



# The RELAY)))

JANUARY 2020

Happy New Year!

The Official Publication of the Arrowhead Radio Amateur Club

A.R.A.C. Inc. P.O. Box 7164 Duluth MN 55807-7164 <http://www.thearac.org> Dues: Member \$20/Family \$25

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## All About Arctic Oscillation

*Editor's Note: I found this article by Jeff Nast KCØMKS very interesting. It was originally printed in the January newsletter eight years ago, but the science is still the same! We were experiencing a warm winter at the time, which was a switch from the preceding winters, so he uses those examples to talk about weather patterns. This reprint has minor edits and editor's notes and we've added analysis from a scientist in this field. Thanks Jeff, for a very informative report on the topic!*

**H**appy New Year! A warm mild winter ahead? No doubt you have probably heard about it on the TV and even on the Northland Weather Group Net (yes, an unabashed advertisement: Mondays at 8 pm!). Weather affects us tremendously in our everyday lives. And much time is spent discussing the weather. I have not found any evidence that indicates Arctic Oscillation (AO) is helpful for UHF, VHF or HF. But I have my suspicions!

A white Christmas was a rarity across most of the U.S. [in 2011], as December temperatures were more typical of November, and very little snow fell. Large portions of the eastern half of the country were more than 4°F above average in December, with temperatures averaging 8°F above average over portions of North Dakota. This is quite a switch from the previous two winters, which were both much colder and snowier than average. All three winters featured La Niña conditions in the Eastern Pacific Ocean, so that cannot explain the difference. A key reason for the 2011 December warmth and the cold and snowy Decembers of 2010 and 2009 is a weather pattern known as the Arctic Oscillation.

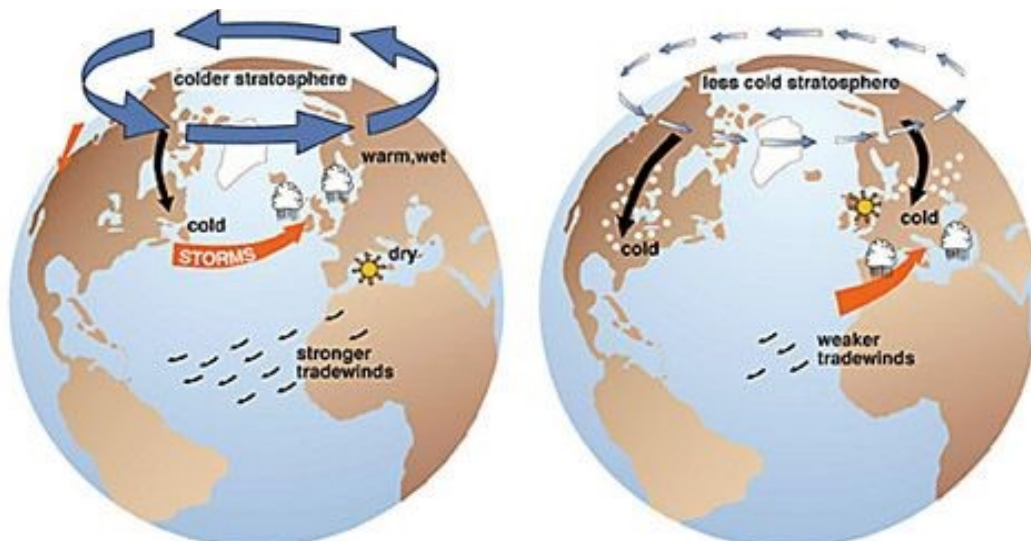
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Co-Editors:

Kim & Steve • Waller  
Kim - KEØNQS Steve - KEØNQT  
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**Prez Sez...**

## **HAPPY NEW YEAR !!**

I hope you all had a very merry Christmas!

I would like to thank all those who helped out with the Christmas Party. Unfortunately the bad weather kept some at home but those that did make it had a good time. I would like to extend a special thank you to Steve and Kim Waller for the fantastic program they put on telling the Club history!!

Several times this year scammers have used my name in emails sent to club members soliciting money or gift cards from ARAC members. They have taken names and emails from the Club Newsletter to create a mailing list. I will not send any of you requests for money or gift cards so if you get these emails just delete them.

**73 Gene Ellefsen NØVRM**

# ARAC Board Meeting Minutes - December 3, 2019

## PRESIDENT



**NØVRM**  
Gene Ellefsen  
371Ø Chambersburg Ave  
Duluth, MN 55811  
218-39Ø-3272  
lspitech@mail.com

## VICE PRESIDENT



**NØPDG**  
Mike Lovold  
386Ø Birchwood Rd  
Downtown Arnold, MN  
558Ø3  
lovoldm@gmail.com

## SECRETARY



**NØCALL**  
Robin Davis  
218-391-3Ø77  
davisfam2858@yahoo.com

## TREASURER



**KEØNIT**  
Bruce Carlson  
9Ø6 Anderson Rd  
Duluth, MN 55811  
763-315-2967  
carlsbr@gmail.com

## 3RD YEAR BOARD

**KD9ABS**  
Gary Minter  
1621 N 26th St  
Superior WI 5488Ø

## 2ND YEAR BOARD



**AAØAC**  
Dave Davis  
218-348-6649  
aaØac@outlook.com

## 1ST YEAR BOARD

**KDØYLN**  
Robert Boyd  
5054 Boulder Dr  
Hermantown, MN 55811

**Present:** Gene Ellefsen-NØVRM, Mike Lovold-NØPDG, Bruce Carlson-KEØNIT, Dave Davis-AAØAC, Gary Minter-KD9ABS, Bob Boyd-KDØYLN, Doug Nelson-AAØAW, Kim Waller-KEØNQS, Steve Waller-KEØNQT, Robin Davis

**Guest:** Emery Davis, Del Minter-KEØCLI

Meeting called to order by President Gene-NØVRM at 6:32 pm

### Minutes:

Minutes are in the newsletter and on the web page. Read the Article about the history of the Club. Great job on the article. Motion by Mike-NØPDG to accept, seconded by Gary-KD9ABS, motion passed

### Treasurer's Report:

Checking .....	1,906.82
Savings .....	1,372.37
Cash Subtotal.....	\$3,279.19

Outstanding Check (Repeater # 1414) .... **-1,100.00**

Winter CD .....	1,707.19
Summer CD .....	1,700.00
CD Subtotal.....	\$3,407.19

Grand Total .....\$5,586.38

Questions? Collecting annual dues now. Our Winter CD will renew at a higher rate in December. Should we look for a different investment to make more money? We are a Not for Profit organization. Motion to accept by Mike-NØPDG, seconded by Bob-KDØLYN, motion passed

We have enough money for the Christmas party food and prizes. Our annual Liability/Officers Insurance is coming due in the next few months. Storage Unit rental fee was paid and we're paid through October 2020

### Testing:

One tomorrow night, Tom Ferguson-WBØDHE, teaching at UMD, used Amateur Radio as part of a class. He has 10-16 students that are interested in taking the test. Next one is on Tuesday, a week from today, as part of the Community Education class. House of Refuge, 5:30 pm registration, 6:00 pm testing. Next Community Ed classes starts in February. Anyone interested in testing, contact Doug-AAØAW and he will schedule an individual testing session.

### Christmas Party:

Christmas Party is Thursday, December 12, 2019. We need to check on supplies for the party. Suggestion to announce again asking folks to limit taking all of one item at the party. We are asking those who attend to bring a non-perishable item for the Food Shelf. East Choraliers will be providing the music. Kim-KEØNQS will present a little on the history of the Club. Kim-KEØNQS is shopping around for pricing on a sheet cake for the party. Gene-NØVRM orders three (3) meat & cheese trays. Do we give anything to the choir?

