



[Search Terms for HF Radio propagation](#)

This page is part of the project "[Understanding HF Propagation](#)."
by [Doron Tal](#), [4X4XM](#)

PDF format does not support search

Website Search

Search terms addressed on this website

1. [24-hour QSO Planner](#)

A

2. [A beginner's guide to HF radio propagation](#)
3. [A beginner's guide to radio propagation](#)
4. [A beginners guide to radio propagation](#)
5. [A combination of long-term prediction and short-term forecast methods](#)
6. [A comparison between Radio and Light propagation phenomena](#)
7. [A comprehensive beginner's guide for RF propagation](#)
8. [A comprehensive guide to HF propagation](#)
9. [A guide for ham radio propagation](#)
10. [A guide to HF propagation](#)
11. [A guide to HF propagation indicators](#)
12. [A primer on space weather](#)
13. [A quick guide to solar indices](#) — A review of skywave propagation indicators
14. [A review of significant radio blackout events of the 25th solar cycle](#)
15. [A simple guide to get started ham radio propaharion](#)
16. [A-index](#)
17. [Absorption](#)
18. [ACE](#)
19. [Active sun](#)
20. [Activity Charts and DX Clusters](#)—references
21. [Activity map ham radio](#)

22. [Advanced techniques in HF propagation forecast](#)
23. [Advanced tutorials on HF propagation](#)
24. [ALE](#) — Automatic link establishment
25. [Alerts](#)
26. [All-in-One HF Propagation Resource](#)
27. [All bands closed?](#)
28. [Amateur ham radio](#)
29. [Amateur radio](#)
30. [Amateur radio and ionospheric science](#)
31. [Amateur radio band conditions](#)
32. [Amateur radio bands](#)
33. [Amateur radio characteristics](#)
34. [Amateur Radio Current Conditions](#)
35. [Amateur radio frequencies](#)
36. [Amateur radio frequency allocations](#)
37. [Amateur radio frequency list](#)
38. [Amateur radio grey-line](#)(British) or Gray-line (American)
39. [Amateur radio guide on propagation](#)
40. [Amateur radio HF band conditions](#)
41. [Amateur radio HF propagation conditions](#)
42. [Amateur radio HF propagation frequencies & forecast](#)
43. [Amateur radio live maps](#)
44. [Amateur radio maps](#)
45. [Amateur radio online propagation charts](#)
46. [Amateur radio online propagation conditions](#)
47. [Amateur radio online propagation maps](#)
48. [Amateur radio operator](#)
49. [Amateur radio propagation conditions](#)
50. [Amateur radio propagation forecast](#)
51. [Amateur radio propagation frequencies](#)
52. [Amateur Radio Propagation Map](#)
53. [Amateur Radio Propagation Now](#)
54. [Amateur radio propagation studies](#)

55. [Amateur radio propagation today](#)
56. [Amateur radio solar activity](#)
57. [Amateur radio space weather](#)
58. [Amateur Radio Usable HF Propagation Frequencies & Forecast](#)
59. [Amateur Radio views and reviews for Beginners](#)
60. [Amplitude of radio waves](#)
61. [An intro to ham radio for beginners](#)
62. [An introduction for beginners on radio propagation](#)
63. [An introduction to HF propagation](#)
64. [An Introduction to Ionosphere and Magnetosphere\(Abstract\)](#)
65. [An introduction to radio wave propagation](#)
66. [Analyze HF propagation using DX clusters](#)
67. [Antenna directivity](#)
68. [Antenna efficiency](#)
69. [Antenna for NVIS](#)
70. [Antenna gain](#)
71. [Antenna height](#)
72. [Antenna height, directivity, gain](#)
73. [Appleton formula for the refractive index the ionosphere](#)
74. [Applications for analyzing and forecasting HF propagation](#)
75. [Applications used for forecasts and predictions](#) (references — list of sources)
76. [APRS-IS—Automatic Packet Reporting System-Internet Service](#)—references
77. [Are there any benefits to solar activity?](#)
78. [Aurora | At what Kp index can I see aurora?](#)
79. [Aurora forecast](#)
80. [Aurora light show](#)
81. [Auroral Radar Network](#) (references — list of sources)
82. [Australian Space Weather Alert System \(2024\)](#)

B

83. [Bad conditions on ham bands](#)
84. [Band Activity](#)
85. [Band Activity Worldwide](#)

86. [Band conditions](#)
87. [Band conditions banners](#)
88. [Band conditions based on DX charts, PSKR, WSPR, WebSDRs, Beacons](#)
89. [Band conditions charts](#)
90. [Band Conditions Forecast](#)
91. [Band Conditions Ham Radio](#)
92. [Band conditions ham radio live](#)
93. [Band Opennings](#)
94. [Banners and widgets](#)
95. [Banners for band conditions](#)
96. [Banners showing propagation conditions](#)
97. [Basic Amateur Radio—HF Propagation](#)
98. [Basic electromagnetic wave properties](#)
99. [Basic EM wave properties](#)
100. [Basic EM wave properties](#) (references — list of sources)
101. [Basic intro to ham radio for beginners](#)
102. [Basic Wave Propagation, Nor Hadzfizah Binti Mohd Radi \(2017\)](#)
103. [Basics for Short Wave Operation](#)
104. [Basic HF propagation for amateur radio](#)
105. [Basics of HF propagation](#)
106. [Basics of HF radio propagation](#)
107. [Basics of Radio Waves](#)
108. [Basics of Radio Wave propagation](#)
109. [Be prepared for volatile band conditions](#)
110. [Be ready to try new frequencies](#)
111. [Beacons](#)
112. [Beacons](#)—references
113. [Beginner's Guide to Ham Radio Range](#)
114. [Benefits of the HAARP Project for Radio Hams](#)
115. [Best HF frequencies for daytime](#)
116. [Best propagation frequency](#)
117. [Best solar propagation frequency](#)
118. [Beyond line of site](#) (BLOS)

119. [Blackouts](#) what are they?
120. [Blind zone](#)
121. [BLOS](#) (Beyond line of site)
122. [Bt - total strength of the Interplanetary Magnetic field \(IMF\)](#)
123. [Bz - orientation of the IMF](#)

C

124. [Calculate the ionospheric refractive index](#)
125. [Calculation of the maximum usable frequency](#)
126. [Can a ham radio reach space?](#)
127. [Can ham radio communicate with the other side of the globe?](#)
128. [Can ham radio talk around the world?](#)
129. [Can HF radio propagation be predicted?](#)
130. [Can I get shorwave radio on my PC?](#)
131. [Carrington event](#)
132. [CF vs MUF—Difference between CF and MUF](#)
133. [CF vs MUF: Understanding Critical and Maximum Usable Frequencies](#)
134. [Challenges in storm forecasting](#)
135. [Characteristics of radio waves](#)
136. [ChatGPT learns about forecasting tools for radio amateurs](#)
137. [Check DX Propagation with Beacons](#)
138. [Chirping](#)
139. [Choose now the best HF bands for skywave communication](#)
140. [Choose the correct amateur band and the right time of the day for long range communications](#)
141. [Choosing the right frequency](#)
142. [Clouds of plasma in the ionosphere](#)
143. [CME](#) - coronal Mass ejection
144. [Communication blackout](#)
145. [Communication blackout 2024](#)
146. [Communication blackout meaning](#)
147. [Communication blackout today](#)
148. [Compare DR2W propagation tool with VOACAP](#)

149. [Compare forecasting tools for HF radio propagation](#)
150. [Compare forecasting tools for radio amateurs](#)
151. [Comparing Ionospheric MUF using IRI16 Model with Mid Latitude \(2020\)](#)
152. [Communication conditions](#)
153. [Complex HF propagation Modes | Complex Modes of Skywave Propagation—references](#)
154. [Conductive ground](#)
155. [Correlation analysis of Solar activity and Cosmic ray \(J_Phys_Conf 2017\)](#)
156. [Correlation of Sunspot Numbers and Geomagnetic Indices with Various Climate Change Parameters \(2024\)](#)
157. [Correlation between conditions, MUF, SSN and SFI](#)
158. [Correlation between K and A values](#)
159. [Correlation between MUF and solar flux](#)
160. [Correlation between SFI and bands openings](#)
161. [Correlation Between solar flux and sunspot number](#)
162. [Correlation between solar indices band conditions](#)
163. [Correlation of sunspot numbers and geomagnetic indices](#)
164. [Correlation between sunspot numbers and geomagnetic parameters for solar cycle 24](#)
165. [Coronal hole](#)
166. [Coronal Mass ejection \(CME\)](#)
167. [Critical frequencies foF2, MUF, OTF, LUF](#)
168. [Critical Frequencies LUF vs MUF](#)
169. [Critical frequency](#)
170. [Critical frequency formula](#)
171. [Critical Frequency, LUF, and MUF](#)
172. [Critical frequency propagation](#)
173. [Critique of IONCAP's Reliability and Service Probability Calculations \(1993\)](#)
174. [Current and predicted fadeouts](#)
175. [Current band conditions](#)
176. [Current flare](#)
177. [Current ham band conditions](#)
178. [Current Ham Band Conditions Charts Explained](#)
179. [Current Ham Band Conditions Explained](#)
180. [Current ham band propagation](#)

181. [Current ham band propagation conditions](#)
182. [Current ham conditions](#)
183. [Current ham radio condition charts](#)
184. [Current ham radio conditions](#)
185. [Current ham radio conditions charts](#)
186. [Current ham radio propagation](#)
187. [Current ham radio propagation conditions](#)
188. [Current ham radio propagation map](#)
189. [Current ham radio propagation report](#)
190. [Current HamBands Conditions](#)
191. [Current HF Bands Conditions](#)
192. [Current HF Band Conditions Maps For Radio Operators](#)
193. [Current HF Band conditions online map](#)
194. [Current HF Bands Conditions—Charts for Radio Hams](#)
195. [Current HF conditions](#)
196. [Current HF propagation](#)
197. [Current HF Propagation Conditions](#)
198. [Current HF Propagation Conditions FAQ](#)
199. [Current HF propagation conditions maps for radio operators](#)
200. [Current HF propagation map](#)
201. [Current HF radio propagation](#)
202. [Current Kp index](#)
203. [Current LUF conditions](#)
204. [Current LUF map](#)
205. [Current LUF propagation](#)
206. [Current MUF](#)
207. [Current MUF Conditions](#)
208. [Current optimal frequency charts](#)
209. [Current propagation](#)
210. [Current propagation chart](#)
211. [Current propagation conditions](#)
212. [Current radio communication conditions](#)
213. [Current radio propagation conditions](#)

214. [Current shortwave propagation conditions](#)
 215. [Current Shortwave propagation conditions map](#)
 216. [Current skywave propagation](#)
 217. [Current solar activity](#)
 218. [Current solar alerts](#)
 219. [Current solar conditions Ham radio](#)
 220. [Current solar cycle prediction](#)
 221. [Current solar events](#)
 222. [Current Solar Flare](#)
 223. [Current Solar Terrestrial Activity Report](#)
 224. [Current space weather parameters](#)
 225. [Current sunspot cycle](#)
 226. [Current sunspot cycle activity](#)
 227. [Critical frequency](#)
 228. [Critical frequency map/chart](#)
- D
229. [D layer of ionosphere](#) is rather a region
 230. [D region](#)
 231. [D-Rap model—Global Fadeout Report](#)
 232. [D-Region Absorption Product](#)
 233. [D Region Absorption Predictions \(D-RAP\)](#)
 234. [Daily sunspots groups](#)
 235. [Day night live world map](#)
 236. [Day-night—diurnal cycle](#)
 237. [Dead Zone](#)
 238. [Definition of the Ionospheric Regions](#)
 239. [Decoding space weather data for HF propagation](#)
 240. [Detect Changes in Propagation Conditions using RBN, WSPR, PSKR](#)—references
 241. [Detection and Localization of F-layer Ionospheric Irregularities \(2022\)](#)
 242. [Digisonde Directogram](#)
 243. [Digital Reporter](#)
 244. [Direct wave propagation](#)

