

Cross-border coordination MFCN/ATS in L-band

Compatibility studies for draft ECC Report

**15th Baltic Electronic Communications and Postal Services Regulators meeting
23-24 August 2018, Vilnius, Lithuania**

Communications Regulatory Authority
Deputy Director
Dr. Mindaugas Žilinskas

Regulations

- RR footnote No. 5.341A (WRC-15)

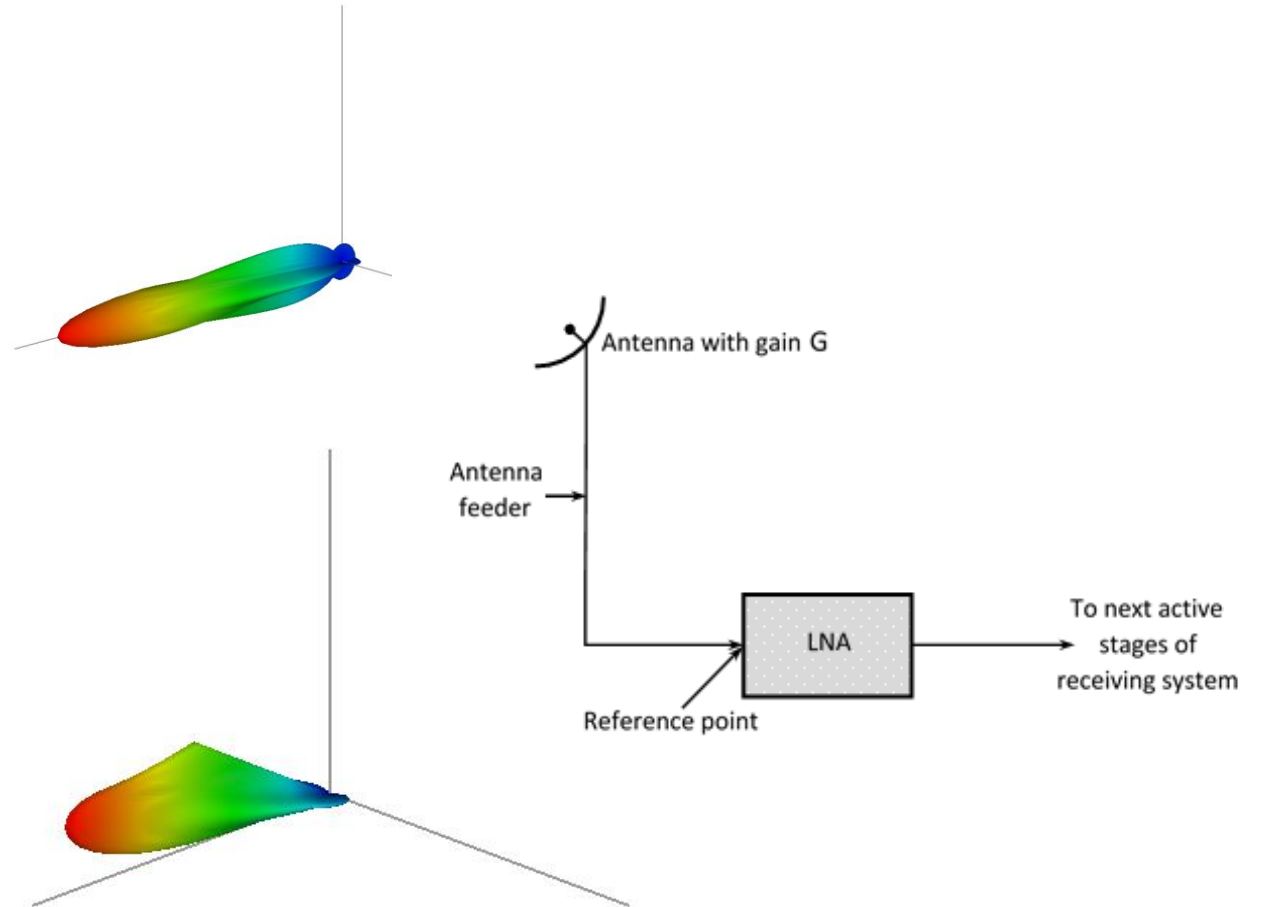
In Region 1, the frequency bands **1 427-1 452 MHz** and **1 492-1 518 MHz** are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-15)**. This identification does not preclude the use of these frequency bands by any other application of the services to which it is allocated and does not establish priority in the Radio Regulations. The use of IMT stations is subject to agreement obtained under No. **9.21** with respect to the aeronautical mobile service used for aeronautical telemetry in accordance with No. **5.342**.

- RR footnote No. 5.342 (WRC-15)

Additional allocation: in Armenia, Azerbaijan, Belarus, the Russian Federation, Uzbekistan, Kyrgyzstan and Ukraine, the frequency band 1 429-1 535 MHz is also allocated to the aeronautical mobile service on a primary basis, exclusively for the purposes of aeronautical telemetry within the national territory. As of 1 April 2007, the use of the frequency band **1 452-1 492 MHz** is subject to agreement between the administrations concerned.