*Continued on Page 4*

# ARAC Board Meeting Minutes , continued

Doug-AA0AW made a motion to spend no more than \$250.00 on a cake, seconded by Robin, motion passed. The Club for the party will also provide a fruit tray and veggie tray

## Bell Ringing:

Bell ringing for the Salvation Army? It's a hoot according to several who have done it in the past. Gene-N0VRM will make contact with them to schedule a time to ring

## Repeater:

No update but the Mahtowa Repeater update is unfinished at this time

## ARAC 90<sup>th</sup> Anniversary:

W0GKP 90th Anniversary Event - always the same people that step up and work the events, which can be discouraging

## Ice Station ZZL:

Ice Station ZZL was not originally an ARAC Club event but is promoted through ARAC. More information will follow concerning the details in 2020

## Field Day:

Mike-N0PDG is proposing to have a meeting specifically to plan for Field Day in 2020. It needs to be better organized. Part of the problem this year was that it fell on Grandma's Marathon weekend. We need to promote it again to draw in new people. Too many people came just to eat and never operated a radio, which defeats the purpose

## Program:

January and February programs are open at this time

## Christmas Party:

Kim-KE0NQS has been to a variety of events with a variety of clubs. When we bring gifts to share, most of the time in the past, they put everybody's numbers or call signs in a bucket. Everybody brings a gift so everybody gets a gift. Is there consideration to do it as a turnstile? Everybody gets a number so everybody gets a gift. Maybe there should be a limit on the number of prizes that an individual can win. It is not everybody brings something, gets something. The current process is cumbersome and it is extremely long but the Board is open to suggestions. Here is an idea - What if you tied it into volunteering? If you volunteer, you get your name in the drawing. The same people always volunteer. Can you put a value on my time instead of me bringing a \$2.00 flashlight? More discussion needs to be had

We are amateur radio operators and we are not supposed to make money with the hobby. We are not a 501C3. There are community grants available that Kim-KE0NQS believes we would qualify to receive. Our expenses per person are \$36.70 approximately, which is \$15.00 above the dues. It is good to keep the dues reasonable. We need to point out the need for volunteers because we spend \$15.00 above the dues but it is because of things like the Ham Fest that earn money for the Club

One other thing about the Christmas Party – Kim-KE0NQS will bring the original or copies of some of the documents from the Club's history. She asked for Gene-N0VRM to read the certificate that started our Club

## ARAC Anniversary:

Ninetieth Anniversary of ARAC - we need people to get on the air. Contacts have to be logged. Techs usually go to a place where it is already set up and a General on site. Most don't have the equipment to go outside of their privileges

## Repeater:

UHV link on the main site does not have any power out

## Skywarn:

Skywarn Recognition is this weekend. We may have just one (1) station with one (1) antenna. If you are interested in coming up, Doug-AA0AW needs to know who you are because you need security access. Doug-AA0AW needs to provide a list to the Weather Station. It starts Friday night at 6:00 pm (0000 UTT)

## Thomas J Reibold Award:

The Award will be presented to the winner at the Christmas Party on December 12, 2019

Mike-N0PDG makes a motion we adjourn, Bruce-KE0NIT seconded, motion passed at 7:26 pm





# ARAC Club Meeting Minutes

December 12, 2019

**Present:**

President Gene Ellefsen-N0VRM  
Vice President Mike Lovold-N0PDG  
Treasurer / Membership Bruce Carlson-KE0NIT  
Secretary Robin Davis  
Third Year Board Gary Minter-KD9ABS  
Second Year Board Dave Davis-AA0AC  
First Year Board Bob Boyd-KD0YLN  
Parliamentarian Grant Forsyth-KC0WUP  
Special Events – Open / Gene Ellefsen-N0VRM acting  
Ham Fest / Education Bob Schultz-KC0NFB  
Property / Picnic Scott Ahlgren-N0VYU  
Newsletter / Historian Kim Waller-KE0NQS  
Newsletter Steve Waller-KE0NQT  
Repeater Randy Wabik-KR0B  
Testing Doug Nelson-AA0AW

**Absent:**

Chaplain (Visiting) Rolland Bockbrader-KB0CK  
Repeater Derek McCorison-W0DNF  
Repeater Randy Haglin-N0BZZ  
Web Site Thomas Dorr-KE0RHA

Meeting called to order by President Gene-N0VRM at 6:07 pm

Good evening. Thank you for braving the weather. There is a group downstairs, who is having a plated dinner, need the kitchen and the Fellowship Hall. Hence, we are here in the Vestibule. Thank you to Mike-N0PDG and Mitch Wiss-WA9TRY for all the help Gene-N0VRM got setting up for today. Also, a big thank you to Chris, who is the Custodian at the Church. The President and the Board appreciate your help

**Announcement:**

Allen Anway-KC9LJN – In the Fireside Lounge are all of the pictures from his home. They are on display including two (2) pictures of Dorothy Anway-KC9LSG

**Minutes:**

Moved to approve by Bob-KC0NFB, seconded by Geoff Bennett-KE0BNX

**Treasurer's Report:**

Checking.....	1,906.82
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Outstanding Check (Repeater # 1414).....	-1,100.00
Winter CD .....	1,707.19
Summer CD .....	1,700.00
CD Subtotal .....	\$3,407.19
Grand Total.....	\$5,586.38

Details are available from Bruce-KE0NIT. Questions? Motion to approve by Mike-N0PDG, seconded by Bob-KC0NFB, motion passed

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# ARAC Club Meeting Minutes, continued

## **Committee Reports:**

### **Education:**

Next Technician Class in February 2020, through Duluth Community Education programs along with a General Study Group. It will be held at House of Refuge again, details to follow

### **Testing:**

Successfully completed two (2) test sessions - UMD Class sixteen (16) tested with eleven (11) new Technician licenses and one (1) upgrade. Second Session, on Tuesday, December 10, 2019, ten (10) Candidates, all new or upgrades. Well done. There were four (4) new extras on Tuesday, Two (2) at UMD. Thank you to all the VEs who helped. Thank you to Doug-AA0AW for organizing it

## **Election of Officers:**

President Gene-N0VRM ----- White Ballot  
Vice President Mike-N0PDG----- White Ballot  
Treasurer Bruce-KE0NIT ----- White Ballot  
Secretary Robin-No Call ----- White Ballot  
First Year Board Gary-KD9ABS----- White Ballot

Diane Saunders-K0DSL moved for white ballot for slate, John Cavanaugh-KC0AFE seconded, motion passed

## **Thomas J Reibold Award W9IBM Memorial Award**

Nominations were received by the three (3) Member Board – Gary-KD9ABS, Bob-KD0LYN, and Dave-AA0AC. After meeting to discuss the nominations, a decision was made as to who is deserving of the recognition for the work, time and effort put in to promote the hobby of Amateur Radio.

This year the Thomas J Reibold W9IBM Memorial Award is given to Mike Lovold-N0PDG. He is a:

Long-time member in good standing of the Arrowhead Radio Amateur Club  
Volunteer Examiner (VE) for the ARRL/VEC  
Net Control Operator for the ARAC CW Net on 7:00PM Sunday Nights on 28.195 MHz  
Monday Evening Minnesota Section Phone Net Control Operator on 3.860 MHz  
Vice President, who actively finds programs to teach us and entertain us at the monthly club meetings.  
Programs that don't empty the room  
Faithfully makes coffee every month for our organization  
Shows up and works at Special Events to help provide communication such as Ham Fest, Field Day, Grandma's Marathon, Inline Skate, Wild Marathon, Eugene Curnow Trail Marathon, etc.  
Assists the Property Chair Scott Ahlgren-N0VYU, working at the Storage Unit as well  
Known for being willing to lend a hand to help get people (New & Experienced Hams) on the air

### **Response from Mike-N0PDG:**

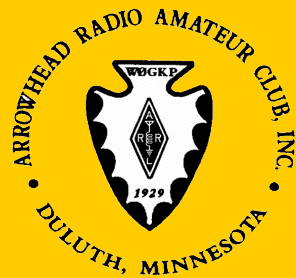
Wow, thank you so much. I am surprised. Volunteering is good to keep your life positive. Thank you again

## **90<sup>th</sup> Anniversary Presentation:**

90th Year of association with ARRL. Copy of original charter is on the table. Program by Kim-KE0NQS and Steve-KE0NQT about ARAC – its history, the beginning of ARAC, the history of radio in Duluth and Superior, how we made it to our 90th Anniversary of membership with ARRL. An excellent program

Suggestion to donate a little more to the coffee fund next month since the coffee kitty will not be out for the Christmas Potluck

Motion to adjourn by Randy Johnson-AA0ME, seconded by Dave-AA0AC, motion passed



# Your Story

ARAC Members Tell Their Story in Amateur Radio

## How I Started in Radio – 1960's to Present

By Glen Nelson KAØGGG

My first 2-way radio was a CB. I thought it would be great to talk to people with wireless radios. A friend helped me set up the CB with antenna out in the high snow bank. The first contact was someone in Texas. I thought, what fun!! Didn't know it was illegal. I toned down and used the radio for a couple years, but the novelty wore off.