245. [Disadvantages of NVIS](#)
246. [Dispertion of light](#)
247. [Dispersion of radio waves](#)
248. [Distance between NVIS stations?](#)
249. [Disturbance-storm time \(Dst\) index](#)
250. [Diurnal cycle](#)
251. [DRAP](#)
252. [DR2W - DX propagation](#)
253. [Dst](#)
254. [DX band condition](#)
255. [DX charts](#)
256. [DX conditions](#)
257. [DX conditions now](#)
258. [DX clusters](#) or [DX Spots](#)
259. [DX cluster is your friend](#)
260. [DX ham band conditions](#)
261. [DX map](#) | [DX propagation map](#)
262. [DX Propagation Forecasting](#)
263. [DX propagation online map](#)
264. [DX propagation prediction](#)
265. [DX radio live](#)
266. [DXFun](#)
267. [DXMAPS](#)
268. [DXView HF map](#)
269. [DXWatch](#)

E

270. [E layer of ionosphere](#) is rather a region
271. [E-region](#)
272. [E-sporadic forecast - propquest](#)
273. [Earth's Atmosphere Layers](#)
274. [Earth's Ionosphere Regions](#)
275. [Earth's magnetic field](#)

276. [Earth's Magnetosphere](#)
277. [Earth Magnetosphere vs Earth's magnetic field](#)
278. [Earth observing system \(EOS\)](#)
279. [Earth's magnetic field](#)
280. [Easy learning radio propagation](#)
281. [Effects of geomagnetic storms on ham radio](#)
282. [Effects of geomagnetic storms on radio hams](#)
283. [Effects of ionospheric motions and irregularities on HF radio propagation](#)
284. [Effects of radio waves](#)
285. [Effects of solar activity on amateur radio](#)
286. [Electromagnetic Radiation](#)
287. [Electromagnetic Radiation—Radio waves properties ► Radio propagation—references](#)
288. [Electromagnetic Spectrum](#) | [Electromagnetic Spectrum—references](#)
289. [Electromagnetic Wave](#)
290. [Electromagnetic Waves Basics](#)
291. [Electron densities](#)
292. [Electron flux \(Ef\)](#)
293. [Elevation Angle](#)
294. [EM wave Properties](#)
295. [EME Deg - earth-Moon-Earth Degradation](#)
296. [Equatorial Spread-F Ionospheric dynamics \(1962\)](#)
297. [EsEU - Sporadic E Europe](#)
298. [EsNA - Sporadic E North America](#)
299. [Estimated sunspot number](#)
300. [Etymology of ham radio](#)
301. [EUV sunlight](#)
302. [Evaluation of models for HF propagation prediction](#)
303. [Evolution of forecasting techniques](#)
304. [Explain DRAP for radio amateurs](#)
305. [Explain ham bands](#)
306. [Explain HF propagation charts](#)
307. [Explain HF propagation conditions maps and charts](#)
308. [Explain HF propagation indicators](#)

309. [Explain HF propagation indices](#)
310. [Explain how solar data is related to HF propagation](#)
311. [Explain propagation banners](#)
312. [Explain skywave erratic propagation conditions](#)
313. [Explain skywave propagation](#)
314. [Explain skywave propagation charts](#)
315. [Explain space weather for radio amateurs](#)
316. [Explain space weather indices](#)
317. [Explain solar indices](#)
318. [Explain what does it mean ham bands closed](#)
319. [Explore ham radio communications](#)
320. [Explore HF propagation](#)
321. [Explore the world of amateur radio](#)

F

322. [F layer of ionosphere](#) is rather a region
323. [Fadeouts](#)
324. [Fading](#)
325. [Fading due to irregularities of ionospheric regions](#)
326. [FAQ on HF propagation](#)
327. [F10.7](#)
328. [F-region](#)
329. [Find charts showing the live conditions](#)
330. [Find your opening on the map](#)
331. [Finding the best operating frequencies for skywave propagation](#)
332. [Flares](#)
333. [\$f_oF_2\$ \(critical frequency\)](#)
334. [foF2 map](#)
335. [Forecast ham band conditions](#)
336. [Forecast HF bands conditions](#)
337. [Forecast HF radio propagation - applications](#)
338. [Forecast HF propagation conditions](#)
339. [Forecast of HF propagation for radio amateurs](#)

340. [Forecast of The Ham radio propagation](#)
341. [Forecast propagation](#)
342. [Forecast propagation for radio amateurs](#)
343. [Forecast proton flux](#)
344. [Forecast radio skywave conditions](#)
345. [Forecast radio skywave propagation](#)
346. [Forecast short wave propagation conditions](#)
347. [Forecast skywave conditions](#)
348. [Forecast skywave propagation](#)
349. [Forecast solar flare](#)
350. [Forecast vs Prediction](#)
351. [Forecast vs prediction of HF band conditions](#)
352. [Forecasting and Prediction](#)
353. [Forecasting evolution over the last 30 years](#)
354. [Forecasting HF propagation for radio amateurs](#)
355. [Forecasting ionospheric disturbances](#)
356. [Forecasting MUF for a 3000 km path](#)
357. [Forecasting tools for radio amateurs](#)
358. [Forecasting vs. Prediction](#)
359. [Free Electron Density](#)
360. [Free gray line map](#)
361. [Free Resource for Amateur Radio Beginners](#)
362. [Frequency Allocations](#)
363. [Frequency of optimum transmission \(FOT\)](#)
364. [Frequency of optimum traffic \(FOT\)](#)
365. [Fundamentals of radio propagation](#)
366. [Fundamentals of radio waves propagation](#)

G

367. [G₀-G₅: scale of geomagnetic activity](#)
368. [Gamma rays](#)
369. [Gama rays bursts](#) (GRB) a cosmic event
370. ["GeoMag" \(index\) - earth`s geomagnetic activity](#)

371. [Geomagnetic activity](#)
372. [Geomagnetic activity forecast](#)
373. [Geomagnetic conditions](#)
374. [Geomagnetic data](#)
375. [Geomagnetic disturbance](#) | [Geomagnetic disturbances](#)
| [Geomagnetic effects](#)
376. [Geomagnetic field](#)
377. [Geomagnetic field activity](#)
378. [Geomagnetic forecast](#)
379. [Geomagnetic indices K, A, HPO](#) | [Geomagnetic Indices](#)
380. [Geomagnetic Indices Explained](#) Quick guide
381. [Geomagnetic storms](#)
382. [Geomagnetic storm and equatorial spread-F \(2004\)](#)
383. [Geomagnetic Storm Dynamics](#)
384. [Geomagnetic storm ham radio](#)
385. [Geomagnetic Storm Impacts](#)
386. [Geomagnetic storms ham radio](#)
387. [Geomagnetic storm radio amateur](#)
388. [Geomagnetic storms](#)
389. [Geophysical activity](#)
390. [Getting Started in HF](#)
391. [Global conditions](#) | [Global conditions banners](#)
392. [Global HF conditions](#)
393. [Global HF fadeout](#)
394. [Global HF propagation](#)
395. [Global radio propagation conditions](#)
396. [Global vs Regional HF propagation conditions](#)
397. [GMF](#)
398. [Gray-line or grey-line](#)
399. [Gray line live map](#)
400. [Gray line propagation](#)
401. [GRB](#) - Gama-rays bursts
402. [Grey Line Map](#)

403. [Grey line map real time](#)
404. [Greyline](#) short explanation
405. [Greyline propagation](#)
406. [Greyline radio propagation explained](#)
407. [Greyline vs "Solar Terminator"](#)
408. [Ground Wave](#)—references
409. [Ground wave and sky propagation](#)
410. [Ground wave propagation](#)
411. [Ground wave vs skywave](#)
412. [Ground waves](#)
413. [Guide for radio hams on HF propagation](#)
414. [Guide to radio wave propagation, studies, guides and documentation](#)

H

415. [Hale cycle](#)
416. [Ham Activity](#)
417. [Ham Band Activity](#)
418. [Ham band conditions](#)
419. [Ham band condition charts](#)
420. [Ham band conditions](#)
421. [Ham band condition now](#)
422. [Ham band list](#)
423. [Ham band propagation chart](#)
424. [Ham band propagation characteristics](#)
425. [Ham band propagation conditions](#)
426. [Ham band propagation map](#)
427. [Ham band report](#)
428. [Ham band status](#)
429. [Ham bands closed](#)
430. [Ham bands conditions](#)
431. [Ham bands map](#) | [Ham band map](#)
432. [Ham bands open](#)
433. [Ham bands' activity](#)

434. [Ham conditions](#)
435. [Ham propagation](#)
436. [Ham propagation dashboard](#)
437. [Ham propagation map](#)
438. [Ham Radio - Shortwave Band List](#)
439. [Ham radio atmospheric conditions](#)
440. [Ham radio band characteristics](#)
441. [Ham radio band conditions](#)
442. [Ham radio band frequencies](#)
443. [Ham radio condition](#)
444. [Ham radio band conditions app](#)
445. [Ham radio band conditions map](#)
446. [Ham radio band conditions today](#)
447. [Ham radio band frequencies](#)
448. [Ham radio band plan](#)
449. [Ham radio band propagation](#)
450. [Ham radio band propagation characteristics](#)
451. [Ham radio band propagation chart](#)
452. [Ham radio bands](#)
453. [Ham radio bands and frequencies](#)
454. [Ham Radio Bands: Frequencies and Characteristics](#)
455. [Ham radio basics: Beginners guide to HF radio propagation](#)
456. [Ham radio charts](#)
457. [Ham radio communications](#)
458. [Ham radio condition charts](#)
459. [Ham radio conditions](#)
460. [Ham radio condition map](#)
461. [Ham radio condition maps](#)
462. [Ham radio conditions today](#)
463. [Ham radio current conditions](#)
464. [Ham Radio Dead Bands](#)
465. [Ham radio DX live streaming](#)
466. [Ham radio DX map](#)

467. [Ham radio for Beginners](#)
468. [Ham radio for Newbees](#)
469. [Ham radio for Newbeis](#)
470. [Ham radio frequency chart](#)
471. [Ham radio frequencies](#)
472. [Ham radio frequencies and bands](#)
473. [Ham Radio Glossary of Terms](#)
474. [Ham Radio Guide for HF propagation](#)
475. [Ham radio HF band conditions](#)
476. [Ham radio HF conditions](#)
477. [Ham radio HF propagation real-time](#)
478. [Ham radio live](#)
479. [Ham radio propagation](#)
480. [Ham radio propagation app](#)
481. [Ham radio propagation charts](#)
482. [Ham radio propagation conditions](#)
483. [Ham radio propagation current conditions](#)
484. [Ham radio propagation forecast](#)
485. [Ham radio propagation forecasts](#)
486. [Ham radio propagation frequencies](#)
487. [Ham radio propagation live map](#)
488. [Ham radio propagation map](#)
489. [Ham radio propagation overview](#)
490. [Ham radio propagation now](#)
491. [Ham radio propagation prediction](#)
492. [Ham radio propagation real-time](#)
493. [Ham radio propagation review](#)
494. [Ham radio propagation today](#)
495. [Ham radio propagation tutorial](#)
496. [Ham radio propagation websites](#)
497. [Ham Radio Propagation YouTube](#)
498. [Ham radio propagation: Solar conditions](#)
499. [Ham Radio Range Guide](#)

500. [Ham Radio Range Guide: How Far Can You Talk?](#)
501. [Ham Radio Range: How Far Can You Talk With It?](#)
502. [Ham radio skywave tutorial](#)
503. [Ham radio solar activity](#)
504. [Ham radio solar conditions](#)
505. [Ham radio solar cycle](#)
506. [Ham radio solar weather](#)
507. [Ham radio space weather](#)
508. [Ham radio websites](#)
509. [Ham radio websites about forecasting HF propagation](#)
510. [Ham radio sun conditions](#)
511. [Ham radio sunspot](#)
512. [Ham radio sunspot conditions](#)
513. [Ham radio sunspots now](#)
514. [Ham radio Today](#)
515. [Ham radio wave propagation](#)
516. [Ham Radio YouTube Channels Skywave Propagation](#)
517. [Ham Solar](#)
518. [Ham solar conditions](#)
519. [HamSCI Space Weather Operational Resources and Needs of the Amateur Radio Community \(2020\)](#)
520. [Heliophysics](#)
521. [Heliophysics and Amateur Radio](#)
522. [Heliosphere](#)
523. [Heliospheric Current Sheet \(HCS\)](#)
524. [Heliviewer](#)
525. [Helium lines](#)
526. [HF—High frequency](#)
527. [HF band conditions](#)
528. [HF band conditions maps](#)
529. [HF band conditions regional](#)
530. [HF Band conditions: A Comprehensive Guide](#)
531. [HF band openings](#)

