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**OCRACES
Holiday Dinner**

**Rodrigo's
Mexican Grill
Orange**

**Monday,
December 5, 2022,
at 5:30 p.m.**

Orange County Sheriff's Department
Emergency Management Division



Newsletter of the County of Orange Radio Amateur Civil Emergency Service

CRO's Nest

by Ken Bourne, W6HK, OCRACES Chief Radio Officer

Tropospheric Propagation

Tropospheric propagation, commonly known to radio amateurs as tropospheric ducting, tropospheric bending, troposcatter, or "tropo," is a type of radio propagation that allows transmission of VHF and UHF signals beyond traditional line-of-sight range. Technically, it is caused by scattering from inhomogeneities in the refractive index of the air.

Tropo is a phenomenon observed on 6 meters, 2 meters, and 70 centimeters, and also on amateur microwave bands. It is not the same as ionospheric refraction that is common on HF bands. Tropospheric propagation effects occur comparatively close to the earth's surface.

Propagation above 30 MHz normally extends to just beyond the optical horizon (line-of-site), although ionospheric refraction does occur on the 6-meter and 2-meter VHF bands, but not often. The troposphere is the lowest region of the atmosphere, extending from the earth's surface to a height of about 4 to over 6 miles. The tropopause, which is about 5 to 10 miles high and where temperature inversion occurs, separates the troposphere from the stratosphere, the next higher layer. The stratosphere extends up to about 31 miles. Above the stratosphere is the mesosphere, which is 31 to 53 miles high.

The ionosphere is the layer of the earth's atmosphere that contains a high concentration of ions and free electrons and is able to reflect radio waves (mostly HF and MF). It extends from about 50 to 600

miles above the earth's surface and is ionized by solar radiation.

The troposphere is not ionized. Radio signals above 30 MHz are refracted by small changes that exist in the troposphere close to the ground. The refractive index of the air close to the ground is very slightly higher than that higher up. As a result, the radio signals are bent towards the area of higher refractive index, which is closer to the ground, thereby extending the range of the radio signals, often 300 to 600 miles or more. Otherwise, without tropo conditions, VHF and UHF signals would travel into outer space when they reach the horizon.

There are three types of tropospheric propagation:

- *Enhanced tropospheric refraction*, which occurs when there is a significant increase above the normal value of the refractive index in the atmosphere. It occurs when the lower troposphere divides into two stable layers, typically a warm dry layer over a cool moist layer.
- *Tropospheric ducting*, which occurs when radio waves are trapped within channels bounded by sharp changes in refractive index. Surface ducts occur when the refractive bending increases so much that the signal hits the ground at a distance far away from the transmitter and is then reflected back up to the inversion, to then be refracted back down again. Elevated ducts form when a double discontinuity in refractive index occurs. In this case, the waves are

CRO's Nest *Continued from page 1*

bent upwards from the lower boundary of the duct, and downwards from the upper boundary.

- *Tropospheric scattering*, which arises from small-scale variations in the refractive index. Changes in refractive index occur whenever there is turbulence, for example in convection cells and in any strong wind.

Tropo signals typically exhibit a slow fading cycle, contrary to more rapid fading (QSB) of ionospheric propagation.

Ionospheric propagation is not normally affected by weather conditions, but tropo is, with such conditions extending over hundreds of miles. During very settled, warm anticyclonic weather (such as in a high-pressure area), usually weak signals from distant transmitters increase in strength. A settled high-pressure system can enhance tropospheric propagation, in particular favoring signals that travel along the prevailing isobar pattern (rather than across it). Such conditions can occur at any time, but generally the summer and autumn months are the best periods.