I started teaching Electronics at Proctor High School in 1963 and got interested in radio again. My friend Bill Hughes (now passed) and I took our Novice test for Les Taylor (QIT, now passed) at UMD. As I progressed, I got my Tech and later General license, KAØGGG.

I had gotten my radio equipment through the Tennison family in Duluth with relatives in Moose Lake. The husband had passed away and the wife donated the equipment to our school. I got radios, a 60-foot tower with antenna, rotator and many accessories. We had a bus, so we could haul the antenna and stuff to school. I set up a ham shack in my back room at school so that we could make contact during classes.

I was in the Air National Guard in Communications to bolster my interest in radio. The knowledge I learned in Guards fit well in my teaching Electronics in school. Because I set up my ham station at school, I was also able to teach Novice classes. Doug Nelson AAØAW and Larry Geisler WAØAFO (now passed) gave the test at school and several people passed the test. One student would use the radio to talk to his Dad in the Navy on ship in California.

I joined ARAC in the early 1960's, when it was meeting in Superior at Wisconsin Indianhead Technical College. I was fortunate to be on Larry Geisler's advisory committee for several years for his Electronics class.

I started working Grandmas' Marathon races around the DECC building and on Superior Street by 4<sup>th</sup> and 5<sup>th</sup> Avenue, keeping the public back from the race course. I would also work the 100-mile North Shore Race, stationed at Lutsen. I worked the Inline Skate Marathon on my motorcycle with medic on the back. Because Doug Nelson knew I rode motorcycle, and had coached [Minnesota Mile Run record-holder & US Olympian] Garry Bjorklund in High School Cross-County at Proctor, he asked if I would like to lead the Garry Bjorklund Half-Marathon on my cycle. I said yes and led that race for several years. My wife told me when I hit 75 years old I am done riding my cycle!

At Swap Fest time, I was able to get donations from Hinckley Casino. I would get one night's lodging and a buffet for 2. They discontinued that because the Swap Fest is in Superior and they are oriented in Minnesota. I also got cards to pass out several times at meetings. Other door prizes came from Harbor Freight, Super One and Hanson Hardware (west end, now closed).

I am not active any more, but ARAC is a great group of people doing a great job around the community!

Do you have a story to share about your ARAC history or your favorite aspect of the hobby? Submit an article or an idea for an upcoming newsletter topic by emailing us at [KEØNQS.mn@gmail.com](mailto:KEØNQS.mn@gmail.com)  
We'd love to hear from you!

## The Thomas J. Reibold Award

The W9IBM Award, paying tribute to Father Thomas J. Reibold, honors an individual who has promoted the hobby of Amateur Radio and the Arrowhead Radio Amateurs Club.

Our 2019 Thomas J. Reibold Award was presented to Club Vice President Mike Lovold NØPDG on December 12, 2019, for many years of outstanding service to the Club and to the hobby of Amateur Radio.

### About Mike Lovold

Mike was born & raised in the Northland. He lives in Arnold, Minnesota with his wife Karin of 29 years and has 3 beautiful daughters.

#### Career:

Owner of a Tang Soo Do martial arts studio, professional truck driver

#### Participation in Amateur Radio:

Mike became interested in radio as a professional truck driver. He and a group of friends first started on CB radio, then became interested in amateur radio and took their license tests.

First licensed as a Technician in 2003, five months later Mike received his General license. That was about 6 months before they dropped morse code requirement for 5 words per minute. Mike obtained his Extra license in 2017.

Doug Nelson AAØAW first got Mike into CW back in 2006. With 4 back surgeries and 3 surgeries on his hip, Mike wanted something to focus on besides pain and concentrated on CW. It was during this recovery time that he became proficient in CW. He went on to share alternating Net Control duties with AAØAW for the past 5 years for the CW Net on Sunday nights at 7:30 pm, 28.125. Mike also is Net Control for the Minnesota Section Phone Net, Mondays at 5:30 pm, 3.860 LSB

An ARAC officer 4 years, Mike procures the programming for the Club Meetings and also presides over the refreshment set up. Mike has succeeded in building good relationships with several organizations and individuals on behalf of the Club. The Yaesu representative has presented programs repeatedly, as well as established a Yaesu table every year at Hamfest. Astro Bob has been a recurring presenter enjoyed by the Club for several years. Mike has also developed regular participation by AMSAT (Amateur Radio Satellite), East High Robotics team and the Lighthouse Preservation Society.

For many years Mike has diligently served at a variety of race events such as the Northshore Inline Marathon, Superior Man Triathlon, Grandma's Marathon, and Wild Duluth Races. In addition, Mike has also worked many years on Annual Field Day, Hamfest and the Club Picnic.

#### Mike's look ahead to aspects of the hobby that are new:

Software Defined Radio (SDR). This gives operators the ability to see the frequencies and spectrum that you are on. You are able to see people talking above and below your band. If a station comes close, you can see it, rather than hear it. As a result of this new technology, in the next few years more people will purchase these radios to update their ham shacks. An abundance of used radio equipment will then be coming onto the market and in swap fests. This should bring a good selection for amateur radio operators to purchase second-hand at a great price.

#### Advice for the Club:

a) Be a doer, not just a thinker or observer. b) Take a broader look at club activities, beyond what is good for yourself, but instead what is good for the Club and advancing the hobby

#### Comments on receiving the Thomas J. Reibold Award:

It's a great honor to be able to have my name on the distinguished list of Award Recipients.







## Contest Calendar - January 2020

+ AGB New Year Snowball Contest	0000Z-0100Z, Jan 1
+ QRP Fox Hunt	0200Z-0330Z, Jan 1
+ Phone Fray	0230Z-0300Z, Jan 1
	0800Z-1100Z, Jan 1
	0900Z-1200Z, Jan 1
	1300Z-1400Z, Jan 1 and
+ SARTG New Year RTTY Contest	1900Z-2000Z, Jan 1 and
	0300Z-0400Z, Jan 2
+ CWops Mini-CWT Test	1400Z-1700Z, Jan 1 (144) and
	1700Z-1800Z, Jan 1 (432)
	1500Z-1800Z, Jan 1
+ CWops Mini-CWT Test	2000Z-2100Z, Jan 1
+ UKEICC 80m Contest	1800Z-1900Z, Jan 2 (CW) and
+ NRAU 10m Activity Contest	1900Z-2000Z, Jan 2 (SSB) and
+ NRAU 10m Activity Contest	2000Z-2100Z, Jan 2 (FM) and
+ NRAU 10m Activity Contest	2100Z-2200Z, Jan 2 (Dig)
+ NRAU 10m Activity Contest	2000Z-2200Z, Jan 2
	0145Z-0215Z, Jan 3
+ SKCC Sprint Europe	0200Z-0330Z, Jan 3
	0230Z-0300Z, Jan 3
	0000Z-2400Z, Jan 4
	1200Z, Jan 4 to 1200Z, Jan 5
+ NCCC Sprint	1300Z-1700Z, Jan 4
+ ARRL RTTY Roundup	1800Z, Jan 4 to 2400Z, Jan 5
	1800Z-2359Z, Jan 4
+ ARRL Kids Day	

