

SSB Basics

La Cruz
Marina
12/27/13



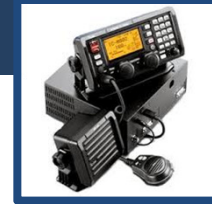
About Me – David DeLong



- 40 years radio experience
 - At 13 youngest to get extra class license & built my own transmitter
- Work for **ZETRON** for 28 years
 - Started out as a hardware engineer
 - Involved in all aspects of the business - VP for most departments – Sales, Product Management, Most recently Engineering
- Currently on 2 year venture on our sailboat Apsaras
- My rig – Icom 718



Plan for Today

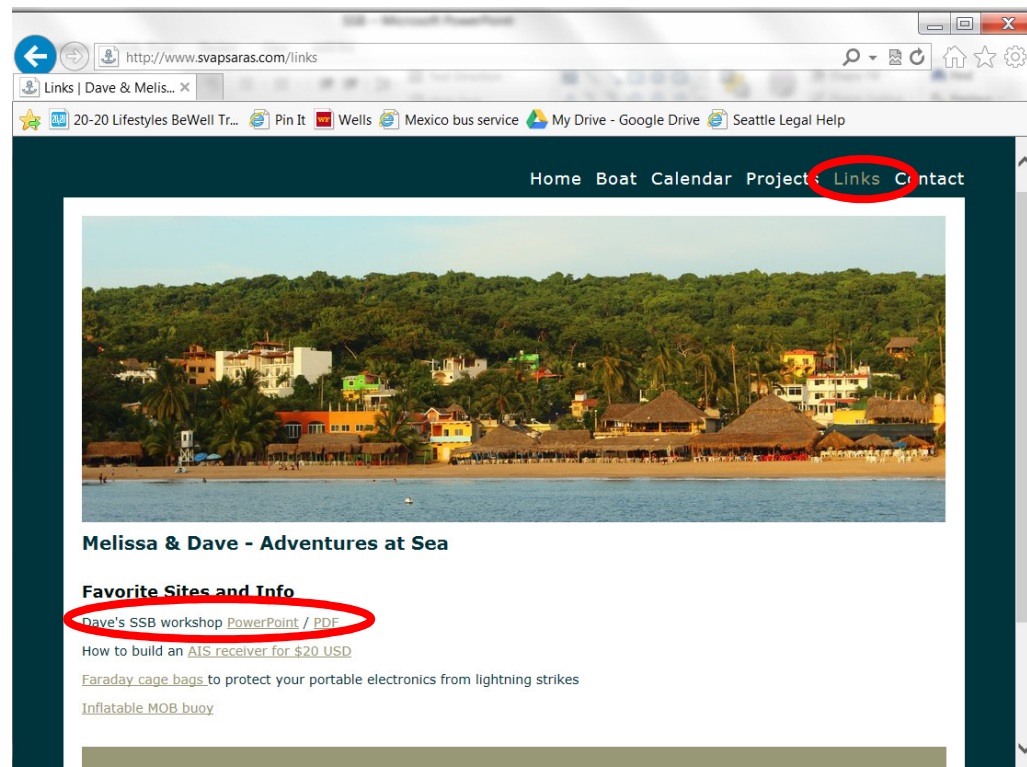


- Few slides and info prepared
- I'll ask on each topic whether there are people interested to make sure we focus on areas of interest
- Intended to be casual conversation so holler out with questions
- Plus lots of time for questions at the end

Don't sweat taking notes



- Will publish this presentation on our blog site links page – www.svapsaras.com



Agenda



- Why SSB
- HAM vs. Marine
- Licensing
- System components
- Noise sources
- Propagation
- Transceiver Operation
 - Channels vs frequencies
 - Antenna tuning
 - RIT/Clarifier
- Emergency Channels
- Popular nets
- Data/email
- Weather charts
- My favorites
 - Cheap Navigation
 - Lightning Protection

Why SSB?