My first tropo experience was in 1960 on 6 meters AM, when my call sign was K9GHR in Glen Ellyn, Illinois (just west of Chicago). I worked Bob Heil, K9EID (yes, the famous Bob Heil of Heil Sound!) in Marissa, Illinois, about 265 miles away. A temperature inversion that day caused tropospheric ducting, whereby our signals, which originated in a large mass of cold air, encountered a higher layer of warmer air, causing the signal to bend downwards toward the colder, denser air, following the curvature of the earth. VHF enthusiasts in the Midwest commonly watched for weather changes, such as warm fronts and cold fronts, which could cause temperature inversions, resulting in unusual propagation distances. I have had several tropo experiences on 6 meters, but tropo signals are typically stronger on 2 meters.

Tropospheric propagation during high-pressure weather conditions is usually on clear, cloudless days with little or no wind. At sunset, the upper air cools, as does the surface temperature, but at different rates. This produces a boundary or temperature gradient, which allows an inversion layer to form. A similar effect occurs at sunrise. The inversion allows VHF and UHF signal propagation well beyond the normal radio horizon distance.

Fog can also enhance tropospheric propagation, due to inversion effects. Fog occurs during high-pressure weather. If such conditions result in a large belt of fog with clear sky above, the upper fog level will be heated and produce an inversion. This condition often arises at night fall, continues overnight, and clears with the sunrise over a period of around 4 to 5 hours.

Temperature inversions are also common along

coastal areas bordering large bodies of water. This is the result of natural onshore movement of cool, humid air shortly after sunset, when the ground air cools more rapidly than the upper air layers. Similar action occurs in the morning, when the rising sun warms the upper layers.

Sometimes phenomenal distances are reached by tropo ducting on VHF, UHF, and microwave frequencies. During a couple of weeks each summer, a tropo ducting path exists between California and Hawaii. A world record was established on August 21, 1999, between KH6HME of Hilo, Hawaii, and W1LP/mm south of Cabo San Lucas, on 144.170 MHz SSB. The distance was 2,954 miles! The KH6HME beacons are located on the slopes of the Mauna Loa volcano at an elevation of 8,200 feet, with the exception of the 6-meter beacon, which is located in lower Puna in the Hawaiian Beaches Subdivision of the Big Island of Hawaii. The first beacon started operating on 432.075 MHz in April 1979. In 1980, the 1296 MHz beacon was activated. In 1981, the 144.170 MHz beacon started sending its signals to the Mainland West Coast of the United States. There is also a 10 GHz beacon, which is turned on when conditions are favorable. On July 15, 1989, KH6HME worked XE2GXO (N6XQ) (2,579.69 miles) on 220 MHz, 432 MHz, and 1296 MHz by tropo ducting. In July 1991 and 1994, KH6HME worked N6CA (2,474.476 miles) on 2304, 3456, and 5760 MHz. In July 1995, KH6HME worked N6XQ (2,523.369 miles) on 902 MHz.

High mountains and undulating terrain between stations are typically a barrier to tropospheric signals. However, a mountain can cause a less common type of tropospheric propagation known as *knife-edge diffraction*, which is not ducting. It redirects a portion of the incident radiation that strikes a well-defined obstacle such as a mountain range or the edge of a building. One day, for example, after communicating from my mobile on 146.52 MHz simplex with my wife Carol, N6YL (SK), she was called by a station in Lancaster, on the other side of the San Gabriel Mountains. Carol was running about 50 watts into a 13-element Yagi antenna pointed north. Normally, they would not have been able to detect each others' signals, but their locations were just right for ideal knife-edge diffraction. I previously developed an incorrect theory for this phenomenon, thinking that the less dense air at the mountain top, with a lower index of refraction, caused the radio signal to bend downwards toward the higher density air, similar to the effect of ducting. However, the knife-edge effect is correctly explained by Huygens' principle, which states that a well-defined obstruction to an electromagnetic wave acts as a secondary source, and creates a new wavefront. This new wavefront propagates into the geomagnetic shadow area of the obstacle. ★

OCRACES Holiday Dinner: December 5, 2022

The annual OCRACES Holiday Dinner is returning after a two-year suspension due to the COVID-19 pandemic. As before, it will be held at Rodrigo's Mexican Grill, 1230 E. Katella Ave., in Orange, at 5:30 p.m. OC-

RACES members and their families, as well as OCSO Emergency Management Division staff, are looking forward to this celebration! ★



SKYWARN Recognition Day: December 3rd

The annual SKYWARN™ Recognition Day (SRD) on-the-air activity will take place Saturday, December 3, 2022, from 0000 to 2400 UTC. For U.S. time zones, activity begins on the evening of Friday, December 2, 2022.

