

The Brendan Trophies: Insights for the New Millennium

Can amateurs cross the Atlantic on 144 MHz without satellites or moonbounce? Here's another look at this fascinating challenge.

Since 1998, much has been discussed and written about the Brendan Trophies. All who have tried to obtain them have come up short in one way or another. This article is designed to free the amateur imagination in the hopes of sparking a renewed interest in systematically conquering this next frontier of the amateur VHFer: the spanning of the Atlantic Ocean on the 2-meter band.

According to the Irish Radio Transmitters Society Web site,¹ “The Brendan Trophies will be awarded to each of the operators of the two Amateur Radio stations which first establish two-way communication between the continents of Europe and America (North or South) within the Two Metre Amateur Band [using an all-terrestrial, non-artificial means of propagation].”

The challenge is straightforward. Though rules are few, rest assured that a well-organized peer-review process will

closely audit the first applications. Take the time to visit the Web site to read the entire award text. By doing so, one will gain insights that are otherwise not possible. This article will examine three factors in this quest: hemispheric geography, known propagation modes and recent advances in amateur technology. With this information to consider, perhaps some readers somewhere will be encouraged to assemble a plan that will eventually attain this Holy Grail of the amateur VHFer.

The Geography

The natural inclination is to believe that one should begin examining the path geography by determining the shortest distances between the two continents. Attention quickly turns to the area around St John's, Newfoundland. The distance from here to Europe's westernmost point is slightly less than 3150 km. While this point seems well situated for Brendan Trophy success, the fact is that there aren't

many high-power VHF narrowband-interested amateurs here. Still, expeditions are not out of the question.

Focusing on the United States, the easternmost point is in Maine, fully landlocked as far as a direct RF path to Europe is concerned. This would imply the need for altitude and the mentality of an expedition (bringing along everything one needs for the job). From Maine, Europe is some 4130 km distant at best, though there are some good mountaintop candidates just a few kilometers inland that would provide some excellent RF take-off angles. Much further inland are several good mountaintop candidates, including Mount Washington, New Hampshire (grid FN44ig). Its 4500+ kilometers to Europe's closest point is somewhat mitigated by its towering 6288 foot (1917 meters) stature. Climate there can be brutal and amenities are few, making any serious effort quite problematic.

Remember, though; if one is considering a “line of sight” mode such as



Figure 1—The path from North America to Europe from the North Carolina coast. The gold area highlights the all-water path, while the orange shows some mid-path obstruction by coastal landfall.



Figure 2—Brendan Trophy pioneers as far south as South Florida enjoy not only an excellent *squint angle* to the European continent, but may be able to take advantage of Gulf Stream related enhancement.

Meteora	3,162	K5UR	(EM35wa)	--	ED4ERG	(FK60vg)	13-Dec-1998
Meteora	2,496	K6WNY	(EM32dm)	--	N1REZ	(FM55ea)	11-Aug-1998
Meteora	2,364	W5ORH	--	KL4BR	12-Aug-1998		
Meteora	2,339	W2CRS	(EM78lx)	--	EA2RDO	(FM12ea)	12-Aug-1994
Meteora	2,219	N8RT	(EM77jg)	--	N1GDP	(FM55eq)	12-Aug-1994
Meteora	2,217	N8KQV	(EM96gk)	--	VR3RKE	(FM25na)	17-Nov-1998
Sporadic E	3,636	W4YGE	(EM13eo)	--	N4FF	(EL96em)	29-May-1998
Sporadic E	3,617	K7TUV	(EM98dv)	--	N4QE	(EM90gc)	29-May-1998
Sporadic E	3,501	W7YOE	(CM87vz)	--	NR4CGG	(EM72do)	06-Jun-1998
Sporadic E	3,185	NW7O/7	(EM25gz)	--	ED4WF	(EM92kb)	14-Jun-1997
Sporadic E	3,028	W4YFD	(EM30ap)	--	NR4CDA	(EL88qa)	29-May-1998
Tropo (F)	4,333	K6GME	(EK29go)	--	N7FI	(CM87va)	01-Jul-1995
Tropo (F)	4,325	K6GME	(EK29go)	--	N7FDZ	(CM87vz)	01-Jul-1995
Tropo (F)	4,281	K6GME	(EK29go)	--	XE2/W6RQ	(DL28ug)	19-Jul-1999
Tropo (F)	4,179	K6GME	(EK29go)	--	N7KSI	(CM86em)	30-Jun-1995
Tropo (F)	4,097	K6GME	(EK29go)	--	NTAVE	(CM84lv)	30-Jun-1995

Figure 3—North American DX records for various propagation modes that have been proven to support 3100-km+ DX on the 2 meter amateur band.