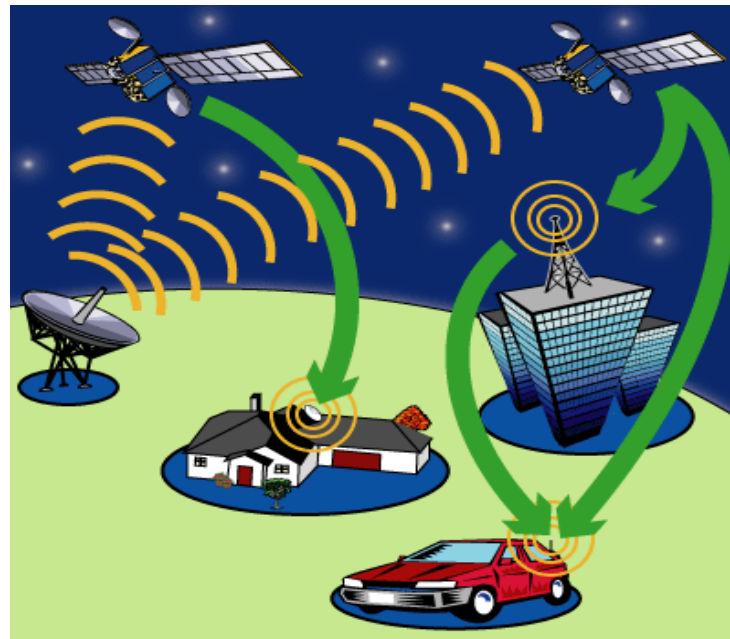
- Not a substitute for VHF FM
- Long range communication
 - Reliable 50-150 miles
 - Slightly tricky: 1000's miles
- Slow speed data capabilities
 - Weather charts
 - Email
- Fills the “gap” between VHF and satellite with no airtime cost



Why not?



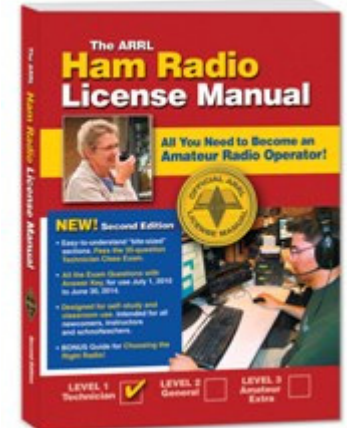
- Satellite coming down in cost
- Coast Guard HF infrastructure nearing end of life



HAM vs Marine



- HAM pro's
 - More people on land to talk to
 - Free email (winlink)
- HAM con's
 - Test required for license
 - No reciprocal privileges for US in Mexico
 - Cannot use Marine frequencies
 - Not a substitute for Marine



Licensing



- SSB requires 2 licenses
- Station license
 - Good for 10 years
 - Assigns MMSI and call sign to your boat
- Operator license
 - Restricted Radiotelephone (RR)
 - Good forever
- File online using FCC's ULS

Federal Communications Commission
Wireless Telecommunications Bureau
SHIP RADIO STATION AUTHORIZATION

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JAMES M BROOKS
TDI BROOKS INTERNATIONAL INC
1902 PINON DR
COLLEGE STATION TX 77845

Licensee Name: TDI BROOKS INTERNATIONAL INC

Radio Service	Official Ship Number	Ship Name
SB - Ship Compulsary Equipped	501390	J. W. POWELL

FCC Call Sign	File Number	Type of License	Number in Fleet
WDA6172	0000628567	Regular	

Radio Req/Category	INMARSAT No.	Ship Station Identity	Selective Calling No.
E		303189000	

Grant Date	Effective Date	Print Date	Expiration Date
10-19-2001	10-19-2001	10-19-2001	

Frequencies contained in 47 C.F.R. Part 80 Subpart H including, but not limited to any of the MF/HF Radiotelephone, Radiotelegraph, VHF/UHF Radiotelephone, Radiotelegraph, Satellite, Facsimile.

Special Conditions:
NONE

THIS AUTHORIZATION IS NOT TRANSFERABLE

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

Marine Radio Operator Permit

RODRIGUEZ, RICHARD J
PO BOX
BIRNEY HARBOR, WA 98208

FCC Registration Number (FRN): 000

Special Conditions / Endorsements

This permit does not authorize the operation of AM, FM or TV broadcast stations. Licensee authorized to operate station pursuant to Memorandum Opinion and Order, Third Report and Order, and Third Further Notice of Proposed Rule Making in FCC 06-129.