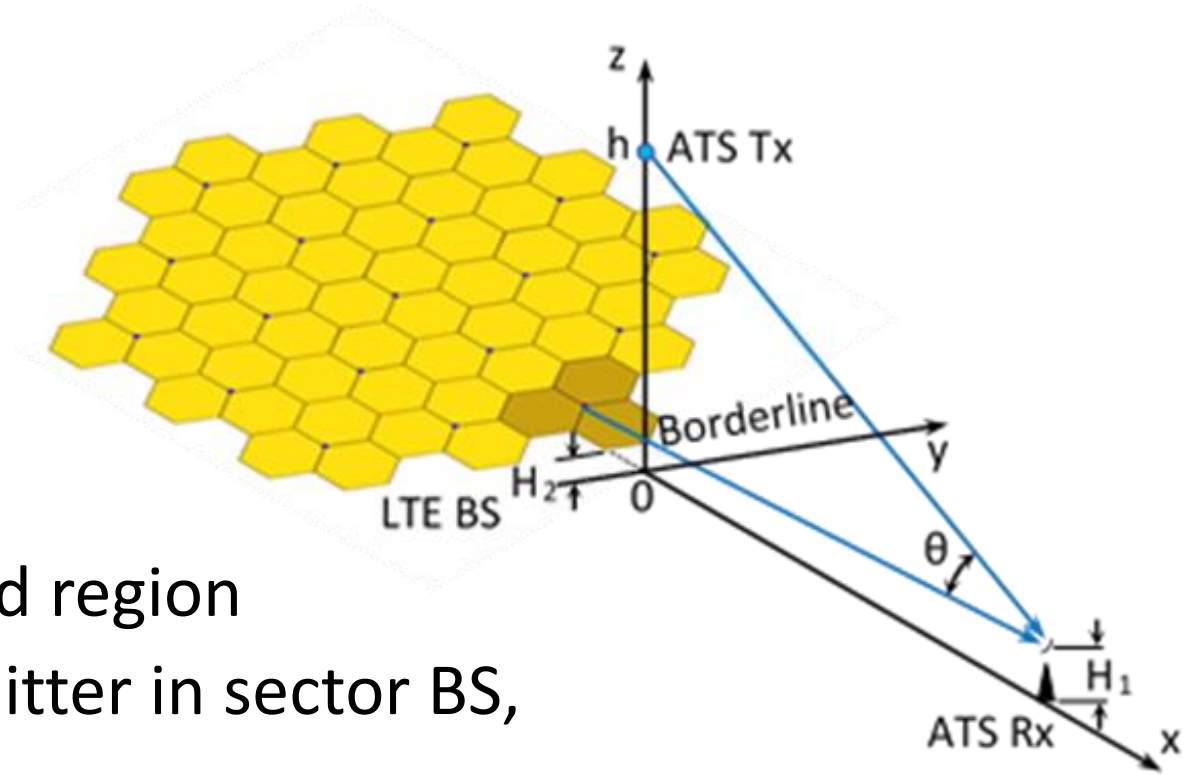
ATS antenna

- acc. to Rec. ITU-R M.1459
Tracking-type antenna system
antenna gain 29 dBi
- acc. to Rec. ITU-R M.1851
Radar-type antenna system
antenna gain 30 dBi



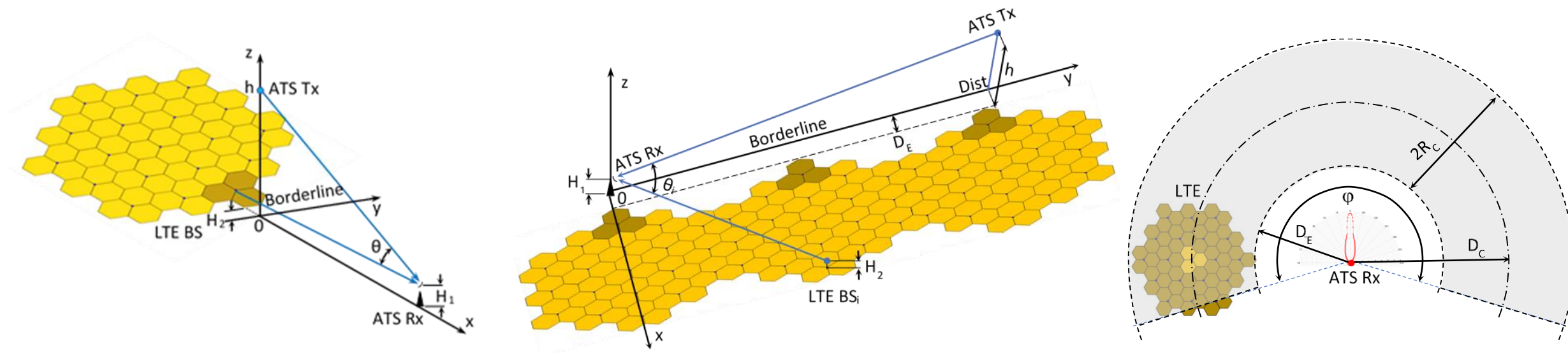
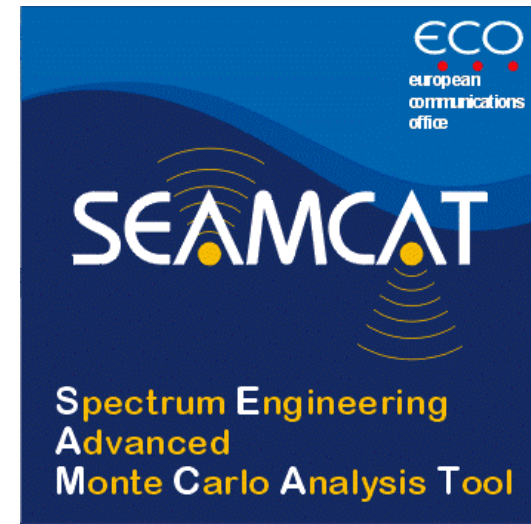
Interference analysis for different protection methods

- I/N
- $C/(I+N)$
- SEAMCAT
- Example of ATS in Kaliningrad region
- $\text{eirp}=61$ dBm of each transmitter in sector BS,
- $H = 30\text{m}$, down tilt $=-3\text{degree}$.
- $\Delta f = 5$ MHz.

