SST-Offshore.Com™
Offshore Fishing Services

AND

SeaView Fishing by Ocean Imaging

PRESENT

Fishfinding from Space

Introduction

"In order to find a fish you have to think like one." So goes a popular piece of advice. Unfortunately, following it is often not so easy. As most fishermen and fisheries, biologists will attest, we still have much to learn about why fish do what they do and why they prefer one spot in the ocean over another. So far, modern research has uncovered a number of oceanographic variables affecting pelagic fish distributions and concentration levels. Many, like sea surface temperature (SST), ocean color (PLNK-phytoplankton and turbidity levels), sea surface height anomaly (SSH) and ocean currents (VEL) are easily measured from sensors on satellites. Model-derived data such as mixed layer depth (MLD – very similar to thermocline depth), sub-surface ocean temperature (SBST) and salinity (SAL) are more difficult to directly relate to fish abundance and catchability, but also provide useful information when deciding where fish might be congregating.

Nowadays, most offshore fishermen are well aware of the importance of measuring ocean temperature when searching for game fish. Some fish are highly sensitive to temperature and exhibit a definite temperature preference. Therefore, finding water of a preferred temperature for a particular species will increase one's chances of locating his/her target fish or school. Similarly many pelagic fish restrict their distribution to waters with certain phytoplankton levels (color) and turbidity characteristics. For example, albacore tuna tend to be caught more often in clear, blue water than in murkier, green water.

Preferred Water Temperature Ranges for Some Pelagic Fish Species		
Fish	**Common Temperature Range °F**	**Common Temperature Range °C**
Albacore Tuna	59° - 67°	15° - 19°
Bigeye Tuna	64° - 77°	17.5° - 25°
Bluefin Tuna	very broad	very broad
Marlin	68° - 85°	20° - 29°
Sailfish	74° - 88°	23° - 31°
Skipjack Tuna	66° - 77°	19° - 25°
Swordfish	64° - 80°	17.5 – 26.5°
Yellowfin Tuna	68° - 82°	20° - 27.5°

Table 1: Preferred temperature ranges for many pelagic fish species.

As you may or may not already know, SST and ocean color do not tell the entire story. There are many factors that add up to a good fishing location. Often times it is the combination, movement or persistence of these oceanographic variables that play a larger role in determining where the fish might be concentrating. Below, all of the variables provided via SST-Offshore.Com (SST-O) and Ocean Imaging's (OI) SeaView service are discussed both as independent indicators of where fish might be, but also how they act together to help attract and congregate fish. First, however, let's understand a little more about the satellites and sensors providing the data.

Satellite Remote Sensing

The potential for monitoring the ocean from Earth orbiting satellites was recognized as soon as the first visible and infrared images of the Earth were obtained in the early 1960s. While visible light images showed patterns of ocean color, infrared images could be used to estimate the sea surface temperature. However, successful utilization of these techniques was limited by the available technology. In the late 1970s and 1980s advanced, sensitive radiometers and high speed data processing capabilities of modern computers, made possible accurate monitoring of the ocean from space. Now OI acquires a variety of oceanographic data from different sensors on several satellites. The primary satellites used for OI's data products are polar orbiting satellites owned and operated the United States National Oceanic and Atmospheric Administration (NOAA), the U.S. National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA).

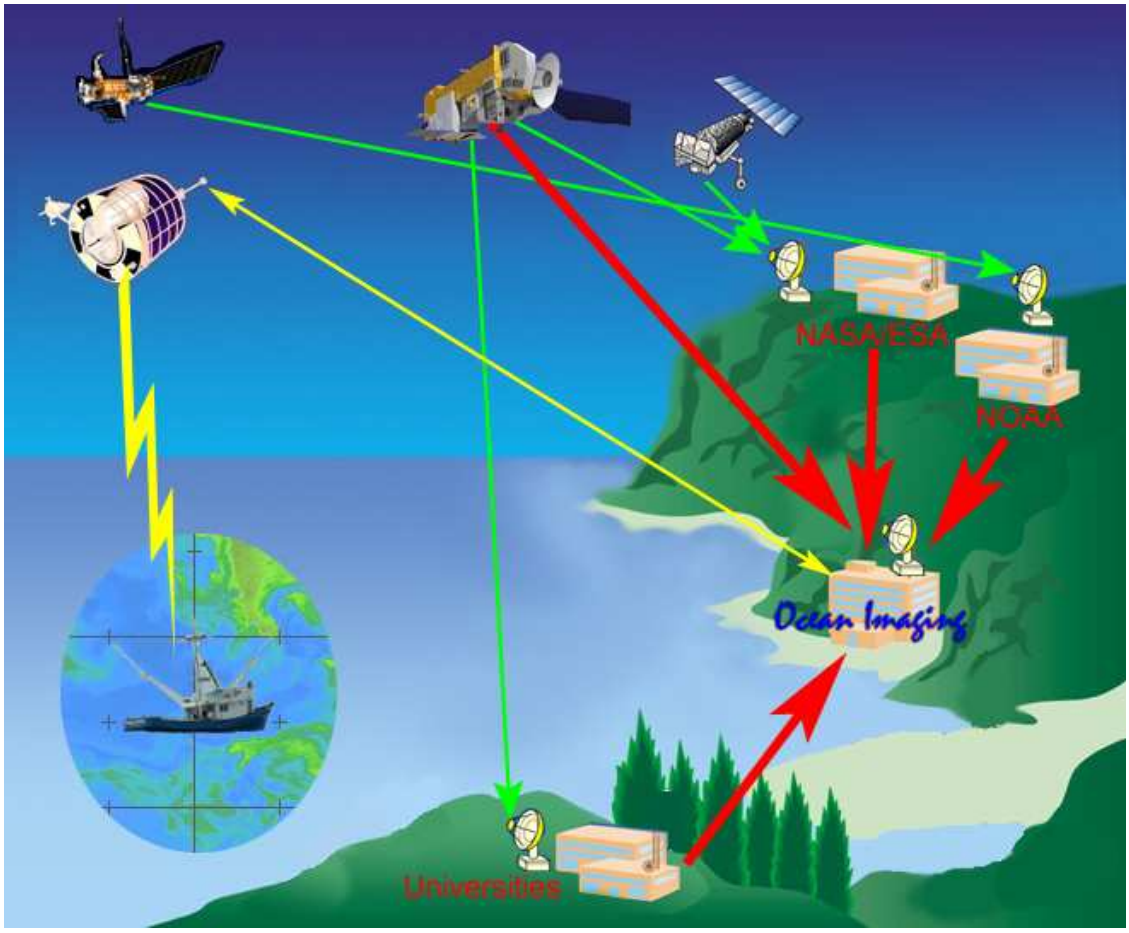


Figure 1

Most are polar orbiting satellites meaning that they orbit the planet in a north-south direction while the Earth revolves in an east-west direction below as illustrated in Figure 2. Each successive satellite orbit is displaced somewhat to the west. Thus, in the case of the NOAA polar orbiting satellites, each satellite views the entire Earth every 12 hours. Table 2 shows several satellites, sensors, the data they provide and the related SeaView products.

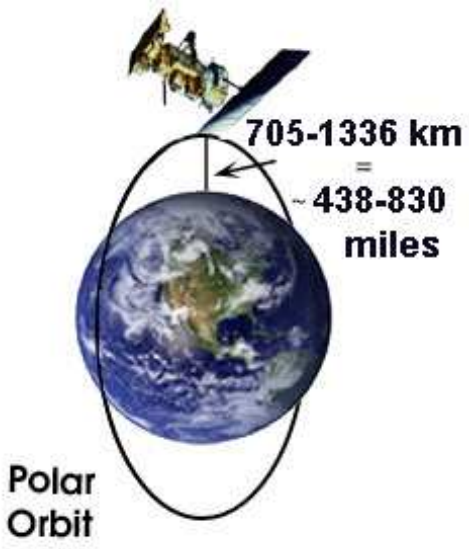


Figure 2: Polar orbiting satellite example. (graphic credit: University of Wisconsin-Madison SSEC)

Satellite Platform	**Sensor**	**Data Type**	**Spatial Resolution**	**SeaView Product**
NOAA 12-18	AVHRR	thermal infrared	0.1 km/pixel	SST, SSTC
GOES	GOES Imager	thermal infrared	5.0 km/pixel	SSTC
TRMM	TMI	microwave	~25 km/pixel	SSTM
Aqua	AMSR-E	microwave	~25 km/pixel	SSTM
Terra	MODIS	Chlorophyll_a	~0.1 km/pixel	PLNK, PLNKC
Aqua	MODIS	Chlorophyll_a	~0.1 km/pixel	PLNK, PLNKC
Jason-1	altimeter	sea surface height	25-50 km/pixel	SSH, VEL
Jason-2	altimeter	sea surface height	25-50 km/pixel	SSH, VEL
Envisat	altimeter	sea surface height	25-50 km/pixel	SSH. VE:
QuikScat	Sea Winds scatterometer	Wind speed and direction	~25 km / reading	WND

Table 2: Satellites and sensors used to collect data for SeaView products.

