

ISLAND WEATHER

By Patrick J. Tyson

“Island!”, announced the old salt, pointing with his grizzled chin toward the distant horizon.

“Where?”, responded the tourist, rushing to the ship’s rail. Then, after a fruitless scan of the horizon, “I can’t see any land out there!”

“Still below the horizon.”, the salt admitted gruffly.

“Then how do you know it’s there?”, challenged the tourist.

“Cloud”, came the laconic reply. Then, grudgingly, “That cloud cap over there stays still while the other clouds drift with the wind. The island is underneath.”

The tourist raised one eyebrow skeptically.

“Island!”, repeated the old salt in a tone that brooked no argument. Then, nodding his grizzled chin in finality, he turned away.

And so it was.

Cloud Caps: Islands, especially mountainous ones, often create their own cloud caps, distinctive clouds that hover stationary in the wind above the island. Winds, sweeping across the open seas, pick up water vapor from the sea surface. Encountering the barrier of an island, they are forced to rise. In rising, the air cools and cloud droplets condense out of the moist air.

The life span of an individual cloud droplet, however, is only a matter of minutes. The droplets are created in their billions in the updraft on the windward side of the island’s crest, drift across that crest with the wind, and evaporate into water vapor once more as the air descends the leeward slopes, warming as it goes.

The life of a cloud cap droplet may thus be brief, but the cloud itself may last for months under the right conditions.

Do all islands produce cloud caps? No, but the majority of them do at one time or another. This cloud cap is most likely when the island is large, when it is mountainous (or, at least, hilly), and when the winds are persistent.

Small islets don't force enough air up to create a cloud under most conditions. Still, even small islets can create a cap cloud if conditions are just right. There have even been instances of small cloud caps actually being formed over ships at sea.

Very flat islands may not produce enough uplift due to topography, but can create cloud caps due to their surfaces being warmed sufficiently to create thermal updrafts. Naturally, these caps form during the day and disappear when the island surface cools at night.

Mountainous islands almost always have a cloud cap, no matter which way the wind is blowing. If there is no regional wind, the cloud cap may once more disappear when the sun goes down.

The best cases of island cloud caps can be found on mountainous islands in areas of persistent winds (winds that blow from the same quarter at least two-thirds of the time). The Trade Winds and monsoon winds are among the most persistent on earth. It is in the parts of our globe where these winds are found that island cloud caps reach their best development.

Windward versus Leeward: Why should you be concerned about cloud caps? Because, cloud caps tend to make the windward sides of islands a bit less sunny than the leeward sides. Since clouds produce rain from time to time, the windward sides of islands are often rainier than the leeward sides, as well.

This climatic distinction between the windward and the leeward sides of islands is often embedded in the local language. In Hawaii, the windward direction is called *koolau*, and the windward sides of the islands carry the same designation. The leeward direction is termed *kona*, as are the leeward shores. The Hawaiians wouldn't have made these linguistic distinctions unless they thought it was important. Resort developers very definitely agree with them. Most of Hawaii's major resort developments can be found on the *kona* shores.

An excellent example of this can be found on Hawaii's Big Island. The Hawaiian Islands are located in the belt of the Northeast Trades. These winds blow rather steadily and strongly out of the northeast most of the year. Hilo, on the windward (*koolau*) northeast side of the island, averages some 140 inches of rain per year. The suburbs on the higher slopes can get half again as much. Rain falls on four out of five days over the course of the year.

The Kailua - Kona resort area by contrast, on the sheltered leeward (*kona*) southwest side of the Big Island, only gets about 27 inches of rain for the year.

And that, gentle readers, is why the big Hawaiian resorts are located where they are. The leeward shores of the Hawaiian Islands are sunnier than the windward ones, and they get less rain. Tourists like sun and don't like rain. What could be simpler?

The islands of the West Indies are located in the same belt of the Northeast Trades. Here, almost all of the older communities are located on the sheltered lee shores. Not only are these shores sunnier and drier, but they offer more protection from the tropical storms that sweep the region during the summer and autumn.

Windward shores do have their advantages, however. They are a bit cooler in the afternoon and in the summer, a bit warmer in the night and in the winter. They have more and stronger sea breezes. They have the best surf and more dramatic vistas of wind and wave. They have fewer flying insects, due to the same strong inshore breezes. And, they are generally less crowded—a big plus in the eyes of many.