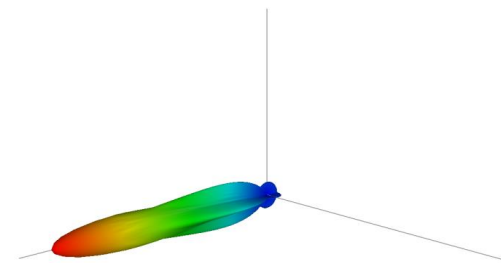
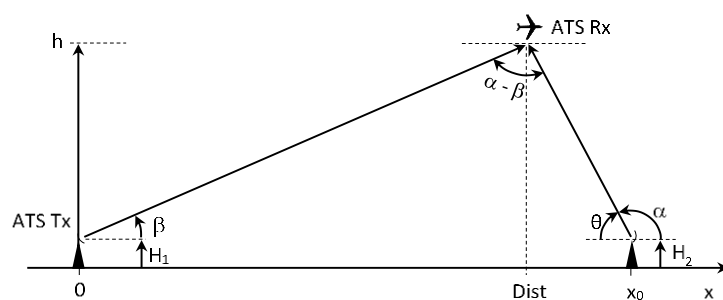
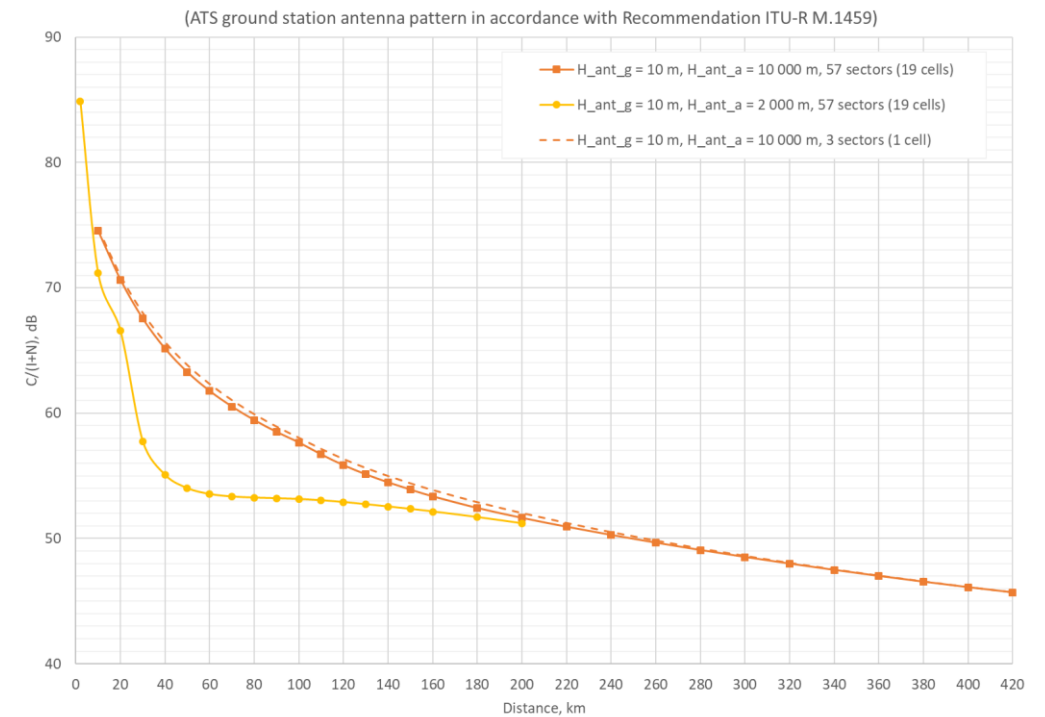
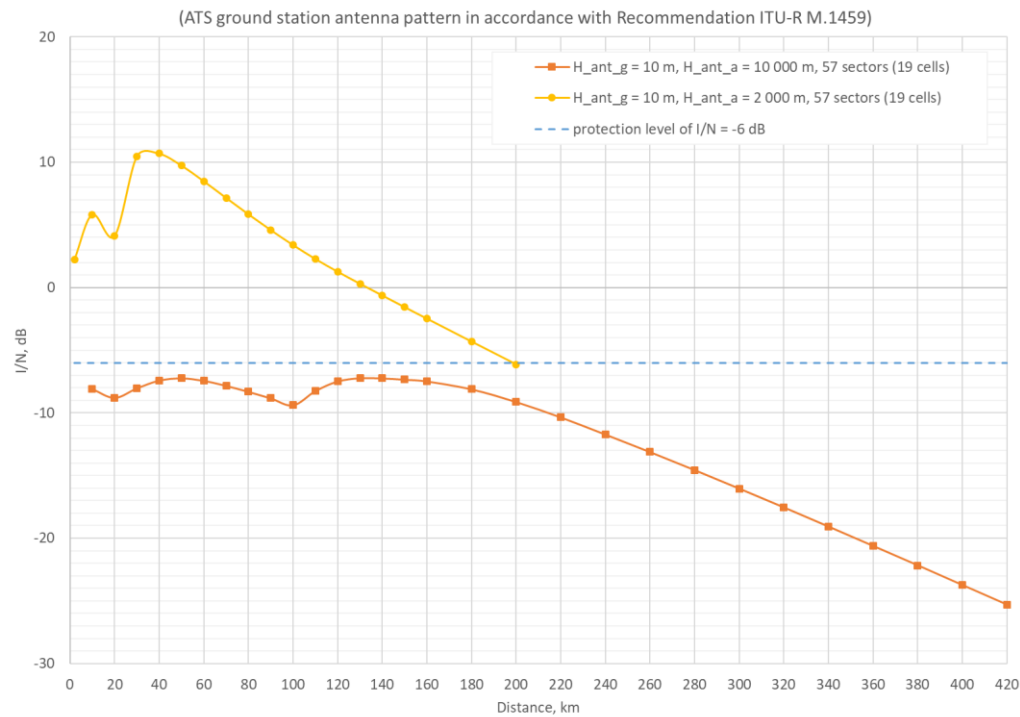


SEAMCAT, interference to ground ATS

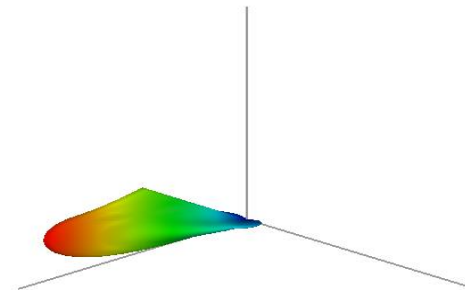
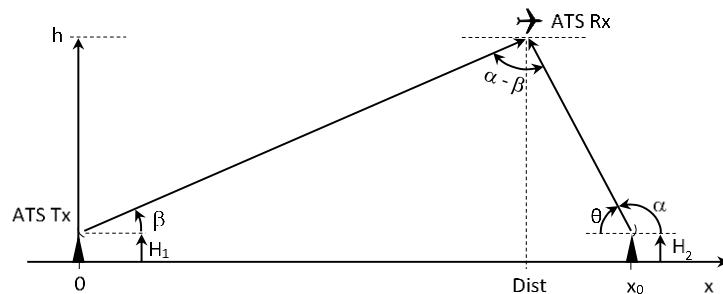
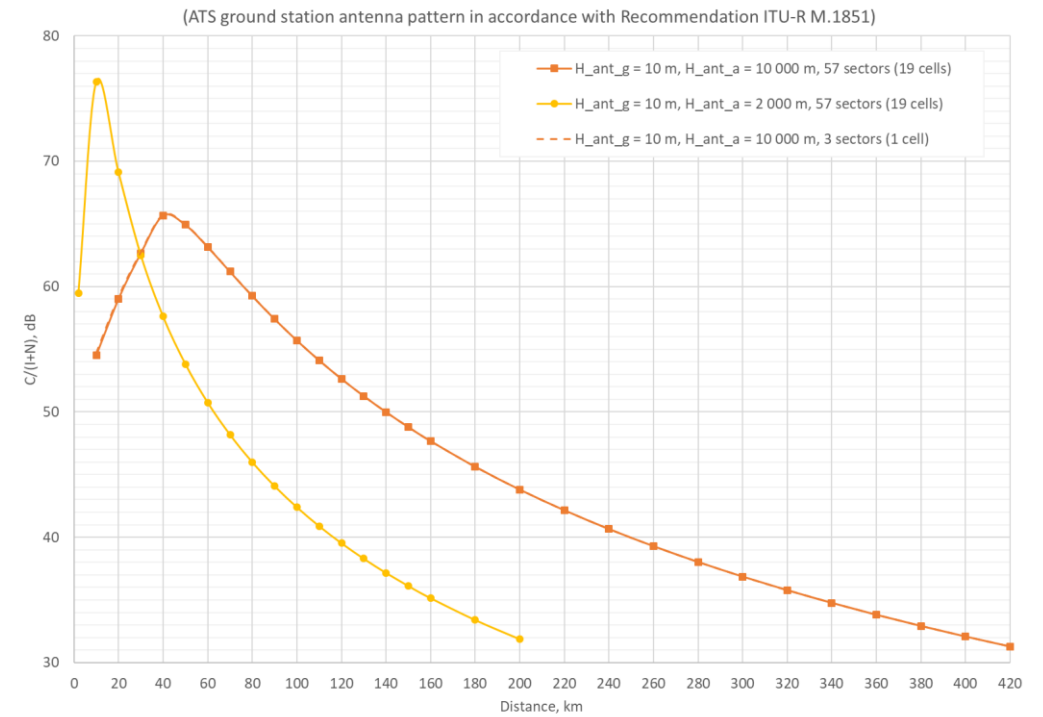
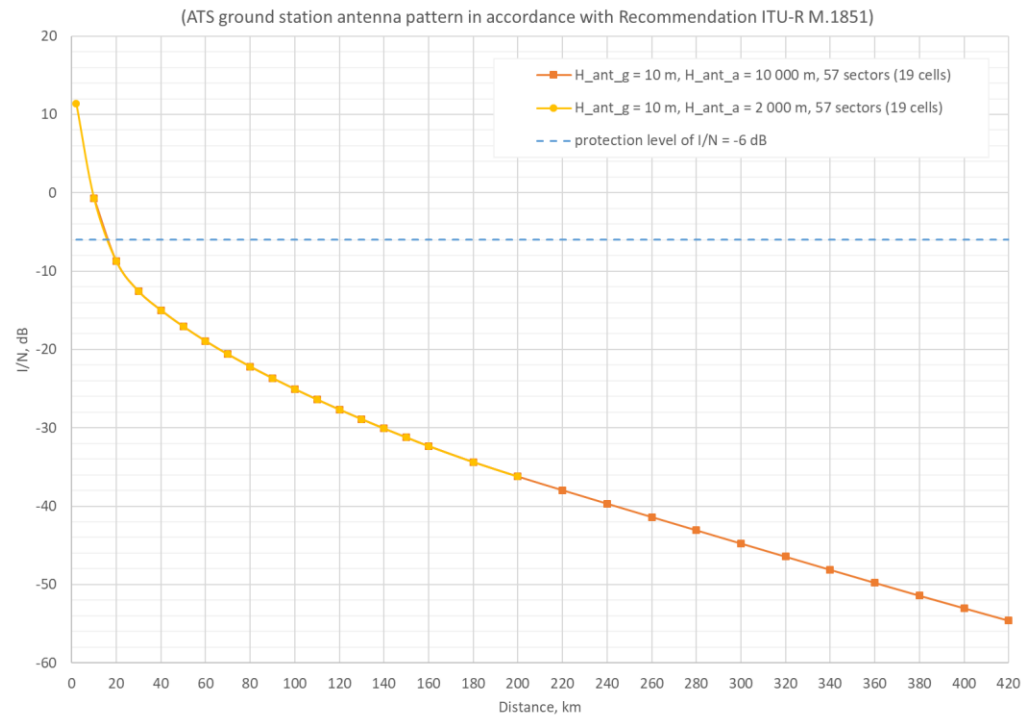
- Network cluster case (scenario 1 & 2)
- Surrounding network (ring) case
- Example of existing network