*Continued on Page 10*

# Contest Calendar - January 2020, Continued

+ EUCW 160m Contest	2000Z-2300Z, Jan 4 and 0400Z-0700Z, Jan 5
+ IQRP Quarterly Marathon	0800Z, Jan 6 to 2000Z, Jan 12
+ ARS Spartan Sprint	0200Z-0400Z, Jan 7
+ QRP Fox Hunt	0200Z-0330Z, Jan 8
+ Phone Fray	0230Z-0300Z, Jan 8 1300Z-1400Z, Jan 8 and 1900Z-2000Z, Jan 8 and 0300Z-0400Z, Jan 9
+ CWops Mini-CWT Test	2300Z, Jan 8 to 2300Z, Jan 9 and 2300Z, Jan 11 to 2300Z, Jan 12
+ AWA Linc Cundall Memorial CW Contest	0145Z-0215Z, Jan 10
+ NCCC RTTY Sprint	0200Z-0330Z, Jan 10
+ QRP Fox Hunt	0230Z-0300Z, Jan 10
+ NCCC Sprint	0000Z-2359Z, Jan 11
+ YB DX Contest	0500Z-0900Z, Jan 11
+ Old New Year Contest	1200Z, Jan 11 to 1200Z, Jan 12
+ UBA PSK63 Prefix Contest	1200Z, Jan 11 to 2400Z, Jan 12
+ SKCC Weekend Sprintathon	1800Z, Jan 11 to 0559Z, Jan 12
+ North American QSO Party, CW	0630Z-0830Z, Jan 12
+ NRAU-Baltic Contest, SSB	0900Z-1100Z, Jan 12
+ NRAU-Baltic Contest, CW	0900Z-1059Z, Jan 12
+ DARC 10-Meter Contest	1000Z-1400Z, Jan 12
+ Midwinter Contest	1300Z-1700Z, Jan 12
+ RSGB AFS Contest, Data	1400Z, Jan 12 to 0800Z, Jan 13 and 1400Z, Jan 13 to 0800Z, Jan 15
+ Classic Exchange, CW	0100Z-0300Z, Jan 13
+ 4 States QRP Group Second Sunday Sprint	

*Continued on Page 11*

# Contest Calendar - January 2020, Continued

+ QRP Fox Hunt	0200Z-0330Z, Jan 15
+ Phone Fray	0230Z-0300Z, Jan 15
	1300Z-1400Z, Jan 15 and
	1900Z-2000Z, Jan 15 and
+ CWops Mini-CWT Test	0300Z-0400Z, Jan 16
+ NAQCC CW Sprint	0130Z-0330Z, Jan 16
+ NCCC RTTY Sprint	0145Z-0215Z, Jan 17
+ QRP Fox Hunt	0200Z-0330Z, Jan 17
+ NCCC Sprint	0230Z-0300Z, Jan 17
+ LZ Open Contest	1800Z-2200Z, Jan 17
+ Hungarian DX Contest	1200Z, Jan 18 to 1159Z, Jan 19
+ RSGB AFS Contest, SSB	1300Z-1700Z, Jan 18
+ North American QSO Party, SSB	1800Z, Jan 18 to 0559Z, Jan 19
+ NA Collegiate Championship, SSB	1800Z, Jan 18 to 0559Z, Jan 19
+ ARRL January VHF Contest	1900Z, Jan 18 to 0359Z, Jan 20
+ WAB 1.8 MHz Phone/CW	1900Z-2300Z, Jan 18
	2000Z-2359Z, Jan 18 (EU-AF) and
	2300Z, Jan 18 to 0259Z, Jan 19 (ENA-ESA) and
+ Feld Hell Sprint	0200Z-0559Z, Jan 19 (WNA-OC-AS)
+ Run for the Bacon QRP Contest	0200Z-0400Z, Jan 20
+ SKCC Sprint	0000Z-0200Z, Jan 22
+ QRP Fox Hunt	0200Z-0330Z, Jan 22
+ Phone Fray	0230Z-0300Z, Jan 22
	1300Z-1400Z, Jan 22 and
	1900Z-2000Z, Jan 22 and
+ CWops Mini-CWT Test	0300Z-0400Z, Jan 23

*Continued on Page 12*

# Contest Calendar - January 2020, Continued

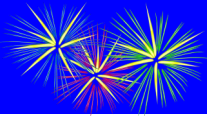
+ NAQCC CW Sprint	0130Z-0330Z, Jan 23
+ NCCC RTTY Sprint	0145Z-0215Z, Jan 24
+ QRP Fox Hunt	0200Z-0330Z, Jan 24
+ NCCC Sprint	0230Z-0300Z, Jan 24
+ CQ 160-Meter Contest, CW	2200Z, Jan 24 to 2200Z, Jan 26
+ REF Contest, CW	0600Z, Jan 25 to 1800Z, Jan 26
+ BARTG RTTY Sprint	1200Z, Jan 25 to 1200Z, Jan 26
+ UBA DX Contest, SSB	1300Z, Jan 25 to 1300Z, Jan 26
+ Winter Field Day	1900Z, Jan 25 to 1900Z, Jan 26
	1300Z-1400Z, Jan 27 and
	1900Z-2000Z, Jan 27 and
+ QCX Challenge	0300Z-0400Z, Jan 28
+ QRP Fox Hunt	0200Z-0330Z, Jan 29
+ Phone Fray	0230Z-0300Z, Jan 29
	1300Z-1400Z, Jan 29 and
	1900Z-2000Z, Jan 29 and
+ CWops Mini-CWT Test	0300Z-0400Z, Jan 30
+ UKEICC 80m Contest	2000Z-2100Z, Jan 29
+ NCCC RTTY Sprint	0145Z-0215Z, Jan 31
+ QRP Fox Hunt	0200Z-0330Z, Jan 31
+ NCCC Sprint	0230Z-0300Z, Jan 31



**Our thanks to  
Bruce Horn, WA7BNM  
for use of this calendar!**

Please visit Bruce's site at  
[www.contestcalendar.com/  
contestcal.html](http://www.contestcalendar.com/contestcal.html)  
for many other helpful  
contest calendar formats.





# CW Abbreviations

AR End of Message	AS Pse QRX	BK Back to You	SK End of Contact
TU Thank You	PSE Please	K Invite to Transmit	
QST Calling all Amateurs	QRL Are You Busy?	QRU Have anything for me	
QRV Are You Ready?	QRX Standby	QRS Transit Slower	



A	●	M	—	Y	— ● — ● — ●
B	— ● ● ●	N	— ●	Z	— ● ● ●
C	— ● ● ● ●	O	— — — —	1	● — — — — —
D	— ● ● ●	P	— ● ● ● ●	2	● ● — — — —
E	●	Q	— — — ● — —	3	● ● ● — — —
F	● ● ● ●	R	— ● ● ●	4	● ● ● ● — —
G	— ● ● ●	S	● ● ●	5	● ● ● ● ●
H	● ● ● ●	T	— —	6	— ● ● ● ● ●
I	● ●	U	● ● — —	7	— — ● ● ● ●
J	— ● — — — —	V	● ● ● — —	8	— — — ● ● ●
K	— ● ● — — —	W	— ● ● — —	9	— — — — ● ●
L	— ● ● ● ●	X	— ● ● ●	0	— — — — — ●

## US Amateur Radio Bands

### US AMATEUR POWER LIMITS

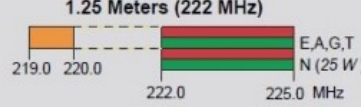
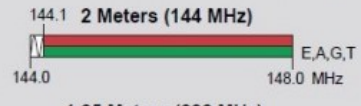
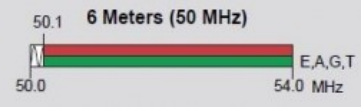
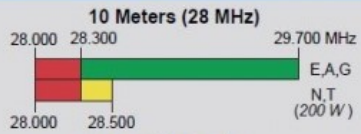
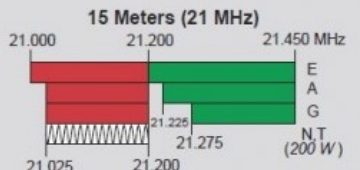
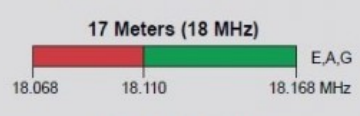
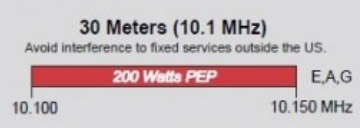
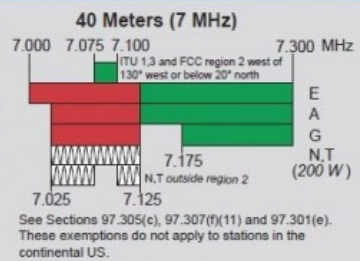
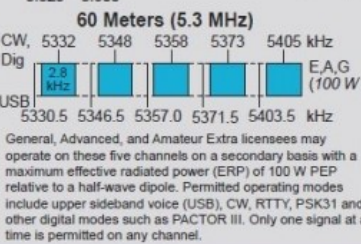
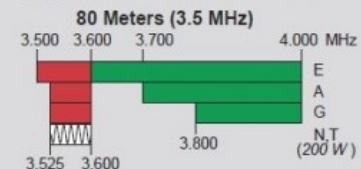
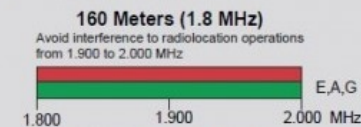
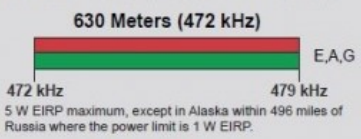
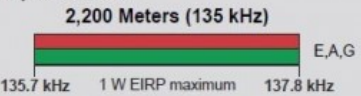
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

