GEAR FOCUS: WEATHER ROUTEING

Route to success

Weather routeing software is becoming increasingly sophisticated, with special packages for racing and cruising. Pro navigator and ex-B&G race specialist Nat Ives explains how it works and looks at the products

Weather routeing, sometimes called route planning or optimum routeing, is the calculation of the fastest route from A to B based upon predictions for wind, current and boat performance. It is the natural progression of traditional passage planning enabled by the availability of PCs on board and numerical weather forecast data.

Forecasts are downloaded from the internet in the form of GRIB files, current and tide data are readily available in forms to be loaded into the software and boat performance is defined in the form of a polar file

(boat speed predicted for a range of wind angles and wind speeds).

Brice Pryszo pioneered the isochrone method of routeing as early as 1984 when he created the MaxSea software, which is still a leader in the market today. This isochrone method is used by nearly all routeing software available.

How it works

■ The approach uses a series of equal time steps to explore the route.
■ For the first time step the software calculates the predicted speed of a boat at a series of different headings

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based upon the forecasted wind and current for that time and location.
■ The software can then plot the final position of the boat at the end of the time step for each heading tried. The line joining these positions is an isochrone and represents a line of equal time on the chart showing possible positions for the boat at the end of that time step. See Diagram 1.
■ The process can then be repeated for each of the positions and a second isochrone is created showing possible positions for the boat after two time steps. See Diagram 2.
■ By repeating the process over a number of time steps, eventually an isochrone will pass through (or near to) the finish and then the software can work back through the web it has created and plot the route that got to the destination first. See Diagram 3 with optimum route shown in green.
■ Most software then shows the user the route plotted on the chart and a

Key features to consider

Weather file functionality (GRIBs)
- What forecast data can the software display? Just wind and pressure, or can it do others such as rain, wave height and ocean currents
- Is it easy to download a file from within the software for your current location via an integrated GRIB file provider such as GRIB.US or Predictwind?

Tidal and current data
- Which tidal and current sources can the software use and do they cover your area?
- Can you use the stream information in your route planning?
- Can you load GRIB files for current as well as wind for passages?

Weather routeing features
Simple, but helpful features such as:
- Automatic land avoidance
- Set max and min wind speeds and wave heights to avoid if possible
- Plan for a specific arrival time rather than start time
- Route through multiple waypoints rather than just from A to B
- Simulation or animation of a route showing yacht and expected winds and currents
- Manually input wind or boat speed for when a forecast or polar are not available or for when motoring

More advanced features such as:
- Route using multiple wind GRIBs (useful when higher resolution files do not cover the whole route area so need supplementing with lower resolution data)
- Tools to amend the weather forecast (adjusting the wind data in terms of strength, position or timing to match observations)
- Display of isochrones and inverse isochrones (time from the finish) to aid route analysis
- Display of multiple route solutions based on different polars or GRIBs
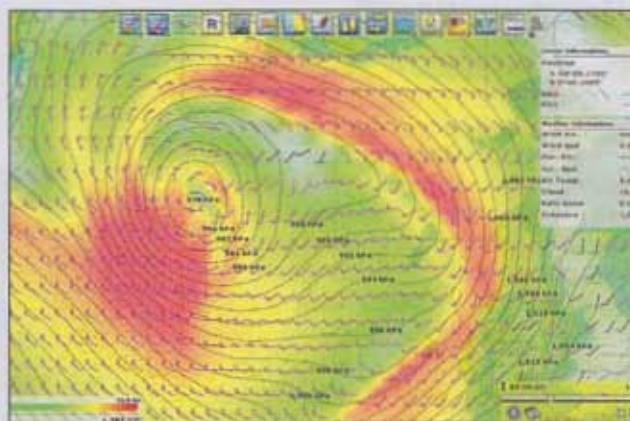
Above: the presentation of weather information varies between systems and may influence your choice of software. Being able to overlay real-time weather such as rain (below) is a useful feature