Figure 4—Compare the Hawaii-to-West Coast path and the potential North America-to-Europe path.

meteor scatter or E_s (where the refracting medium must be line-of-sight to the participants), greater distances tend to reduce the chances for success.

If one is willing to consider a tropospheric propagation mode, then proximity to open water has its advantages. For instance, the longest tropospheric DX to date has occurred over all-water paths. The closest point in the US that has an unobstructed all-water path to Europe occurs along the Massachusetts shoreline. More of Europe comes into direct view as one travels farther south. Figure 1 shows the path from North America to

Europe from the North Carolina coast. The gold area highlights the all-water path, while the orange shows some mid-path obstruction by coastal landfall. Does landfall (especially at mid-path) negatively impact such a potential circuit? It's entirely possible that any effect is minimal. It certainly shouldn't stop anyone from trying.

Of course, the farther south one travels along the US East Coast, the greater the distance to Europe. Interestingly though, more southerly locations include additive factors that more northerly locations don't enjoy (see the sidebar "The

Slowly Swirling Sargasso Sea").

Figure 2 illustrates how potential Brendan Trophy pioneers as far south as South Florida enjoy not only an excellent *squint angle* to the European continent, but may be able to take advantage of Gulf Stream related enhancement. Interestingly, this route takes RF through several mid-Atlantic islands. Is this 6600 km path to Europe surmountable? The only way to know for sure is to try.

3100+ km Propagation Modes

Let's examine amateur distance records for North America. Doing so may

The Slowly Swirling Sargasso Sea

It is an oval of some 3 million square miles in the North Atlantic Ocean, where the waters are warm and calm and the seaweed was thick enough to convince Columbus that he must have been near land, though it was still hundreds of miles away. It gets its name from the Portuguese word for grape, a reference to the seaweed's grapelike floats. This sea has no land-boundaries. Jules Verne's *20,000 Leagues Under the Sea* immortalized it.

The Sargasso Sea is an area of the North Atlantic Ocean that is bounded on the south by the North-Equatorial Current and to the north by the Gulf Stream. As a result, the waters here form a warm water lens that slowly rotates clockwise across the mid North Atlantic Ocean.* The accompanying graphic shows the area known as the Sargasso Sea in gray and the paths taken by these mid-ocean currents. The extreme North Atlantic is well known for its bitter winds and harsh weather. It is entirely possible that an approaching front from Greenland and/or hurricanes from Africa's west coast could inject just the right mix of conditions upon Atlantic waters bounded by these mid-ocean streams, further enhancing 2-meter propagation on this path.**

The path from EA8, through the Iberian Peninsula to the UK (shown in light green in Figure A) is a well-exploited 2-meter path. Periodically, 2-meter DX along North America's Atlantic coast will likewise mirror this success. The three

*kingfish.coastal.edu/gulfstream/page2.html

**ARRL Handbook, 1991, p 22-17 and Proceedings of the 21st Conference of the Central States VHF Society, 1987, p 34, "The Thanksgiving Tropo Opening of 1986" by Jon K. Jones, NOØY.

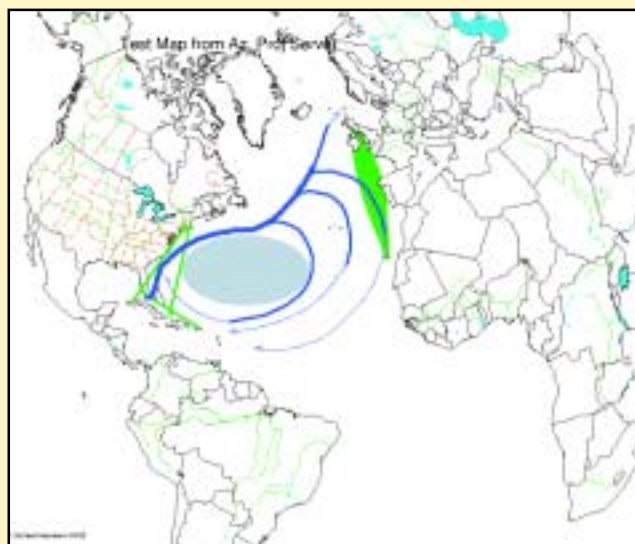


Figure A—The path from EA8, through the Iberian Peninsula to the UK (shown in light green) is a well-exploited 2-meter path.