Effective Date for  
2,200 and 630 Meters  
to be announced

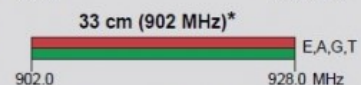
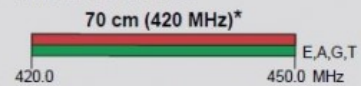


ARRL THE NATIONAL ASSOCIATION FOR AMATEUR RADIO

On March 28, 2017, the Federal Communications Commission adopted rules that will allow Amateur Radio access to 472-479 kHz (630 meters) and to 135.7-137.8 kHz (2,200 meters). However, amateurs cannot use these frequencies until 30 days after the Report and Order is published in the Federal Register and the final procedures for registering stations with the Utilities Telecom Council (UTC) have been approved and announced. At the time this chart was created, the Report and Order had not been published and the UTC online registration site is not yet available. Follow ARRL news for further information. New charts will be published at [www.arrl.org/graphical-frequency-allocations](http://www.arrl.org/graphical-frequency-allocations) when the bands are fully available for use.



\*Geographical and power restrictions may apply to all bands above 420 MHz. See The ARRL Operating Manual for information about your area.



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz ‡	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

‡ No pulse emissions

**KEY**

Note: CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.

Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems only

E = Amateur Extra  
A = Advanced  
G = General  
T = Technician  
N = Novice

See ARRLWeb at [www.arrl.org](http://www.arrl.org) for detailed band plans.

**ARRL**  
We're At Your Service

ARRL Headquarters:  
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email: [hq@arrl.org](mailto:hq@arrl.org)

Publication Orders:  
[www.arrl.org/shop](http://www.arrl.org/shop)  
Toll-Free 1-888-277-5289 (860-594-0355)  
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Toll-Free 1-888-277-5289 (860-594-0338)  
email: [membership@arrl.org](mailto:membership@arrl.org)

Getting Started in Amateur Radio:  
Toll-Free 1-800-326-3942 (860-594-0355)  
email: [nowham@arrl.org](mailto:nowham@arrl.org)

Exams: 860-594-0300 email: [vec@arrl.org](mailto:vec@arrl.org)

# NETS

Have a favorite HF/6m/2m/1.25m/70cm net that you check into or listen in on? Also, please send corrections and we will add it to the list below - Kim KEØNQS at my email KEØNQS.mn@gmail.com.

- **Northland Weather Group Net:** Mondays 2000 on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:30 on Reflector 53A
- **Minnesota Section Net** 1200 and 1730 on 3.860 [Net Manager: NØYR] [http://www.mn-section.org/dept\\_stm.html](http://www.mn-section.org/dept_stm.html)
- The non-non-net: Evenings 2000 144.200 USB except for Sunday evenings.
- Badger WX Net: 0500-0715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET:** 3.925 from 0900-1100 CT Mon-Sat and 1600-1700 CT Mon-Fri. Info at: <http://www.piconet3925.com>
- Michigan Upper Peninsula Net: 1600 (CST) on 3.921 MHz Sun-Sat and 1200 Sun. Info: <http://www.michupnet.com>
- Great Lakes Marine/Maritime Mobile Net: Morning 07:30 - 3.932; 08:15 - 7.261 MHz and evening 18:30 - 3.1730927; 19:15 - 7.268 MHz. Weekend extra net: 10:00 - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: <http://www.sailblogs.com/member/glimmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.330 MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.908 +/- at 0830 CST Sundays
- WARFA: 3.908 +/- Sun/Tue/Thu nights at 2200 CST, <http://warfa.org/>
- Youth Net: 14.320-14330 Sundays 1800-1900 UTC, Net Control: AC8PI
- YACHT: Saturdays 1900 CST on EchoLink #481872, <http://yachthams.webstarts.com>
- Northwestern Ontario ARES Net: Evenings at 20:15 (Central) on +/- 3.750Mhz
- The Iron Range Net: Saturdays at 0800 Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 1900 Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays 08:00 CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: [w8irt@aol.com](mailto:w8irt@aol.com)
- Minnesota ARES Digital Net: Thursdays at 2000 CST, 3.5835 MHz USB +/- QRM, Mode: Olivia 8/500.
- SARA Digital Net: Sundays at 1900 Local, 3.582.150 MHz USB +/- QRM, Mode: BPSK31/BPSK63
- Spider Web Net (Marco Island FL): 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Broadcaster Net: 7.231 or 3.855 M/W/F @ 1500 UTC. 14.255 M-F @ 2130 UTC. <http://www.cbsretirees.com/ham.htm>
- Old Military Radio Net: 7.268 +/- nightly at 0200z. Other times/Frequencies too. See: <http://www.mrca.ar88.net/>
- Rag Chew Crew/Tailgaters/Freewheelers Nets: 3.916 +/- nightly at 1900 CST, <http://www.tailgatersnet.com>
- North South Net: 7.214.6 +/- at 0700 CST, Monday-Saturday



Happy  
New  
Year

Next  
**ARAC Board Meeting**  
Tuesday, Jan. 7, 2019  
@ 6:30 p.m.  
**Sammy's West Duluth**

**KCØNFB Bob**, would like to remind all hams to make sure your license is current and up-to-date on your address. You can visit the FCC ULS to check it and make changes at [www.fcc.gov/uls](http://www.fcc.gov/uls).

### **Amateur Radio License Class**

Tuesdays, 7-9pm  
Feb 11th—May 12th

House of Refuge  
115 West Myrtle, Duluth, MN

Course fee \$10  
License Test on 5/12; \$15 test fee

Instruction and testing for those who want to become Ham Radio operators. **Invite friends & family to join the hobby!**

Participants will learn communications for weather spotting, marathons, and disasters. Class will cover what you need to know to get your Technician license. We use the Gordon West manual that may be purchased the first night of class for \$25.

Contact Bob KCØNFB at [kc0nfb@charter.net](mailto:kc0nfb@charter.net) for information on signing up.

**CLUB REPEATER**  
**WØGKP**

**146.94 (-)**  
**CTCSS TONE**  
**103.5**

### **Next ARAC Club Meeting:**

Thursday, January 9, 2020  
**7 p.m.**

**Copper Top Church**

**This month's presentation:**

**Wires-X**  
with  
**Doug Nelson AAØAW**

#### **What is Wires-X?**

WIRES (Wide-coverage Internet Repeater Enhancement System) is an Internet communication system which expands the range of amateur radio communication. For WIRES-X, an amateur node station connecting to the Internet is used as the access point and connects the wireless communication to the Internet. Users' stations can communicate with other amateur stations all over the world using a node within the radio wave range.

Join us AAØAW walks us through exciting ways to use this technology in our hobby!