The satellite images you receive as a subscriber to SST-Offshore and SeaView services are composed of millions of individual measurements from either infrared and optical radiometers or radar altimeters orbiting on satellites hundreds of miles over the Earth. Each measurement represents the average radiation or radar reflectance measurement over the spatial resolution of the sensor. For example, in the case of the AVHRR system on the NOAA polar orbiting satellites, the measurement is an average of the thermal radiation emitted and reflected from the Earth's surface over approximately 1.1 square kilometers (~0.6 miles). The original data are relayed down to ground receiving stations at either SeaView's California, U.S.A. office or to one

of our data providers. Then the data are transferred to SeaView's computer systems for final processing. The raw measurements are calibrated to meaningful units of temperature, chlorophyll level or height anomaly and corrected for interference caused by moisture and aerosols in the atmosphere. Finally, the resulting images are corrected for the curvature of the Earth and mapped to a geographic projection to make them easy to navigate using SST_Offshore.Com's Bluewater Supermap. When mosaicked together, formatted and displayed on a computer using specialized software such as SeaView, the result is a photograph-like image showing oceanographic parameters such as temperature or chlorophyll. Each one of these readings is represented in the displayed digital image by what is called a "pixel". In some cases these data are then sub-sampled down to a spatial resolution of 2.5-4 kilometers per pixel in order to reduce the overall size of the image file and better facilitate transfer of the data to a boat over slow satellite telephone connections. While this may seem rather coarse at first glance, bear in mind that most temperature and other oceanographic features, e.g. eddies, currents and upwelling centers, measure dozens or even hundreds of miles across and are thus perfectly well defined in the satellite image products provided by SeaView. Additionally, the SeaView user can magnify the image to show as much detail as the spatial resolution resolves. Also in SeaView, specific colors can be assigned to a value range to show SST or plankton levels, creating a color-coded map depicting that aspect of the ocean's present characteristics.

Where to Find Fish

As mentioned above, simply finding waters of a preferred temperature range will rarely locate the best fishing grounds for your target species. While game fish do have distinct temperature preferences, they can survive in waters that are colder or warmer. Research done on albacore tuna, marlin and swordfish using acoustic and satellite tagging devices shows that these fish frequently dive into deep, cold water and experience much greater temperature changes than when crossing a temperature gradient near the surface. In fact, it is not entirely uncommon for fish to be caught in waters outside of the temperature ranges listed above. In warmer, tropical regions, sea surface temperature actually plays a lesser role in determining the best fishing spots. Fishes respond to a great number of environmental factors. Even with today's technology, it is impossible to monitor all of them effectively. However, because physics and biology are often related in the ocean, we can use the different data types in combination with temperature to help find the most productive fishing spots. This document presents a few of many concepts on how to use satellite and oceanographic information to increase your fishing success.

One reason fish tend to congregate in a certain area is the presence of food. Cooler, nutrient-rich water usually supports more plankton growth. So, much of the time the greener (often cooler) water holds more prey. The biological system is driven by the particular food chain specific to that part of the ocean. Figures 3 and 4 show both a simple and more complex illustration of the ocean's food chains. This means that planktivorous fish and zooplankton (small animals which feed on plants or 'phytoplankton') will aggregate in or near green, phytoplankton-rich water in turn attracting small fish, squid and other invertebrates sought out by the larger predators.

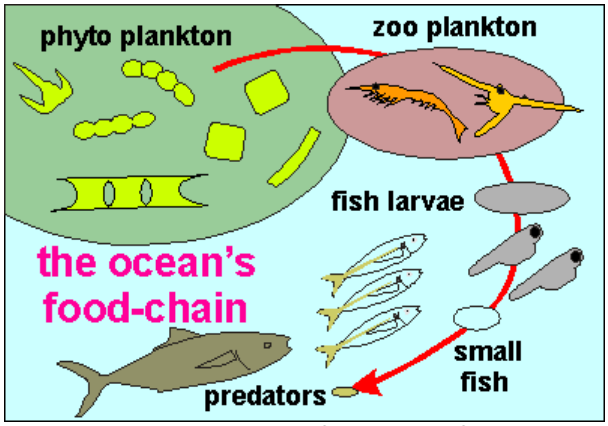


Figure 3: A simple illustration of the ocean's food-chain (graphic credit: http://www.seafriends.org.nz)

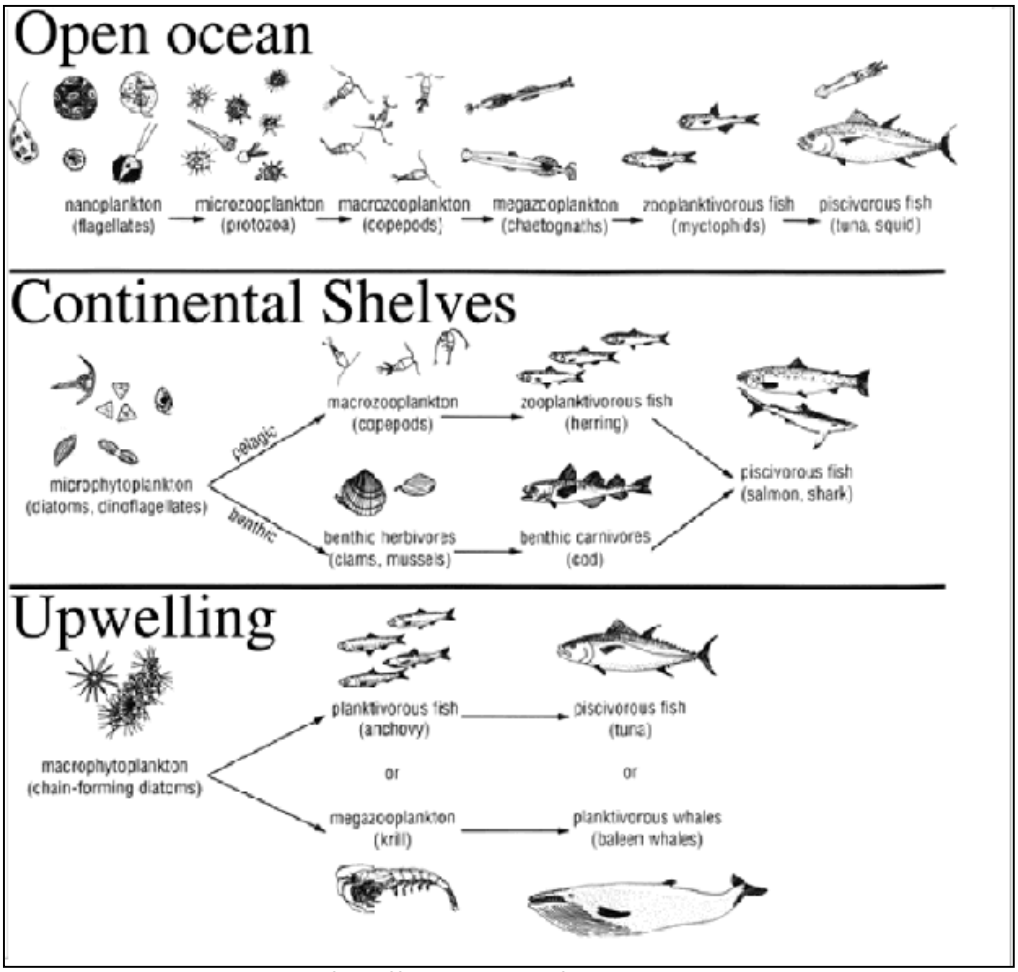


Figure 4: Food-chain examples for different regions of the ocean. (graphic credit: the University of Michigan)

It may therefore seem logical that larger pelagic, game fish would seek out those green regions to feed. Scientific evidence, however, suggests that larger fish like the tunas, marlin, sailfish, swordfish and other higher trophic level species are visual feeders, meaning they rely primarily

on eyesight when hunting for prey. Hence, they will be much more successful finding and capturing the baitfish or prey in the clearer water than when swimming through the turbid, green water. The theory follows that the ideal place for these predator species to feed would be in an area having abundant prey, but reasonably clear water. Such conditions are often found along oceanic frontal boundaries – zones where water masses of different type converge. These boundaries are also called convergence or frontal zones and can be identified in the satellite imagery by the locations of relatively strong thermal or chlorophyll (color) gradients.



Figure 5: Note the large eyes of most tunas and other pelagic, predatory fish used for spotting prey.

A striking example of how large predatory fish follow temperature/color fronts is shown in Figure 6. It displays the swimming path of a striped marlin caught off of Catalina Island west of California, USA during a tournament in the mid 1980s. The fish was tagged with an ultrasonic transmitter and tracked by a specially equipped vessel for the next 48 hours. In that time, the marlin swam more than 55 miles closely following a temperature/color boundary between the warm inshore body of water and a body of cooler, green water offshore.