SKYWARN Recognition Day was developed in 1999 by the National Weather Service (NWS) and ARRL The National Association for Amateur Radio® to honor the contributions that SKYWARN volunteers make to the NWS mission—the protection of life and property during threatening weather. During the SKYWARN special event, hams will operate from several NWS offices, as well as from their mobile, home, and club stations. “The relationship between amateur radio operators and the NWS is extremely important for relaying information during storms of any type,” said ARRL Director of Emergency Management Josh Johnston, KE5MHV. “SKYWARN is a perfect example of the value of hams working together with government partners during times of disaster.”

The SKYWARN Storm Spotter Program has been a mechanism used by the NWS for years to educate people on what to watch for during weather events and to provide a source for information to the NWS offices. Program courses provide information on reportable criteria for cloud formations, and even what to look for during the formation of supercells that may cause tornadoes or other potentially dangerous weather events.

For information about SKYWARN spotter courses, which are available to anyone around the country or online, visit <https://www.weather.gov/skywarn/>.

ARRL also offers a book, *Storm Spotting and Amateur Radio*, that is available from ARRL and its publication dealers.

Individuals and NWS office amateur radio stations who are planning on operating for 2022 SKYWARN Recognition Day should register to participate. All amateur radio stations and SKYWARN spotters that register will receive an SRD number to their

email address once registered. Information about participating, registration, and a Spotter Recognition Map is available at <https://www.weather.gov/crh/skywarnrecognition>.

In-person amateur radio operations will be determined by each local National Weather Service Forecast Office. Amateur radio operators must make all necessary inquiries with the appropriate NWS staff at your respective National Weather Forecast Office (San Diego) ahead of SRD.

Look for station WX1AW, operated by ARRL Emergency Management Assistant Ken Bailey, K1FUG, during SRD. WX1AW will be active on 40 thru 10 meters using SSB and FT8 Modes and will monitor local VHF and UHF repeaters. Contacts will be uploaded to LoTW after the event. QSL via the station license address with a SASE (self-addressed-stamped-envelope).

More information is available at <https://www.arrl.org/skywarn-recognition-day>.

★

ARRL Offers Handbook 100

Handbook 100 is the 100th edition of *The ARRL Handbook for Radio Communications*. ARRL is offering a collector's edition—hardbound in textured black finish with silver foil embossing, including a special insert looking back across decades of technological innovation and growth of ham radio.

Key topics:

- Radio electronics theory and principles
- Circuit design and equipment

- Signal transmission and propagation
- Digital modulation and protocols
- Antennas and transmission lines
- Construction practices

Handbook 100 has new projects and content, including radio propagation, electronic circuit simulation, cavity filter and high-power HF filter projects, digital protocols and modes, RFI from low-voltage lighting, portable station equipment, antennas, power, and assembly. ★



OCRACES Welcomes Ron Mosher, K0PGE

Welcome to OCSD PSR Ron Mosher, K0PGE, who became an OCRACES member on Monday, November 7, 2022.

Ron grew up in a small Iowa town where he earned his Novice license, KNØPGE, in 1958 and upgraded to General, KØPGE, the next year. After high school, real life took over and ham radio was set aside until recent retirement.

Enlistment in the U.S. Air Force at the time of the Cuban Missile Crisis (1963) led to assignment as an electronics instructor for four years in Denver and, subsequently, a Bachelor Degree from the University of Denver and a stint with Price Waterhouse in Denver as a Certified Public Accountant (CPA). Also in 1963, Ron and Pat were married and their two sons were born during those years in Denver.

