

CASE STUDY · WEATHER ROUTING

A year of weather on one feeder lane.

WindMar v0.2.3

52 weekly departures replayed with ERA5 2024 archives

Pointe-à-Pitre → Ushant TSS

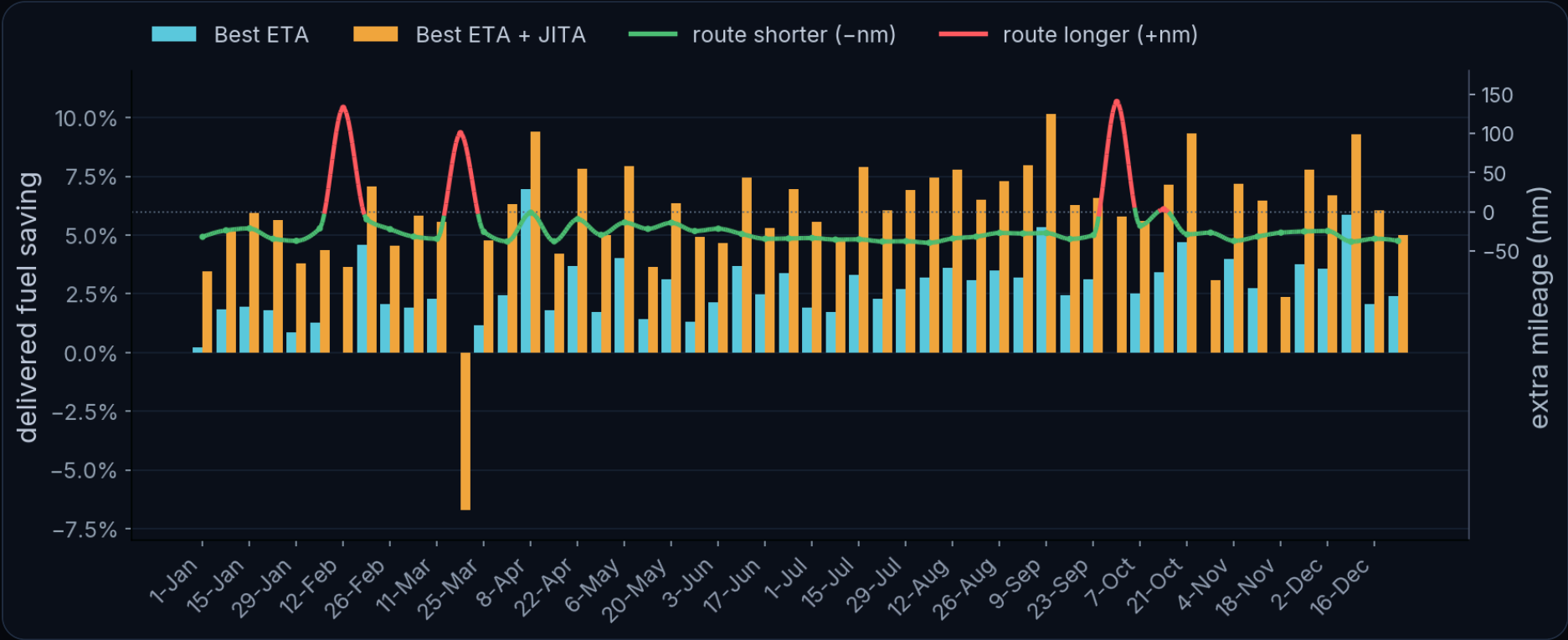
Model : Generic Small Feeder 1100

Routing engine : isochrone variant, 6 m Hs max

Full study : slmar.co/publications

A YEAR OF REAL WEATHER

Fuel saved every week,
not just the calm ones.