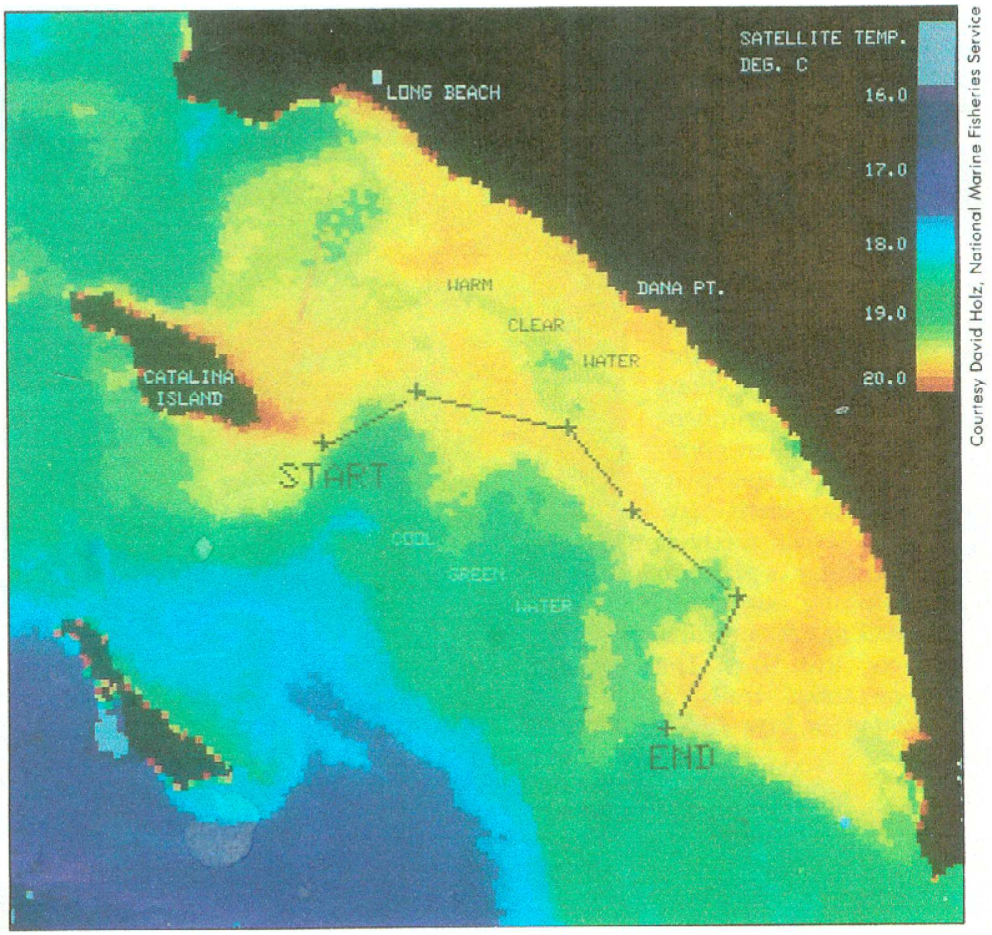


Figure 6: Color-coded AVHRR satellite temperature image showing the path of a tagged marlin which swam more than 55 miles in two days, closely following temperature and color frontal zones.

While at sea, you can identify a frontal zone when crossing it by noting a rapid temperature change on your gauge. Sometimes there will also be visual clues like distinct changes in water color over a relatively short distance, wave patterns or lines of floating weeds and debris. Signs such as these are often good indicators of deep, convergence zones. Some sharp changes in temperature manifestations of strong ocean current shear zones which show semi-permanent frontal features such as the western edge of the Gulf Stream in the northern Atlantic Ocean. Yet in a number of cases, a change in temperature may simply be a surface feature and not a sign of a stable, deep convergence zone. SeaViews research has shown that older, stable or semi-permanent boundaries tend to attract more fish than newly-formed and/or transient ones. That is why studying the different types of data offered via the SeaView system can help better locate the fish-attracting frontal zones. More on that later….

There are distinct types of oceanographic convergence zones depending on where you are in the world's oceans and the prevailing environmental and atmospheric conditions. Physical phenomena known as mixing and upwelling bring deep water to the surface. The deeper water is typically colder, lower in salinity and richer in nutrients. When it reaches the surface the sunlight hitting the nutrient-rich water facilitates a phytoplankton bloom. An effective 'wall' of water is created where this highly productive water meets lower productivity water. In coastal areas,

convergence zones are often created by coastal upwelling. The upwelling front will usually be a more stable, deep 'wall' rather than a transient, surface feature possibly created by solar heating of the top few millimeters or inches of the water (Figure 7). Open-ocean mixing is also a mechanism that results in convergence zones. Figure 8 shows how this process works and how it leads to productive, bait-rich waters butting up against warmer, bluer water.

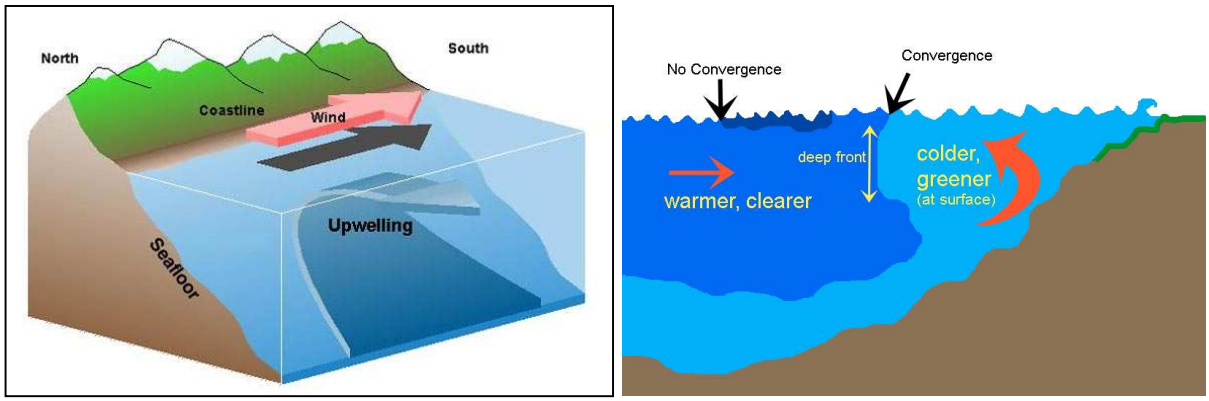


Figure 7: Upwelling illustration and upwelling-created convergence (graphic credit: NOAA PMEL)

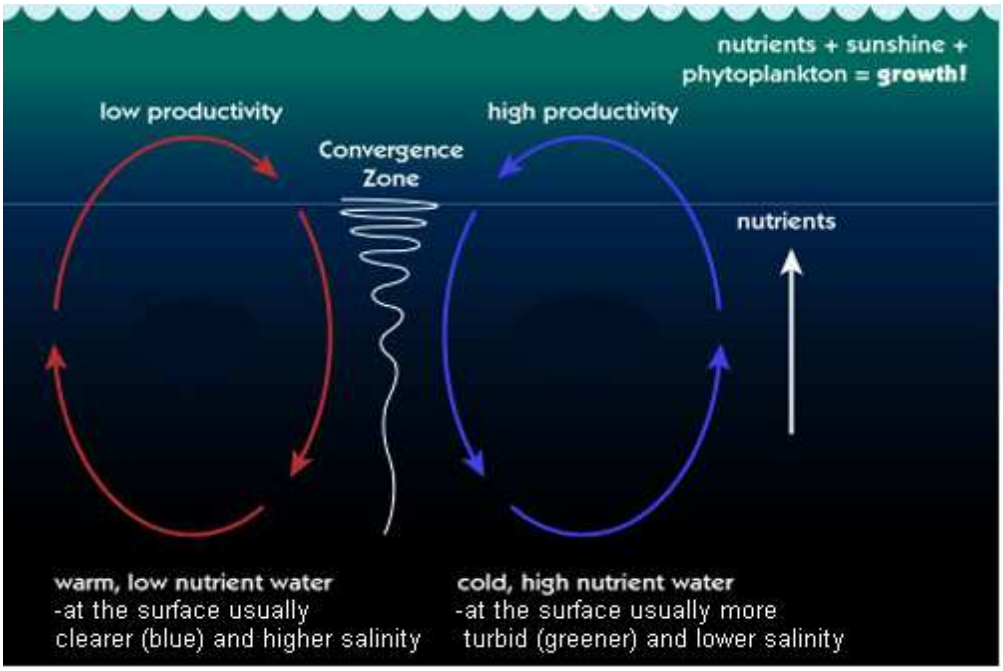


Figure 8: Illustration of open-ocean mixing. (graphic credit: GSFC/NASA)

Other conditions such as the prevailing ocean currents and sea surface height variability can also set up areas of convergence. Large-scale, seasonal, surface and deep water currents as well as differences in the height of the ocean over great distances produce water movement bringing large water masses together. This movement can generate mixing and hence the frontal zones which attract and concentrate fish.