Ron and family moved to Ithaca, New York, to attend the MBA program at Cornell University, followed by employment in finance positions in Pennsylvania, Maine, and Delaware. An opportunity arose to serve as the Budget Director for a newly elected Governor in Delaware and subsequently as the Comptroller for the State of Iowa. A return to the corporate world resulted in various senior financial positions in the U.S. and in Europe until retirement. After retirement, Ron served on Boards of Directors for a variety of public and private companies for the next

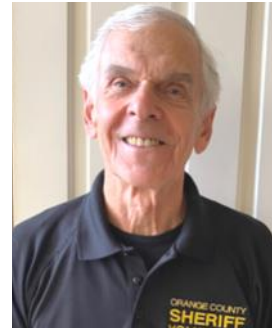
twenty years until a final, real retirement, at which time amateur radio activity resumed.

Ron got his Extra license in 2014 and also retrieved his original callsign. He is interested in SSB, CW, and digital modes. His base station includes a Collins S-Line and an FTdx3000. Unfortunately, HOA restrictions limit antennas to the attic where a 20-meter dipole and a 20-10 meter mag loop reside. A portable go-box includes an FT-857D, tuner, Bioenno 30Ah battery and provisions for future solar panels, for SSB, CW, and digital operations on all bands through 2 meters, with appropriate antennas.

EmComm activities have included OCHEART and Laguna Niguel ACS. Other memberships include SOARA, Collins Collectors Association (CCA), CW Operators (CWops), and Battleship Iowa Amateur Radio Association (BIARA).

Ron and Pat will celebrate their 60th year of marriage next June. One son, his wife, and three grandsons also live in Laguna Niguel and one son and wife live in Flagstaff.

★



Ron Mosher, K0PGE.

U.S. Bans Some Chinese Telecoms Gear

Beware of security risks from some Chinese electronic products, including radios, cameras (security, dashcam, etc.), and test equipment. On Friday, November 22, 2022, federal authorities announced a ban on the import or sale of communications equipment deemed “an unacceptable risk to national security”—including products from Chinese giants Huawei Technologies and ZTE. Both firms have been on a roster of companies listed as a threat by the Federal Communications Commission (FCC), and the new rules bar future authorizations of their equipment. This move is the latest in a series of actions to limit the access of Chinese telecoms firms in United States networks.

FCC Chairwoman Jessica Rosenworcel said, “The FCC is committed

to protecting our national security by ensuring that untrustworthy communications equipment is not authorized for use within our borders.” She added that the new rules are a part of ongoing work to guard against security threats.

The order also affects companies including video surveillance equipment firms Hangzhou Hikvision Digital Technology and Dahua Technology, and telecoms equipment firm Hyttera Communications. The FCC is also seeking comment on future action relating to existing authorizations.

Washington had previously banned Huawei from supplying U.S. government systems and strongly discouraged the use of equipment in the private sector, with fears that Huawei equipment could be compromised by Chinese intelligence. In 2019, Huawei

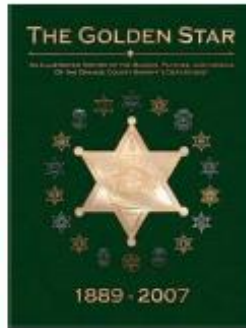
was put on a trade blacklist that barred U.S. suppliers from doing business with it, cutting the Chinese firm—also a top smartphone brand—off from Google’s Android mobile operating system.

Be sure to scan your computer for malware after every update of firmware or programming software for your Chinese radios and test equipment, as well as your cameras used for home security, dashcams, or ATV (commonly via AREDN mesh). Even if a device is clean when installed, there will be a myriad of software (and sometimes firmware) updates over its lifetime. These may contain malware, and they cannot be adequately monitored. The coupling of these devices and the cloud is a powerful combination, but storing data in China is madness!

