

Oceanography 101 - Using the Mark I Eyeball and BOM Rain Radar real-time images to find the EAC

What's the East Australian Current got to do with our game fishery...? Quite a bit as it turns out... most of you already know that if you're Solitary Coast locals. In addition to being the means of a free ride down our coastline for all manner of game fish, it also brings bait, coastal weather effects, and other interesting localised phenomena to our fishing grounds.

There's little doubt that this unique current is used by fish to ride their way down the coast over the summer months, and in a nutshell, that's the underlying driver of our game fishery.

Just look at the last couple of summer blue marlin seasons – the first time the EAC brought water over 25C to our coast, the blue marlin came with it, riding that temperature right into our piece of ocean. Then as winter slowed the current and cooled its core temperature below that magic 25C reading, the blue marlin fishing stopped as if someone had switched off a light .

However, when our water temperatures out on the shelf dropped below 25C, the Gold Coast still had plenty of water at or above that level, and that was when the blues all accumulated in those southeast Queensland waters rather than continue to ride the current's cooling core anywhere past the border. As we know, they had a blinder of a late blue marlin season up there, while just to the south in northern NSW it went dead.

This doesn't mean that those big marlin won't ever stick around over the cooler months, but they simply get off the bus when the temperature starts to drop, and unless you get occasional pulses of warmer water flowing through, then by and large, don't expect to see them until you start to see satellite shots in Spring with the EAC holding mid-twenties water flowing down here consistently again.

Similarly, during those years (2011 and 2012 being the most recent examples) when one of those large clockwise ocean circulations sets up off Coffs for weeks at a time and pushes the EAC 80-100 miles off the coast in a big loop bypassing northern NSW almost completely, guess what happens to the black marlin that would normally be riding the current into the Solitary Coast around December? Yep... they simply never stop off here, but ride the current as it loops out to sea between Byron and Forster.

Fortunately, the blues aren't working on as tight a timetable as the little blacks, and they keep coming long after these weird current loops and everything else have gone away, whereas the blacks only seem to have that one shot at passing along our coast, and if they end up bypassing us out to sea, that's the last we see of them for the entire year.

It's worth going out on a limb and making a bet that anytime another of those big clockwise ocean rotations establishes itself off our coast early in the summer, that the black marlin fishing here will be poor to non-existent if the current ends up being looped way out to sea beyond the spring. This is because there doesn't seem to be a consistent migration of these little blacks down the coast all summer – rather, they all seem to jump on the current at once in early summer.

Focusing more on the East Australian Current and its various effects with regard to game fishing, so I thought it worth mentioning a couple of hints about tracking its location at any given time.

When the EAC is flowing normally, its width varies from about 5 nautical miles to around 25 nautical miles, which means that there are times you may have to go up to 50 miles or so to the east to find the outer edge. The core of the current can be as much as 5 degrees Celsius warmer than the surrounding ocean at certain times of the year, and while the overhead satellites can detect temperature differences of less than one tenth of one degree from space, and our temp readouts on the boats can do the same, we have only a couple of reliable ways of “seeing” the current from a distance. Sure, you can usually tell when you’re actually in it, because the water is always a deeper, clearer blue, and even if you don’t look at your sea temperature readout, you can often simply feel the difference just in the warmer air on top of it.

However, this is what you get once you’re actually there in the current... so how do we find it from some distance away? There are several ways, and unfortunately, all the remote sensing options available are generally good at telling you where the EAC was yesterday, not right now. So you really only have two real time options...

One surefire way to check out the location of the warmest part of the EAC is with your eyeballs. The other is using near real time radar uploads from the BOM.

The first method is the simplest - just take a look to the east as you head out to sea in the morning. If the relative humidity is high enough and the morning air temperature cool enough, and as long as there isn’t a frontal system around, the core of the EAC is generally very accurately indicated by a long line of north/south cloud sitting directly above it. In other words, when conditions are right, the warmer water of the current core heats the air directly above it, which rises and forms a thin line of cumulus cloud snaking along directly above the current core. This will usually only be seen just after sunrise when the air is cooler and there’s sufficient temperature differential between the current and the surrounding ocean.