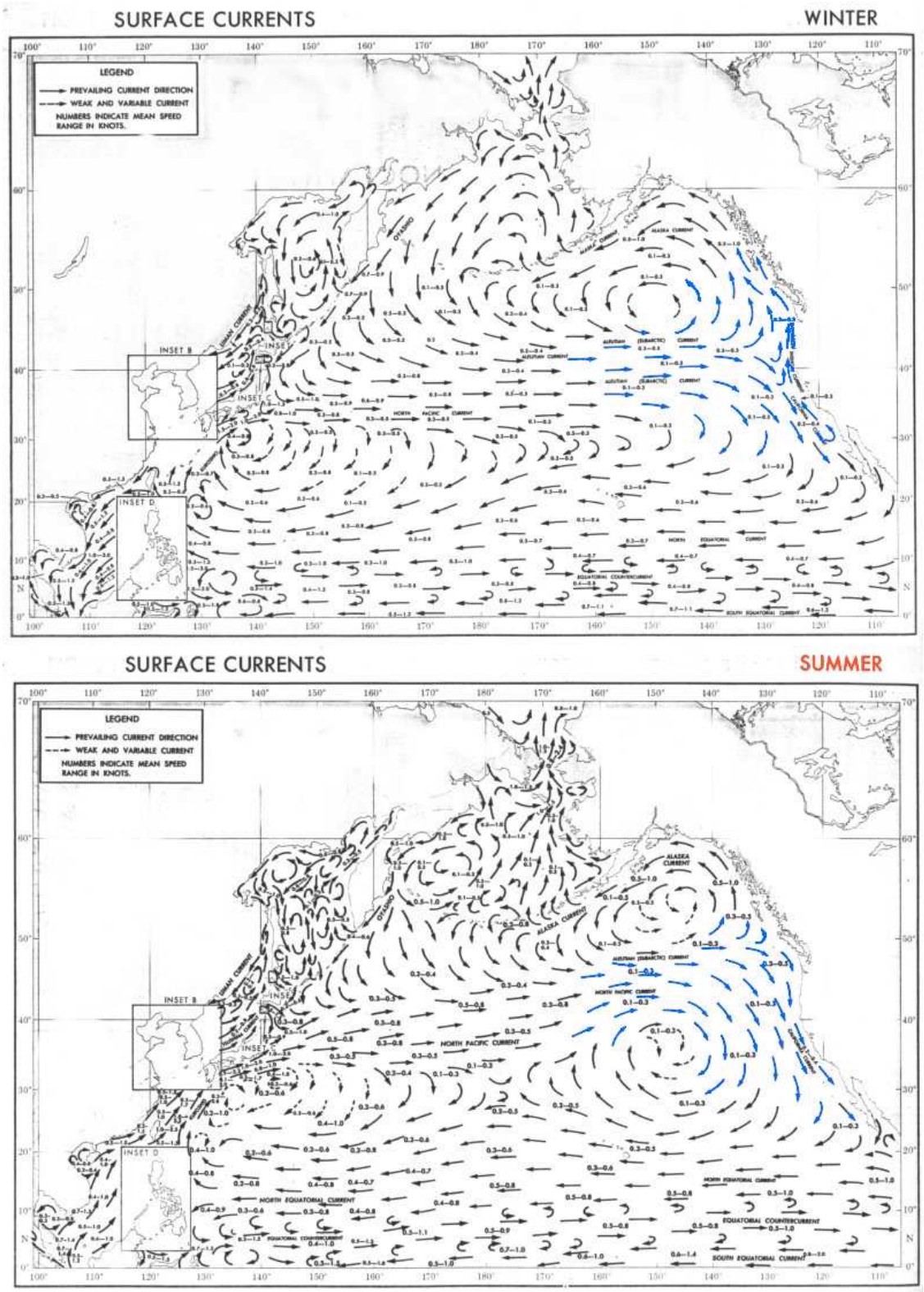
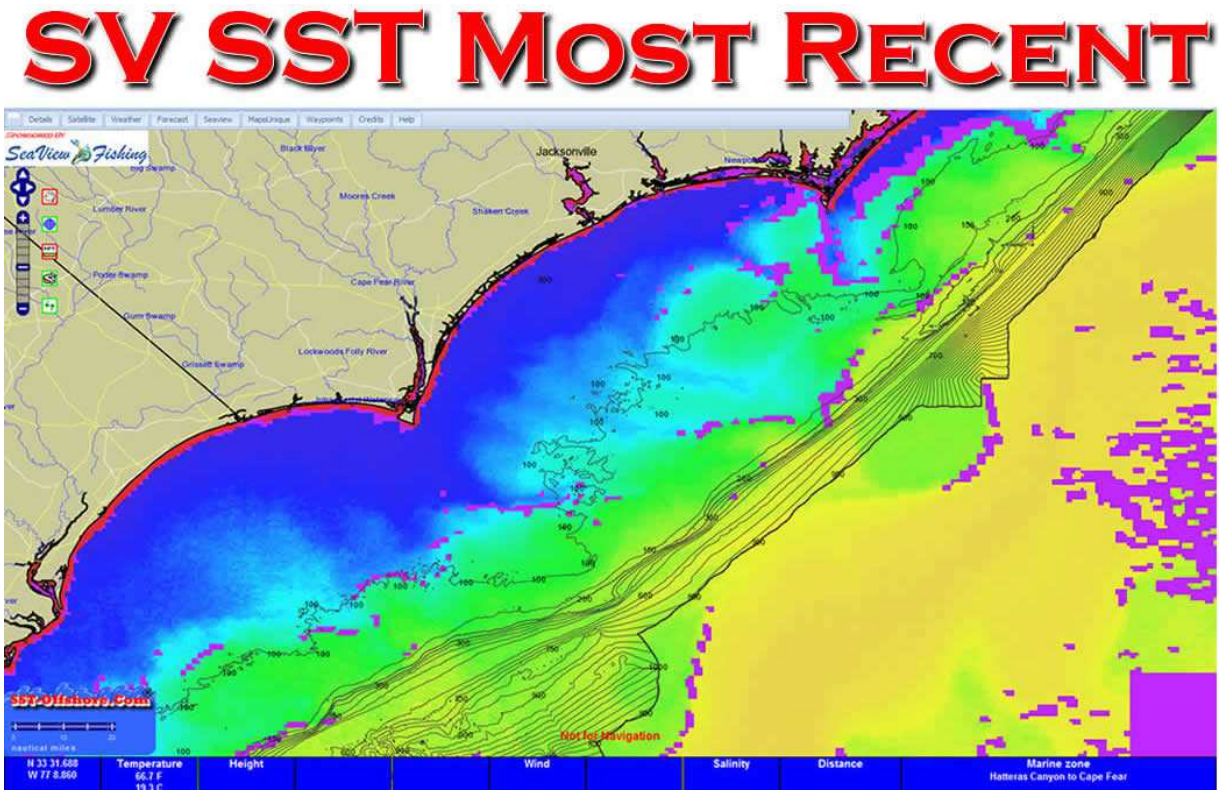


Figure 9: Example of large scale ocean surface currents in the North Pacific Ocean during the winter and Summer seasons. Knowing the prevailing currents during the time of fishing can help locate convergence zones. (graphic credit: www.meer.org)

Other pieces of information such as the temperature of the water below the surface, the depth of the thermocline or the weather conditions can provide indicators where stable frontal zones will be located, the strength of the convergence and the stability of the region. In the case of the weather, for example, if a low pressure system moves through an area, it can create water movement, instability and mixing which changes the oceanographic conditions previously concentrating fish in a certain area. As indicated above, stable frontal zones which hold their position and magnitude for several days tend to show higher productivity than features only lasting a day or so. Knowing the conditions prior to and following weather disturbances can offer clues to why fish were in a spot before the event, but not there after the event. Below each of the major data products offered by Ocean Imaging are discussed, further elaborating on the concepts explained above.



Sea Surface Temperature (SST)

SST is perhaps the most common type of environmental information used by vessels to locate high-potential fishing areas. Remember, game fish do exhibit a definite temperature preference, so finding edges within water of the target species' SST range should increase potential for catch. Some fishing operations actually use sophisticated on-board equipment to target specific temperature ranges in the water column. Keep in mind, however, that temperature is not necessarily the primary driving force behind fish behavior/movement and hence, their location. Pelagic fish species such as tunas, mackerels, swordfish and marlin are commonly found on or near relatively sharp SST gradients, also referred to as 'edges' or 'breaks'. These edges are usually indicators of a water mass boundary or convergence zone as explained earlier. In many