longest documented Atlantic QSO paths are shown in green as well. Certainly noticeable is the fact that these are not as long as the Pacific paths attained to date. Is it possible that the previously noted environmental features could combine to promote transatlantic 2-meter propagation some lazy summer day?

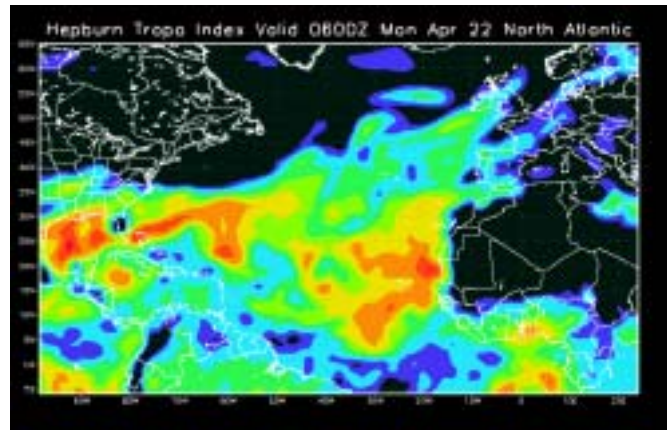
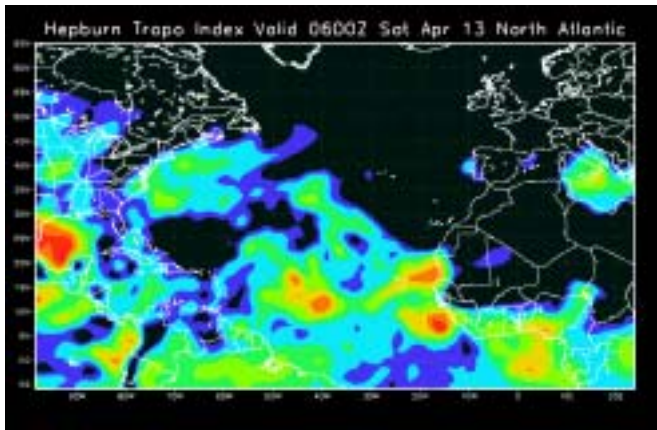


Figure 5—As this article is being written (mid April), a check of the Hepburn tropospheric forecast page shows an interesting potential already forming across the ocean.

offer special insights into an eventual Brendan Trophy success.

Al Ward, W5LUA, and Emil Pocock, W3EP, have long kept distance records² for amateur VHF operation in North America. VHFers have used these as both gauges and goals. We may be well served by starting here in setting a strategy to conquer the Atlantic Ocean on 2 meters. Figure 3 shows the present North American DX records for various propagation modes that have been proven to support 3100-km+ DX on the 2 meter amateur band. The eagle-eyed observer will note that the Transequatorial (TE) mode is omitted. The obvious reason is that the path from North America to Europe does not cross the equator.

As one looks through such listings, it is important to remember that some of these are distance limited by the physics of the propagation medium, while others are simply the best DX that has been accomplished to date. There are natural limits that are associated with some modes (ie, the maximum distance a single E-hop can support) and known activity levels in remote areas. Using an HF analogy, North Korea isn't rare because of lack of propagation. It's rare because there simply is very little bona fide amateur activity there. Keep this in the back of your mind as we examine our present records, remembering that where activity can be generated, DX records can be broken!

The longest attained paths have used tropospheric ducting (from KH6HME to W7FI) at 4333 km, sporadic-E (double-hop from WA7OSK to W4FF) at 3635 km and meteor trail refraction (from K5UR to KP4EKG) at 3154 km. Remember that, at their closest, the two continents are slightly less than 3150 km apart! The Brendan Trophies appear to be quite attainable using existing, known propagation modes or combinations of propagation modes!