Orange County Sheriff's Museum & Education Center

Established 2004 in Orange County, California
"Preserving the Past—Preserving the Future"

www.ocsheriffmuseum.com/shop



- Challenge coin set, 6 unmounted \$65.00
- Uniform Bottle Coolie \$12.00
- OCSD Medallion \$199.00
- Sheriff's Badge Medallion \$199.00
- Golden Star Badge Book \$20.00
- Wood plaque with mounted coins \$115.00
- Sheriff's Museum Ball Cap \$15.00

The Orange County Sheriff's Museum & Education Center is a non-profit organization dedicated to preserving the history of the Orange County Sheriff's Department and to educating the public about law enforcement's role in the community. Proceeds from the sales of this merchandise will be used to support the future construction of a permanent facility that will display the department's historic memorabilia and fund law-enforcement-related education programs. Donations to the Orange County Sheriff's Museum may be made through PayPal, by clicking on the button below. The IRS Public Charity 501(c)(3) Tax Identification Number is 20-2273943.



Countywide RACES/EmComm News

Anaheim RACES

The new call sign for Anaheim RACES is KA6ANA.

Orange County Fire Watch

The National Weather Service issued a Red Flag Warning for Saturday, November 19, 2022, from 0100 to 2200 hours, for the Mountain, Inland, and Coastal weather zones of Orange County. As a result, Orange County Fire Watch Manager Tony Pointer deployed OCFW volunteers to Regional, Wilderness, and State Parks and Open Space areas. Two of the deployed OCFW volunteers included OCRACES members Scott MacGillivray, KM6RTE, and Ron Mosher, K0PGE. Communications were via the SOARA repeater, with Gordon West, WB6NOA, as net control. Other deployed OCFW radio amateurs included: Kevin Korff, KK6CUR; Mikel Hansen, NR6E; Bruce Crabtree, KI6RZW; Kristopher Cutting, W6KJC; Robert Gimbel, KG6WTQ; Dan Upchurch, N6RPR; Fred Kix, KC6TWV; William Frey, K6FRY; Raymond Hutchinson, AE6H; Craig Konrad, KF6NFD; Chip Leopard, KJ6VCT; Charley Speelman, WA6RUZ; Matthew Salcius, KN6GAM; Jeff Mikoleit, KK6YUP; Gary Bickal, KN6QPI; and Jerry Couchman, KE6KZR.

OCRACES was prepared to activate, with Randy Benicky, N6PRL, Ken Bourne, W6HK, Scott Byington, KC6MMF, and Robert Stoffel, KD6DAQ, ready for deployment and observing local conditions. Emergency Management Division Deputy Director Lee Kaser, KK6VIV, advised that the midway turnout and lower parking lot at Loma Ridge, normally available for Severe Fire Weather Patrol observations, could not be manned due to road construction.

Southern California Radio Rodeo

On November 3, 2022, the OCSD Emergency Communications Bureau and Control One conducted the annual Radio Rodeo at The Honda Center in Anaheim. Radio Rodeo is an exercise to test the interoperability to communicate with agencies inside and outside Orange County during emergencies.

Orange County Sheriff's Department Mutual Aid Bureau

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mutualaidreserves@ocsheriff.gov (714) 566-2711

Laguna Woods RACES

Jim Riedel, K6EEE, Silent Key

With great sadness, we report that Laguna Woods RACES Deputy Radio Officer Jim Riedel, K6EEE, passed away on Friday, November 18, 2022. Jim was a valued friend to those in Laguna Woods RACES, as well as the Laguna Woods Amateur Radio Club and South Orange Amateur Radio Association. He actively checked into the OCRACES Monday 2-meter nets and Saturday 60-meter nets on behalf of Laguna Woods RACES.



Jim Riedel, K6EEE.

Jim was born and raised in Chicago and moved to Southern California in 1967. He became a radio amateur in 1984 and held an Extra Class license. He was active on the HF bands and enjoyed digital modes, including DSTAR and JS8Call. He held DXCC and enjoyed CW and QRP operation.