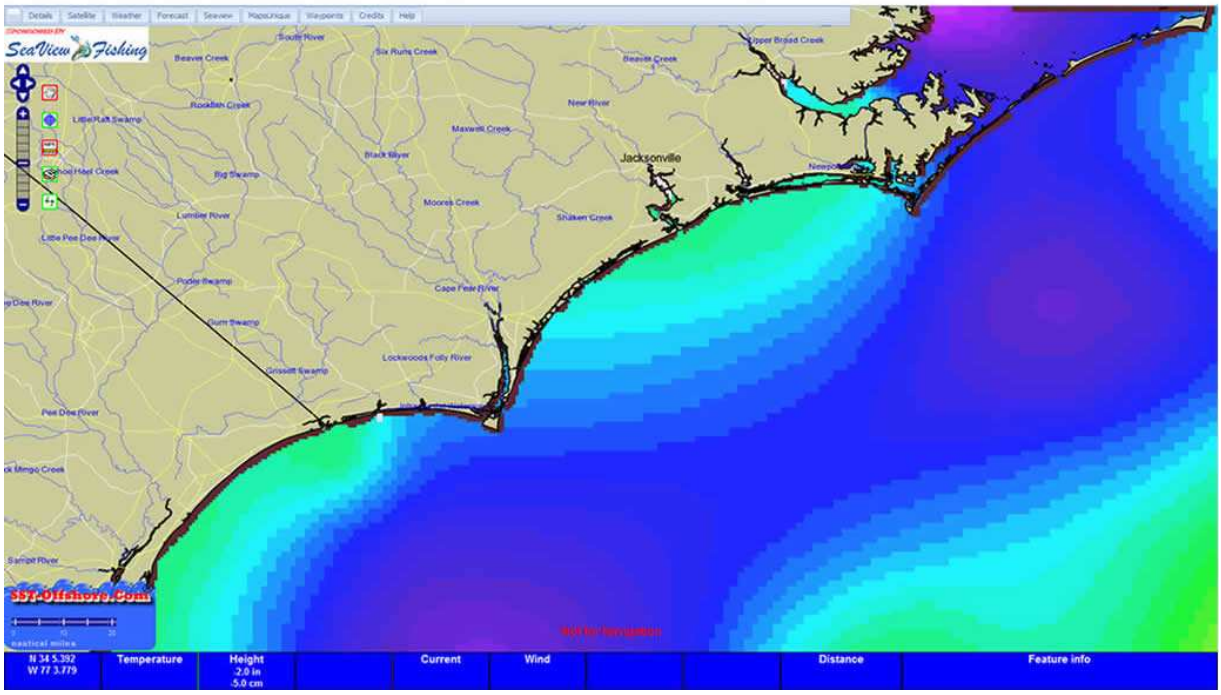
cases, especially in cooler, more temperate coastal regions where coastal upwelling occurs, fish are more abundant on the warmer side of the edge or in warm 'pockets' of water surrounded by cooler, greener water. The strength of what is considered a fish-attracting SST edge will vary depending on the region of the world you are fishing. In cooler, coastal regions or areas with strong, well-defined currents such as the Gulf Stream, a SST edge considered significant might be 1°-3°+C (1.5°-5.5+°F) from the cool side to the warm side over a 2-10 kilometers (1-5 miles) distance. In warmer, more tropical regions where the surface temperature structure is much less varied and well-defined, an edge of 0.25°-1°C (0.5°-1.5°F) might be 'strong' enough to indicate a fish-attracting ocean front. Also, in tropical regions fish aren't always found on the warmer side of the SST edge. An edge may indicate a convergence zone, but the more productive water holding the prey could be on the cooler side while the water is relatively clear on both sides. In some cases a good strategy is to first use the satellite data to locate the best looking temperature front and then work both sides of the gradient to determine where the fish are more prevalent.

Other factors to consider are the proximity of the SST edge to other convergence zone indicators such as a plankton or color edges. In addition, study the sea surface height anomaly features or currents which may bring feed-rich waters towards the area of convergence. It must be stressed that not all species react the same to temperature. Albacore tuna, yellowfin tuna, skipjack, swordfish and marlin show a higher catch rate correlated to temperature structure, but some species such as bigeye tuna, bluefin tuna and sailfish show a lower correlation of 'catchability' to temperature. Planktivorous species such as anchovy and sardines are usually found in the cooler, greener water.

To summarize, here's a list of a few simple SST guidelines to follow:

- Look for SST gradients (edges or breaks)
- Work in the species' preferred temperature range for the best results
- In temperate and coastal regions focus on the warm side of the break – sometimes a slightly warmer spot just 'off' the main break is best for swordfish and albacore tuna
- In tropical regions SST may have a lesser influence on fish distribution – work both sides of the edge
- Try to find a deeper temperature front, not just a surface phenomenon created by solar heating of the thin, upper layer.
- Use a time-series of imagery to find a more stable SST edge (has been there for a few days, not changing too much)
- Look for 'pockets' of water (a 'pocket' is formed by a surrounding barrier to help concentrate fish)
- SST edges near a food source (plankton rich water) or which the location corresponds with a color/plankton gradient are better than isolated SST edges
- Use ocean current information to see where warmer water is pushing into 'richer', colder water.
- Use other convergence zone indicators such as sea surface height anomaly and subsurface temperature analyses to better judge the depth and stability of a SST edge (more on this below).

SV SSH Anomaly



Sea Surface Height Anomaly (SSH)

Sea surface height anomaly is measured using satellite altimeters. The data show the large-scale height of the ocean in relation to the Earth's geoid or a long term mean. Winds and atmospheric forcing can 'push' water to one part of the ocean or another effectively piling it up in spots and leaving depressions where the water was moved from. The resulting images show information analogous to hills and valleys in the ocean. Naturally, in order to come to equilibrium, the water on the tops of the 'hills' flows 'downhill' and the water in the 'valleys' flows 'uphill'. This creates large currents resulting in converging bodies of water.

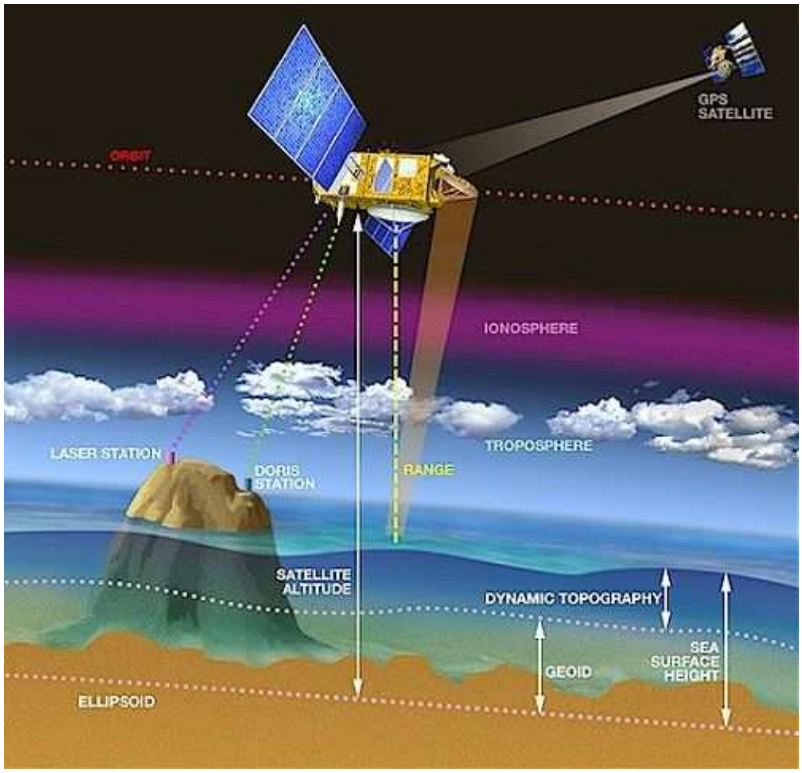


Figure 10: Illustration showing how satellite altimeters measure sea height (graphic credit: *CNES/D. Ducro)*

Typically the SeaView SSH images are enhanced between +30cm to -30cm or +15cm to -15cm in order to properly show the variability in height. The color green often represents the zone of zero anomaly. In the SSH imagery, fish are more often found in the green-yellow neutral or slightly positive zones on the outskirts of high and low anomalies as opposed to near the centers of high and low anomalies.

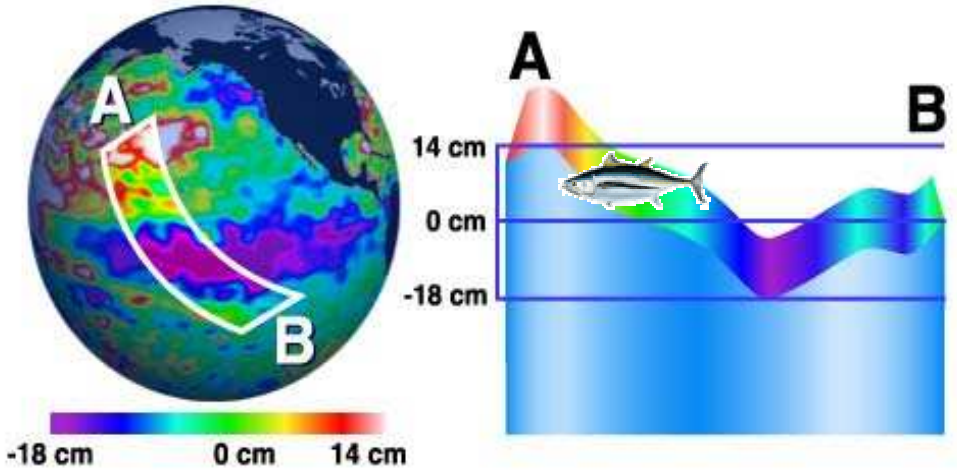


Figure 11: Fish are more often found in the neutral to slightly positive regions on the outskirts of SSH anomalies.

Furthermore, regions which show a relatively high SSH anomaly in close proximity to a low anomaly creating a pinched 'normal' height zone will have a higher chance of being productive convergence zones. Use the SSH data in combination with the other data types such as plankton and SST to narrow down which SST or plankton edges show the highest fishing potential or where along a break the best fishing spot will be. Since radar altimeter data is not affected by atmospheric conditions, SSH data can be used during periods of persistent cloud cover to help locate good fishing regions. SSH data are also used more frequently in tropical areas where SST gradients tend to be weaker and not the best indicators of convergence zones.