SEAMCAT Network cluster case (scenario 1)

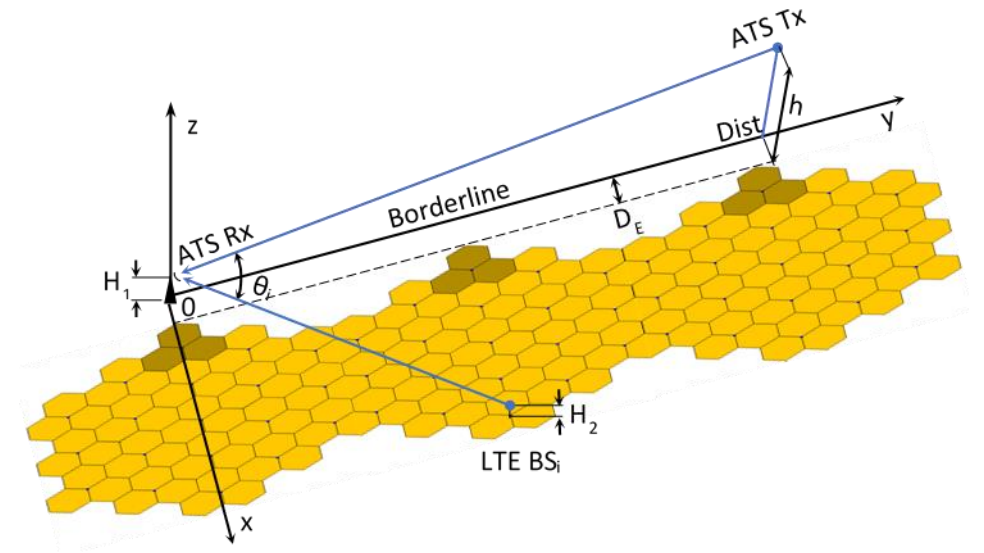


SEAMCAT Network cluster case (scenario 1)



SEAMCAT simulation results (scenario 2)

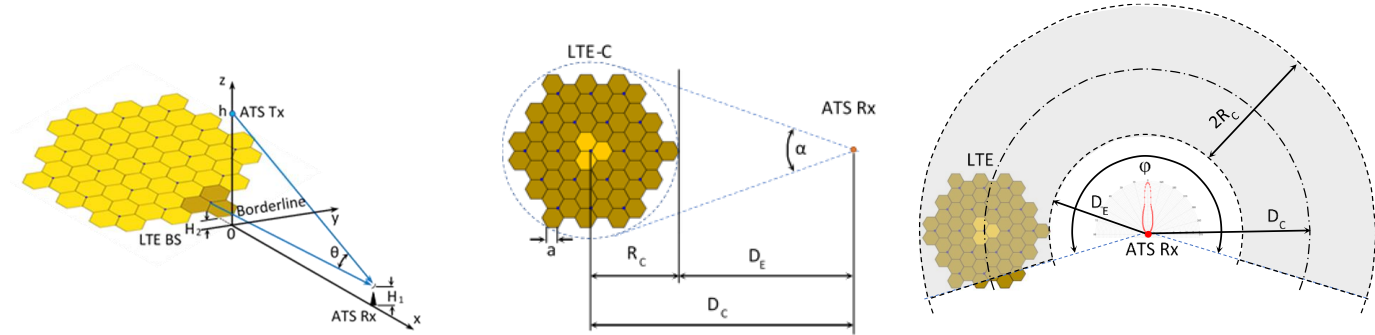
iRSS, dBm	Antenna pattern		
	M.1459	M.1851_cos	M.1851_sinc
iRSS1	-105.64 dBm	-118.13 dBm	-98.13 dBm
iRSS2	-114.71 dBm	-138.18 dBm	-118.17 dBm
iRSS3	-117.08 dBm	-154.31 dBm	-135.02 dBm
iRSS4	-120.79 dBm	-158.74 dBm	-142.79 dBm
iRSS5	-123.23 dBm	-161.17 dBm	-148.34 dBm
iRSS6	-126.22 dBm	-161.42 dBm	-153.10 dBm
iRSS total	-104.66 dBm	-118.09 dBm	-98.09 dBm