*Interested in providing a program, or have an idea for one? Contact Mike NØPDG at [lovoldm@gmail.com](mailto:lovoldm@gmail.com)*



# Duluth Area Repeaters



## ARAC System WØGKP

Freq.	Offset	Tone	Location
146.940	minus	103.5	Duluth
146.940	minus	107.2	Lakeside (rcv)
146.940	minus	151.4	Two Harbors (rcv)
146.940	minus	100.0	Gary-New Duluth (rcv)
146.940	minus	123.0	Solway (rcv)
146.940	minus	110.9	Cloquet (rcv)
147.000	minus	103.5	Mahtowa
444.100	plus	103.5	Duluth UHF Link

## N9MMU/N9QWH System (WI)

145.310	minus	110.9	Duluth
145.490	minus	110.9	Solon Springs
147.255	plus	110.9	Hayward
145.110	minus	110.9	Rice Lake
147.345	minus	136.5	Holcombe
145.230	minus	110.9	Eau Claire

## WECOMM – WI Statewide Linked System WE9COM

147.075 plus 110.9 Meteor Hill (closest repeater to Duluth)

## LSAC System #1

147.330	plus	151.4	Proctor
147.330	plus	103.5	Duluth (rcv for Proctor)
147.330	plus	156.7	Duluth (North) (Fish Lake)
147.270	plus	114.8	Two Harbors
147.270	plus	103.5	Wales
147.090	plus	114.8	Silver Bay
145.410	minus	114.8	Finland
147.300	plus	114.8	Isabella
145.150	minus	103.5	Washburn, WI
146.700	minus	103.5	Bayfield, WI
443.850	+5.00	none	Bayfield, WI
147.165	plus	110.9	Hurley, WI
146.640	minus	151.4	Ely
443.500	+5.00	141.3	Gilbert
147.060	plus	103.5	Virginia
147.360	plus	162.2	Cook
147.165	plus	114.8	Coleraine
443.925	+5.00	110.9	Brainerd

## NARC System NAØRC

145.45Ø	minus	1Ø3.5	Solway Twp
145.45Ø	minus	114.8	Park Point (rcv)
147.135	plus	114.8	Park Point (rcv)
147.135	plus	1Ø3.5	Knife River

## Stand Alone Repeaters

145.21Ø	minus	11Ø.9	Clam Lake, WI
146.88Ø	minus	123.Ø	Grand Rapids
146.91Ø	minus	146.2	Duxbury, MN

## Fusion and D Star

Fusion (Analog has tone and C4FM digital with no tone)

147.15Ø	plus	151.4	NTØB Gilbert Fusion Rptr
145.17Ø	minus	11Ø.9	WA9KLM Superior – Douglas County RACES/ARES Fusion Repeater

443.1ØØ +5.ØØ 1Ø3.5 KBØYHX Cloquet – Carlton County RACES/ARES Fusion Repeater

444.3ØØ +5.ØØ 1Ø3.5 NØEO Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO

147.375 plus NØEO D Star  
442.2ØØ plus NØEO D Star

[Repeater list compiled by Dr. Frequency—KCØWDQ]

## ST. Louis County Department of Emergency Services Net Control Roster

N9DMG	Scott Swanson	NØVRM	Gene Ellefsen
AAØAW	Doug Nelson	KCØWDQ	Paul Dallavia
WØNWO	Dave Miller	WØDIO	Dennis Anderson
KØDSL	Diane Saunders	AAØME	Randy Johnson

*Sunday Nights at 21ØØ on the ARAC System*  
(See Calendar for net control schedule)

## Ten Meter SSB Net Control Roster

AAØAW	Doug Nelson	WØLWU	Joe Meese
NUØW	Gary Hanson	K9KDK	Al Babcock
WØDIO	Dennis Anderson	NØVRM	Gene Ellefsen
AAØME	Randy Johnson	KØDSL	Diane Saunders

*Sunday Nights at 2ØØØ on 28.45Ø MHz USB*

## Ten Meter CW Net Control Roster

AAØAW	Doug Nelson	NØPDG	Mike Lovold
-------	-------------	-------	-------------

*Sunday Nights at 193Ø on 28.125 MHz*

## Northland Weather Group Net Control Roster

KCØMKS Jeff Nast

*Monday Nights at 2ØØØ on the ARAC System*

## Douglas County Net

*Tuesday Nights at 2ØØØ on 145.49Ø (N9QWH System)*

## Central Carlton County Net

*Tuesday Nights at 2Ø3Ø on the ARAC System*

## Lake County RACES/ARES Net

*2nd & 4th Wednesday Nights at 19ØØ on the LSAC 1 System*

# Elmers

## El-mer / el-mær/ [el-mer]

1. a male given name: from Old English words meaning "noble" and "famous."
2. an adhesive used to bond like or unlike materials
3. An experienced ham radio operator who mentors new and prospective hams.

Name	Call	Expertise
Jeff Nast	KCØMKS	APRS, EchoLink, WinLink, Fusion, Contesting
Bob Schulz	KCØNFB	Contesting
Jim Anderson	NØJWA	QsoNet
Doug Nelson	AAØAW	HF, VHF/UHF, Contesting, Packet, APRS, Morse Code, VE testing, Echolink, Allstar, EmCom...



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Contact Kim or Steve Waller to include your name in this listing!

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Members, please check your name and email address for accuracy. If you are not on this list and want to be on the list, contact us with your info. If you need to make a change, please let us know at KEØNQS.mn@gmail.com Or KEØNQT@gmail.com

Co-Editors,  
Kim & Steve Waller



**SUNDAY NIGHT NETS**  
 1930 - CW - 28.125 MHz USB-CW  
 2000 - USB 28.450 MHz  
 2100 - Southern St. Louis County  
 Emergency Services Net  
**MONDAY NIGHT NETS**  
 2000 - Northland WX Net - ARAC Repeater

# JANUARY

## CLUB EVENTS

**TUESDAY NIGHT NETS**  
 2000 - Douglas Cty 145.490 MHz  
 2030 - Central Carlton County  
**WEDNESDAY NIGHT NETS**  
 1900 - Lake County - LSAC1  
 2nd & 4th Wednesdays  
 2100 - BWAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1  2100 - BWAR	2	3	4
5  CW 1930 NØPDG USB 2000 WØLWU ES 2100 WØNWO	6  WX 2000 KCØMKS	7 <b>ARAC BOARD MEETING</b> 6pm Sammy's West Duluth  DC Net 2000 CC Net 2030	8 <b>Lake County ARES/RACES Meeting 1800</b> Lake County Net 1900 2100 - BWAR	9  <b>ARAC Club Meeting</b> Coppertop Church  7 pm	10	11
12  CW 1930 AAØAW USB 2000 K9KDK ES 2100 NØVRM	13 <b>DC ARES/RACES Mtg 1900 DC EOC</b>  WX 2000 KCØMKS	14  DC Net 2000 CC Net 2030	15 <b>St. Louis County ARES/RACES Mtg 1630 Pike Lake EOC</b>  2100 - BWAR	16	17	18
19  CW 1930 NØPDG USB 2000 WØDIO ES 2100 KØDSL	20  WX 2000 KCØMKS	21  DC Net 2000 CC Net 2030	22  Lake County Net 1900  2100 - BWAR	23 <b>Carlton County ARES/RACES Meeting 1900 CC EOC</b>	24	25 <b>Club Breakfast @ The Chalet 0730-0800</b>
26  CW 1930 AAØAW USB 2000 AAØAW ES 2100 NØVRM	27  WX 2000 KCØMKS	28  DC Net 2000 CC Net 2030	29  2100 - BWAR	30	31	

Get this newsletter *faster*  
via email!  
Email Doug AAØAW at  
[aa0aw@arrl.net](mailto:aa0aw@arrl.net)

Next Meeting: Thursday,  
*January 9, 2020 - 7 pm*  
Coppertop Church

## ARAC Committee Chairs

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Scott Ahlgren, NØVYU

**Repeater Chairs:**

Randy Haglin NØBZZ  
Randy Wabik KAØJZV

## CONGRATULATIONS

To new hams who have joined our amateur radio community in the last few weeks, as well as those who have newly upgraded to General or Extra!

We had a great turn-out at our December 10th testing session and look forward to having you all with us at the upcoming club meetings and events in 2020!

**Contest Calendar** at [www.contestcalendar.com](http://www.contestcalendar.com)

**National Contest Journal** at [www.ncjweb.com](http://www.ncjweb.com)

**QSO Party Note:** State/Province/National QSO Parties are abbreviated with the 2 or 3 letter abbreviation for the state/province/national designation followed by QP for QSO Party:

Examples: Minnesota QSO Party is MNQP  
British Columbia QSO Party = BCQP

**QRZ** web site at [www.qrz.com](http://www.qrz.com)

**VHF Propagation** site at [www.aprs.mountainlake.k12.mn.us](http://www.aprs.mountainlake.k12.mn.us)

**Reminder:** The **Contest Corral** monthly listing of contests can be found in each issue of **QST**. **ARRL** sponsored contests can be found in Contest Corral, highlighted, or on the

# U.S. AIR FORCE MILITARY AUXILIARY RADIO SYSTEM



Minnesota State MARS Director  
Reginald B. Cass / AFS5MN

Gene Ellefsen  
NØVRM

Thank you for your time and interest.