Diagram 1

Forecasted wind
Isochrone at end of first time step
A
B

Diagram 2

Isochrones at end of second time step
A
B
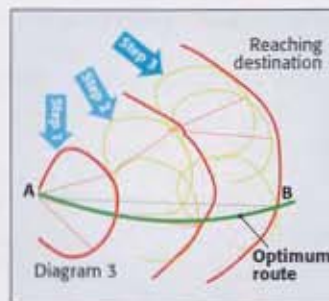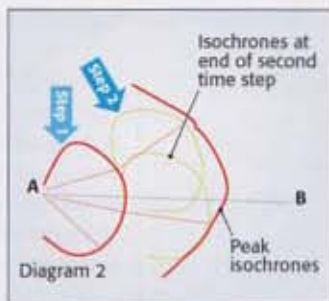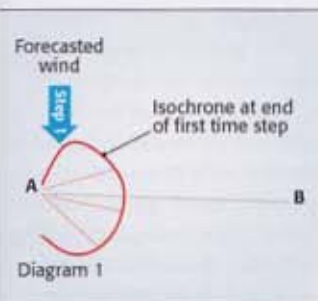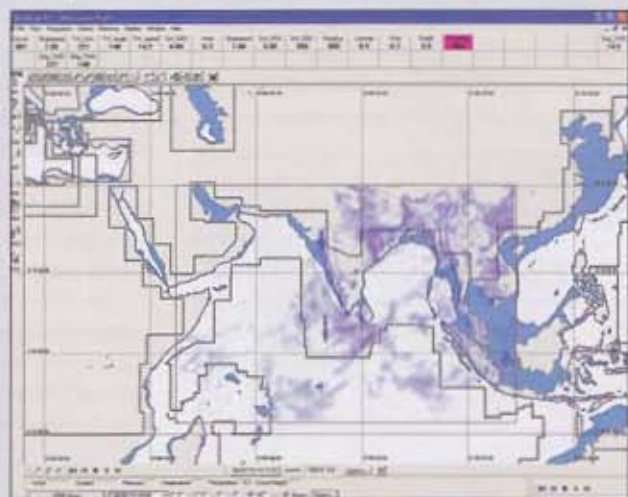Peak isochrones

Diagram 3

Reaching destination
A
B
Optimum route

table of data for each time step along the route listing calculated wind, current, heading, boat speed, etc.

For good results
The process is not overly complex and with modern computers the range of headings and number of time steps used can be large, allowing many possibilities to be explored. This being the case, the validity of the route is based upon the accuracy of the inputs rather than the software.

However, even with a very basic polar and free GRIB file it will always be a more efficient route than a basic passage plan and that is why weather routeing is becoming a tool of the keen cruising yachtsman as well.

Once users have got to grips with using routeing to good effect then they can choose to invest more time in making the boat polar more accurate or subscribe to potentially more accurate GRIB files.

Range of software
Software manufacturers have not been slow to recognise the appeal of routeing functionality and almost

" It's the natural progression of the traditional passage plan

every leading navigational package now offers some sort of weather routeing functionality either built-in or as an add-on.

Depending upon their heritage (cruising or racing) the routeing features vary, with racing software offering more in-depth ways of analysing the sensitivity of routes and tactical options and cruising packages trying to make routeing as accessible as possible or offer ways of optimising based on comfort (sea state) rather than outright speed.

I have taken the time to look at nine of the main contenders and highlight the differences. However, with the underlying routeing functionality being fairly similar among them, it is more likely that other areas of the software will influence a buyer's choice. Alternatively, you may already own one of the packages listed and therefore just be considering purchasing a routeing add-on.

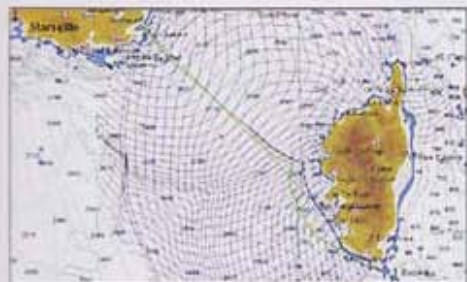# GEAR FOCUS: WEATHER ROUTEING

RACING PRODUCTS

These software packages have been developed solely with the racing sailor in mind. This means they are stacked with features and can be a little hard to use at first. They may also lack some more cruising-orientated features such as pilotage information and advanced charting tools.

Adrena

An extensive race navigation package with a French heritage and popular among short-handed teams, this package has the most complete set of racing-related routeing features, especially if you go for the RoutingPro module on top of the standard Routing module.