532. [HF band propagation FAQ](#)
533. [HF bands - what to expect](#)
534. [HF bands affected by solar conditions](#)
535. [HF bands allocated for radio amateurs](#)
536. [HF bands allocated for radio amateurs and their characteristics](#)
537. [HF bands allocated for radio amateurs and their features](#)
538. [HF bands ham radio guide](#)
539. [HF bands assigned to hams](#)
540. [HF bands assigned to radio amateurs](#)
541. [HF Bands Ham Radio Guide](#)
542. [HF bands open now](#)
543. [HF band propagation chart](#)
544. [HF bands monitoring](#)
545. [HF communication](#)
546. [HF communication prediction tools](#)
547. [HF communications response to solar activity](#)
548. [HF conditions](#) Regional
549. [HF conditions at a glance](#)
550. [HF Conditions in Real Time](#)
551. [HF conditions UK](#)
552. [HF critical frequency](#)
553. [HF DXView](#)
554. [HF frequency range](#)
555. [HF guide for all level radio ham](#)
556. [HF ham radio bands](#)
557. [HF ham radio bands: HF frequencies](#)
558. [HF ham radio DX](#)
559. [HF ham radio for beginners](#)
560. [HF open now](#)
561. [HF openings now](#)
562. [HF prediction](#)
563. [HF propagation](#)
564. [HF Propagation and the Ionosphere](#)

565. [HF propagation and solar-terrestrial data](#)
566. [HF propagation app](#)
567. [HF propagation applications](#)
568. [HF propagation bad conditions](#)
569. [HF propagation basics](#)
570. [HF propagation blackout](#)
571. [HF propagation calculator](#)
572. [HF propagation chart](#)
573. [HF Propagation Condition Map](#)
574. [HF propagation conditions](#)
575. [HF propagation conditions explained](#)
576. [HF propagation conditions: forecasting and prediction](#)
577. [HF propagation conditions at a glance](#)
578. [HF propagation data](#)
579. [HF propagation data app](#)
580. [HF propagation data seasons](#)
581. [HF propagation data study](#)
582. [HF propagation disruptions AU](#)
583. [HF propagation disruptions UK](#)
584. [HF propagation disruptions US](#)
585. [HF propagation experts](#)
586. [HF propagation explained](#)
587. [HF propagation explanation](#)
588. [HF propagation fadeouts](#)
589. [HF propagation fluctuations](#)
590. [HF propagation for advanced hams](#)
591. [HF Propagation for amateurs](#)
592. [HF propagation for beginners](#)
593. [HF propagation for beginners and advanced](#)
594. [HF propagation for ham operators](#)
595. [HF Propagation for ham radio explained](#)
596. [HF propagation for newbies](#)
597. [HF Propagation for amateurs](#)

598. [HF Propagational Resources](#)
599. [HF propagation for radio amateurs](#)
600. [HF propagation for radio hams](#)
601. [HF propagation forecast](#)
602. [HF propagation forecast applications](#)
603. [HF propagation forecast for radio amateurs](#)
604. [HF propagation forecast tool](#) KC2G
605. [HF propagation forecast tools](#) (references)
606. [HF propagation forecasting](#)
607. [HF propagation fundamentals](#)
608. [HF propagation guide](#)
609. [HF propagation guide for radio hams](#)
610. [HF propagation indicators](#)
611. [HF propagation ionospheric disturbances](#)
612. [HF propagation live chart](#)
613. [HF propagation live map](#)
614. [HF propagation map](#)
615. [HF propagation map google](#)
616. [HF propagation models](#)
617. [HF propagation modes](#)
618. [HF propagation modes overview](#)
619. [HF propagation now \(real-time\)](#)
620. [HF propagation odd conditions](#)
621. [HF propagation online map](#)
622. [HF propagation online reports](#)
623. [HF propagation overview](#)
624. [HF Propagation Planning Tool](#)
625. [HF Propagation Planner](#)
626. [HF propagation prediction](#)
627. [HF propagation prediction based on real-time DX reports](#)
628. [HF propagation prediction online](#)
629. [HF propagation prediction software](#)
630. [HF propagation predictions](#)

631. [HF propagation preface](#)
632. [HF propagation reporter](#)
633. [HF propagation reports](#)
634. [HF propagation scale](#)
635. [HF propagation shortcast overview](#)
636. [HF propagation shortcast review](#)
637. [HF propagation score](#)
638. [HF propagation shortcasts](#) a folder of brief podcasts less than 15 minutes
639. [HF Propagation software review](#)
640. [HF Propagation solar indicators](#)
641. [HF propagation status](#)
642. [HF propagation tools](#)
643. [HF propagation tutorials](#)
644. [HF propagation tutorial for radio amateurs](#)
645. [HF propagation tutorials](#)
646. [HF propagation today](#)
647. [HF propagation tools](#)
648. [HF propagation using solar index](#)
649. [HF propagation widget](#)
650. [HF Propagation YouTube](#)
651. [HF radio bands and propagation](#)
652. [HF radio glossary](#)
653. [HF radio communication](#)
654. [HF radio conditions](#)
655. [HF radio propagation](#)
656. [HF radio propagation app](#)
657. [HF radio propagation bands](#)
658. [HF radio propagation basics](#)
659. [HF radio propagation chart ↗ ↗](#)
660. [HF radio propagation conditions](#)
661. [HF radio propagation during a solar storm](#)
662. [HF radio propagation for beginners](#)
663. [HF radio propagation forecast](#)

664. [HF radio propagation indices and scales](#)
665. [HF propagation map](#) Nowcast
666. [HF radio propagation map](#): Explanation of real-time MUF 3,000 km propagation map
667. [HF radio propagation maps](#)
668. [HF radio propagation modes](#)
669. [HF radio propagation now](#)
670. [HF radio propagation prediction](#) | [HF radio propagation prediction compared to forecast](#)
671. [HF radio propagation seasons](#)
672. [HF radio propagation tutorial for radio amateurs](#)
673. [HF radio propagation software](#)
674. [HF radio propagation today](#).
675. [HF radio wave propagation](#)
676. [HF radio wave propagation factors](#)
677. [HF radio waves](#) (basics)
678. [HF real-time propagation](#)
679. [HF signals propagation](#)
680. [HF skywave communication](#)
681. HF skywave window: LUF—MUF
682. [HF space weather](#)
683. [HF Systems MUF maps and forecasting charts](#)
684. [HF wave propagation](#)
685. [HFTA - High frequency Terrain Assessment](#)
686. [High Frequency \(HF\) amateur radio](#)
687. [High frequency communications response to solar activity](#)
688. [High frequency propagation software](#)
689. [High frequency radio propagation](#)
690. [Highest frequency bands at night](#)
691. [Highest Possible Frequency \(HPF\)](#)
692. [History of amateur radio](#)
693. [How are current band conditions?](#)
694. [How are HF conditions determined?](#)
695. [How are ionospheric conditions measured?](#)
696. [How can I monitor HF bands without having a good receiver and antenna?](#)

697. [How can I operate during solar storms?](#)
698. [How can I use my PC as a ham band monitor?](#)
699. [How can propagation reports help ham radio operators](#)
700. [How can we forecast changes in HF conditions over the next hour?](#)
701. [How can we forecast HF propagation conditions?](#)
702. [How do disturbances such as solar flares, geomagnetic storms, and traveling ionospheric disturbances affect radio wave propagation?](#)
703. [How do geomagnetic storms affect radio wave propagation?](#)
704. [How do I find open ham bands](#)
705. [How do I find out what bands are open?](#)
706. [How do radio frequencies work?](#)
707. [How do ionospheric disturbances affect radio wave propagation?](#)
708. [How do radio waves bounce off the ionosphere for long-distance communication?](#)
709. [How do radio waves propagate?](#)
710. [How do radio frequencies work?](#)
711. [How do radio waves travel through the Earth's atmosphere?](#)
712. [How do solar flares affect radio wave propagation?](#)
713. [How do solar flares cause geomagnetic storms?](#)
714. [How do solar storms affect radio propagation?](#)
715. [How do solar storms cause geomagnetic storms?](#)
716. [How do the seasons affect HF radio propagation?](#)
717. [How do traveling ionospheric disturbances affect radio wave propagation?](#)
718. [How do you interpret HF propagation map?](#)
719. [How do you read HF band conditions?](#)
720. [How do we monitor space weather?](#)
721. [How does a fadeout happen?](#)
722. [How does geomagnetic activity affect HF propagation?](#)
723. [How does elevation affect HF propagation?](#)
724. [How does HF propagation work?](#)
725. [How Does Ionospheric propagation take place?](#)
726. [How Does Ionospheric propagation work?](#)
727. [How does HF radio propagate?](#)
728. [How Does Radio Waves Compare to Visible Light?](#)

729. [How does the ionosphere affect HF radio propagation?](#)
730. [How does the ionosphere affect radio wave propagation?](#)
731. [How does the ionosphere couple with the neutral atmosphere and with space?](#)
732. [How does the ionosphere respond to inputs from space and from the neutral atmosphere?](#)
733. [How does the sun affect radio communication?](#)
734. [How far can a ham radio reach?](#)
735. [How far can ham radio talk?](#)
736. [How far can HF radio go?](#)
737. [How far can HF radio transmit?](#)
738. [How far can I communicate?](#)
739. [How far can I talk?](#)
740. [How far can I talk with my ham radio?](#)
741. [How far can you talk on ham radio?](#)
742. [How far will a radio transmit?](#)
743. [How ionospheric structure affects radio refraction](#)
744. [How skywave propagation works](#)
745. [How solar storms affect ham radio propagation](#)
746. [How the Sun powers the ionosphere](#)
747. [How to assess propagation?](#)
748. [How to choose antenna?](#)
749. [How to choose ham band based on propagation conditions?](#)
750. [How to determine HF propagation conditions?](#)
751. [How to determine if a band is open?](#)
752. [How to find out propagation conditions now](#)
753. [How to improve HF communication frequency selection ability?](#)
754. [How to know if a band is open?](#)
755. [How to predict MUF?](#)
756. [How to read HF band conditions?](#)
757. [How to read propagation charts for HF](#)
758. [How to select a frequency for NVIS operation?](#)
759. [How to use a remote HF radio receiver?](#)
760. [How to use NVIS?](#)
761. [How to use propagation forecast charts?](#)

- 762. [How will a solar storm affect my ham radio activities?](#)
- 763. [HPF—Highest Possible Frequency](#)
- 764. [Hybrid ionospheric models](#)

- I
- 765. [IMF - Interplanetary Magnetic field](#)
- 766. [Incident angle](#)
- 767. [Impacts of space weather](#)
- 768. [Impacts of space weather on HF radio communications](#)
- 769. [Impact of the sun](#)
- 770. Index of refraction—[Glass's refractive index in comparison to plasma/ionosphere](#)
- 771. [Interplanetary magnetic field \(IMF\)](#)
- 772. [Interpretation of the propagation indices](#)
- 773. [Introduction to HF propagation](#)
 - Recommended references:
 - i. [Introduction to HF Radio Propagation Australian Gov \(2002\)](#)
 - ii. [Introduction to-HF Radio Propagation Australian Gov \(2007\)](#)
- 774. [Ionospheric Propagation, Prof. Sean Victor Hum \(2018\)](#)
- 775. [Ionospheric propagation frequency range](#)
- 776. [Ionospheric Radio Propagation, Kenneth Davies \(1965\)](#)
- 777. [Introduction to ionospheric propagation](#)
- 778. [Introduction to RF propagation](#)
- 779. [Ionisation](#)
- 780. [Ionization](#)
- 781. [IonoProbe](#)
- 782. [Ionogram](#)
- 783. [Ionograms](#) (references — list of sources)
- 784. [Ionosonde](#)
- 785. [Ionosondes](#) (references — list of sources)
- 786. [Ionosondes HF propagation](#)
- 787. [Ionosphere](#)
- 788. [Ionosphere — HF radio propagation](#); Multi-refractions; free electron density and Geomagnetic storms