Air Force MARS membership could be for you. We do hope that it is.

If you have the following interests, and capabilities, we are interested in recruiting you to become an Air Force MARS member. Completion of the following on line training is mandatory:

Personally, Identifiable Information (PII) <https://iatraining.disa.mil/eta/piiv2/launchPage.htm>

Cyber Awareness [https://iatraining.disa.mil/eta/disa\\_cac2018/launchPage.htm](https://iatraining.disa.mil/eta/disa_cac2018/launchPage.htm)

If you have completed: Incident Command System (ICS) -100, 200, 700, and 800 training, and have obtained certification for Air Force MARS or are willing to obtain this training, again, Air Force MARS could be for you.

You must be interested in joining a group of individuals that are dedicated to amateur radio, emergency communications, and willingness to learn and used military communications procedures for voice and digital communications.

You must have equipment that will meet the minimum requirements for voice and digital operation. The equipment will be: transmitter, receiver, (transceiver) modified to operate out of amateur radio bands, computer, modem, and antenna's that are designed to operate on military assigned frequencies. (The best antenna's will be a dipole cut to the operational frequency. NVIS antennas work best. You will not need a linear amplifier, however if you have one that will operate on out of amateur radio bands that will be a plus)

You must go through and complete training. You are allowed up to 180 days to do so.

Air Force MARS operation's and procedures are based upon "MARS Operating Instruction", (MOI). The MOI manual uses as its basis for instruction a series of Allied Communications Publications (ACP's), Department of Defense Directives, Department of Defense Instructions, and Department of Defense Manual.

If you already belong to a MARS program and would like to consider Air Force MARS, please contact one of the recruiting team members.

For even more information please open and read the attachment.

Our recruitment team is as follows:

AFA5XK Dave, WB7DRU [wb7dru@gmail.com](mailto:wb7dru@gmail.com)

AFA5ZV Randy, KRØB [afa5zv@gmail.com](mailto:afa5zv@gmail.com)

AFA5JY Reg, KAØRJY [reg\\_cass@msn.com](mailto:reg_cass@msn.com)



## Arctic Oscillation, Continued from Page 1

The Arctic Oscillation (AO), and its close cousin, the North Atlantic Oscillation (NAO), are climate patterns in the Northern Hemisphere defined by fluctuations in the difference of sea-level pressure between the Icelandic Low and the Azores High. It is one of oldest known climate oscillations—seafaring Scandinavians described the pattern several centuries ago. Through east-west oscillation motions of the Icelandic Low and the Azores High, the AO and NAO control the strength and direction of westerly winds and storm tracks across the North Atlantic. A large difference in the pressure between Iceland and the Azores (positive AO/NAO) leads to increased westerly winds and mild winter in the U.S. and Western Europe. Positive AO/NAO conditions also cause the Icelandic Low to draw a stronger south-westerly flow of air over eastern North America, preventing Arctic air from plunging southward. In contrast, if the difference in sea-level pressure between Iceland and the Azores is small (negative AO/NAO), westerly winds are suppressed, allowing Arctic air to spill southwards into eastern North America more readily. Negative AO/NAO winters tend to bring cold winters to Europe and the U.S. East Coast, but leads to very warm conditions in the Arctic, since all the cold air spilling out of the Arctic gets replaced by warm air flowing poleward.

The winter of 2009 – 2010 had the most extreme negative NAO and AO since record keeping began in 1865; a very extreme AO/NAO also developed during the winter of 2010 – 2011. But the next year, the pattern flipped. The AO was almost as strong, but in the opposite sense—a positive AO, leading to very warm conditions over the U.S. Unfortunately, the AO is difficult to predict more than a week or two and advance, and [research is ongoing to help us] understand why the AO can vary so much from winter to winter.

*Editor's note: The article from Jeff KCØMKS ends here, but the on the subject of ongoing research, consider Dr. Judah Cohen's work at AER, found at [www.aer.com/science-research/climate-weather/arctic-oscillation](http://www.aer.com/science-research/climate-weather/arctic-oscillation) :*

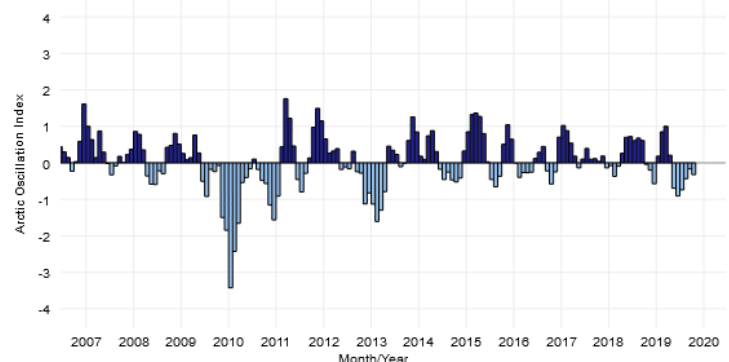
Dr. Judah Cohen from Atmospheric and Environmental Research (AER) recently embarked on an experimental process of regular research, review, and analysis of the Arctic Oscillation (AO) and Polar Vortex (PV). This analysis is intended to provide researchers and practitioners real-time insights on one of North America's and Europe's leading drivers for extreme and persistent temperature patterns. During the winter schedule the blog is updated once every week. Snow accumulation forecasts replace precipitation forecasts. Also, there is renewed emphasis on ice and snow boundary conditions and their influence on hemispheric weather.

### Arctic Oscillation and Polar Vortex Analysis and Forecasts

#### Dr. Cohen's Notes for December 30, 2019

##### Summary [Excerpt]

- The Arctic Oscillation (AO) is currently positive and is predicted to remain positive the next two weeks.
- This week the predicted pattern across North America is troughing/negative pressure/geopotential height anomalies with widespread normal to below normal temperatures across Alaska and the Western United States (US) with ridging/positive geopotential height anomalies and normal to above normal temperatures widespread in Canada and the central and eastern US. Next week the troughing/negative pressure/geopotential height anomalies will slide into the Eastern US pulling some of the normal to below normal temperatures now in Alaska into Eastern Canada and the Eastern US. In week two the troughing/negative pressure/geopotential height anomalies are predicted to retrograde once more into western North America allowing cold temperatures to become widespread across Alaska and Canada and



**Snapshot of NOAA's Arctic Oscillation Index interactive graph.** Go to [www.climate.gov/news-features/understanding-climate/climate-variability-arctic-oscillation](http://www.climate.gov/news-features/understanding-climate/climate-variability-arctic-oscillation) to click and drag to display different parts of the graph. This graph shows monthly values for the Arctic Oscillation index.

possibly the Northern US, though overall the Eastern US should be milder this period.

##### Impacts

I feel like it is *déjà-vu* all over again with a strong stratospheric polar vortex (PV) in December leading to a

*Continued on page 22*

## Arctic Oscillation, Continued from Page 21

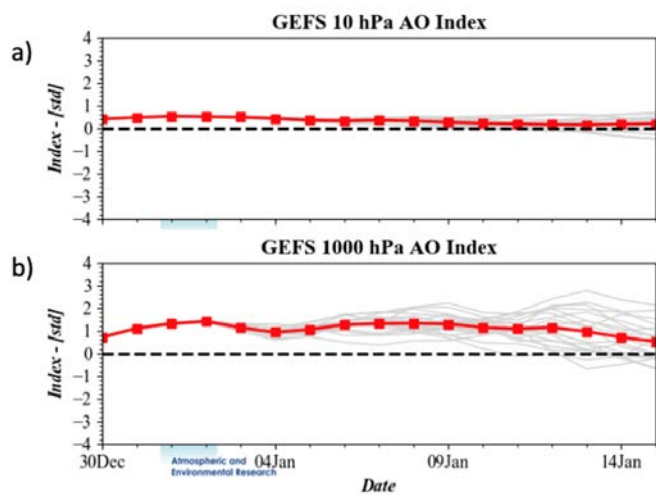
positive AO and a relatively mild pattern across the Northern Hemisphere as we head into January. Reminds me most recently of winters 2015/16 and 2016/17. In 2015/16 possibly the combination of a westerly quasi biennial oscillation (QBO) and super El Niño lead to an anomalously strong, possibly even an all-time record strong PV that I would argue contributed to an overall mild winter. January was surprisingly cold in the Eastern US given the record strong PV in large part because a cyclone penetrated unusually far north into the central Arctic bringing with it anomalous heat and humidity that triggered a tropospheric negative AO event. Eventually though in February and especially March the PV became more disrupted and contributed to at least episodic more severe winter weather.