2.45%

Best ETA
median fuel saving

6.04%

Best ETA + JITA
median fuel saving

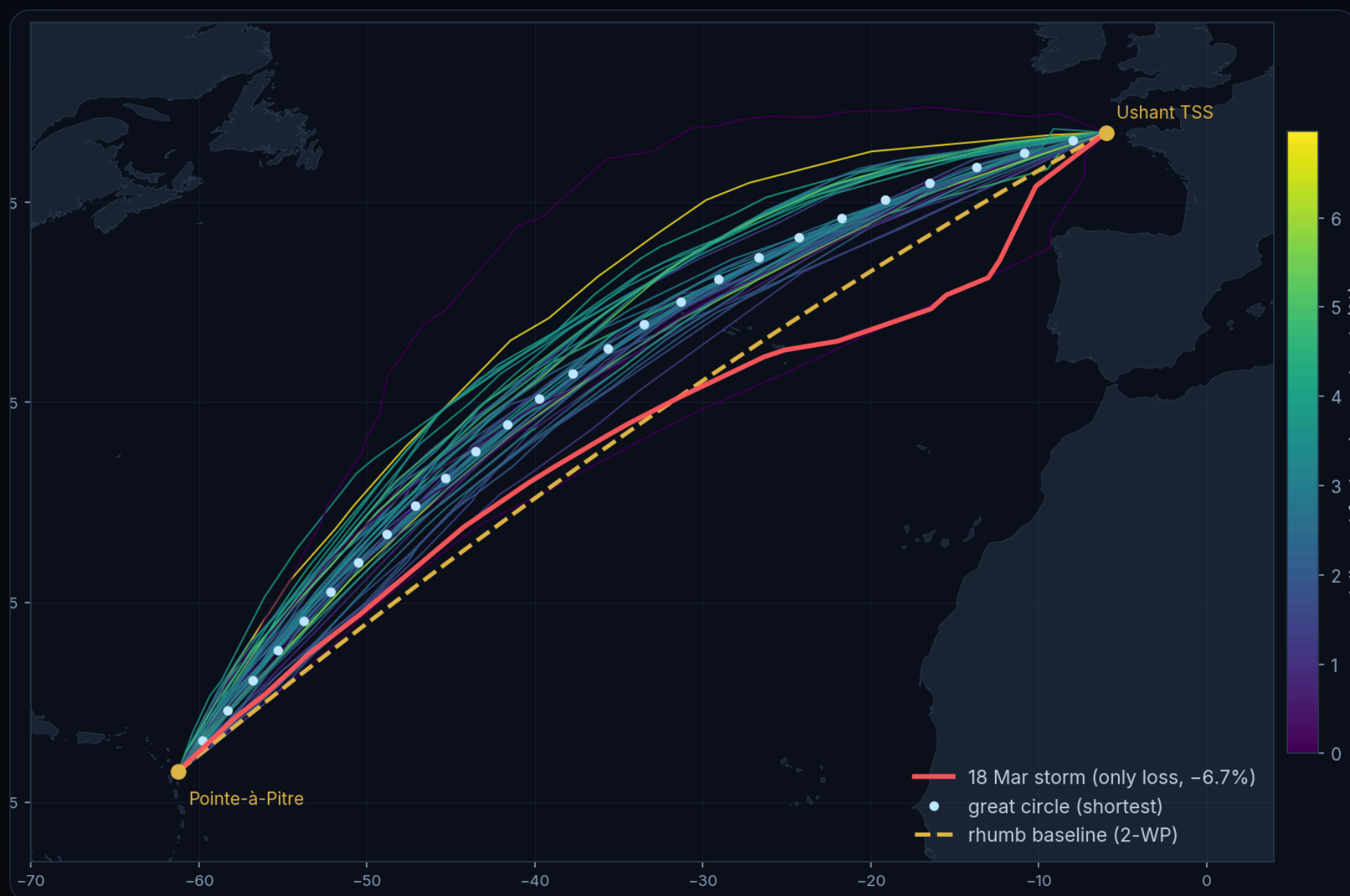
8.4 MT

bunkers saved
per crossing (JITA)

One departure per week, replayed against the weather archive.
Best ETA routes around the weather at the instructed speed.
Best ETA + JITA holds the baseline schedule on the Best ETA route and turns the time saved into fuel.

ROUTE & METHOD

One lane, 52 weeks, a rhumb baseline.



47 / 52

weeks with a saving
(Best ETA)

36 / 52

weeks $\geq 5\%$
(Best ETA + JITA)