789. [Ionosphere and HF](#)
790. [Ionosphere and radio signals](#)
791. [Ionosphere and skywave propagation](#); Ionization of D, E and F regions | Free-electron density | Skywaves
792. [Ionosphere at night](#)
793. [Ionosphere dynamics](#)
794. [Ionosphere is a part of which layer of atmosphere?](#)
795. [Ionosphere is also known as...](#)
796. [Ionosphere layers diagram](#)
797. [Ionosphere probing](#)
798. [Ionosphere propagation](#)
799. [Ionosphere regions](#)
800. [Ionosphere temperature](#)
801. [Ionosphere understanding](#)
802. [Ionosphere, radio waves](#)
803. [Ionosphere, space weather and radio propagation](#)
804. [Ionosphere's influence](#)
805. [Ionospheric absorption](#)
806. [Ionospheric anomalies](#) (references — list of sources)
807. [Ionospheric bubbles](#)
808. [Ionospheric clouds](#)
809. [Ionospheric conditions](#) | [Ionospheric conditions](#)
810. [Ionospheric data](#)
811. [Ionospheric dispersion of radio waves](#)
812. [Ionospheric distortion](#)
813. [Ionospheric disturbances](#)
814. [Ionospheric disturbances and HF propagation conditiona](#)
815. [Ionospheric disturbances and their impacts on HF radio wave propagation](#)
816. [Ionospheric disturbances probing](#) (references — list of sources)
817. [Ionospheric dynamics](#)
818. [Ionospheric effects on hf radio wave propagation](#)
819. [Ionospheric interference](#)
820. [Ionospheric irregularities](#)

821. [Basic Ionospheric models](#) (references — list of sources)
 - [Ionospheric models](#)
 - [Ionospheric models that simulate a neural network](#)
 - [Ray-tracing models](#)
 - [Skywave propagation indicators](#)
 - [Hybrid ionospheric models](#)
822. [Ionospheric monitoring and HF frequency management](#)
823. [Ionospheric prediction and HF frequency management](#)
824. [Ionospheric propagation](#)
825. [Ionospheric propagation chart](#)
826. [Ionospheric propagation map](#)
827. [Ionospheric propagation examples](#)
828. [Ionospheric propagation model](#)
829. [Ionospheric propagation of radio waves](#)
830. [Ionospheric propagation of radio waves explained](#)
831. [Ionospheric propagation theory](#)
832. [Ionospheric radio propagation](#)
833. [Ionospheric reflection](#) (resources)
834. [Ionospheric refraction](#) (resources)
835. [Ionospheric radio propagation](#)
836. [Ionospheric regions](#)
837. [Ionospheric regions](#) (references — list of sources)
838. [Ionospheric regions and HF Skywaves](#)
839. [Ionospheric research](#) (references — list of sources)
840. [Ionospheric skywave propagation](#)
841. [Ionospheric storms](#)
842. [Ionospheric variations](#) (references — list of sources)
843. [Is HF propagation reciprocal?](#)
844. [IRI ionospheric model](#)
845. [ITU model](#)

J

846. [John Ashworth Aatcliffe \(12-December-1902-25-October 1987\)](#)

K

- 847. [KC2G HF MUF propagation maps](#)
- 848. [Keep an Eye on the High Bands](#)
- 849. [Key aspects of radio propagation for hams](#)
- 850. [Key concepts of HF propagation](#)
- 851. [Key factors affecting HF propagation](#)
- 852. [Key for HF Propagation Charts](#)
- 853. [K-Index](#)
- 854. [K-index Australia](#)
- 855. [K-index United Kingdom](#)
- 856. [K-index United States](#)
- 857. [Kp index](#)
- 858. [Kp index Aurora](#)
- 859. [Kp Index Explained](#)
- 860. [Kp index Nowcast](#)
- 861. [KiwiSDR](#) map of remote public SDR receivers accessible via the Internet

L

- 862. [Lagrange points](#)
- 863. [Latest HF Bands Propagation](#)
- 864. [Layers or regions of the ionosphere?](#)
- 865. [Learning about space weather](#)
- 866. [Line-Of-Sight propagation \(LOS\)](#)
- 867. [Live DX spot reports by ham radio](#)
- 868. [Live ham band reports](#)
- 869. [Live ham radio band conditions](#)
- 870. [Live ham radio map](#)
- 871. [Live ham radio propagation](#)
- 872. [Live ham radio reports](#)
- 873. [Live HF DX propagation maps](#)
- 874. [Live HF propagation](#)
- 875. [Live HF propagation charts and maps](#)

876. [Live HF propagation map](#)
877. [Live HF propagation maps and charts](#)
878. [Live HF propagation maps and charts explained](#)
879. [Live Propagation and Solar Data](#)
880. [Live radio propagation map](#)
881. [Live radio propagation reports](#)
882. [Live solar activity](#)
883. [Live solar alerts for ham radio](#)
884. [Live solar events and past solar activity](#)
885. [Listen live ham radio](#)
886. [LOS](#)
887. [LOS - Line of sight propagation](#)
888. [Long and mid-range skywaves](#)
889. [Long distance communication](#)
890. [Long- and short-term prediction of HF radio propagation](#)
891. [Long-term prediction and short-term prediction of HF radio propagation](#)
892. [Lowest & Maximum Usable Frequency, Critical Frequency](#)
893. [Lowest usable frequency \(LUF\)](#)
894. [Lowest Usable Frequency map](#)
895. [LUF frequency range due to SID](#)
896. [LUF frequency range chart](#)
897. [LUF \(Lowest Usable frequency\)](#)
898. [LUF chart](#)
899. [LUF chart for radio amateurs](#)
900. [LUF map](#)
901. [LUF Propagation Map](#)
902. [LUF-MUF window:](#)

M

903. [Magic band openings](#)
904. [Magnetic field](#)
905. [Magnetosphere \(MS\)](#)
906. [Making sense of solar indices](#)

907. [Mastering HF propagation](#)
908. [Maximum usable frequency \(MUF\)](#)
909. [Maximum Usable frequency map](#)
910. [Methods for forecasting band conditions](#)
911. [Methods for monitoring HF propagation](#)
912. [Methodes to forecast radio propagation](#)
913. [Minimum usable frequency](#)—The lowest usable frequency (LUF)
914. [Model evaluation](#)
915. [Model validation](#)
916. [Model verification](#)
917. [Modeling the Topside Ionosphere Observations by Satellites \(2003\)](#)
918. [Models](#)
919. [Modes of HF radio propagation](#)
920. [Modes of radio propagation](#)
921. [Modes of Radio Wave Propagation in Wireless Communication](#)
922. [Monitor band activity of radio amateurs ↗](#)
923. [Monitor Worldwide HF HAM Band Activity](#)
924. [Monitoring and forecasting skywave propagation](#)
925. [Monitoring HF band activity](#)
926. [Monitoring HF band conditions](#)
927. [Moniotring HF propagation](#)
928. [Monitoring solar flux levels for promising band openings](#)
929. [MS — Meteor Scatter Activity](#)
930. [MUF | Maximum Usable Frequency](#)
931. [MUF\(3000\)F2 plots](#)
932. [MUF 3000 km map](#)
933. [MUF and LUF](#)
934. [MUF calculation](#)
935. [MUF calculator](#)
936. [MUF factor](#)
937. [MUF ham radio](#)
938. [MUF Indicator](#)
939. [MUF indicators](#)

940. [MUF LUF FOT](#)
941. [MUF LUF prediction](#)
942. [MUF map](#)
943. [MUF map real time](#)
944. [MUF maps and charts](#)
945. [MUF meaning](#)
946. [MUF propagation](#)
947. [MUF propagation chart](#)
948. [MUF propagation map](#)
949. [MUF propagation map: Assess optimal frequencies and paths](#)
950. [MUF propagation online map](#)
951. [MUF radio propagation](#)
952. [MUF radio propagation map](#)
953. [MUF, LUF, and FOT](#)
954. [My current local HF conditions](#)

N

955. [Near real-time HF propagation charts](#)
956. [Near real-time F2-region critical frequency map](#)
957. [Near real-time regional maps](#)
958. [Near real-time skywave propagation charts](#)
959. [Near Vertical Incidence Skywave](#)
960. [NET ionospheric model](#)
961. [NM7M's-HF-Propagation-tutorial-2015-by-Thierry-Lombry,-LX4SKY](#) (txt file)
962. [NM7M HF Propagation tutorial](#)
963. [NOAA](#)
964. [NOAA predicted sunspot number](#)
965. [NOAA Radio dashboard](#)
966. [NOAA solar cycle](#)
967. [NOAA solar flux predictions](#)
968. [NOAA sunspot cycle predictions](#)
969. [NOAA SWPC space weather scales](#)
970. [Noise level](#)

971. [Nowcast HF propagation conditions](#)
972. [Number of radio amateurs by country](#)
973. [NVIS](#)
974. [NVIS antenna](#)
975. [NVIS antennas explained](#)
976. [NVIS HF signal propagation in ionosphere](#)
977. [NVIS map](#)
978. [NVIS propagation](#)
979. [NVIS propagation concept](#)
980. [NVIS propagation maps](#)
981. [NVIS propagation problems](#)
982. [NVIS tutorial](#)
983. [NVIS vs conventional skywave](#)
984. [NVIS: Stephen C. Finch AI0W \(2008\)](#)

- O
985. [Observations - Geo \(Terrestrial\) & Solar](#)
986. [Observations and Modeling of Traveling Ionospheric Disturbances](#)
987. [Odd propagation conditions](#)
988. [On-Line HF Propagation Forecast](#)
989. [On-line HF Propagation Prediction](#)
990. [Online chart of the recent LUF](#)
991. [Online HF propagation prediction](#)
992. [Online indices](#)
993. [Online LUF chart](#)
994. [Online LUF map](#)
995. [Online propagation charts](#)
996. [Online HF propagation prediction](#)
997. [Online propagation tools](#)
998. [Online real-time propagation charts](#)
999. [Open ham bands](#)
1000. [Optical dispersion of light vs Ionospheric dispersion of radio waves](#)
1001. [Optimal sending frequency](#)

- 1002. [Optimizing HF Bands: Frequency, Propagation, and Time-of-Day](#)
- 1003. [Optimum traffic frequency \(OTF\)](#)
- 1004. [Optimum transmission frequency \(OTF\)](#)
- 1005. [Optimizing HF Bands—Frequency, Propagation, and Time-of-Day](#)
- 1006. [OWF — Optimum Working frequency](#)

P

- 1007. [Past solar activity](#)
- 1008. [PCA \(polar cap absorption\)](#)
- 1009. [Physics of Propagation - Refraction Absorption Polarization](#)
- 1010. [Plan your QSO today](#)
- 1011. [Plasma](#)
- 1012. [Plasma clouds](#)
- 1013. [Polar cap absorption event](#)
- 1014. [PSKR, WSPR](#)
- 1015. [Practical applications](#)
- 1016. [Practical approach](#)
- 1017. [Practical Forecasting and Prediction](#)
- 1018. [Practical guide](#)
- 1019. [Predict conditions](#)
- 1020. [Predict HF propagation radio propagation](#)
- 1021. [Predict MUF](#)
- 1022. [Predict propagation](#)
- 1023. [Predict skywave propagation—nowcast](#)
- 1024. [Predict solar flux](#)
- 1025. [Predict space weather](#)
- 1026. [Predict sunspot numbers](#)
- 1027. [Prediction of sky-wave propagation conditions](#)
- 1028. [Predicting HF Band Conditions for Ham Radio](#)
- 1029. [Predicting HF propagation](#)
- 1030. [Predicting ionospheric conditions](#)
- 1031. [Predicting propagation](#)
- 1032. [Predicting propagation of skywave](#)