This winter the PV weakened in November heading into December but the PV weakening fell well short of major warming status, despite model forecasts to the contrary. The PV has since recovered and has been on the stronger side of normal and this has coupled with the surface contributing to a positive AO to at least kick-off January accompanied by a relatively mild pattern across the NH. In the Eastern US the mild pattern will be interrupted briefly by colder temperatures early next week. I would attribute this interruption in the mild pattern to a relatively minor and short-lived reflective PV disruption. But once the forcing from the PV disruption abates by late next week, it makes sense to me that Madden Julian Oscillation forcing should dominate North American weather. MJO is predicted to be in a fairly robust phase five which favors ridging south of the Aleutians troughing in western North America and more ridging in the Eastern US. However, Canada is predicted to remain cold and storms traversing North America can tap into this reservoir of cold resulting in at least short-term cold air outbreaks. Also I do believe that the models are overly sensitive to tropical forcing and they could adjust colder with time.

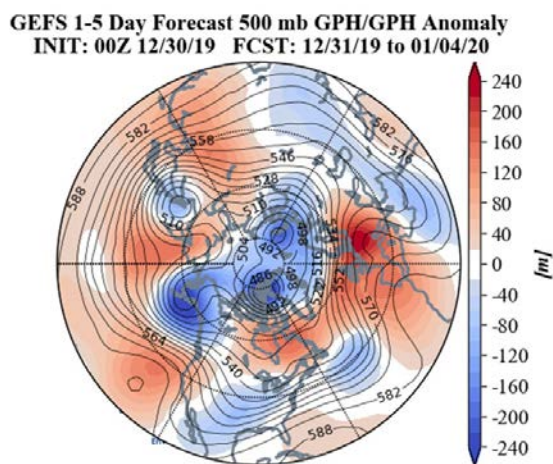
But like in 2016 and again 2017 I expect the PV to become more disrupted. Increasing at least episodic severe winter weather. Our polar vortex model is predicting a weakening of the PV from the very end of the second into the third week of January. Though I am certain the predicted weakening in the model is overdone, the model at least usually matches the trend in the PV. Also based on what I see from the ECMWF stratospheric winds a much more defined reflective layer is predicted to form in the stratosphere so if nothing else I would expect more reflective PV disruptions. So, though January looks to start off relatively mild in the Eastern US or at least seasonable given the cold air from the reflective event next week, I expect an increasing risk of cold weather related to PV disruptions. The risk for cold weather is probably aided by the warm sea surface temperatures in the eastern North Pacific that favors mid-tropospheric ridging in the region.

### Near Term Conditions (1-5 day)

The AO is currently positive (**Figure 1**) with negative geopotential height anomalies across the Arctic and mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**, page 24). And with weak negative geopotential height anomalies across Greenland and Iceland (**Figure 2**), the NAO is slightly positive as well.



**Figure 1.** (a) The predicted daily-mean AO at 10 hPa from the 00Z 30 December 2019 GFS ensemble. (b) The predicted daily-mean near-surface AO from the 00Z 30 December 2019 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.



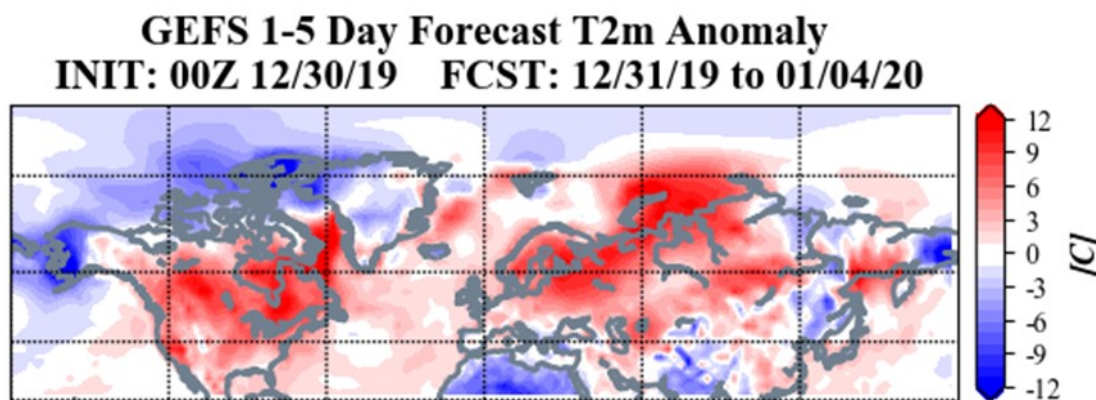
**Figure 2.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 31 December 2019 – 4 January 2020. The forecasts are from the 30 December 00z GFS ensemble.

Continued on page 23

## Arctic Oscillation, Continued from Page 22

This week ridging/positive geopotential height anomalies are predicted to dominate Western and Northern Europe with troughing/negative geopotential height anomalies mostly confined to Southeastern Europe (**Figure 2**). General high heights and lack of snow cover will result in normal to above normal temperatures across much of Europe including the UK with the possible exception of normal to below normal temperatures across the Balkan States and Turkey (**Figure 3**). This week, ridging/positive geopotential height anomalies are predicted to dominate much of Asia (**Figure 2**) favoring widespread normal to above normal temperatures across much of Asia (**Figure 3**). Exceptions are the northern India subcontinent and Northeastern Asia where regional troughing/negative geopotential height anomalies (**Figure 2**) are predicted to result in normal to below normal temperatures (**Figure 3**).

Troughing/negative geopotential height anomalies in Alaska and the Western US will force downstream ridging/positive geopotential height anomalies across central and eastern North America (**Figure 2**). This is predicted to result in normal to below normal temperatures in Alaska and the Western US with normal to above normal temperatures across much of Canada and the Central and Eastern US (**Figure 3**).



**Figure 3.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 31 December 2019 – 4 January 2020.

The forecast is from the 00Z 30 December 2019 GFS ensemble.

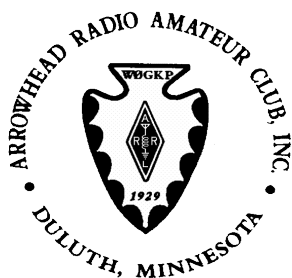
All chart and blog excerpts courtesy Dr. Judah Cohen, Atmospheric and Environmental Research (AER)

**Wow!** So enlightening to hear from a scientist like Dr. Cohen, who is dedicated to research on the subject of arctic oscillation and polar vortex analysis. Sharing this analysis with us, the general public, in near-real time is wonderful.

Sometimes I feel like we in the Northland are “live research” as we tough it out through the challenging winters those weather patterns can dish out at us! Our analysis for December, 2019 would probably sound something like “Uffda, that was a doozy!” Not very “scientific” perhaps, but definitely a sentiment shared by many. Maybe we’ll catch a break in January and February!

Visit Dr. Cohen’s website (address on p 21) for the latest predictions or follow him on Twitter @judah47 ★

## The ARAC RELAY



*Published monthly and distributed free to members, “The RELAY” is the official publication of the Arrowhead Radio Amateur Club, Inc. Members are encouraged to submit articles, opinions, and classifieds. Your submission will be placed as soon as possible providing it does not conflict with the bylaws of the Arrowhead Radio Amateur Club, Inc. The editors reserve the right to omit any submission that is not a required item. If a submission is questionable, it will be presented to the Board of Directors at the next scheduled board meeting for authorization.*