So, when that time-share salesman offers you that "really good deal", find out on which side of the island the property is located before you put your name on the dotted line.

Sea Breezes and Land Breezes: While sunning yourself on the sands of your favorite (leeward) beach resort, you may find yourself pleasantly cooled by the sea breeze. Sea breeze? Aren't the winds supposed to be blowing out to sea on the leeward shores?

Yes, they are. And the regional winds aloft are most likely behaving properly and blowing in their assigned direction. However, the contrast between the different rates at which land and sea heat and cool produces shallow, local

winds that vary from day to night. These strictly local winds are called sea breezes and land breezes. (All winds, by the way, are named after the direction *from which they blow*.)

Under sunny skies, the land begins to warm slightly after sunrise. Warmer island air is less dense than the cooler air over the sea, and this cooler air will move in and push the warmer air up. This sea breeze usually becomes noticeable about two hours after sunrise, and strengthens as the day progresses. It is strongest when the temperature difference between land and water is greatest—in mid-afternoon. It then diminishes and generally disappears around sunset.

Since land cools much more quickly than water. The island may cool sufficiently during the night to produce a much weaker land breeze. This breeze usually starts rather gently before midnight, and reaches a mild peak around sunrise. This outward flow accounts for the rather common practice of sailing ships leaving port at dawn. When you depend upon wind power, you take advantage of the winds you have—no matter how light.

These land and sea breezes are quite shallow, usually only a few hundred feet in depth at most. Moreover, they don't reach very far inland, especially when they have to contend with the much stronger regional winds such as the Trades. The windward shores of the Hawaiian Islands don't show much of a land breeze at all when the Trades are in full force. .

Also, these breezes depend upon strong local heating. They diminish on cloudy days, or disappear altogether. And you won't find them when both the land and the sea are at essentially the same temperature, such as when covered with ice and snow.

Land breezes are strengthened by the presence of mountains behind the coast, with cooler air getting a boost from gravity as it flows downhill toward the coast. Flat islands often don't get much in the way of a land breeze.

Finally, a gentle reminder that—human nature being what it is—people will call any breeze that comes from the water a “sea breeze”, and any wind that blows from the land to the water a “land breeze”. They don't care whether it's shallow or deep, local or regional.

Islands versus the Mainland: Islands generally have a climate that is significantly different from that of the nearest mainland at the same latitude. The reason for this is the obvious one: they are surrounded by water. Water heats much more slowly than does land, and cools much more slowly as well. This temperature lag has two major effects.

Both the daily range of temperature and the annual range will be much less on the island than on the mainland. The surrounding water tends to moderate temperatures. Days won't be as hot, nights won't be as cold. If the island has both winters and summers, then the summers won't be as hot and the winters won't be as cold.

The Channel Islands, just off the coast of Los Angeles, California, have a daily range of temperatures that averages 12° (55° to 67°) and an annual range of 53° (38° to 91°). Los Angeles itself, on the coast, has a daily range of 19° (54° to 73°) and an annual range of 63° (36° to 99°). Palm Springs, farther inland, has a daily range of 33° (55° to 88°) and an annual range of 95° (24° to 119°).

The moderating effect of the surrounding waters also means that island seasons will be delayed over those on the mainland. This delay can range from a few days to a few weeks. This is especially important in agriculture, particularly fruit-growing. Island orchards will blossom significantly later in the season, compared to orchards on the mainland. This allows them to avoid many of the spring frosts that can be devastating to fruit-farmers.

For tourists, it means that tropical islands may be later in getting the summer heat, and that mid-latitude islands may stay fairly pleasant when the first cold snaps of autumn are chilling the mainland.

All in all, islands have a lot going for them in terms of their weather. Compared to the mainland, they are cooler in the summer and warmer in the winter. Their days aren't as hot and their nights aren't as cold. Their beaches have a climatic variety over short distances that may be lacking on the continent. If you feel that it is too muggy, then head for the breezes and surf of the windward shores. If you feel it's too cool and windy, head for the warmth and sunshine of the leeward shores.

Or, simply relax on the beach, sip a cool drink, warm yourself in the cheery sun, cool yourself with the pleasant murmuring of the sea breeze, and don't worry about any of it.

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