Grant Date	Effective Date	Print Date	Expiration Date
05-24	05-24	05-25	

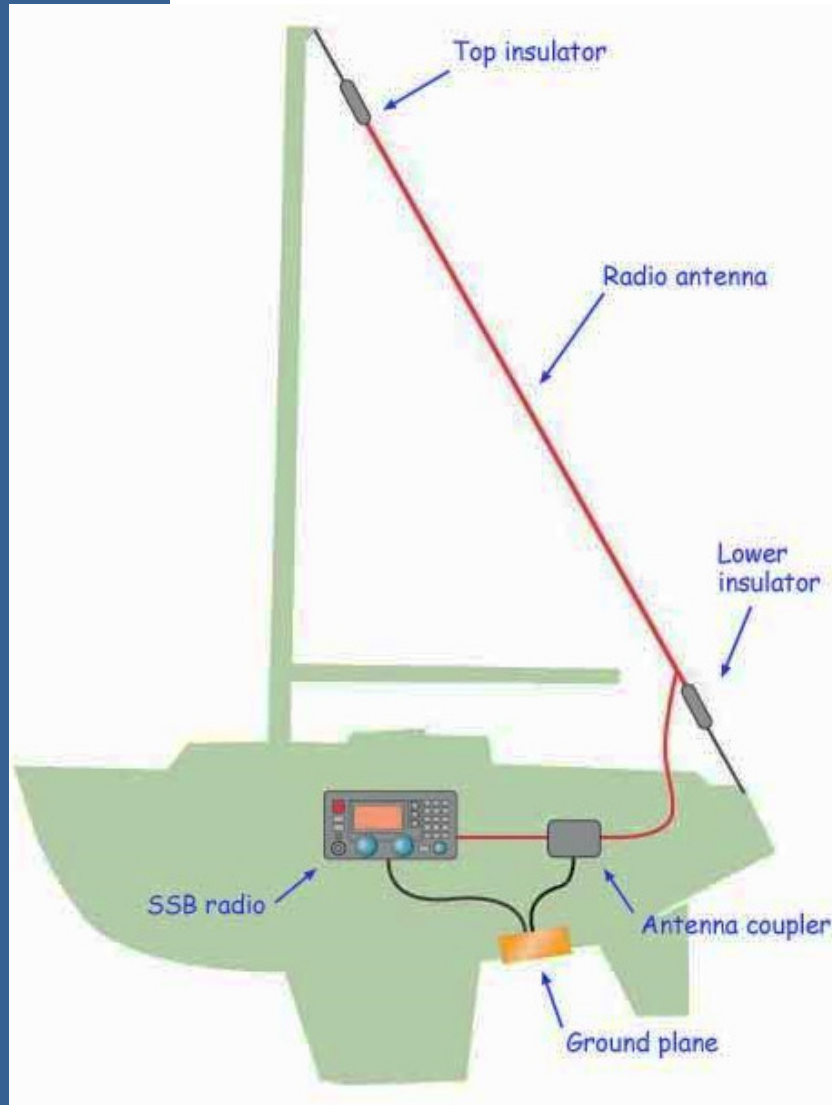
File Number	Serial Number	Date of Birth
000074	MP0000	06-12

THIS LICENSE IS NOT TRANSFERABLE

Richard J. Rodriguez
General Manager

FCC 06-ENC-104

System Components



- Transceiver
- Tuner
- Antenna
- Ground system
- Optional
 - Modem for email

Transceiver



- Icom 802 appears most popular system
 - Comes with control head separate from transceiver itself



Tuner



- Most are automatic
- Should be near antenna and ground
- Radio can be anywhere



Antenna

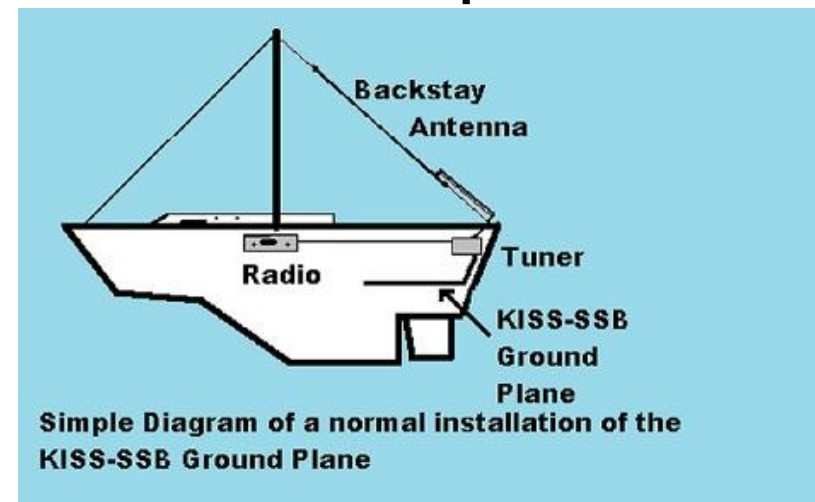


- Whip
 - Some have “traps” that work like a tuner
- Backstay
 - Random length requires a tuner
 - Watch out – high voltages cause “RF burns”
- Emergency
 - a 14 gauge wire is very effective