SEAMCAT Surrounding network (ring) case

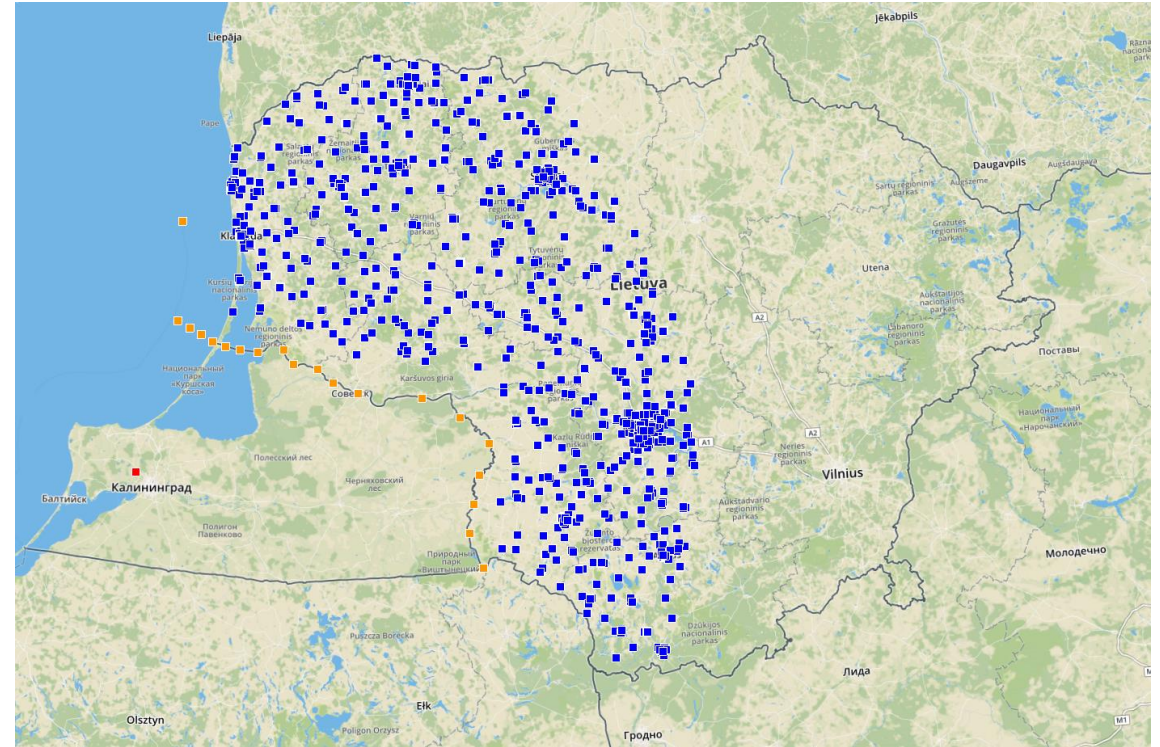
ATS type	h, m	D _E , km	iRSS _{clust_max} , dBm	iRSS _{clust_av} , dBm	iRSS _{ring} , dBm	Diff ₂ , dB	iRSS _{front} , dBm	iRSS _{back} , dBm	Diff ₁ , dB
tracking-type antenna system (M.1459)	2000	10	-91.98	-96.13	-94.62	1.51	-95.69	-101.21	5.52
		40	-86.29	-91.05	-90.88	0.17	-90.95	-108.62	17.67
		80	-91.13	-93.94	-93.77	0.17	-93.81	-113.76	19.95
	10000	10	-105.07	-107.47	-100.02	7.45	-109.25	-100.58	-8.67
		40	-104.39	-106.13	-103.46	2.67	-104.91	-108.93	4.02
		80	-105.29	-107.04	-105.18	1.86	-105.82	-113.78	7.96
radar-type antenna system (M.1851_cos)	-	10	-97.75	-107.95	-106.60	1.35	-108.00	-112.22	4.22
		40	-112.11	-117.95	-116.39	1.56	-117.84	-121.88	4.04
		80	-119.38	-123.36	-121.58	1.78	-123.05	-127.00	3.95
radar-type antenna system (M.1851_sinc)	-	10	-97.72	-107.29	-100.22	7.07	-108.37	-100.94	-7.43
		40	-111.97	-117.44	-108.42	9.02	-116.62	-109.13	-7.49
		80	-119.16	-122.97	-112.01	10.96	-120.24	-112.72	-7.52.

iRSS_{clust_max} is maximum interference level from clustered network, iRSS_{clust_av} is average interference level from clustered network, iRSS_{ring} is overall interference level from ring type network, Diff₂ is the difference between iRSS_{clust_av} and iRSS_{ring}, iRSS_{front} is received interference level for main lobe and side lobes, iRSS_{back} is received interference level for the rest of antenna pattern. Diff₁ is the difference between interference level of iRSS_{front} and iRSS_{back}.

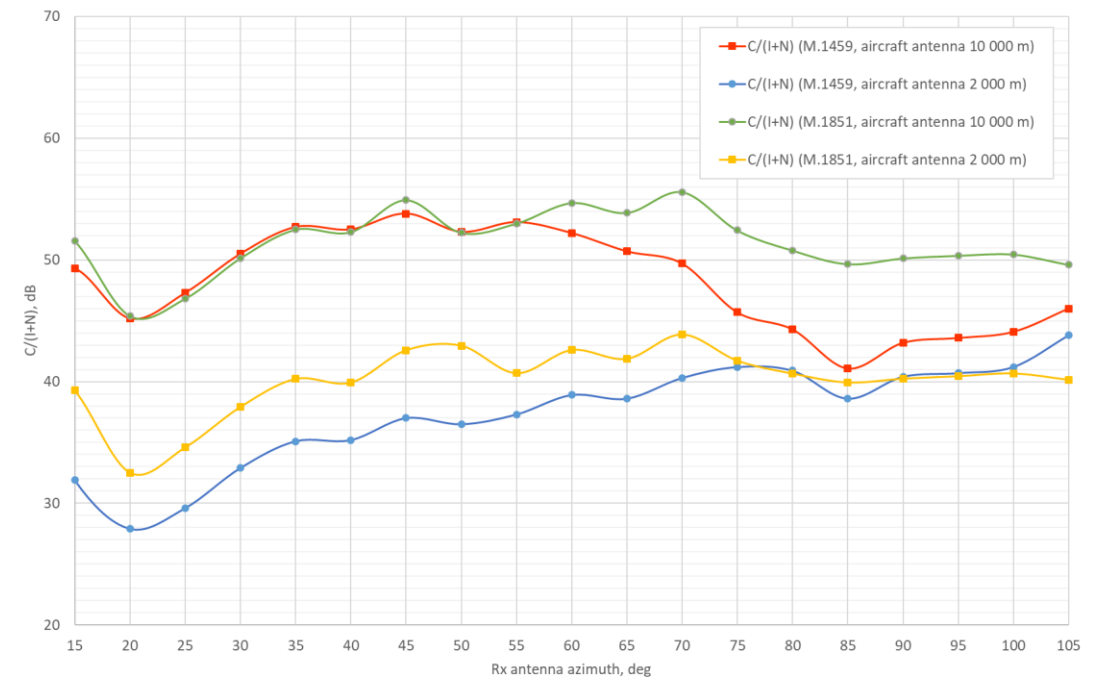
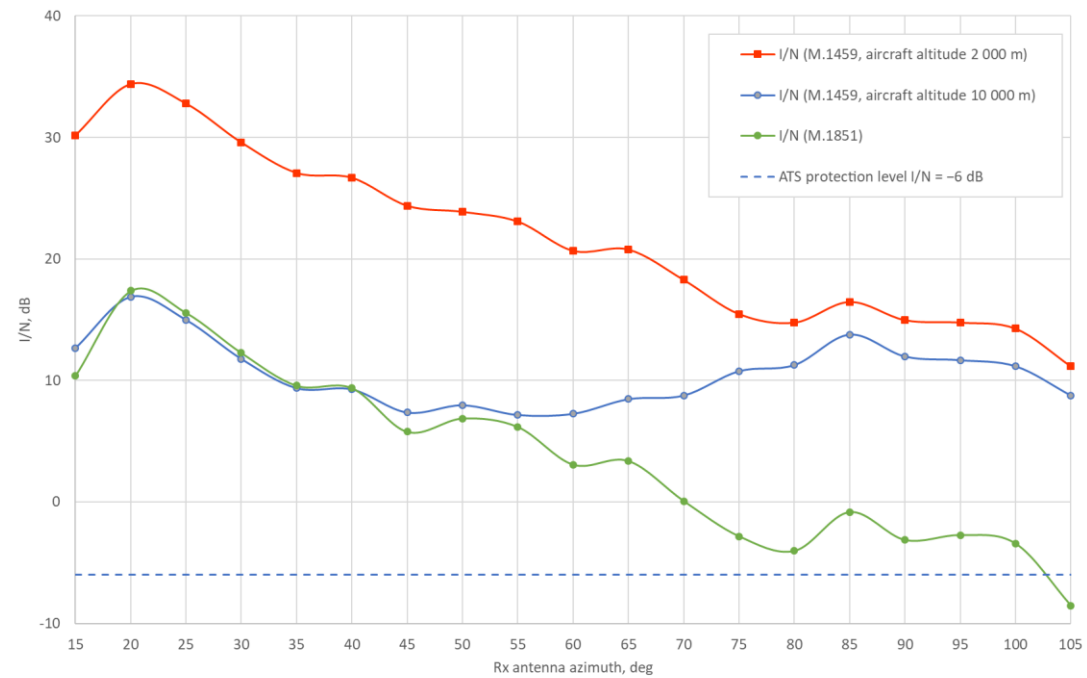