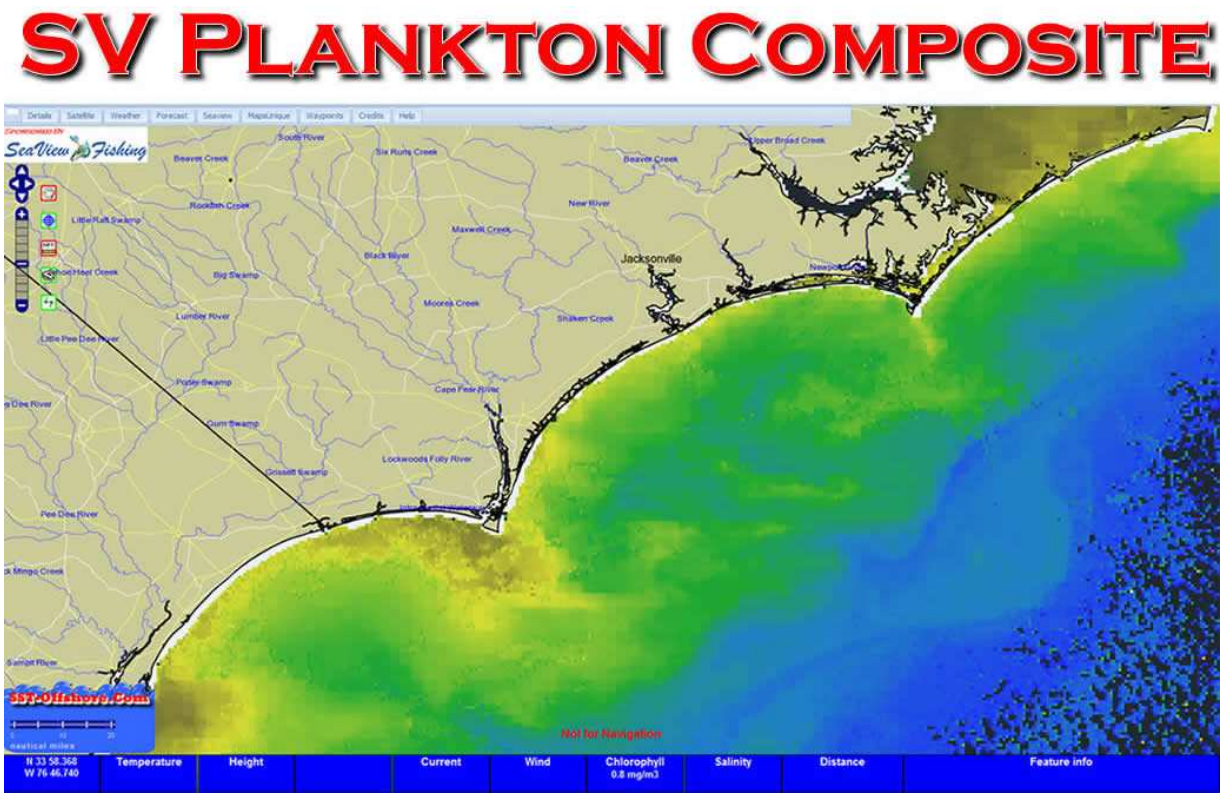


Figure 13: SeaView plankton image off of the North Carolina coast of the U.S.

Plankton levels (PLNK)

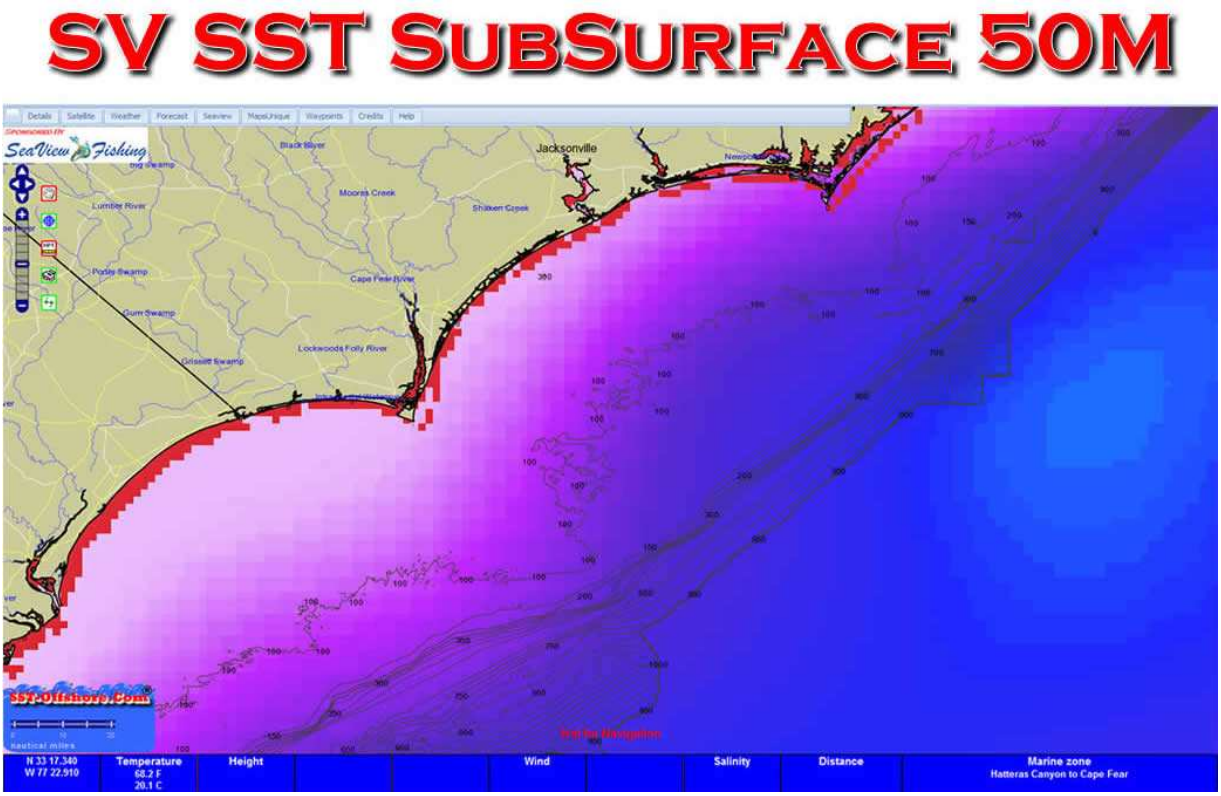
What SeaView calls plankton imagery is actually a measure of the plant pigment Chlorophyll_a measured in mg/m^3. Since phytoplankton is the plant constituent of ocean plankton (free floating microorganisms), the Chlorophyll level is a very good indicator of the amount of phytoplankton in a region. As a 'rule of thumb', at chlorophyll levels between 0.3-0.4 mg/m^3 the human eye begins to see the water as "off color", meaning not blue or green, but a transitional blue-green color. Levels above 0.4 mg/m^3 typically represent water which will appear green to someone on a boat. Phytoplankton is also the base of the food chain and the source of primary production in the ocean (see Figure 3, Page 5). So, not only does the plankton imagery show the color of the water, but these data are used as an indicator of the amount of life in a region as well. As

discussed above, the greener water showing higher plankton levels is more nutrient-rich and attracts more bait fish which feed on the phyto- and zooplankton. Along the coast higher plankton levels are most often linked to coastal upwelling, while in the open-ocean, vertical mixing or open-ocean upwelling brings the nutrients to the surface creating plankton blooms. More often than not pelagics such as tunas, swordfish and marlin are found near, but not in the green, plankton-filled water. Other species such as mullet, anchovies, sardines and salmon are commonly found within the greener water. Therefore, when searching for these fish, boats are often seen on the greener side of a convergence zone as opposed to on the blue, clearer side. Looking for a color gradient in the satellite imagery is still the best strategy, but for smaller, planktivorous species searching on the greener side will lead to higher success.

When combined with other information such as SST imagery, plankton imagery not only shows the possible presence of life (i.e. bait and birds) in an area, but can also offer insight as to the locations of convergence zones. If a plankton/color gradient is in the same location and position of a SST edge, that frontal is more likely to be a deep stable front rather than a transient surface feature

Plankton levels in warmer, more tropical waters are often significantly lower compared to temperate regions of the world. Therefore, the plankton gradients in those places are weaker as well. Some parts of the world's seas and oceans show chlorophyll levels (plankton) near 0.0 mg/m^3. This does not mean that these regions will be void of life, but rather that the plankton imagery will play a lesser role in the locating of oceanographic frontal zones. SSH, SST and other data types will be better suited in these areas to help find high potential fishing grounds.

It is also advised to watch the changing plankton conditions over time. Remember that what we are seeing in the imagery is the phytoplankton (plant plankton), so a plankton bloom, which has only recently appeared, may not have existed long enough to cycle through the food chain. A patch of plankton or a plankton edge may take 2-5 days before the zooplankton arrive to eat the phytoplankton; the baitfish arrive to feed on the zooplankton, and finally the large predator fish congregate near the bloom. Watching to see how long a plankton feature has been in place and whether or not it is stable enough over time to allow fish to concentrate in the area, will aid in narrowing down your search for the best possible spot.



Model-derived Oceanographic Analyses (SBST, SAL, MLD)

Up to this point, only the data, which is acquired by direct satellite observation, have been discussed. SeaView also offers analyses which are generated using sophisticated computer models to estimate specific ocean conditions. Technology does not yet exist to directly measure this information on a large synoptic scale. The salinity, mixed layer depth and subsurface temperature analyses are all created by inputting known parameters such as SST and SSH into models and having a powerful computer system produce synthetic images showing the parameter in question. While little research has been done to test the effectiveness of these analyses for locating good fishing spots, they can be used as additional pieces of information to aid in the location and assessment of oceanographic convergence zones.