Grounding



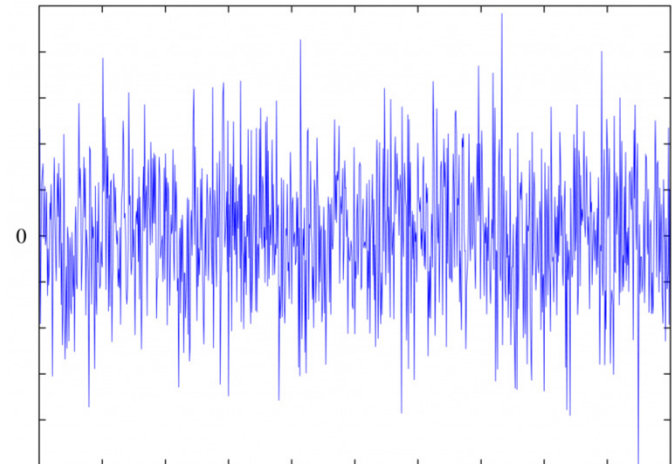
- Controversial subject
- Some recommend 25-75 square feet of copper foil strap in your bilge
- Others run a copper foil to a thru-hull
- I use the KISS-SSB counterpoise



Noise Sources



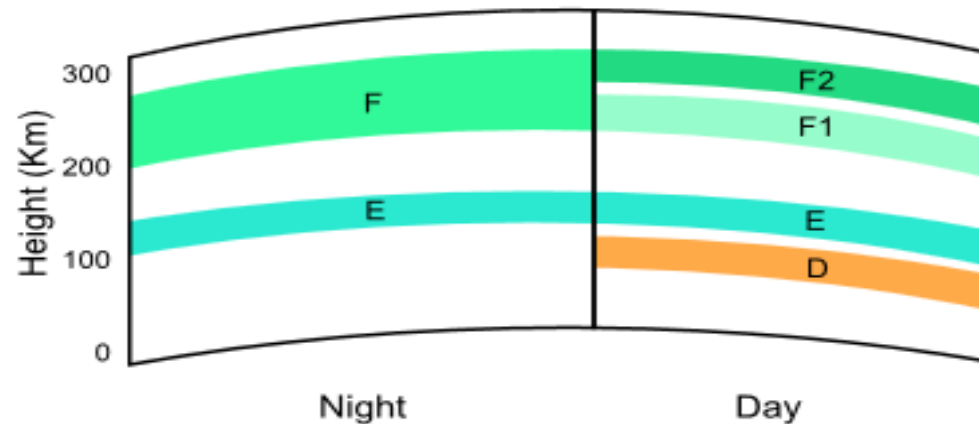
- Unlike VHF FM, HF SSB is very sensitive to noise
 - Inverter
 - Motors
 - Computers
 - Florescent lights
 - Some LEDs
 - Wireless router



Propagation



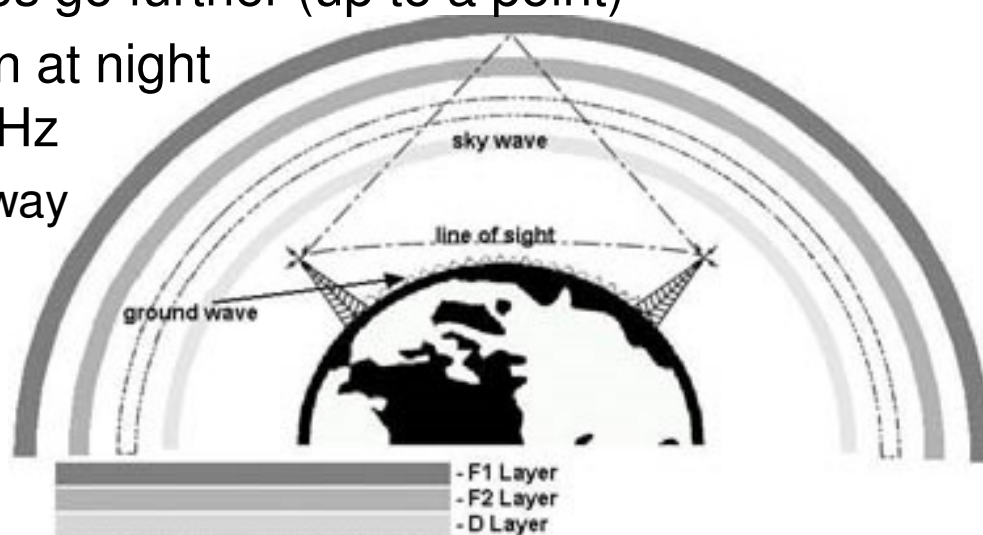
- Ionosphere excited by the sun
- Radio waves absorbed or bounced (skip)