1033. [Predicting radio propagation](#)
1034. [Predicting skywave propagation](#)
1035. [Predicting solar flares](#)
1036. [Predicting solar flux](#)
1037. [Prediction](#)
1038. [Prediction vs forecast of HF band conditions](#)
1039. [Principles of radio wave propagation](#)
1040. [Probing ionospheric disturbances](#) (references — list of sources)
1041. [Propagation](#)
1042. [Propogation and RadioScience, KL7AL \(ARRL 2005\)](#)
1043. [Propagation and Sun](#)
1044. [Propagation beginner's guide](#)
1045. [Propagation characteristics of radio waves](#)
1046. [Propagation characteristics analysis of high-frequency radio waves](#)
1047. [Propagation charts tutorial](#)
1048. [Propagation conditions](#)
1049. [Propagation forecast](#)
1050. [Propagation HF prediction](#)
1051. [Propagation indicators](#)
1052. [Propagation indicators: foF2, MUF, OWF, LUF](#)
1053. [Propagation indices](#)
1054. [Propagation — modes of HF radio propagation](#)
1055. [Propagation charts for ham radio ↗ ↗](#)
1056. [Propagation condition map](#)
1057. [Propagation conditions](#)
1058. [Propagation DX](#)
1059. [Propagation explained](#)
1060. [Propagation factors & conditions](#)
1061. [Propagation forecast](#)
1062. [Propagation forecast for HF radio](#)
1063. [Propagation forecast methodes](#)
1064. [Propagation forecasts for radio amateurs](#)
1065. [Propagation guide for radio hams](#)

1066. [Propagation indices](#) (plural of propagation index)
1067. [Propagation live map](#)
1068. [Propagation map](#)
1069. [Propagation map for ham radio](#)
1070. [Propagation maps for ham radio](#)
1071. [Propagation modes](#)
1072. [Propagation Modes, Ken Larson, KJ6RZ \(2024\)](#)
1073. [Propagation of HF radio waves](#)
1074. [Propagation of radiowaves](#)
1075. [Propagation of radio waves](#)
1076. [Propagation of radio waves explained](#)
1077. [Propagation of radio waves: ground wave vs. skywave](#)
1078. [Propagation of RF Signals](#)
1079. [Propagation of high frequency radio waves — The rebirth of HF](#)
1080. [Propagation of radio waves for beginners](#)
1081. [Propagation of shortwave radio](#)
1082. [Propagation of short radio waves](#)
1083. [Propagation online map](#)
1084. [Propagation Overview 48-Hour](#)
1085. [Propagation prediction](#)
1086. [Propagation predictions for HF operation](#)
1087. [Propagation prediction programs and forecasts](#)
1088. [Propagation prediction software for skywave propagation](#)
1089. [Propagation Prediction Tool](#)
1090. [Propagation prediction tools](#)
1091. [Propagation report ham radio](#)
1092. [Propagation reports](#)
1093. [Propagation reports for digital modes](#)
1094. [Propagation software](#)
1095. [Forecasting Tool](#)
1096. [Propagation tools for ham radio](#)
1097. [Propagation tools to help succeed with your ham radio](#)
1098. [Propagation Tutorial](#) | [Table of contents](#)

- 1099. [Propagation visualization](#)
- 1100. [Properties of electromagnetic waves](#)
- 1101. [Properties of radio waves](#)
- 1102. [Proton flux \(Pf\)](#)
- 1103. [PSKR - PSK reporter](#)

Q

- 1104. [QSL net propagation](#)
- 1105. [QSO Activity reports](#)
- 1106. [Quick guide to HF propagation using solar indices](#)
- 1107. [Quiet sun](#)

R

- 1108. [R-S-G Scales defined](#)
- 1109. [R-S-G Scales now](#)
- 1110. [R1-R5: Scale of Radio blackouts](#)
- 1111. [Radio amateur HF tutorial](#)
- 1112. [Radio blackout phenomenon](#)
- 1113. [Radio Amateur](#)
- 1114. [Radio blackout](#)
- 1115. [Radio blackout effects](#)
- 1116. [Radio blackout map](#)
- 1117. [Radio blackout phenomenon](#)
- 1118.
- 1119. [Radio blackout today](#)
- 1120. [Radio blackouts](#)
- 1121. [Radio amateurs HF bands characteristics](#)
- 1122. [Radio blackouts due to solar storms](#)
- 1123. [Radio blackout events during 2024](#)
- 1124. [Radio communication and the ionosphere](#)
- 1125. [Radio communications dashboard](#)
- 1126. [Radio fadeouts](#)
- 1127. [Radio frequency](#)

1128. [Radio Frequency \(RF\) Fundamentals](#)
1129. [Radio frequency chart](#)
1130. [Radio frequency range chart](#)
1131. [Radio frequency ranges chart](#)
1132. [Radio frequency table](#)
1133. [Radio frequency use chart](#)
1134. [Radio frequency and Ionosphere](#)
1135. [Radio frequency propagation](#)
1136. [Radio frequency propagation](#)
1137. [Radio frequency propagation: A comprehensive beginner's guide](#)
1138. [Radio frequency propagation for Ham radio](#)
1139. [Radio frequency propagation: A Comprehensive Guide](#)
1140. [Radio ham bands live](#)
1141. [Radio ham HF band conditions](#)
1142. [Radio propagation](#) | [Radio Propagation](#)—references
1143. [Radio propagation](#) - what is it?
1144. [Radio propagation and space weather](#)
1145. [Radio propagation basics](#)
1146. [Radio propagation beacon](#)
1147. [Radio propagation charts](#)
1148. [Radio propagation conditions map](#)
1149. [Radio propagation conditions today](#)
1150. [Radio propagation data map](#)
1151. [Radio propagation explained](#)
1152. [Radio propagation for beginners](#)
1153. [Radio propagation forecast](#)
1154. [Radio propagation forecasting](#)
1155. [Radio propagation formula](#)
1156. [Radio propagation free software](#)
1157. [Radio propagation frequency](#)
1158. [Radio propagation indicators](#)
1159. [Radio propagation indices](#)
1160. [Radio propagation levels map](#)

1161. [Radio propagation live map](#)
1162. [Radio propagation maps](#)
1163. [Radio propagation metrics](#)
1164. [Radio propagation model](#)
1165. [Radio propagation modeling](#)
1166. [Radio Propagation Prediction](#)
1167. [Radio propagation prediction for HF communications](#)
1168. [Radio propagation prediction vs. forecasting](#)
1169. [Radio propagation prediction modelling](#)
1170. [Radio Propagation Online Tools](#)
1171. [Radio Propagation Overview](#)
1172. [Radio Propagation Overview Recent 48-Hours](#)
1173. [Radio propagation properties](#)
1174. [Radio propagation software](#)
1175. [Radio propagation today](#)
1176. [Radio propagation tool](#)
1177. [Radio propagation tutorials for radio amateurs](#)
1178. [Radio Propagation YouTube](#)
1179. [Radio spectrum](#) | [Radio Spectrum](#)—references
1180. [Radio wave](#)
1181. [Radio Wave fundamentals](#)
1182. [Radio wave principles](#)
1183. [Radio wave propagation](#)
1184. [Radio wave propagation](#)
1185. [Radio wave propagation fundamentals](#)
1186. [Radio wave propagation guide](#)
1187. [Radio wave propagation in the ionosphere](#)
1188. [Radio wave propagation model](#)
1189. [Radio Wave Propagation part-1 Introduction, Marcel H. De-Canck, ON5AU \(2002\)](#)
1190. [Radio wave propagation tutorial](#)
1191. [Radio wave HF propagation models](#)
1192. [Radio wave characteristics](#)
1193. [Radio wave propagation characteristic](#)

1194. [Radio wave propagation forecasting](#)
1195. [Radio wave propagation in the ionosphere](#)
1196. [Radio wave propagation today](#)
1197. [Radio wave transmission](#)
1198. [Radio waves](#)
1199. [Radio waves and communications distance](#)
1200. [Radio waves and the ionosphere](#) (effects) | [Radio waves and the ionosphere](#) (structure, regions)
1201. [Radio Waves and the Ionosphere, G3YWX \(QST 1999\)](#)
1202. [Radio waves examples](#)
1203. [Radio waves nature and properties](#)
1204. [Radio waves overview](#)
1205. [Radio waves properties](#)
1206. [Radio wave spectrum](#)
1207. [Radio-wave propagation](#)
1208. [Radio-wave propagation modes](#)
1209. [Ray tracing models](#)
1210. [Ray tracing](#) Optics
1211. [RBN - Reverse beacon Network](#)
1212. [Real time propagation and band conditions](#)
1213. [Real-time activity of radio amateurs](#)
1214. [Real-time band conditions](#)
1215. [Real-time band conditions for ham radio](#)
1216. [Real-time data](#)
1217. [Real-time DX data](#)
1218. [Real-time DX propagation conditions](#)
1219. [Real-time DX reports * HF propagation prediction](#)
1220. [Real-time forecast of HF radio propagation](#)
1221. [Real-time ham band activity using the internet](#)
1222. [Real-time HF band conditions](#)
1223. [Real-time HF DX Propagation Prediction](#)
1224. [Real-time HF propagation charts](#)
1225. [Real-time HF propagation maps](#)

1226. [Real-time HF propagation prediction](#)
1227. [Real-time HF propagation reports](#)
1228. [Real-time HF Propagation Space Weather](#)
1229. [Real-time ionogram](#)
1230. [Real-time LUF Conditions](#)
1231. [Real-time maps and lists of ham radio activity](#)
1232. [Real-time MUF 3000 km propagation map](#)
1233. [Real-time MUF conditions](#)
1234. [Real-time MUF map](#)
1235. [Real-time propagation and band conditions](#)
1236. [Real-time propagation charts](#)
1237. [Real-time propagation charts for HF radio ↗ ↗](#)
1238. [Real-time propagation conditions](#)
1239. [Real-time propagation map](#)
1240. [Real-time radio propagation map](#)
1241. [Real-time radio propagation reports](#)
1242. [Real-time reports HF propagation](#)
1243. [Real-time reports of space weather](#)
1244. [Realtime skywave propagation reports](#)
1245. [Real-time solar flare](#)
1246. [Real-time space weather reports](#)
1247. [Real-time space weather reports](#)—Explanation
1248. [Real-Time Sun & Moon Positions](#)
1249. [Real-time sunspots number](#)
1250. [Real-time watching of worldwide ham activity](#)
1251. [Real-time watching of worldwide hams' activity](#)
1252. [Reasons for Closed HF Bands](#)
1253. [Recent geomagnetic storms](#)
1254. [Recent geophysical & solar observations](#)
1255. [Recent Kp](#)
1256. [Recent LUF conditions](#)
1257. [Recent LUF map](#)
1258. [Recent LUF propagation](#)

1259. [Recent MUF distribution](#)
1260. [Recent observations - Geo \(Terrestrial\) & Solar](#)
1261. [Recent propagation conditions](#)
1262. [Recent R-S-G reports](#)
1263. [Recent solar flares](#)
1264. [Recent sunspots number](#)
1265. [Reciprocal HF propagation](#)
1266. **References—external links to internet sources**
 - [Electromagnetic / Radio Waves properties](#) ► [Radio propagation](#) references
 - [Ionospheric Propagation](#) references
 - [NVIS](#) unique mode of a skywave references
 - [Gray line](#) references
 - [Propagation Indices](#) references
 - [Observations](#) references: [Terrestrial magnetometers](#), [the Sun](#), [space weather](#), [Total Electron Content \(TEC\)](#), [real-time MUF](#), [propagation charts](#) references
 - [Solar Phenomena](#) references
 - [Space weather phenomena](#) references
 - [Space weather references to agencies & services](#)
 - [Forecasting and prediction](#) references
 - [Tools and applications references for analyzing and forecasting HF propagation](#)
1267. [Refraction of radio wave compared to visible light](#)
1268. [Refractive index maps](#)
1269. [Refractive index of HF radio in the ionosphere](#)
1270. [Regional and global online reports of HF propagation](#)
1271. [Regional conditions](#)
1272. [Regional HF conditions](#)
1273. [Regional MUF and solar indices](#)
1274. [Regional propagation](#)
1275. [Regional Variations](#)
1276. [Regional vs Global HF propagation conditions](#)
1277. [Regional vs Global propagation conditions](#)
1278. [Regions of ionization](#)
1279. [Region vs. Layer: Earth's Atmosphere and Ionosphere](#)