Example of ATS in Kaliningrad region

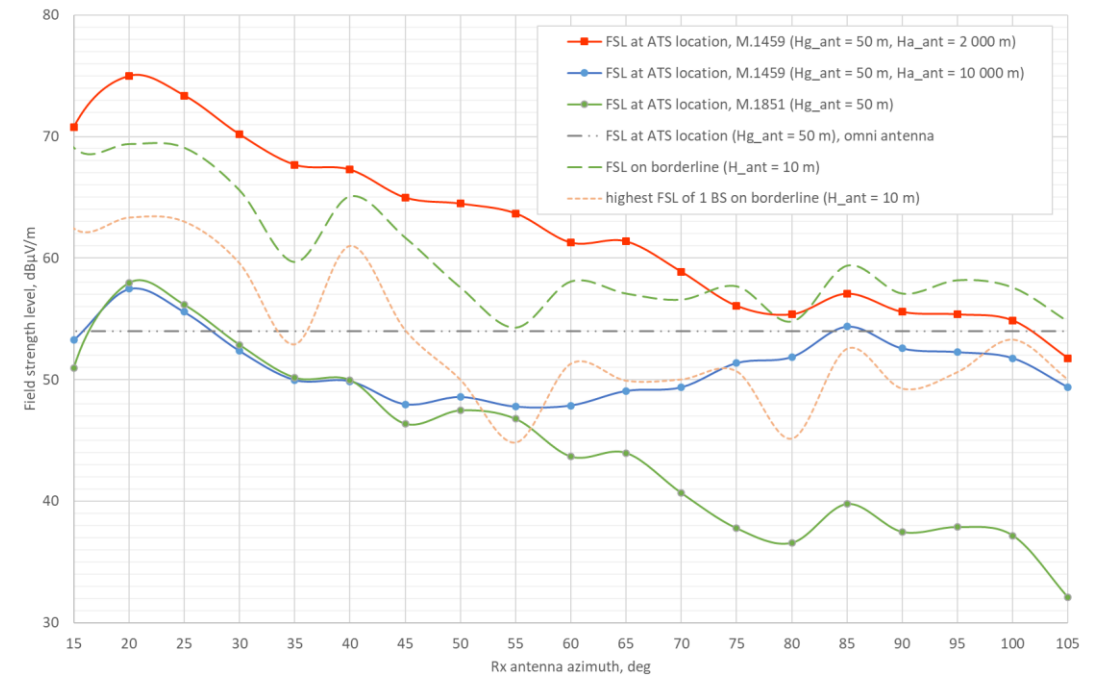
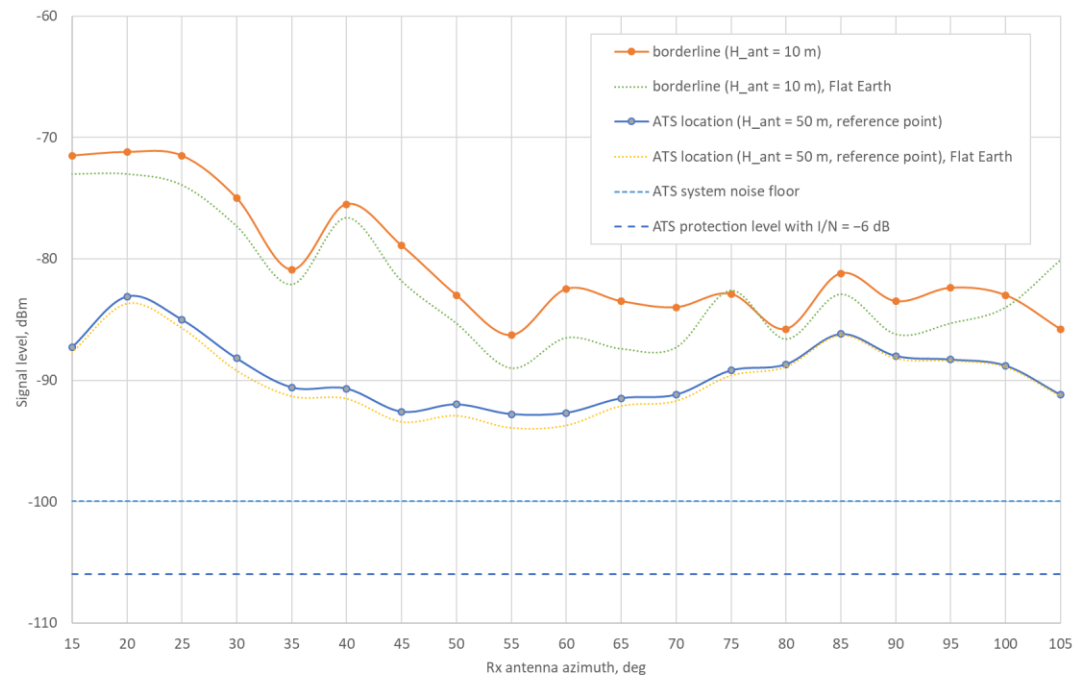
- Interference to ATS ground station
 - 50 m antenna height (BRIFIC)