Propagation – Ground or Sky Wave



- Ground wave 50-150 miles
 - Lower frequencies “bend” over horizon
 - Lower frequencies go further
 - Frequencies up to about 4 MHz absorbed by the D layer during the day inhibiting skip
- Sky wave (skip) can be worldwide
 - Higher frequencies go further (up to a point)
 - MUF comes down at night to about 10-12 MHz
 - D layer goes away enabling low freq skip



Propagation Summary



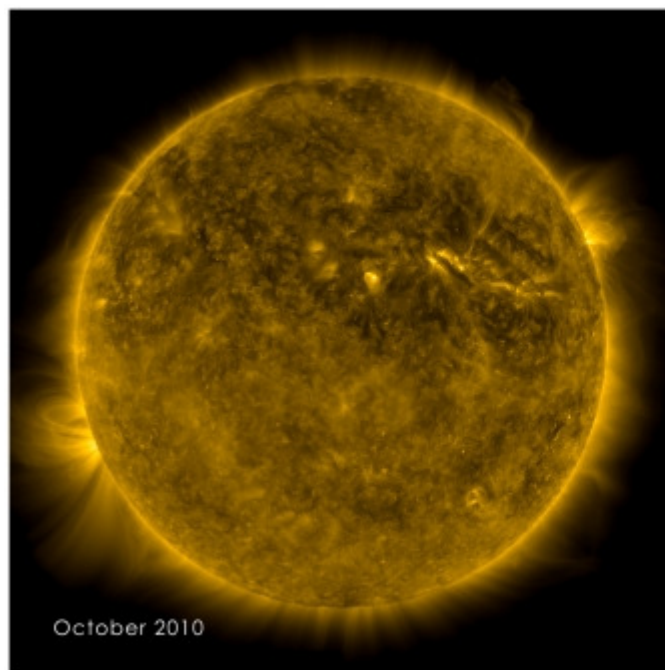
	Day (sun's radiation exciting the layers)	Night
Lower Freq (4-8 MHz)	<p>Good for ground wave short hop 50-150 miles long distances won't work—absorbed by D layer</p>	<p>Good at night for longer distances when the D layer stops absorbing</p>
Higher Freq (12-25 MHz)	<p>Good for long distances during the day</p>	<p>Max Usable Freq. (MUF) decreases at night as high- er frequencies stop bouncing and go off into space</p>

Effects on Propagation

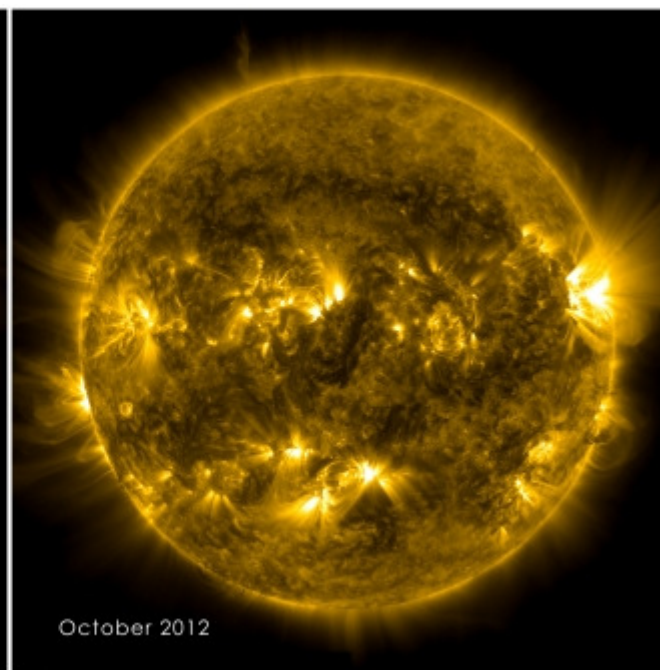


- Time of day
- Sun spots
 - 11 year cycle (peaked this year)
 - Excites the F layer improving skip
- Solar flares
 - Excites the D layer increasing absorption
- Other
 - Geomagnetic storms, lightning, EMP