Quite often, this line of cloud above the current is the only cloud out there first thing in the morning when the sun hasn’t been warming up the water all day, and the only overnight source of cloud-forming heat has been the current. This effect is therefore generally going to be at its strongest first thing in the morning when the katabatic air coming off the land is cool, the breeze at sea is calm or relatively light, and humidity over the ocean is quite high. Generally, as the day wears on, this phenomenon becomes less distinct because the sun starts to warm the ocean, and the developing sea breeze usually stops the air from lingering over the current core and warming enough for a distinctive cloud line effect to develop.

Also, on those days when the current temperature differential is poor, or when relative humidity in the air above the ocean is low and the air mass is generally pretty warm throughout, then the cloud above the current simply doesn’t appear at all because the forces that would normally create it are too weak.

There’s also a second way to see where the current is before you even leave home, or, if you have a smartphone, and you’re in the boat and getting ready to leave, or

before that, you can invest a little time on your computer after you first get up, and see what's out there even if it's pitch black outside. Sure, you can take a look at the satellite pictures if you subscribe to one of those services, and while that's fabulous data, it's also often hours old. It will of course tell you with great accuracy what was there when the satellite passed overhead, and it helps enormously with planning your day, but by the time you're passing out of the harbour entrance, the satellite data is even more out of date.

So the other thing you should always take a quick look at is the BOM rain radar. You may already do this as a matter of course just to see if there's something nasty coming up the coast, or if there are any big areas of storms out there. However, assuming that things are pretty normal, don't pass up on that look at the BOM radar image, because it will frequently tell you exactly where the EAC is sitting, and most importantly, it's the only source that can give you that info *in real time*.

As you know, the BOM radar image stream is generally only a couple of minutes old. It also doesn't just track falling rain as the name implies – it really tracks water droplets, including those forming clouds but not necessarily actually falling as rain.

See where this is going...? Yep, the radar will show you any strong lines of cloud out to sea, and it will certainly show you the line of cloud sitting over the core of the EAC on any given morning when the conditions are right.

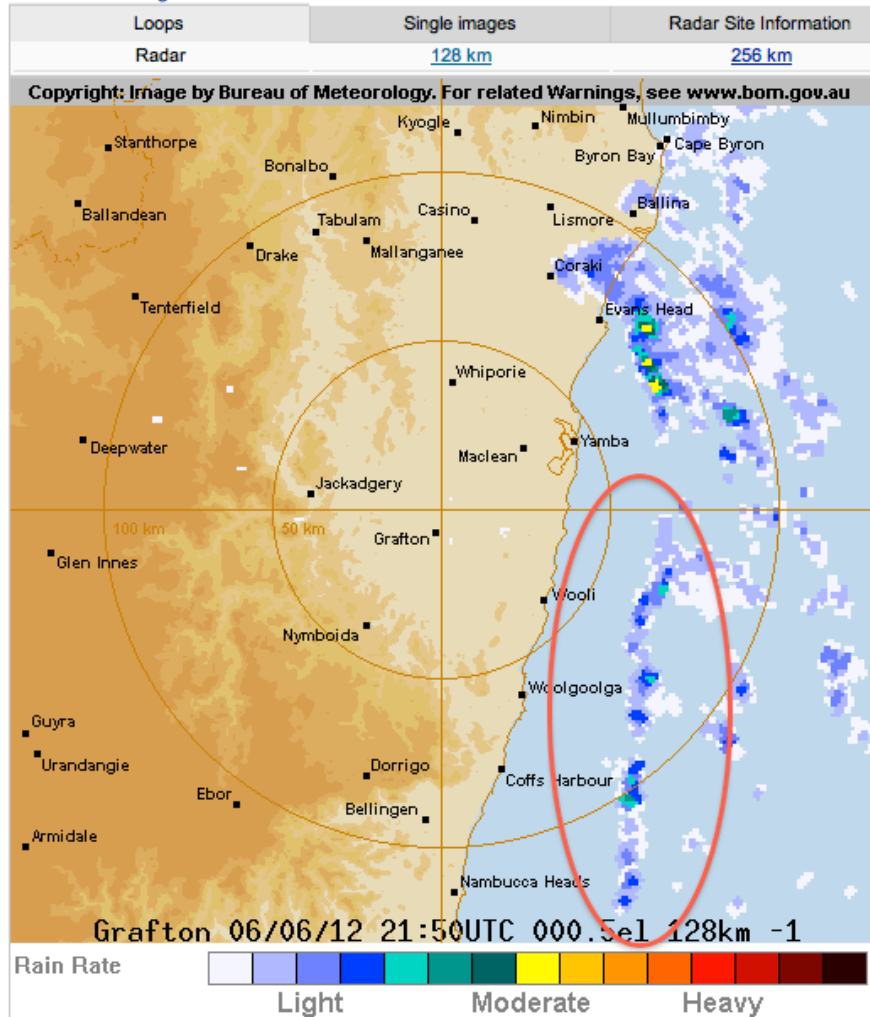
For example, here's a screen shot of the Grafton BOM radar taken on the morning of 6 June. You can see a fairly heavy buildup of cloud with some rain falling from it just off Evans Head, and then very clearly on this image, you can see a distinct north/south line of cloud running down off the coast from Wooli to Nambucca that I've circled. This is the EAC!