The oceanic mixed layer is a layer in which active turbulence has homogenized some range of depths. The surface mixed layer is a layer where this turbulence is generated by winds, cooling, or processes such as evaporation or sea ice formation, which results in an increase in salinity. The plankton layer in the water column is often closely associated with the mixed layer depth (Figure 14). What's more, the mixed layer depth is very often equivalent to the thermocline depth (Figure 15). The SeaView mixed layer depth analysis is a 2-dimensional image in which the depth of the mixed layer is represented by different colors (Figure 16). Areas in the analysis showing significant changes in color over distance can indicate a convergence zone. Some fishermen also prefer to target waters with a deeper or shallower mixed layer depth.

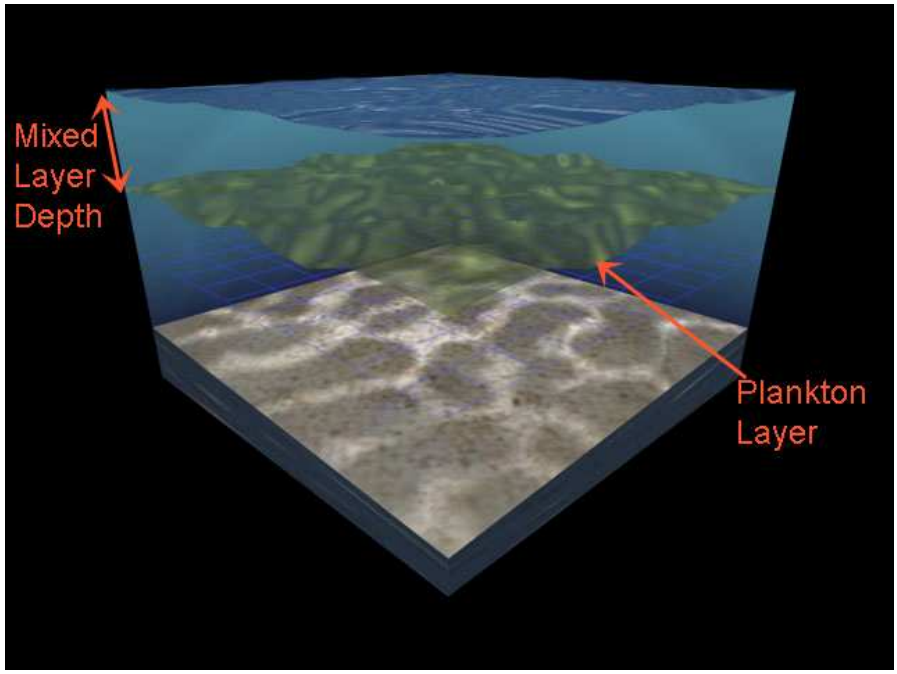


Figure 14: A graphical representation of the mixed layer depth

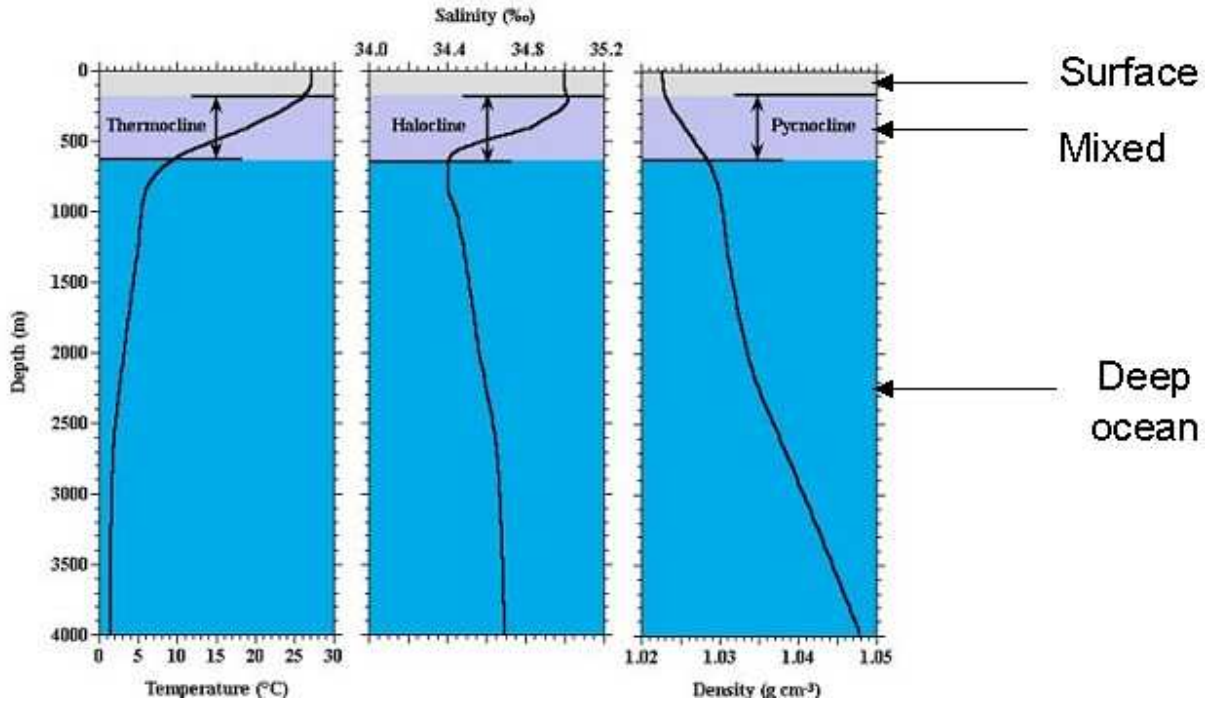
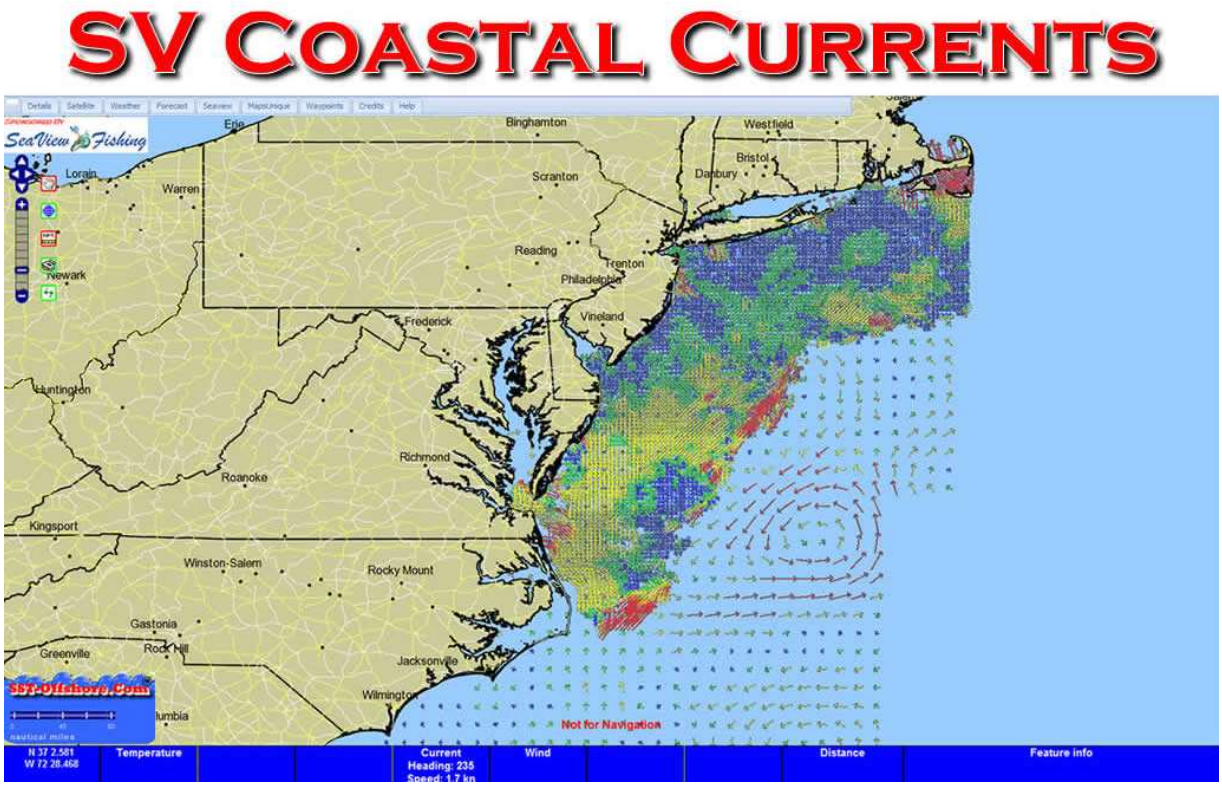


Figure 15: Graphic illustrating the correlation of the thermocline, halocline and pycnocline to the mixed layer. The thermocline is a section of the water column showing a sharp change in temperature with depth. The halocline shows a sharp change in salinity with depth and the pycnocline shows a sharp change in density with depth. (graphic credit: http://ocp.ldeo.columbia.edu/)

Ocean surface salinity and sub surface temperature analyses can show potential areas of convergence too. While these images are of relatively coarse spatial scale, they are generated