Sun Spots



October 2010



October 2012

How to test Propagation



- HAM channel 14,300
Is almost always active. Even if you aren't a HAM you can listen in and see who you can hear.
- Atomic clock time - National Institute of Standards & Technology's (NIST) continuously transmits on 2.5, 5, 10, 15 and 20 MHz.
 - WWVH in Kauai, Hawaii – female voice
 - WWV in Fort Collins, Colorado - male voice
 - They also transmit severe oceanic weather warnings

Radio Operation



- Channels/Frequencies
- Antenna Tuning
 - Auto/Manual
- Clarifier/RIT



Emergency Channels



- Digital Selective Call (DSC):
 - 2,187.5, 4,207.5, 6,312, 8,414.5, 12,577, 16,804.5 kHz
- Use HAM frequencies in an emergency
 - 14,300 is almost always active
- These simplex frequencies are used for distress and safety communications but are not normally guarded.
 - 2182, 4125, 6215, 8291, 12290, 16420 kHz

Simplex Channels



2182 is the CH 16 of HF

4 MHz

4146
4149

6 MHz

6224
6227
6230

8 MHz

8294
8297

12 MHz

12,353
12,356
12,359
12,362
12,365

16 MHz

16,528
16,531
16,534
16,537
16,540
16,543
16,546

18/19 MHz

18,825
18,828
18,831
18,834
18,837
18,840
18,843

22 MHz

22,159
22,162
22,165
22,168
22,171
22,174
22,177

25/26 MHz

25,100
25,103
25,106
25,109
25,112
25,115
25,118

Generally

Good during the day for ground wave 50 to 100 miles & at night for sky wave for longer distances

Good during the day for sky wave longer distances

Popular Nets



- Local time (GMT -6 hours)
- Time Freq Notes
- 0730 6212 Picante
- 0800 6212* Amigo Mexico and Puddlejump
*May change to 6227
- 0830 3968 Sonrisa HAM (LSB)
- 1500 21412 Pacific Maritime Mobile HAM
- 1900 6516 Southbound
- All 14300 Pacific Seafarer's Net

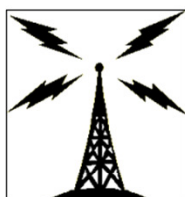
Email



Marine or Satellite (Iridium & Inmarsat)

SailMail

\$250/year



SSB Radio



Pactor Modem \$1500



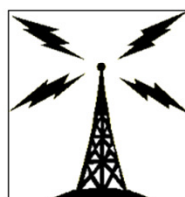
Serial-USB Cable \$10



HAM



Donations Accepted



SSB Radio



SignalLink USB Interface \$110



<http://www.tigertronics.com/>



Weather

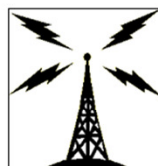


Sound Capture

Periodic automatic transmission:

FAX: <http://www.nws.noaa.gov/om/marine/rfax.pdf>

Sitor/Text: <http://www.nws.noaa.gov/om/marine/hfsitor.htm>



SSB Radio

Signalink USB Interface



Sound from SSB transmitted to built in PC microphone



EMAIL

1. Request GRIB file via email—either client will work
2. Wait a few minutes
3. Check your received emails and you will have an email with GRIB files attached

Marine or Satellite (Iridium & Inmarsat)

SailMail
\$250/year



SSB Radio



Pactor Modem \$1500



Serial USB Cable \$10



HAM



Donations Accepted



SSB Radio



Signalink USB Interface \$110



<http://www.tigertronics.com/>

Cheap Navigation



NooElec Tuner/
Antenna \$20



Open CPN Chart Software—Free



USB GPS
Antenna \$20

Lightning Protection

- <http://techprotectbag.com/>
for portable electronics



Questions?



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