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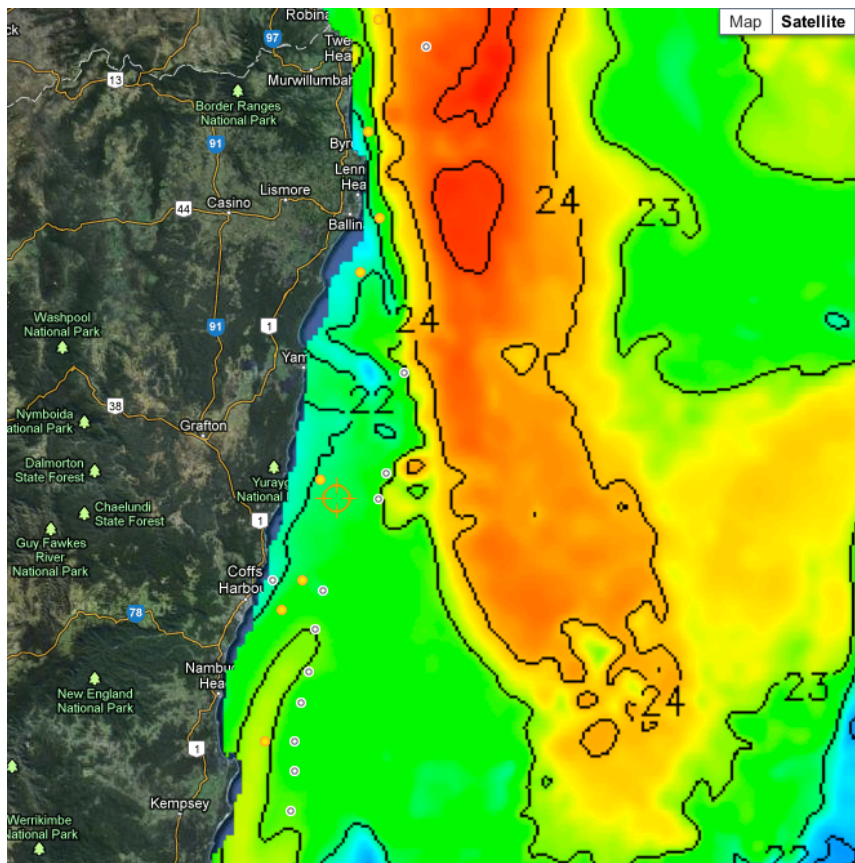
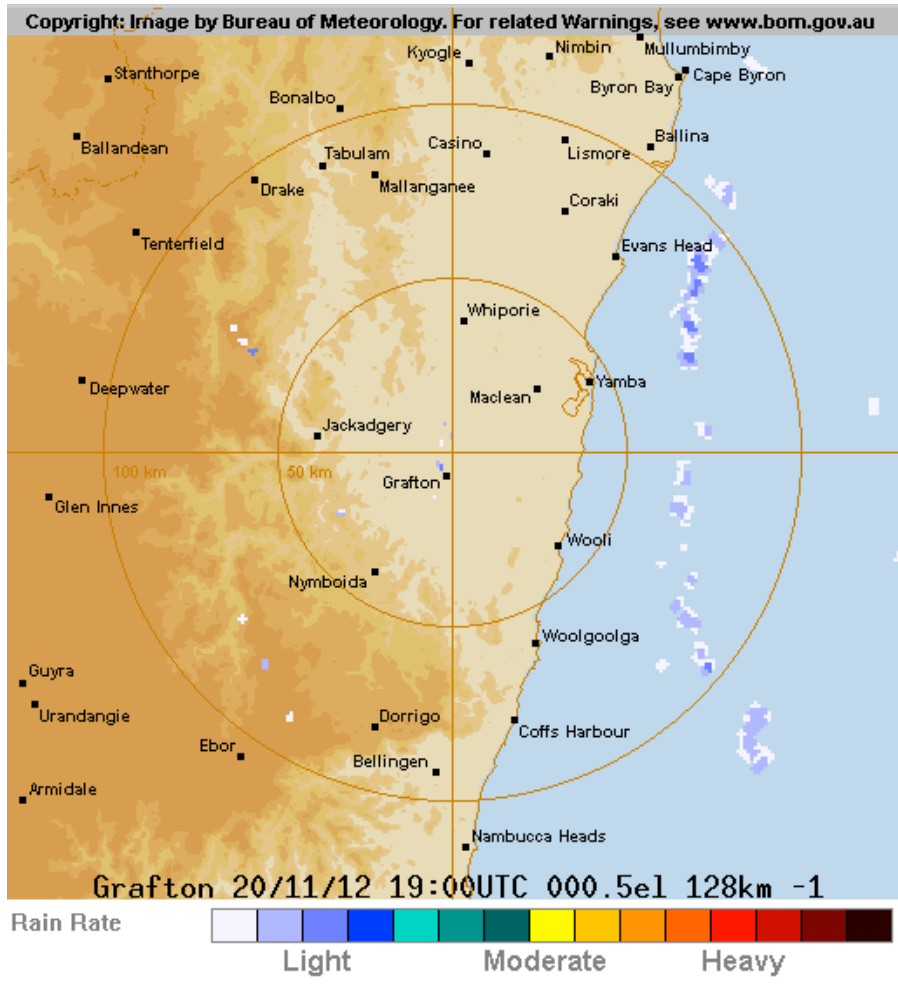
128 km Grafton Radar Loop

