Direction - SSW. Wave Direction (s) - primary swell WNW; secondary swell WNW; confused, but moderating swell. Very few (say 2 -3 breaking waves boarded and swamped cockpit thru the day. There had been much worse in previous weeks, so I was feeling OK about the sea state)

Wave heights (best estimate) - 5- 6 metres thru the day moderated to 3-4 metres around evening.

Course and speed of boat: 6-7 knots bearing ~150. A large wave struck the starboard side and rolled the boat, indicating the boat had broached or there was a large cross wave.

Wave direction relative to the boat (there may have been cross waves, if so their direction as well) - primary swell WNW; secondary swell WNW; confused, but moderating swell. Very few (say 2 -3 dangerous breaking waves[boarding cockpit] thru the day.

No warps or drogue deployed at the time but a Series Jordan Drogue had been deployed previously. Shane commented as follows:-

- they are very effective in bringing the boat under control in circumstances where boat speed - and consequent loss of steering control - is putting the vessel at risk;
- the series drogue is hazardous to deploy
- the series drogue requires gargantuan strength/effort to recover.

He knew of these benefits and risks, and only deployed his drogue as the wind and sea state were forecast to remain Force 8/9 for the following 24 hours.

Peter Shaw. Rustler 36

In storm conditions during a voyage in 2004, trailed warps in bights with various appendages from the stern attached to them to reduce speed and drift and wrapped cloths around these ropes to prevent chafe. The motion was relatively kind. The speed with no sails up was 3kts. It was reduced to about 0.75kts by trailing warps and putting the cockpit hood down. Did not carry a drogue.

The Rustler has a cut-away profile on the keel forward (As have the Atkins Eric designs). So in a strong wind, the bows blow off and the stern seeks the wind. Streaming warps astern complements the Rustler's natural tendency in this.

Conclusions

Sailing boats, because of their different shapes, windage and rigs, will behave differently in extreme conditions. Even boats produced from the same mould can have different characteristics depending on how weight is distributed.

The most common factor in these knockdowns seems to be that all the boats that were rolled and dismasted, with the exception of Gregor McGuckin and Uku Randmaa (for his first two Knock downs), they did not have any restraint such as warps or a drogue deployed. Their knockdowns came as a result of coming beam on to a breaking waves either because that was how the boat wanted to lie without any restraint, or had been broached by running or being pushed down the front of a breaking wave. Those boats that deployed drogues or warps, with the exception of Gregor, appear to have been held quite comfortably stern to the waves, accepting that they will get thrown about in a cross sea. The drag of whatever restraint was being used seems to have reduced the risk of boats running or being pushed down the front of a wave.

Heaving to, so the boat lies beam on to the waves in big and breaking seas with high winds puts it at the greatest risk of being rolled and being dismasted. Large waves can be handled by most boats as the surface water is not moving fast, but these waves become seriously dangerous when their fast moving crests start to break.

Both Are Wiig and Mark Slats report that the situation was easing when they were knocked down which might suggest that had they had more power from setting some sail as the wind eased, and might have had more directional stability.

In Susie Goodall's case it is possible that the hawser on her drogue had gone slack and so, when the wave struck, it put a large snatch load on the hawser as the boat accelerated and the hawser tightened. This, and the fact that the hawser was held by a bowline knot might explain why her hawser was found parted after the pitch-pole. It may be that it would be better to keep some sail up, even in these extreme conditions, so there is always some pressure on a drogue hawser or warps to avoid them going slack and suffering snatch loading when the weight of the boat suddenly came on them. More experience is required on this issue.

Research has shown that knots, such a bowline, reduce the strength of a hawser by as much as 70%. A splice reduces the strength by around 30%, but , with modern rope, it needs to be tapered at its end to avoid a hard point, and should be inserted within its standing part by 50 diameters to achieve sufficient strength.

Ropes on their own are not as effective as ropes in a bight. Drogues, although the evidence is that they are effective, have proved unpopular, as sailors have to haul them back in to recover them. Tripping lines, that would allow the drogues to be hauled in from their outer end so the drag is greatly reduced, often become entangled with the hawsers, making recovery difficult.

Whichever method is used to restrain the boat, the hawsers must be strong enough to take a snatch loading.

Those who had storm jibs tended to sheet them in tight amidships so that when trying to sail directly downwind, if the boat slewed round the wind pressure on the sail would tend to push the head back down wind. Storm jibs tended to be no more than 2 square metres in size for this length of boat.

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To view the lightbox of GGR heavy weather rescue pictures, *Click Here* or paste the following address into your browser window: http://www.pplmedia.com/online/lightbox.lasso?id=12675471

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