-0.01 h

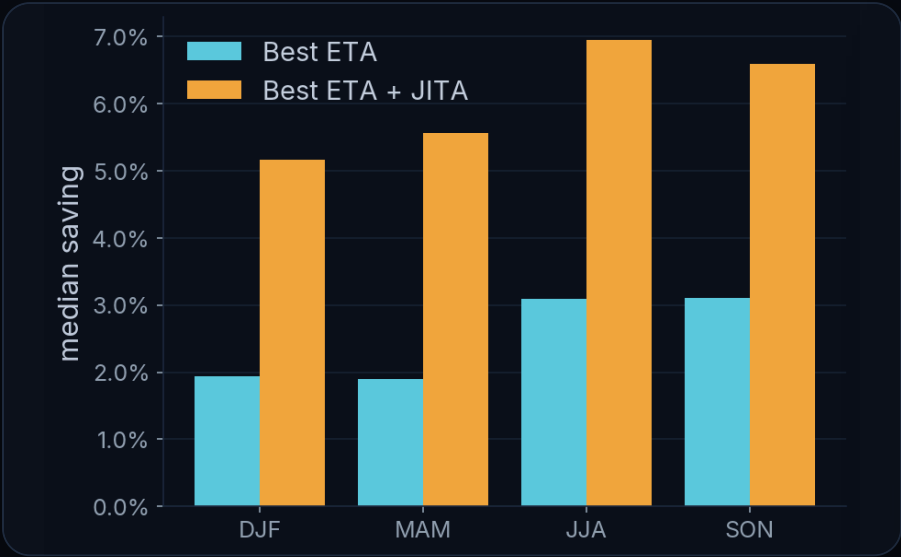
schedule held
median ETA delta

Each week is replayed on its own reanalysis field. That field is ERA5 wind and waves, plus **ocean currents**, which are weak here. It is scored against a **rhumb** baseline of just two waypoints. The great circle is **1.3% shorter**, so about half the Best ETA gain is geometry and the rest is weather.

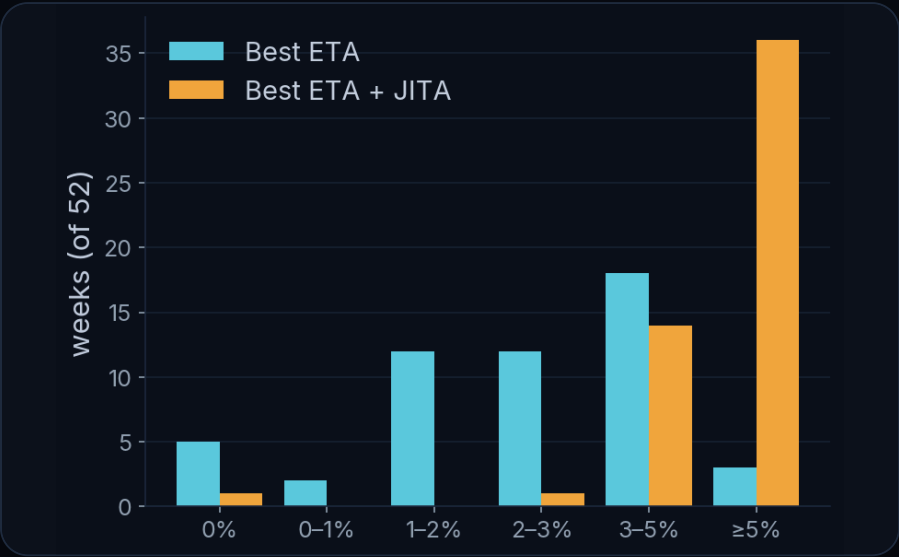
RESULTS & BOUNDS

Season by season, results and bounds.

Median saving by season



Weeks per saving bucket (of 52)



Operating mode	Median	Mean	Max	Weeks <0.1%	Schedule held
Best ETA	2.45%	2.55%	6.97%	5/52	n/a (speed held)
Best ETA + JITA	6.04%	5.89%	10.17%	1/52	-0.01 h median

Under Best ETA + JITA the distribution shifts right: **36 of 52 weeks clear 5%**, and summer is the strongest season. Because the optimiser saw each week's actual weather, read these as a **ceiling**; live forecast routing realises less, while the uncalibrated model keeps them conservative the other way. The real test is a ship in service, checked against its own noon reports.

WHERE IT COST FUEL

One week in fifty-two, it burned more by design.

-6.72%

the only negative week
(18 March 2024, Best ETA + JITA)

+101 nm

storm detour
around the worst seas

0.0%

same week, Best ETA
(no deadline)

On the 18 March 2024 departure, passage Hs reached **6.9 m**. The rhumb baseline plowed straight through it. WindMar found a route that detoured an extra **101 nm** around the storm core, and because Best ETA + JITA must hold the arrival time, it burned more over that longer track. This was the only negative week of the year. Best ETA sets no arrival deadline, so the same week is neutral at **0.0%**: the engine keeps to the baseline and simply arrives later. The extra fuel bought a far steadier ship.

In Best ETA mode, about **half of the 2.5% median saving is geometry**. The rhumb baseline is 1.3% longer than the great circle, and taking the shorter track recovers that. Weather routing brings the other half.

That shorter track also arrives early. Best ETA + JITA slows the ship to keep the schedule and turns the saved hours into fuel, which lifts the median saving to 6.0%. So **about half of the gain is geometry in both modes**: directly as distance under Best ETA, and as the time it frees under Best ETA + JITA.

The full study has the figures, the method and every caveat.

slmar.co/publications