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In fact, overlaying the SST satellite photos for the same day over this radar image, showed that the correlation is startling. I've circled the clearest section of the current line cloud formation in red, but even the big cloudy area east of Evans Head is also marking a warm pool that shows very clearly on the satellite image of this day.

Shown below, you'll find another shot of the BOM radar clearly showing the EAC cloud line, and one taken at the same time from the satellite data showing seas surface temperatures across the same stretch of ocean.



These shots were taken recently, and clearly illustrate the warm core of the EAC as it passes close to Ballina and then starts to bend out to the southeast. As you can see, by the time it passes Coffs it's three times further out to sea than it was when it swept past Ballina. So while the BOM rain radar doesn't tell you what the temperature is out there, it is pretty good at giving you an accurate indication of where you can expect to see the cloudline marking the core of the EAC as you drive out of the harbour.

The BOM radar page allows you to click on a point such as Coffs Harbour, then click again on the edge of the line of cloud east of Coffs, and the BOM server will then give you a very accurate distance between those two waypoint clicks you've made. In this case, it showed that the line of cloud directly east was 37km, or 20 nautical miles from the harbour. This was exactly where the satellite images (not available until several hours later) showed the centre of the EAC to be running as well.

So... if you're considering going out and fishing the edges or the centre of the EAC, just check out the BOM radar image before you leave home, and you can then plot your first leg out of the harbour. Of course, once the sun starts up, you can head directly for the line of cloud, but at least before you even make it down to the boat, by checking satellite images and the BOM radar, you'll have a good idea of exactly where you can start your day's fishing with the greatest chance of success.