- 1280. [Remote sensing of the ionosphere](#)
- 1281. [Remote receivers, WebSDR and KiwiSDR](#)
- 1282. [Report skywave erratic propagation conditions](#)
- 1283. [Reporters of digital modes](#)—references
- 1284. [Reports of space weather](#)
- 1285. [Reports of Space Weather Conditions](#)
- 1286. [Resources for Predicting HF Band Conditions for Ham Radio](#)
- 1287. [RSG scales](#) of [Space Weather](#)

S

- 1288. [Satellites for space weather observations](#)
- 1289. [S1-S5](#) - scale of [Solar radiation storms](#)
- 1290. [Schedule your QSOs today](#)
- 1291. [SDO - Solar Dynamic Observatory \(NASA\)](#)
- 1292. [SDR - Software Defined radio](#)
- 1293. [SDR spectrum](#)
- 1294. [Seasonal Effects on propagation](#)
- 1295. [Seasonal phenomena](#)
- 1296. [Seasonal variations in HF radio propagation](#)
- 1297. [Seasons affect HF radio propagation](#)
- 1298. [Seeing HF Conditions in Real Time](#)
- 1299. [Selecting techniques for HF radio communication](#)
- 1300. [SEP](#)
- 1301. [Severe geomagnetic storm](#)
- 1302. [SFI](#)
- 1303. [SFI today](#)
- 1304. [SFU](#)
- 1305. [Short wave propagation](#)
- 1306. [Short-term forecast of HF radio propagation](#)
- 1307. [Short-term prediction of HF radio propagation](#)
- 1308. [Shortwave Band Characteristics](#)
- 1309. [Shortwave listening \(SWL\)](#)
- 1310. [Shortwave radio frequencies — chart](#)

1311. [Shortwave propagation](#)
1312. [Shortwave propagation conditions](#)
1313. [Shortwave propagation conditions](#) map
1314. [Shortwave propagation forecast](#)
1315. [Shortwave propagation map](#)
1316. [Shortwave propagation prediction](#)
1317. [Shortwave radio propagation](#)
1318. [Shortwave radio propagation today](#)
1319. [SID](#) - Sudden ionospheric disturbances
1320. [Significance of solar activity for amateur radio](#)
1321. [Significant frequencies relevant to skywaves](#)
1322. [Significant geomagnetic storms in 2025](#)
1323. [Significat radio blackout events during 2024](#)
1324. [Simple Ham radio](#)
1325. [Skip distance](#) | [Skip distance](#)—Skywave
1326. [Skip zone](#)
1327. [Skip zone and skip distance](#)
1328. [Sky propagation advantages](#)
1329. [Sky propagation critical frequencies](#)
1330. [Sky propagation diagram](#)
1331. [Sky wave ionospheric propagation](#)
1332. [Sky wave or ionospheric propagation](#)
1333. [Sky wave propagation](#)
1334. [Sky wave propagation basic and tutorials](#)
1335. [Sky wave propagation definition](#)
1336. [Sky wave propagation diagram](#)
1337. [Sky wave propagation example](#)
1338. [Sky wave propagation frequency range](#)
1339. [Sky wave propagation pdf](#)
1340. [Skywave](#) | [Skywave / Skip](#)—references
1341. [Skywave at night](#)
1342. [Skywave concept](#)
1343. [Skywave frequencies to listen to](#)

1344. [Skywave glossary](#)
1345. [Skywave HF radio propagation](#)
1346. [Skywave multi-refractions](#)
1347. [Skywave propagation dynamics](#)
1348. [Skywave propagation—AI generated shortcast](#) courtesy of Jean-Paul Suijs, PA9X
1349. [Skywave propagation bad conditions](#)
1350. [Skywave propagation basics](#)
1351. [Skywave propagation charts](#)
1352. [Skywave propagation charts tutorial](#)
1353. [Skywave propagation conditions](#)
1354. [Skywave propagation example](#)
1355. [Skywave propagation for long-distance contact](#)
1356. [Skywave propagation for radio amateurs](#)
1357. [Skywave propagation forecast](#)
1358. [Skywave propagation frequency range](#)
1359. [Skywave propagation indicators](#)
1360. [Skywave propagation indicators for radio amateurs](#)
1361. [Skywave propagation indicators for radio hams](#)
1362. [Skywave propagation indices](#)
1363. [Skywave propagation metrics](#)
1364. [Skywave propagation mathematical models](#)
1365. [Skywave propagation modes](#)
1366. [Skywave propagation odd conditions](#)
1367. [Skywave propagation review pdf](#) 
1368. [Skywave propagation pdf](#)
1369. [Skywave propagation references](#)
1370. [Skywave propagation review](#)
1371. [Skywave propagation secrets](#)
1372. [Skywave Propagation Today](#)
1373. [Skywave propagation tutorial](#)
1374. [Skywave propagation—what is it?](#)
1375. [Skywave Propagation YouTube](#)
1376. [Skywave radio propagation](#)

1377. [Software for HF propagation prediction](#)
1378. [Solar activity](#)
1379. [Solar activity is interfering with radio signals on earth](#)
1380. [Solar Activity and Ham radio propagation](#)
1381. [Solar Activity & HF propagation](#)
1382. [Solar Activity & HF Radio Propagation](#)
1383. [Solar activity affects HF propagation](#)
1384. [Solar activity affects skywaves](#)
1385. [Solar activity and HF propagation](#)
1386. [Solar activity and the ionosphere](#)
1387. [Solar activity chart over time](#)
1388. [Solar activity cycle chart](#)
1389. [Solar activity for radio amateurs](#)
1390. [Solar activity forecast](#)
1391. [Solar activity prediction](#)
1392. [Solar activity radio propagation](#)
1393. [Solar activity reports](#)
1394. [Solar conditions & ham propagation](#)
1395. [Solar conditions affect HF radio propagation](#)
1396. [Solar conditions and ham propagation](#)
1397. [Solar conditions and ham radio propagation](#)
1398. [Solar conditions and HF radio propagation](#)
1399. [Solar conditions for radio propagation](#)
1400. [Solar cycle](#)
1401. [Solar Cycle Ham radio](#)
1402. [Solar cycle radio amateur propagation](#)
1403. [Solar Cycle, status and progression](#)
1404. [Solar data](#)
1405. [Solar dynamics](#)
1406. [Solar Electromagnetic Spectrum](#)
1407. [Solar energetic Particle \(SEP\)](#)
1408. [Solar events](#)
1409. [Solar events live](#)

1410. [Solar flare alert](#)
1411. [Solar flare chart](#)
1412. [Solar flare forecast](#)
1413. [Solar flare history chart](#)
1414. [Solar flare interference comparison](#)
1415. [Solar flare radiation](#)
1416. [Solar flare radiation graph](#)
1417. [Solar flare warning](#)
1418. [Solar flares](#)
1419. [Solar flares and HF fadeouts](#)
1420. [Solar flares and HF Propagation](#)
1421. [Solar flares and propagation](#)
1422. [Solar flares and Radio blackouts](#)
1423. [Solar flares hitting earth today](#)
1424. [Solar flares today alerts warnings](#)
1425. [Solar flares classification chart](#)
1426. [Solar flux](#)
1427. [Solar flux chart for today](#)
1428. [Solar Flux Index \(SFI\)](#)
1429. [Solar flux index chart](#)
1430. [Solar flux indices: SF, SSN](#)
1431. [Solar flux index HF propagation](#)
1432. [Solar flux index today](#)
1433. [Solar flux outlook](#)
1434. [Solar Flux Today](#)
1435. [Solar flux value for today](#)
1436. [Solar Flux versus Sunspot Activity](#)
1437. [Solar Flux, Sunspots, and Ionizing Radiation](#)
1438. [Solar Ham](#)
1439. [Solar HF propagation chart](#)
1440. [Solar Indices: SSN, Solar Flux](#)
1441. [Solar indices and space weather](#) | [Solar Indices Explained](#)
1442. [Solar indices today](#)

1443. [Solar indices what are they?](#)
1444. [Solar index propagation chart](#)
1445. [Solar index today](#)
1446. [Solar maximum](#)
1447. [Solar minimum](#)
1448. [Solar observations](#)
1449. [Solar Particle event \(SPE\)](#)
1450. [Solar phenomena](#)
1451. [Solar propagation](#)
1452. [Solar propagation data](#)
1453. [Solar propagation ham radio](#)
1454. [Solar radiation](#)
1455. [Solar radio flux](#)
1456. [Solar Radio Interference](#)
1457. [Solar Region Data - SunSpots](#)
1458. [Solar spectra](#)
1459. [Solar storm ham radio](#)
1460. [Solar storm radio amateur](#)
1461. [Solar storm today](#)
1462. [Solar storm warning today](#)
1463. [Solar storms](#) (X-ray flares and particle events)
1464. [Solar storms](#) overview
1465. [Solar storms](#) consist of solar flares and Coronal Mass Ejections (CME)
1466. [Solar storm FAQs: Your top amateur radio questions answered?](#)
1467. [Solar storms ham radio](#)
1468. [Solar synoptic map](#)
1469. [Solar terminator](#) (i.e. Greyline)
1470. [Solar terrestrial activity report](#)
1471. [Solar Terrestrial Data](#)
1472. [Solar terrestrial data explained](#)
1473. [Solar UV and X-ray spectral diagnostics \(2018\)](#)
1474. [Solar weather info](#)
1475. [Solar weather reports](#)

1476. [Solar wind](#)
1477. [Solar wind Ham radio](#)
1478. [Solar wind real-time dials](#)
1479. [Solar wind reports](#)
1480. [Solar X-Ray](#) (Phenomenon)
1481. [Solar X-ray Imaging system \(SXI\)](#)
1482. [Solar X-Ray flux levels](#)
1483. [Solar-terrestrial data and HF propagation](#)
1484. [SolarWx](#)
1485. [Space wave](#)
1486. [Space weather](#) a comprehensive tutorial
1487. [Space weather agencies & services](#) Worldwide
1488. [Space weather and amateur radio](#)
1489. [Space weather and propagation](#)
1490. [Space weather and radio communications](#)
1491. [Space weather and radio propagation](#)
1492. [Space weather by solar ham](#)
1493. [Space weather data and plots](#)
1494. [Space weather effects on communication systems](#)
1495. [Space weather effects on communications systems \(June 2020\)](#)
1496. [Space weather events](#)
1497. [Space weather for Amateur Radio](#)
1498. [Space weather forecast](#)
1499. [Space weather for radio hams](#)
1500. [Space weather forecasting](#)
1501. [Space weather ground-based observatories](#)
1502. [Space weather ham radio](#)
1503. [Space Weather HF propagation](#)
1504. [Space Weather HF Radio propagation](#)
1505. [Space weather live](#)
1506. [Space weather models](#)
1507. [Space weather needs of the amateur radio community](#)
1508. [Space weather news](#)

1509. [Space Weather Nowcast](#)
1510. [Space weather observations](#)
1511. [Space weather observations from satellites](#)
1512. [Space weather overview](#)
1513. [Space weather phenomena](#)
1514. [Space weather prediction](#)
1515. [Space Weather Prediction Center](#) (NOAA)
1516. [Space weather predictions for radio amateurs](#)
1517. [Space weather reports](#)
1518. [Space weather reports](#)
1519. [Space weather scales](#)
1520. [Space weather: real-time 24hr effective sunspot number](#)
1521. [SPE](#)
1522. [Sporadic E \(\$E_s\$ \)](#)
1523. [Sporadic E multipath](#)
1524. [Sporadic E propagation](#)
1525. [Spread F](#)
1526. [Sprites](#)
1527. [SSN](#)
1528. [Stanley article of the month \(QST-June-2021\)](#)
1529. [Stratosphere](#)
1530. [Sudden Ionospheric Disturbances](#) (SID)
1531. [Summary](#)
1532. [Sun flare propagation](#)
1533. [Sun flare radiation](#)
1534. [Sun spots ham radio today](#)
1535. [Sunspot index correlation](#)
1536. [Sunspot number](#)
1537. [Sunspot numbers explained](#)
1538. [Sunspots](#)
1539. [Sunspots and HF propagation](#)
1540. [Sunspots and skywave propagation](#)
1541. [Sunspots and solar flares](#)