Thinking Outside of the Box

Interestingly, amateurs tend to overlook the tropospheric *inversion* or *ducting* path as a transatlantic possibility. This may be due to the fact that the extreme north Atlantic waters are not normally known for being warm enough to support such a path from the Canadian Maritimes to Europe. For the sake of free thought on the topic, let's focus on that for a moment.

Long-distance all-water tropospheric ducting has proven to be well documented, thanks to the KH6HME CW-based propagation beacon high atop Hawaii's Mauna Loa volcano. Almost every summer, amateurs along the US West Coast are treated to the experience of speaking with their fellow Americans more than 3000 km to their west. The opportunity usually begins with someone in Southern California happening to catch weak snippets of Paul's 60-W beacon peaking out of the noise. With a simple telephone call, Paul makes the long journey from his home to the beacon location in order to give as many folks as possible the opportunity to make contact with the 50th state.

Though the opening seems to start in the South, it can often spread quite far up the coast. On several occasions the duct has extended into Oregon and Washington. Apparently, the path is also viable well south of the border with Mexico, too. Mariner Clint Walker, W1LP, has made the grade from off the coast of Mexico's Baja California peninsula!³

Is there a comparison to be made between the Hawaii-to-West Coast path and the potential North America-to-Europe path? Amazingly, there is! With the help of the Web-based [wm7d.net](http://www.wm7d.net) azimuth equidistant map generator, we can see that there is a startling similarity (see Figure 4). The geography and geometry of the present North American 2-meter tropo-

spheric DX record seems to imply promise for a similar success across the Atlantic. The yellow area represents the unobstructed great-circle path from Miami to Europe, while the orange area shows a path that includes some mid-path obstruction. As an aside, let's not forget that the KH6-path tends to open across the warmer southerly waters first. Is it possible that the path from Florida to the Canary Islands (off Africa) could be spanned even before Europe is reached? Why not try?

Another tool that many amateurs and TV/FM DXers use is Bill Hepburn's Web-based Tropo Forecast pages.⁴ Bill assembles various National Weather Service data, massaging it into a visual format that has proven to have a decent correlation to actual RF propagation conditions. As this article is being written (mid April), a check of his tropospheric forecast page shows an interesting potential already forming across the ocean (see Figure 5). The examples show how much tropospheric conditions can change over a period of just a few days. The red, orange, yellow and green (in order of decreasing intensity) show areas where raw NWS data suggests tropo enhancement could be forming. Such enhanced potential will spread farther north and intensify as the summer approaches. Could the tropospheric path have always been there, yet somehow escaping our notice?

Could Digital Close the Divide?

Over the past two years, new and exciting digital modes have presented themselves. Whereas meteor scatter work used to be divided between SSB and CW (with some sporadic work with AX.25 packet), there is now another high-speed mode that is catching the imagination of even moderately powered stations: WSJT's *FSK441*. This is an important improvement to the amateur state-of-the-art as it

allows participation by stations with only a couple of hundred watts of power and moderate antennas. It is so efficient that it is no longer necessary to wait for meteor showers in order to use the mode.

This is significant because the North American meteor mode DX record involved W5UN's massive moonbounce array and maximum RF output. *WSJT* may be just the ticket for power-limited UK operators (400 W maximum RF output) to be heard in North America using meteor trail refraction. There is even some discussion that this year's Leonids (mid November) meteor shower may include coordinated efforts on both continents.⁵

What about those 99% of us who cannot afford to make the trip to Newfoundland or the highlands of New England in order to engage in a coordinated meteor mode effort? A new application for PSK31 has surfaced—BEACONet^31. Using this system, participants along each continent's Atlantic coasts transmit their call signs and grid locators via PSK31 every 10 minutes around the clock via a computer-automated system. When the signal is received, an icon appears on a computer map and an audible alarm goes off, alerting participants to an open-



Figure 6—A simulation of what could be displayed for BEACONet^31 participants, should the “ether” above the Atlantic open for intercontinental communication from South Florida to Portugal (with implied participation on the Atlantic island-nations along the way).

ing in progress and allowing both stations to engage in a keyboard-to-keyboard PSK31 QSO or simply pick up the microphone and complete the contact in a more traditional way. Such a system can lie in wait for a tropospheric or E_s path across the Atlantic, doing so around the clock. Figure 6 shows a simulation of what could be displayed for participants, should the “ether” above the Atlantic open for intercontinental communication from South Florida to Portugal (with implied participation on the Atlantic island-nations along the way). For more information on this system, visit go.to/BEACONet.

