



Why bother with paddles?

Many people ask why they should go to the bother and expense of installing speed and heading sensors on their sailboats when a GPS provides the same information at a tenth the price and hundredth the effort. A GPS is already needed for position (which trumps speed and heading), so why even consider the paddle and compass?

For sailboats, if navigation were the only consideration, COG and SOG from a GPS would fill the bill. However, when it comes to using speed and heading to monitor and improve sailing performance, there are several things to consider before you dismiss the idea of using a paddle and compass.

1. The most important thing to realize is that sailboats don't know about current. They perform by interacting with the speed difference between wind and water. Where the water happens to be going is irrelevant. In this frame of reference, tacks are symmetrical; boatspeed and true wind angle are the same on both tacks (except for [wind shear effects](#)). [Polar and target information](#) is always given in this context.
2. Since COG/SOG is relative to land and not water; anything derived from it includes current. If COG/SOG is used to calculate speed and wind angle, tack data will be different on opposite tacks, and changes with whatever current you happen to be in at the moment. Using polar information and finding the groove on the new tack is therefore much more difficult. The inevitable changing differences tend to erode the crew's confidence that they can control and predict performance.
3. Current, even in small amounts, has an important effect on overall performance. Every tenth of a knot aligned with heading adds (or subtracts) about 2 seconds/mile of rating. The same current athwartship changes your true wind angle (as derived from COG) by 1.5 degrees.

It is incorrect to assume that inland water (i.e. the Great Lakes) doesn't have current. Lake currents are unpredictable when compared to salt water currents, and currents of ½ knot and more are quite common (which is 10 seconds/mile). Not knowing what they are and where they aren't brings a big performance hit.

Since it is so important to performance, knowing the current you're sailing in can be used to take advantage of or avoid it. It is not possible to calculate

current unless you have both water and ground references. Installing a paddle and compass in addition to GPS provides this important piece of data.

4. When GPS is used instead of a wind sensor, wind direction is assumed to be the difference in heading between tacks. Then true wind angle is assumed to be the difference between COG and the last guess at wind direction.
 - The biggest problem is that the wind direction guess is always old – minutes old. Wind shifts are not reflected in the assumed wind angle, so performance numbers based on it, including steering to target are meaningless.
 - GPS also gives no indication of the magnitude of the true wind, so accessing polars is guesswork.
 - If the tack isn't perfect, the wind direction guess will be bogus.

Wind direction is the most important thing to know about from the standpoint of performance. [Here's why](#). If you only use GPS, you are pretty much up the creek.

The bottom line is, if getting the most out of your boat is important to you, then a paddle and a compass are the only way to go.

More reading

Wind shear	http://ockam.com/windshear.html
Polars	http://ockam.com/docs/SplainPolars.pdf
Wind direction	http://ockam.com/functrue.html