Not only can you run multiple GRIB and polar combinations and adjust your standard polar according to wave height and direction, you can also plot competitors' positions and run routeing for them too. Multiple solutions can be displayed at once using colouring to show different sail combinations.

£843.58 plus £335 for Routing module and £335 for RoutingPro module (ex VAT). www.adrena.fr

Deckman

A well-established tactical software package, this B&G equipment is equally popular with both inshore and offshore sailors. Lacking some of the very advanced features of competitors, it is, however, the fastest to generate routes and has sophisticated GRIB manipulation tools for tracking distinctive features in the weather such as fronts or low centres.

Like all the racing packages, it will route through multiple waypoints, taking current into account from built-in sources or current GRIB files.

£1,072 ex VAT with routeing built-in www.bandg.com

Expedition

Another established racing package with a strong following of offshore navigators, which is no surprise given its history of use in the Volvo Ocean Race. Expedition sits alongside Adrena in terms of features, but is slightly more user-friendly.

A good-value package that is easy enough for the beginner race navigator to follow, but with features for the most demanding offshore professionals. Innovative route sensitivity display is a unique feature.

**£900 ex VAT with routeing built-in www.tasmanbaynav.co.nz**

CRUISING AND RACING PRODUCTS

These products are generally a bit more user-friendly and have features to appeal to cruisers and racers alike. With the exception of MaxSea, the weather routeing functionality can lack a few of the more advanced features seen in the racing products.

MaxSea

This is the product that started it all and is still a leader for weather routeing and offshore racing. It may lack race functions in other areas of the system, but the weather routeing is still highly advanced. Unlike the race products, it can only route through one GRIB at a time. The product has impressive graphics and a clean interface, but needs a powerful PC to work well.

£723 ex VAT with routeing built-in www.maxsea.com
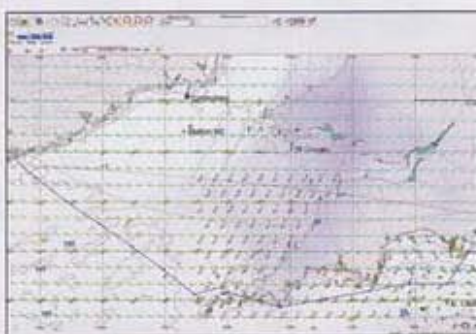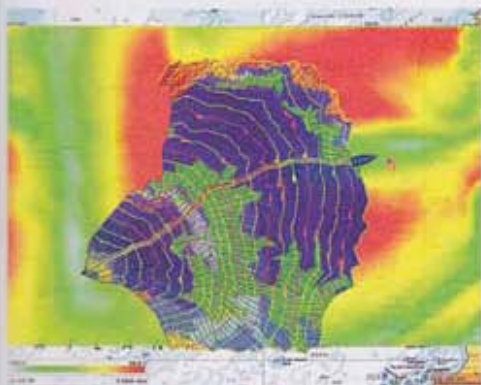
Adrena First

This is a watered-down version of the full-blown racing software to suit beginner offshore racers and smaller budgets. More user-friendly than its big brother and with a price to match its reduced feature set, it still has the fundamental routeing functions in place, however, and some other basic race functions alongside.

Fundamentally, it does not allow currents or tides to be included in routeing.

£405 ex VAT. Routeing add-on an extra £183 www.adrena.fr

Seatrack

This product sits right at the crossover between cruising and racing. Generally easy to use, but lacking some of the routeing features of the dedicated racing products. Routeing is limited to one leg at a time, but a unique feature is the ability to route for a desired arrival time – great for cruisers.

The product comes in three versions to help match features to needs and budgets. Cruising version has simple routeing add-on with more basic polar and no sail plans.

Grand Prix £800, Racer £600 routeing module £150 add-on. Cruiser £500 including basic routeing add-on (prices ex VAT). www.seatrack.co.uk

CRUISING PRODUCTS

These products have come from a cruising-based heritage and have added weather routeing to meet demand from their customers. This makes them ideal for cruisers wanting to make more efficient passages or do the occasional offshore race. The unique online routeing product from PredictWind is also included in this section.