With any fortune, this article has included points of view that you may not have considered before. Perhaps you can picture yourself as being on one end of the transatlantic circuit. Will it be by

meteor trail propagation? How about double-hop sporadic-E? It may just be a transatlantic extension of an intense Bermuda High pressure system that links the two continents. Will it take SSB/CW, *FSK441*, BEACONet PSK31 or some other system? No matter what operating method or propagation mode is first successful, one thing is obvious: it will be successful as a direct result of demonstrating the pioneering amateur spirit.

Notes

¹www.irts.ie/brendan.htm.

²www.arrrl.org/qst/worldabove/dxrecords.html.

³21 August 1999, 0737Z, KH6HME (BK29g) to W1LP/mm (DL51ce) = 4754 km, a world DX record

⁴www.iprimus.ca/~hepburnw/tropo_nat.html.

⁵Stay current with meteor scatter news at www.qsl.net/w8wn/hscw/papers/hot_news.html. QST

STRAYS

QRP DXCC AWARD

◇ In recognition of the popularity of QRP operating, the ARRL is pleased to offer the QRP DXCC Award. This award is a one-time, non-endorsable award, available to all amateurs who have contacted at least 100 DXCC entities using



5 W output or less (see the list on the Web at www.arrrl.org/awards/dxcc/). To apply for the QRP DXCC award, just send a list of your contacts and contact dates. You do not need to send QSLs. The list must also carry a signed statement from you that all of the contacts were made with 5 W RF output (as measured at the antenna system input) or less. You will find a downloadable application form on the Web. You may send your request to QRP DXCC, ARRL, 225 Main St, Newington, CT 06111, or you may fax your request to 860-594-0259.—ARRL DXCC Desk

DEPARTMENT OF STATE STATION QRV

◇ Calling all US Foreign Service Amateur Radio operators. The Department of State

Amateur Radio Club (DOSARC) has renovated W3DOS, its club station. We're looking for new members and trying to locate old ones. Please send an e-mail message to hank@foreignservice.org with your name, US call and foreign call. Or visit the club's Web site, www.foreignservice.org/hamradio.html. The Foreign Service Net continues to meet Sundays on 14.316 MHz from 1500 to 1530Z, on 21.416 MHz from 1530 to 1600Z, and on 28.416 MHz from 1600 to 1630Z, with Jim Henderson, KF7E, usually acting as Net Control.—Dexter Anderson, W4KM

NEW PRODUCTS

LIGHTWEIGHT VERTICAL ANTENNA FROM MFJ

◇ MFJ's Model 1795 vertical antenna covers 40, 20, 15 and 10 meters in a convenient, portable package that's designed for restricted neighborhoods, Field Day or an impromptu DXpedition. Easy to set up and take down, the 1795 can be adjusted for an installed height of between 7 and 10 feet. Other features include automatic band switching, low-angle radiation, a 1500-W PEP power rating and an efficient end-loaded design.

Price: \$169.95. For more information, contact your favorite Amateur Radio products dealer or MFJ, 300 Industrial Park Rd, Starkville, MS 39759, tel 800-647-1800, fax

662-323-6551; mfj@mfjenterprises.com; www.mfjenterprises.com.

VERSATILE SPIRAL SAW FROM ROTOZIP

◇ Developed to speed the work of sheetrock hangers and carpenters, the new Rebel spiral saw from RotoZip is said to have the ability to “plunge” into work material and make “inside cuts.” It is designed to make short work of circular and rectangular cut-outs in sheet metal that previously required “chomping” with a nibbler tool.

Accessories include a variety of cutting and routing bits; a precise, adjustable circle cutter (great for fans and panel meters); a straight-line cutting guide; a right-angle grinder/cutter and a 42-inch flexible shaft. The saw features a 5-A motor (117 V ac).

Price: \$89 (tool); \$139 (kit with tool, carrying case, bits and right-angle cutter). For more information on the RotoZip Rebel and the company's entire line of rotary tools and accessories, see your favorite building supply center or Wal-Mart, or contact RotoZip at 1861 Ludden Dr, Cross Plains, WI 53528, tel 608-798-3737; www.rotozip.com. QST