1542. [Sunspots and sun flare](#)
1543. [Sunspots and solar flux](#)
1544. [Sunspots and the ionosphere](#)
1545. [Sunspots ham radio today](#)
1546. [Sunspots NOAA predicted sunspot number](#)
1547. [Sunspots number](#)
1548. [Sunspots number today](#)
1549. [Sunspots explained](#)
1550. [Sunspots](#)
1551. [Sunspots and solar flux](#)
1552. [Sunspot cycle](#)
1553. [Sunspot number](#)
1554. [SuperDARN](#)
1555. [Sunlight](#)
1556. [Sunspot cycles](#)
1557. [Sunspot index since 1750](#)
1558. [Sunspot index and long-term solar observations](#)
1559. [Sunspot number and radio flux](#)
1560. [Sunspot number forecast](#)
1561. [Sunspot number prediction](#)
1562. [Sunspot propagation chart](#)
1563. [Sunspot propagation effects](#)
1564. [Sunspots recent days](#)
1565. [Sunspot solar cycle 25](#)
1566. [Sunspots today](#)
1567. [Surface wave propagation](#)
1568. [SWPC = Space Weather prediction center \(NOAA\)](#)

T

1569. [T Index map](#)
1570. [Table of frequency allocations chart](#)
1571. [TEC—Total electron content](#)
1572. [Terminator line](#)

1573. [Terrestrial geomagnetic indices](#)
1574. [Terrestrial observations](#)
1575. [The Basics of HF Propagation](#)
1576. [The Big Gun's Guide to Low Band Propagation: A book by NM7M \(2002\)](#)
1577. [The current conditions on ham bands](#)
1578. [The current propagation conditions](#)
1579. [The decline and comeback of skywave HF radio](#)
1580. [The effects of weather on amateur radio propagation](#)
1581. [The effective ham radio range](#)
1582. [The electromagnetic spectrum](#)
1583. [The HF bands assigned to hams](#)
1584. [The HF bands assigned to radio amateurs](#)
1585. [The HF bands](#)
1586. [The HF bands for newcomers](#)
1587. [The Holy Cluster](#)
1588. [The impact of geomagnetic storms on HF propagation](#)
1589. [The importance of frequency management in HF radio communications](#)
1590. [The influence of ionospheric electron density fluctuations on HF propagation](#)
1591. [The ionosphere](#)
1592. [The ionosphere and HF propagation](#)
1593. [The ionosphere and skywave propagation](#)
1594. [The Little Pistol's Guide to HF Propagation Robert R. Brown, Worldradio Books \(1996\)](#)
1595. [The lowest usable frequency](#)
1596. [The Magic of Aurora](#)
1597. [The magnetosphere](#)
1598. [The maximum range of ham radios](#)
1599. [The most significant blackout event of the 25th solar cycle](#) May 2024
1600. [The propagation of radio waves](#)
1601. [The radio spectrum](#)
1602. [The Rebirth of Shortwave radio communication](#)
1603. [The rebirth of skywave HF radio](#)
1604. [The recent propagation conditions](#)
1605. [The recent sunspots number](#)

1606. [The relationships between sunspot number and solar radio flux at 10.7 centimeters](#)
1607. [The science behind radio wave propagation](#)
1608. [The solar cycle | SSN Explained](#)
1609. [The solar cycle and sunspots](#)
1610. [The Sun and solar activity](#)
1611. [The Sun and space weather](#)
1612. [The Super Dual Auroral Radar Network \(SuperDARN\)](#)
1613. [The Structure of the Ionosphere](#)
1614. [Theory-Based Tutorial on HF Propagation](#)
1615. [Thermosphere](#)
1616. [TID \(Traveling ionospheric disturbances\)](#)
1617. [Time of day](#)
1618. [Time-of-day band selection](#)
1619. [Total Electron Content \(TEC\)](#)
1620. [Tools and Applications](#)
1621. [Tools and Applications for Monitoring HF Band Conditions](#)
1622. [Tools for analyzing and forecasting HF propagation](#)
1623. [Total electron content \(TEC\)](#)
1624. [Tracking digital modes](#)
1625. [Tracking global beacons](#)
1626. [Transmission Angle](#)
1627. [Traveling ionospheric disturbances \(TID\)](#)
1628. [Transient Luminous Events \(TLEs\)](#)
1629. [Troposphere](#)
1630. [Tutorial and practice on skywave](#)
1631. [Tutorial and practice on skywave prediction](#)
1632. [Twilight zone](#)
1633. [Types of radio wave propagation](#)

U

1634. [Ultraviolet](#)
1635. [Understanding amateur radio bands](#)
1636. [Understanding amateur radio NVIS](#)

1637. [Understanding Band Conditions Banners](#)
1638. [Understanding current HF band conditions](#)
1639. [Understanding geomagnetic indices](#)
1640. [Understanding ham bands closed](#)
1641. [Understanding ham band conditions banner](#)
1642. [Understanding ham band propagation](#)
1643. [Understanding ham radio bands](#)
1644. [Understanding ham radio frequencies](#)
1645. [Understanding ham radio propagation](#)
1646. [Understanding HF Propagation: A Review](#) 
1647. [Understanding HF Propagation: All in One](#)
1648. [Understanding HF Propagation for radio hams](#)
1649. [Understanding HF propagation numbers](#)
1650. [Understanding HF propagation practice](#)
1651. [Understanding HF radio propagation](#)
1652. [Understanding HF radio systems](#)
1653. [Understanding ionosphere](#)
1654. [Understanding LF and HF propagation, G0KYA, G3NYK, RSGB \(2010\)](#)
1655. [Understanding LUF and MUF](#)
1656. [Understanding NVIS](#)
1657. [Understanding of Ham radio propagation](#)
1658. [Understanding of HF radio propagation](#)
1659. [Understanding Propagation of Radio Waves](#)
1660. [Understanding Propagation of Skywave](#)
1661. [Understanding propagation numbers](#)
1662. [Understanding propagation: How weather affects radio waves](#)
1663. [Understanding propagation: How weather affects radio waves](#)
1664. [Understanding Propagation: Paul L. Herrman, N0NBH \(11-July 2010\)](#)
1665. [Understanding Propagation: WB5ANN.pdf](#)
1666. [Understanding Radio Propagation: A graphical perspective](#)
1667. [Understanding Radio Propagation by Ham Radio](#)
1668. [Understanding Radio Waves](#)
1669. [Understanding radio waves and their frequencies](#)

- 1670. [Understanding RF propagation: Types and properties](#)
- 1671. [Understanding Radio Waves: Nature and Properties](#)
- 1672. [Understanding Radio Waves and their Frequencies](#)
- 1673. [Understanding Radio Waves: Nature and Properties](#)
- 1674. [Understanding solar storms and how they impact ham radio](#)
- 1675. [Understanding the basics of radio propagation](#)
- 1676. [Understanding skywave propagation](#)
- 1677. [Understanding solar activity and its impact on HF propagation](#)
- 1678. [Understanding solar indices](#)
- 1679. [Understanding space weather indices](#)
- 1680. [Understanding the basics of HF band conditions](#)
- 1681. [Understanding the band conditions banner](#)
- 1682. [Understanding the HF band conditions](#)
- 1683. [Understanding wavelengths and frequencies in ham radio](#)
- 1684. [Usable Frequency Range](#): from LUF to MUF
- 1685. [Usable HF frequencies](#)
- 1686. [Uses of radio waves](#)
- 1687. [Using HF beacon tracking programs](#)

V

- 1688. [Validation of HF propagation models](#)
- 1689. [Variations in HF radio propagation](#)
- 1690. [Visualizing HF propagation](#)
- 1691. [Verification of HF propagation models](#)
- 1692. [Very High frequency](#) (VHF)
- 1693. [Very Low frequency](#) (VLF)
- 1694. [VHF propagation map](#)
- 1695. [View HF bands conditions at a glance](#)
- 1696. [Virtual height in wave propagation](#)
- 1697. [Visualizing HF propagation](#)
- 1698. [Voacap HF path prediction maps](#)
- 1699. [VOACAP online](#)
- 1700. [Voacap online HF predictions](#)

1701. [VOACAP prediction](#)

W

1702. [Watch Out for Geomagnetic Storms](#)

1703. [Wave attenuation and absorption](#)

1704. [Wave propagation](#)

1705. [Wavelength and Propagation](#)

1706. [Weather influence on HF radio propagation](#)

1707. [WebSDR](#)

1708. [What affects radio signal?](#)

1709. [What affects radio wave propagation?](#)

1710. [What are band conditions banners?](#)

1711. [What are DX clusters?](#)

1712. [What are electromagnetic waves?](#)

1713. [What are geomagnetic disturbances?](#)

1714. [What are geomagnetic indices?](#)

1715. [What are geomagnetic storms?](#)

1716. [What are HF band conditions?](#)

1717. [What are HF band propagation conditions?](#)

1718. [What are ionospheric clouds?](#)

1719. [What are ionospheric conditions](#)

1720. [What are ionospheric effects?](#)

1721. [What are ionospheric models?](#)

1722. [What are LUF and MUF?](#)

1723. [What are MUF and LUF?](#)

1724. [What are propagation indices?](#)

1725. [What are radio blackouts?](#)

1726. [What are radio waves?](#)

1727. [What are radio waves and how do they travel?](#)

1728. [What are solar flares?](#)

1729. [What are solar storms?](#)

1730. [What are space weather scales?](#)

1731. [What are sprites in Earth's atmosphere?](#)

1732. [What are sunspots?](#)
1733. [What are the amateur radio HF band conditions?](#)
1734. [What are the basic wave propagation mechanisms?](#)
1735. [What are the causes of Sporadic E?](#)
1736. [What are the current conditions on ham bands?](#)
1737. [What are the current HF propagation conditions?](#)
1738. [What are the current shortwave propagation conditions?](#)
1739. [What are the disadvantages of HF radio?](#)
1740. [What are the different types of ionospheric propagation?](#)
1741. [What are the factors affecting RF propagation?](#)
1742. [What are the factors affecting ionospheric conditions?](#)
1743. [What are the geomagnetic indices?](#)
1744. [What are the ham radio HF band conditions?](#)
1745. [What are the HF ham bands?](#)
1746. [What are the modes of HF-radio propagation?](#)
1747. [What are the modes of radio propagation?](#)
1748. [What are the R-S-G scales in space weather?](#)
1749. [What are the regions of the ionosphere?](#)
1750. [What are the solar indices?](#)
1751. [What are the sources of medium and large scale traveling ionospheric disturbances?](#)
1752. [What are the three modes of HF-radio propagation?](#)
1753. [What bands and modes will give me voice at 5,000 kilometers?](#)
1754. [What Bands Are Open Now?](#)
1755. [What can we expect from a HF propagation model?](#)
1756. [What causes ionospheric ionization?](#)
1757. [What causes the ionosphere to form?](#)
1758. [What controls HF propagation under normal conditions?](#)
1759. [What do propagation indices mean?](#)
1760. [What does it mean when a band is closed?](#)
1761. [What does NVIS mean?](#)
1762. [What effect does the change of seasons have on HF propagation?](#)
1763. [What every ham needs to know about skywave propagation](#)
1764. [What does a Grey line mean?](#)

1765. [What does the Solar Flux Index mean?](#)
1766. [What factors influence HF radio propagation?](#)
1767. [What frequency should I use for ham radio?](#)
1768. [What ham radio band should I use?](#)
1769. [What HF bands are allocated for radio amateurs?](#)
1770. [What HF bands are closed now?](#)
1771. [What HF bands are open at night?](#)
1772. [What HF bands are open now?](#)
1773. [What HF frequency should I use?](#)
1774. [What impact do solar phenomena like sunspots and solar flares have on radio communications?](#)
1775. [What important quality does the ionosphere have?](#)
1776. [What is a geomagnetic storm?](#)
1777. [What is a good app or website to see HF propagation?](#)
1778. [What is a skywave propagation?](#)
1779. [What is an electromagnetic \(EM\) wave?](#)
1780. [What is Earth's magnetic field?](#)
1781. [What is earth Magnetosphere?](#)
1782. [What is fading?](#)
1783. [What is Geomagnetic Activity?](#)
1784. [What is Geomagnetic Disturbance?](#)
1785. [What is ham radio?](#)
1786. [What is ham radio and how does it works?](#)
1787. [What is ham radio communications?](#)
1788. [What is ionization?](#)
1789. [What is ionospheric propagation?](#)
1790. [What is Grayline propagation?](#)
1791. [What is Hale cycle?](#)
1792. [What is Ham radio propagation?](#)
1793. [What is HF propagation?](#)
1794. [What is HF radio propagation?](#)
1795. [What is HF radio propagation prediction?](#)
1796. [What is HF wave propagation?](#)