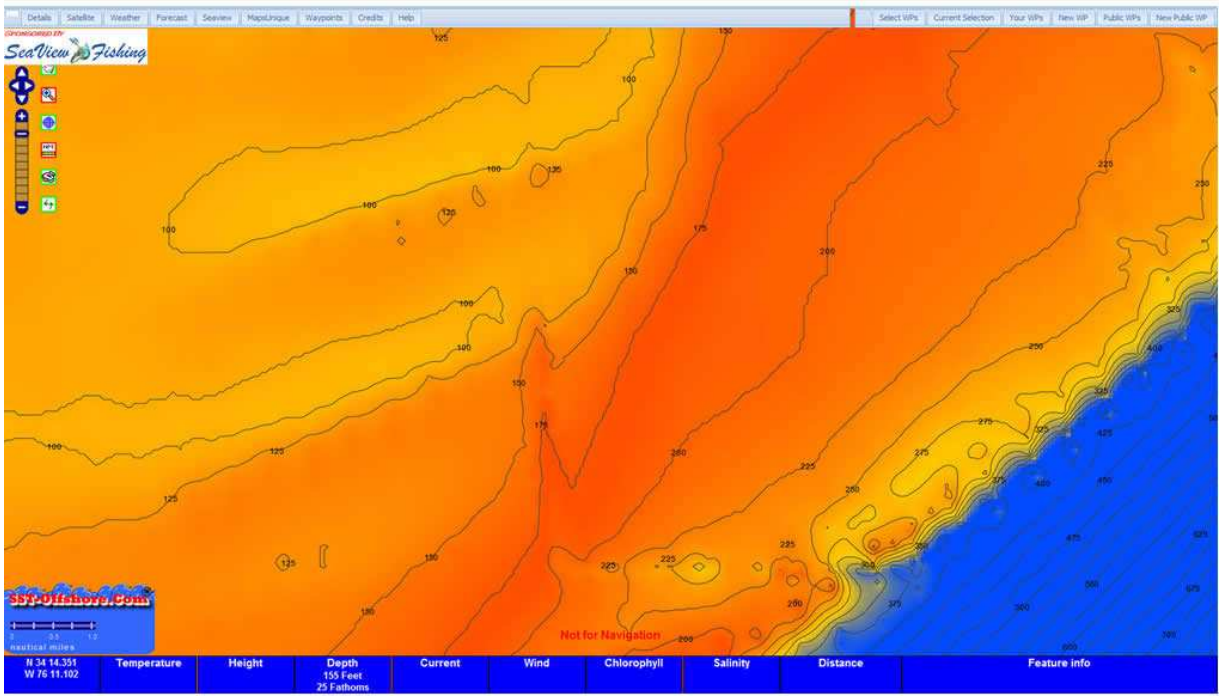
regardless of cloud cover and can offer clues as to general areas where ocean frontal zones exist. Again look for sharp changes in shade in the analyses.



Ocean Currents

As mentioned above knowing the direction and speed of the surface currents can help to find better fishing spots. The most common type of the currents shown in SeaView are called geostrophic currents meaning that they are currents resulting from the balance between gravitational forces and the Coriolis effect. These currents are computed using the SSH data. While they do not take into account effects from wind and other daily changes in atmospheric forcing, these currents are often quite accurate. OI also offers High Frequency Radar derived currents for parts of the U.S. coastline where these systems exist. These current data are more detailed, accurate and do take into account effects from wind. When studying the currents, look for areas in your fishing ground that show currents merging together or moving cooler, green, nutrient-rich water into warmer, clearer water.

COASTAL RELIEF MODEL



Bathymetry

Bathymetry is the sea floor bottom topography. Fish often congregate near and around features such as banks and pinnacles that rise from the ocean bottom. These physical protrusions can create upwelling and vertical mixing bringing nutrients to the surface. They can also set up merging currents creating fish-attracting frontal zones. In SeaView, bathymetric contour lines can be overlaid over any image to show the relationship between ocean parameters such as SST to the bottom topography. If a significant SST or plankton edge is near a bank or pinnacle, the fish-aggregating potential of that SST or plankton edge is increased.

Combining Data for Best Results

Understanding how the varying conditions in the fish's habitat interrelate and how the forces are working together at the time of fishing will help make better decisions regarding the best fishing spots. Whether trying to find the best location along an SST gradient, choosing which pocket of water may be concentrating the species you are targeting or working to determine the location of fish-attracting oceanographic convergence zones, studying more than one aspect of the ocean conditions will improve your decision making process. In SeaView, images can be displayed side by side or by using the software's tools to overlay one piece of information on top of the other. Take the time to learn how the different oceanographic parameters in your particular region combine together to create optimal fishing conditions and you will benefit in the long run.

Complete Layer List available in SST-Offshore's Bluewater Supermap

~FREE~

Bottom Mapping with Science Grade Data

Offshore Color Relief of the Bottom

Contours 10 Feet - 25 Feet - 50 Feet - 75 Feet - 100 Feet- 200 Feet - 500 Feet According to Zoom Level

USCG Offshore Navigation Charts

Offshore and Entrance USCG Navigation Charts

SST Charts - AVHRR SST Charts - MODIS SST Charts - GEOS SST - SST Chart Composite - All 3 SST Charts with Loops

Sea Surface Temperature Charts from all the 3 NOAA Satellites with Looping Subsystem. Complete Read outs of Position and Temperature. Updated every 6 hours. These SST Charts are NOT "Pretty Pictures". All of our data is built into a GIS System for Positional Accuracy. All 4 SST Charts Feature a Looping Subsystem that can Add SST Charts, Subtract SST Charts, Loop SST Charts, Rock SST Charts forward and backward and Zoom in to Looping SST Charts. This is State of the Art in SST Chart Tech!

Chlorophyll Charts - with Loops

Chlorophyll Charts updated every 6 hours. Complete Read outs of Position and Chlorophyll level with high positional accuracy.

Satellite Imagery - Infrared - Visible - Water Vapor - True Color

Satellite Imagery of Current Conditions updated every hour. A great Way to get an Overview of the coming weather conditions.

Current Offshore Conditions

All NDBC Buoys Reports PLUS Ship Reports in one easy to use interface. Updated every 10 min

Forecasts - NWS - GFS - GFS Marine - ETA/Name - ETA/NAM Marine

Complete Forecast coverage from the National Weather Service including Advisories, Warning and Watches. Global Forecasting System, North American Model, nearshore and Offshore NWS Forecasts. All in a Clickable detail format. Get Complete Weather Coverage in Minutes, all in one place. If you want the WHOLE picture...This is where to get it FREE.

WaveCast - Wave Height - Wave Period with Loops

The WaveWatch III Weather Model forecasting Wave Heights and Wave Period every 2 hours. View In Map graphics or Loop the images to watch the overall pattern.

ReefCast - Wind Speed - Wind Direction - Wave Height - Wave Period

The Original ReefCast, 3 mile x 3 mile forecasts for anywhere you click for the next 7 days. We track multiple seas through ReefCast w/extra Wave Data and Multiple Model Runs through ReefCast Ensemble. If you have never seen this be sure to try it. This is where it all started.

This is the Best Offshore Forecasting tool you will ever use.

Tides - All Primary and Secondary Tidal Stations

All primary and secondary Tidal Stations for the entire East Coast and Gulf Coast including Sunrise and Sunset from 1970 to 2037.

Solunar Tables

Solunar Tables for any location including Major and Minor Bite Times, Sun Rise, Transit and Set. Moon Rise, Transit and Set. Action Rating, Moon Phase and illumination.

Waypoint Management System

Complete Waypoint Management System for uploading YOUR PRIVATE waypoints to create your own Custom SST Charts. Ever wondered where that Temp Break really was compared to YOUR waypoint? Upload your numbers and create your OWN PRIVATE SST Chart. You can also Download our 8000+ waypoints. Add, Edit, Delete, Select Icon and Select Category for Display are all included. The ability to add YOUR waypoints on our charts make SST-Offshore.Com the state of the art in SST Charts.

SeaView Premium Service Includes all the above PLUS….

Sea Surface Temperature with Loops

Cleaner, more accurate SST information, posted within 2-3 hours of overpass, better cloud masking than other sources. 1 Day, 3 Day and Cloud Free Composites. This is highest Resolution SST Charts available. They are updated within hours of the satellite overpass and have extreme high positional accuracy. If you need the absolute best SST Charts available, this is the SST Charts that you want!

Plankton Density with Loops

Geographically more accurate data with better cloud masking than other sources and a daily composite.

Sea Surface Height Anomaly with Loops

Sea Surface Anomaly analyses interactive data layer like the SST

Offshore Currents with Speed, Direction and Loops

Geostrophic ocean current vectors as an interactive data layer (updated daily). This is worth the price o0f admission by itself. Knowing the direction and speed of the currents can save you major $$ in fuel! Bottom Fishermen take note of this! Would you like to know what area the current is running in BEFORE you go?

Sub Surface Temperatures - 50m - 100m - 300m with Loops

Medium resolution sub surface temperatures at 50, 100 & 300 meters not just static graphic image, but an interactive data layer like the SST

Salinity

For more information on Ocean Imaging's SeaView service, please visit www.SeaViewfishing.com.

For more information on SST-Offshore.Com's Bluewater Supermap and SeaView service, please visit www.sst-offshore.com.