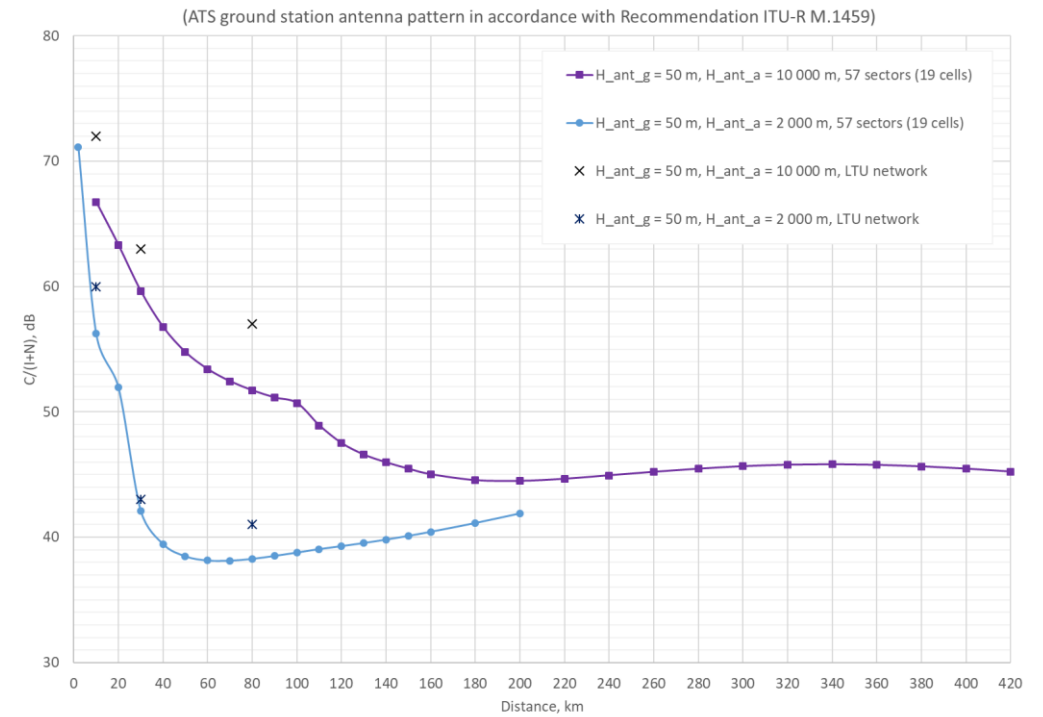
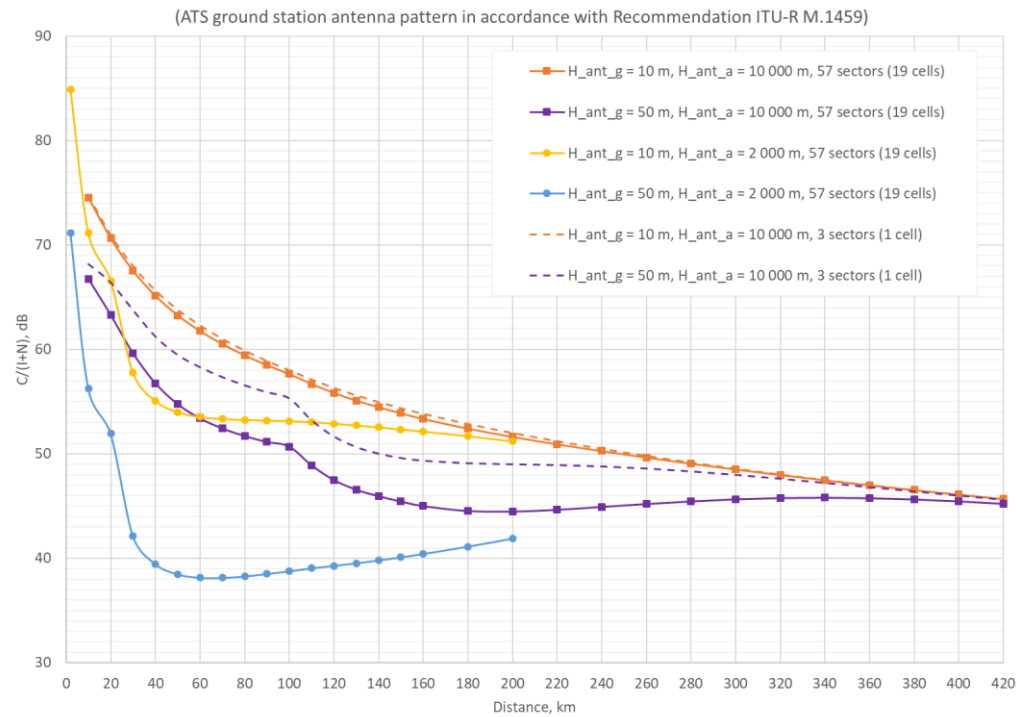
I/N & C/(I+N)