1797. [What is high-frequency_\(HF\)_radio?](#)
1798. [What is ionization?](#)
1799. [What is K index?](#)
1800. [What is LUF?](#)
1801. [What is MUF?](#)
1802. [What is NVIS?](#)
1803. [What is plasma?](#)
1804. [What is radio?](#)
1805. [What is radio propagation?](#)
1806. [What Is radio wave propagation?](#)
1807. [What is RF propagation](#)
1808. [What is sky propagation?](#)
1809. [What Is sky wave propagation?](#)
1810. [What Is Skywave propagation?](#)
1811. [What is solar activity?](#)
1812. [What is solar cycle? | Solar cycles: A tutorial](#)
1813. [What is solar wind?](#)
1814. [What is space weather?](#)
1815. [What is the 80 meter band?](#)
1816. [What is the bandwidth of HF radio?](#)
1817. [What is the best HF band for daytime?](#)
1818. [What is the best HF band for DX?](#)
1819. [What is the best time for the 40 meter band?](#)
1820. [What is the best time of day for HF frequencies?](#)
1821. [What is the best time of day for HF radio?](#)
1822. [What is the composition of the ionosphere?](#)
1823. [What is the current HF propagation?](#)
1824. [What is the current LUF?](#)
1825. [What is the current MUF?](#)
1826. [What is the current lowest usable frequency_\(LUF\)?](#)
1827. [What is the current shortwave propagation conditions?](#)
1828. [What is the current skywave propagation conditions?](#)
1829. [What is the dead zone in radio communication?](#)

1830. [What is the difference between solar proton flux and solar proton density?](#)
1831. [What is the difference between Greyline and the Solar Terminator?](#)
1832. [What is the difference between Global versus Regional HF propagation conditions?](#)
1833. [What is the difference between earth Magnetosphere and Earth's magnetic field?](#)
1834. [What is the difference between geomagnetic and ionospheric storms?](#)
1835. [What is the difference between solar indices and propagation indices?](#)
1836. [What is the D region of the ionosphere?](#)
1837. [What is the E region of the ionosphere?](#)
1838. [What is the F region of the ionosphere?](#)
1839. [What is the farthest a ham radio can reach?](#)
1840. [What is the K index for propagation?](#)
1841. [What is the longest range 2 way radio?](#)
1842. [What is the lowest usable frequency?](#)
1843. [What is the LUF frequency?](#)
1844. [What is the max radio range?](#)
1845. [What is the maximum usable frequency?](#)
1846. [What is the range of a 100 watt ham radio?](#)
1847. [What is the skip zone?](#)
1848. [What is the solar cycle?](#)
1849. [What is the solar index?](#)
1850. [What is the structure of the ionosphere?](#)
1851. [What is the T Index?](#)
1852. [What is Total Electron Content? TEC](#)
1853. [What is virtual height?](#)
1854. [Where can I find solar data?](#)
1855. [What radio waves actually are?](#)
1856. [What the numbers mean in propagation](#)
1857. [What to expect from our HF amateur radio bands?](#)
1858. [When are HF bands closed?](#)
1859. [When will HF band conditions improve?](#)
1860. [Which Ham Band is Open Now?](#)
1861. [Which ham bands are open now?](#)
1862. [Which HF bands are best during the day and which are better at night?](#)

- 1863. [Which ionospheric region is closest to the Earth?](#)
- 1864. [Why are bands bad?](#)
- 1865. [Why are ham bands closed?](#)
- 1866. [Why do we need propagation forecasting?](#)
- 1867. [Why do we need propagation forecasts?](#)
- 1868. [Why does space weather affect ham radio?](#)
- 1869. [Why forecast HF conditions?](#)
- 1870. [Why is a band closed?](#)
- 1871. [Why is a radio band closed?](#)
- 1872. [Why is HF propagation so poor?](#)
- 1873. [Why is HF used for long range communication?](#)
- 1874. [Why is propagation on shortwave \(HF\) terrible right now?](#)
- 1875. [Why is shortwave used for long range communication?](#)
- 1876. [Why is there no activity on the HF Radio?](#)
- 1877. [Wide-band WebSDR](#)
- 1878. [Window of usable frequencies](#): from LUF to MUF
- 1879. [Working The Gray Line](#)
- 1880. [Worldwide LUF map](#)
- 1881. [Worldwide MUF chart](#)
- 1882. [WSPR - Weak Signal propagation reporter](#) * [WSPR Live](#) * [WSPR Rocks](#)
- 1883. [WSPR - Weak Signal Communication](#)—references
- 1884. [WSPR - Weak Signal Propagation Reporter](#)—references
- 1885. [WSPRnet](#)

X

- 1886. [X-ray flares review](#)
 - 1887. [X-Ray flares](#) what are they?
 - 1888. [X-Ray Flux Levels](#) Now
 - 1889. [X-Ray Flux Levels](#) Scale
-

Total visits since 17 August 2022.

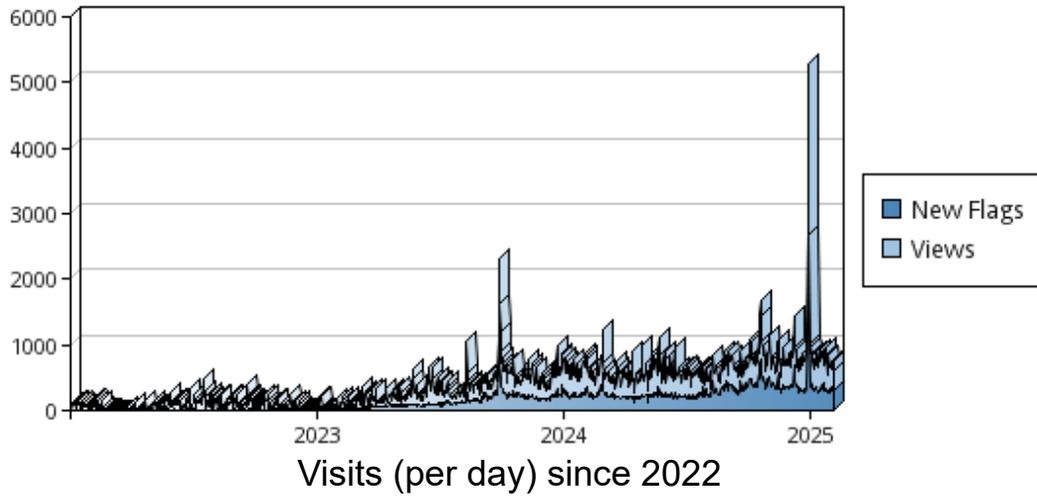
Repeat visits counted as new after 24 hours.

4X4XM

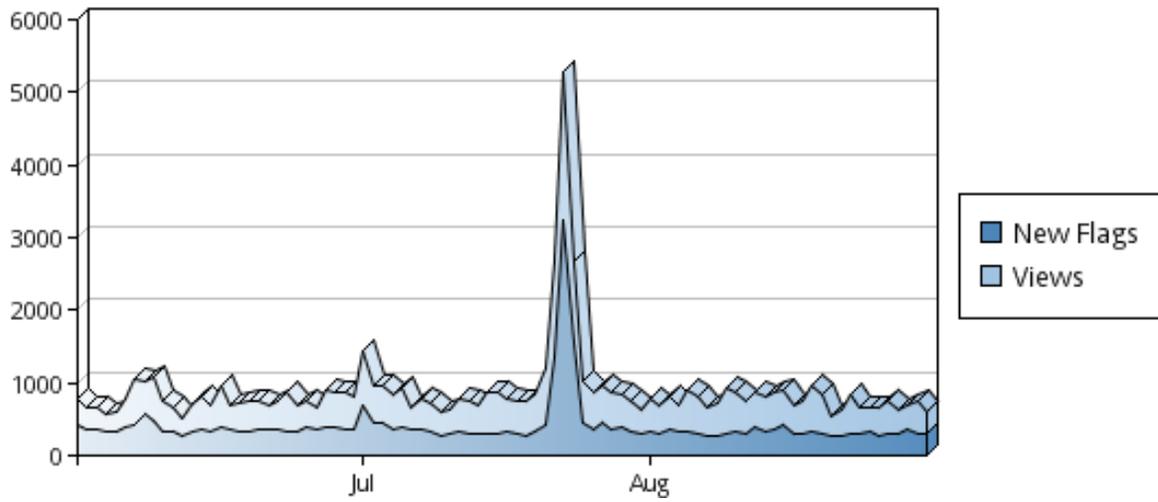
US 102,590	HR 268	UG 35	VG 11	MC 3
GB 12,607	RS 268	GE 35	VI 11	CK 3
CA 8,001	HK 265	EC 33	AO 11	TG 3
DE 4,198	UA 227	GU 33	SY 11	CG 3
NL 3,335	BD 217	JM 33	BW 10	LC 3
AU 3,255	LU 206	TN 30	NE 10	AX 3
IL 2,590	LT 188	RE 30	BO 9	LI 3
IT 2,481	PK 187	SC 30	UZ 9	BZ 3
IN 2,014	SK 174	NI 30	SV 9	AD 3
FR 1,824	CO 174	OM 28	AM 9	NC 3
PL 1,584	TW 164	MM 27	CI 9	DJ 2
ES 1,542	EG 134	JO 27	PF 9	FM 2
SE 1,439	AE 130	KW 26	SR 8	GF 2
SG 1,263	IR 117	LB 26	MV 8	GL 2
BE 1,125	UY 107	NA 26	SO 7	TJ 2
JP 1,076	NG 105	BH 25	ZW 7	NF 2
BR 1,008	EE 104	PY 25	GD 7	TL 2
NO 950	IQ 98	MW 24	SN 7	KM 2
CH 922	HN 98	LY 24	CW 7	MH 2
IE 910	VN 97	TZ 24	LA 7	CM 2
ZA 880	LV 96	MU 22	MN 7	GA 2
NZ 829	SA 93	KZ 21	SD 7	TO 2
FI 793	PE 80	BB 21	PG 6	AS 2
CN 774	VE 79	KH 20	GI 6	SL 2
DK 772	MT 77	AW 20	AI 6	AG 2
PH 689	LK 70	BY 20	FK 6	GY 2
ID 682	KE 69	GH 19	MQ 6	IO 1
AT 641	ET 69	AZ 18	SM 6	KG 1
RO 598	MA 60	DO 17	DM 5	GN 1
TR 588	MZ 59	JE 17	GP 5	BQ 1
GR 561	BA 58	GG 17	VU 5	ST 1
PT 539	IS 56	BN 15	BJ 5	BI 1
CZ 507	QA 55	FO 15	SS 5	YT 1
AR 504	MD 55	AL 14	XK 5	GM 1
HU 487	CR 55	ZM 14	BT 4	TD 1
MY 471	NP 53	CD 14	ME 4	MP 1
RU 465	DZ 53	BM 14	TC 4	WS 1
MX 442	CY 52	AF 14	PS 4	CF 1
CL 381	TT 52	GT 13	BF 4	PW 1
SI 330	CU 46	VC 12	MO 4	ER 1
TH 305	MK 42	YE 12	CV 4	
BG 304	KY 41	RW 12	MG 3	
PR 303	PA 40	FJ 12	SZ 3	
KR 297	IM 39	BS 11	LR 3	

Pageviews: 430,763
 Flags Collected: 216
 You: IL Newest: FM

The number of visits (graphs displayed below) peaked during HF propagation disruptions.



Visits (per day) during the last 3 months



Visits (per day) during the last month