SeaPro

A leading cruising package. The standard version offers basic weather routeing from A to B while the Sailing Performance option adds management of polars, polar learning and sail plans. The standard passage planning feature is a complementary tool when motoring and the use of UKHO tides will appeal to many UK yachtsmen. Automatic land avoidance is not a feature, but this can be overcome by marking it as an exclusion zone.

Standard £247.83 Sailing Performance £468 (ex VAT)
www.euronav.co.uk
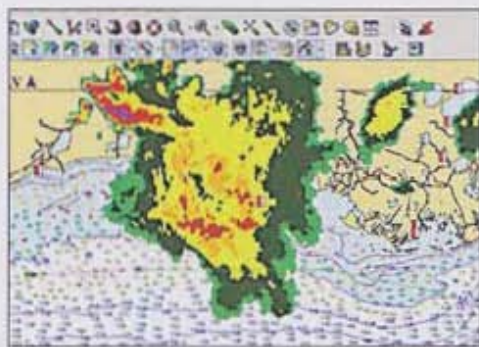
Nobeltec

Popular in the US with impressive multi-screen and radar capabilities, the Windvantage routeing functionality offered is very limited as it can only route one leg at a time and has little in the way of additional features.

Integration with OCENS for weather data and live weather images from digital radio in the US only make it good for weather analysis even if routeing functionality is limited.

Routeing available as an add-on to all versions at £180 ex VAT. www.nobeltec.com

PredictWind

Better known as a supplier of high-resolution GRIB files on subscription, the website now includes a unique routeing tool. The routeing benefits from using the enhanced PredictWind weather data and offers routeing to all sailors from any PC with an internet connection as no software is required.

This is perfect for the occasional user, particularly if you are doing it from the comfort of home. A shortcoming for UK-based users is that tidal streams are not accounted for. However, ocean currents are used and so it is fine for non-tidal areas. Polar input can be detailed or basic and it is possible to avoid areas of rough sea. **Subscription based at £6-£60 per month depending on resolution of data used. www. predictwind.com**

	Adrena	Deckman	Expedition	MaxSea	Seatrack	Adrena First	SeaPro	Nobeltec	PredictWind
WEATHER FEATURES									
Built-In weather sources	GRIBUS Navimail PredictWind	GRIBUS Saildocs OCENS	OCENS PredictWind Saildocs	Maxsea's own	None	GRIBUS Navimail PredictWind	None	OCENS	PredictWind
Can display other GRIB data beyond wind, rain and pressure	✓	✓	✓	✓	–	✓	✓	✓	✓
ROUTEING FEATURES									
Can use a current GRIB in routeing	✓	✓	✓	✓	– (soon)	–	✓	–	✓
Multiple wind GRIBs	✓ (Pro module)	✓	✓	–	– (soon)	–	–	–	–
GRIB edit (rotate/scale)	✓ (Pro module)	✓	✓	✓	✓	–	–	–	–
Reverse isochrones	✓ (Pro module)	✓	✓	–	–	–	–	–	–
Competitor routeing	✓	–	✓	–	–	–	–	–	–
Current	✓	✓	✓	✓	✓	–	✓	✓	Ocean only
Set max/min wind speeds encountered	✓	–	–	✓	–	Max only	–	–	✓
Set wave height maximum	✓	✓	✓	✓	–	–	–	–	✓
Route animation	✓	✓	✓	✓	✓	–	–	–	–
Display multiple route solutions	✓	–	✓	✓	–	–	✓	–	✓
Alternatives/Sensitivity	✓ (Pro module)	–	✓	✓	–	–	–	–	–
Avoid land	✓	✓	✓	✓	✓	✓	–	✓	✓
Mark areas to avoid	✓	–	✓	✓	–	–	✓	✓	–
Fix speed of yacht (motoring)	–	–	–	–	✓	–	–	–	✓
By arrival time	–	–	–	–	✓	–	–	–	–
By passage duration	–	–	✓	–	✓	–	–	–	–
Route along GGC	–	–	✓	–	–	–	–	–	–
Run different polar %	✓ (Pro module)	–	✓	–	–	–	✓	–	–
Manually set wind data	✓	✓	✓	–	✓	✓	✓	–	–
Multiple waypoints	✓	✓	✓	✓	–	–	✓	–	✓