**"RACES/
EmComm
News" provides
an opportunity
to share
information
from all City &
County
RACES/ACS
units and
EmComm
organizations
and supportive
amateur radio
clubs in and
near Orange
County, as well
as from Cal
OES and
federal
agencies.**

**Please send
your news to
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at:**

**[kbourne.ocsd@
earthlink.net](mailto:kbourne.ocsd@earthlink.net)**

December 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3 Weekly 60 m ACS Net & SKYWARN Recognition
4	5 OCRACES Holiday Dinner (no net)	6	7	8	9	10 Weekly 60 m ACS Net
11	12 Weekly 2 m ACS Net	13	14	15	16	17 Weekly 60 m ACS Net
18	19 Weekly 2 m ACS Net	20	21	22	23	24 Christmas Eve (no net)
25 Christmas	26 ACS Nets on 4 Bands	27	28	29	30	31 New Year's Eve (no net)

Upcoming Events:

- **December 3, 0000-2400 UTC:** SKYWARN Recognition Day
- **December 5, 1730 hours:** OCRACES Holiday Dinner, Rodrigo's Mexican Grill, 1230 E. Katella Ave., Orange
- **December 25: Merry Christmas!**



<https://ocraces.org>

Mission Statement

County of Orange RACES has made a commitment to provide all Public Safety departments in Orange County with the most efficient response possible to supplement emergency/disaster and routine Public Safety communications events and activities. We will provide the highest level of service using Amateur and Public Safety radio resources coupled with technology, teamwork, safety, and excellence. We will do so in an efficient, professional, and courteous manner, accepting accountability for all actions. We dedicate ourselves to working in partnership with the Public Safety community to professionally excel in the ability to provide emergency communications resources and services.

County of Orange RACES Frequencies

- 60 m: 5371.5 kHz USB (dial) (Channel 4) (OC ACS Net—Saturdays, 1000 hours)
- 40 m: 7250 kHz LSB
- 10 m: 29.640 MHz output, 29.540 MHz input, 107.2 Hz PL (down for repair)
- 6 m: 52.620 MHz output, 52.120 MHz input, 103.5 Hz PL
- 2 m: 146.895 MHz output, 146.295 MHz input, 136.5 Hz PL*
- 2 m: 146.595 MHz simplex
- 1.25 m: 223.760 MHz output, 222.160 MHz input, 110.9 Hz PL
- 70 cm: 446.000 MHz simplex
- 70 cm: 448.320 MHz output, 443.320 MHz input, 141.3 Hz PL (private)
- 70 cm: 449.100 MHz output, 444.100 MHz input, 110.9 Hz PL (private)
- 70 cm: 449.180 MHz output, 444.180 MHz input, 107.2 Hz PL (private)
- 70 cm: 449.680 MHz output, 444.680 MHz input, 131.8 Hz PL (private)
- *Primary Net—Mondays, 1900 hours

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Radio Officer

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Chief Radio Officer

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Ernest Fierheller, KG6LXT

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Visit Our Web Site
<https://ocraces.org>
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Questions or Comments?
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kbourne.ocsd@earthlink.net



**“W6ACS ...
 Serving
 Orange County”**

Meet Your County of Orange RACES Members!

Officers →



Ken Bourne W6HK Scott Byington KC6MMF Jack Barth AB6VC Ernest Fierheller KG6LXT

**OCSD
 RACES
 Coordinator** →



Lee Kaser
 KK6VIV



Heide Aguire K3TOG Randy Benicky N6PRL Eric Bowen W6RTR Ray Grimes N8RG Walter Kroy KC6HAM Martin La Rocque N6NTH Steve Livingston NJ6R



Scott MacGillivray KM6RTE Ron Mosher K0PGE Fran Needham KJ6UJS John Pilger K6PIO Joe Selikov KB6EID Robert Stoffel KD6DAQ Chuck Streitz KK6HFS Ken Tucker WF6F