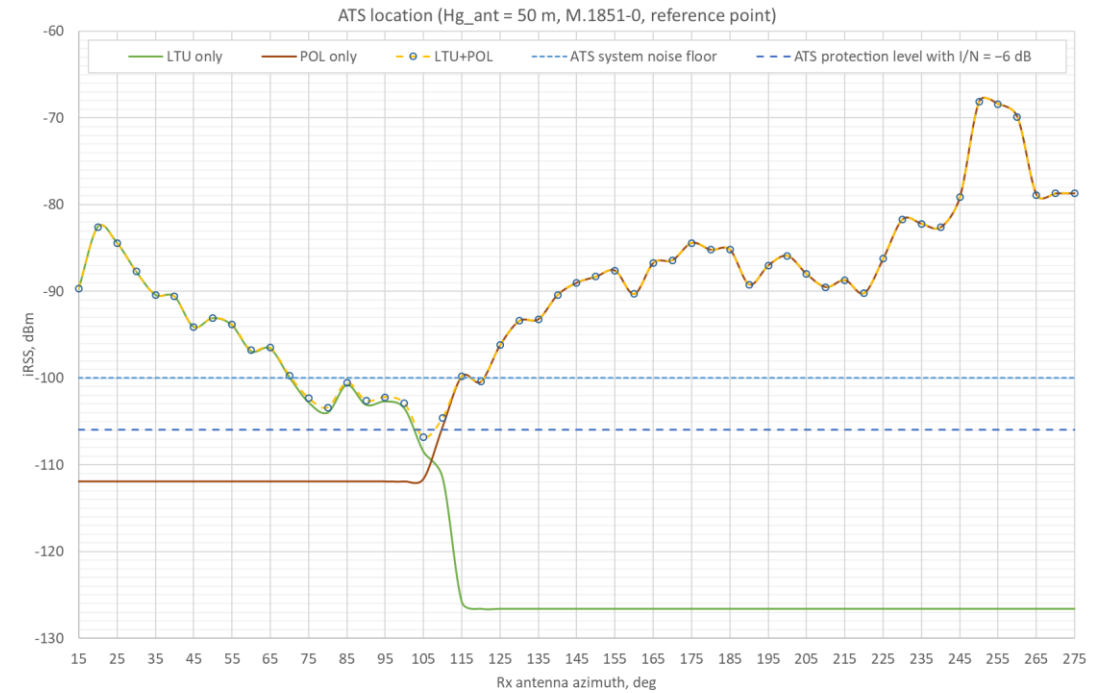
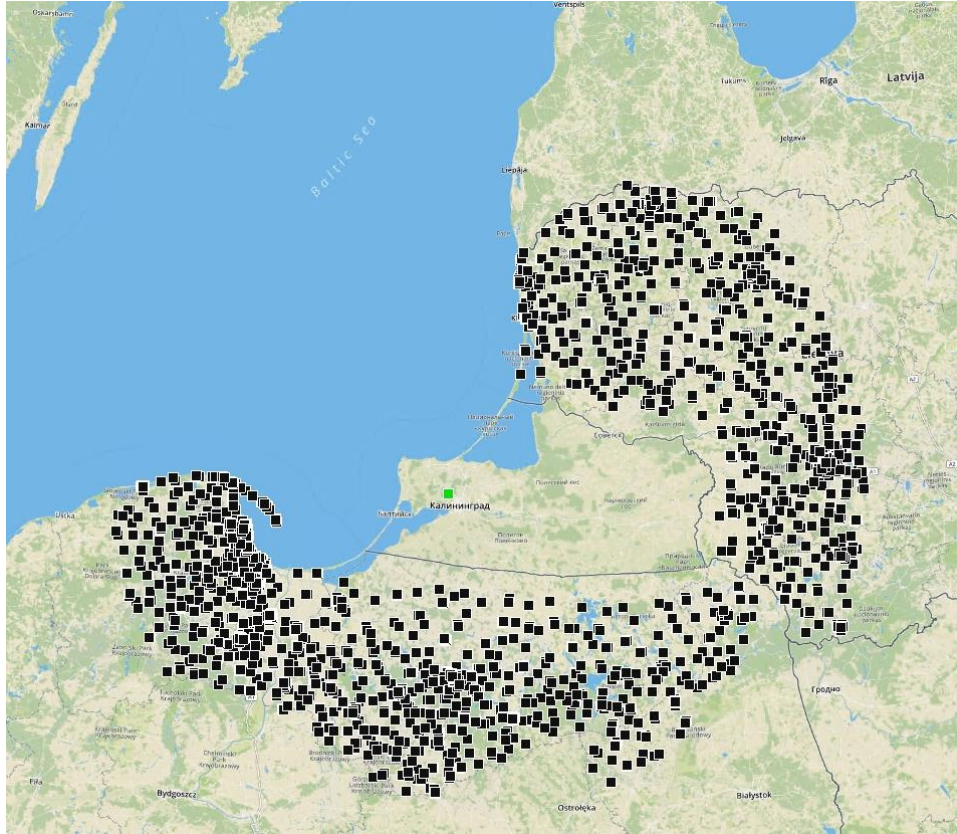
Field strength level



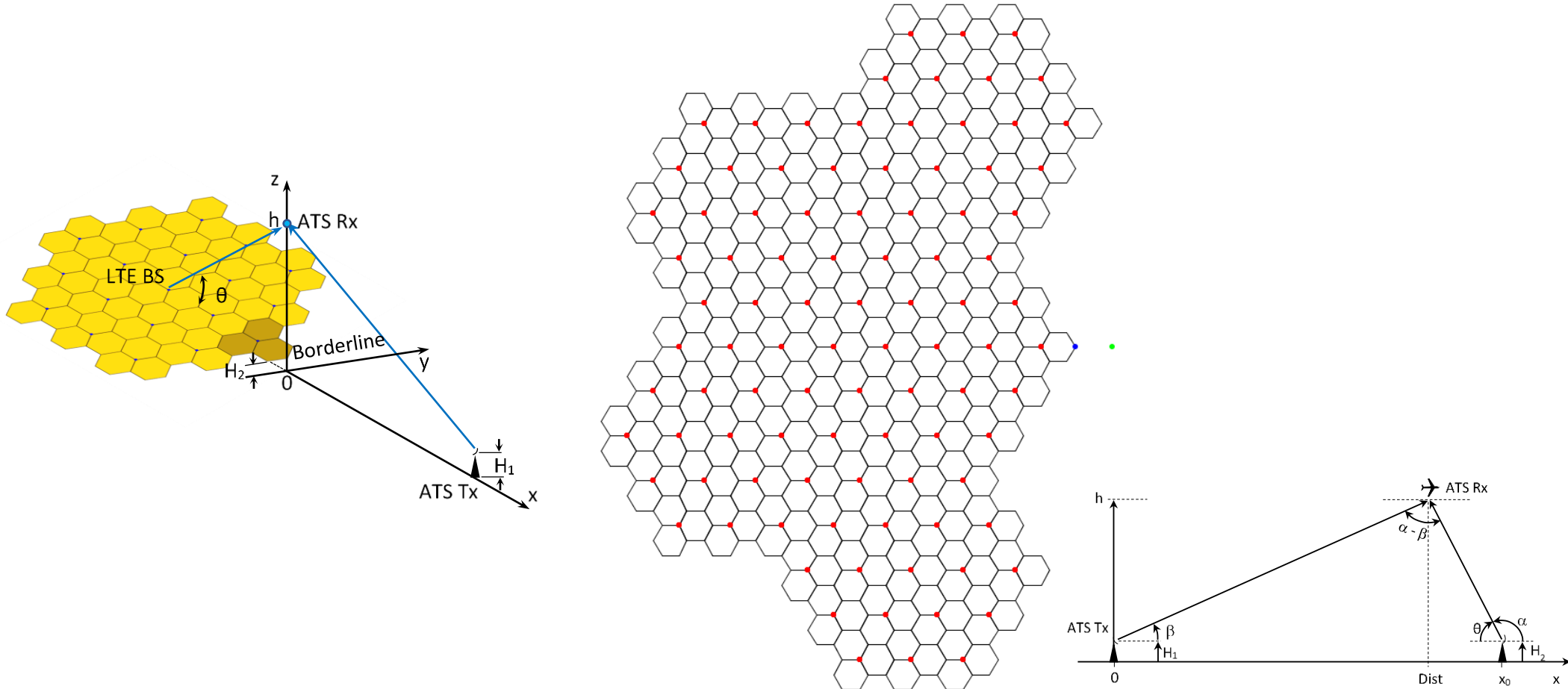
Comparison with SEAMCAT



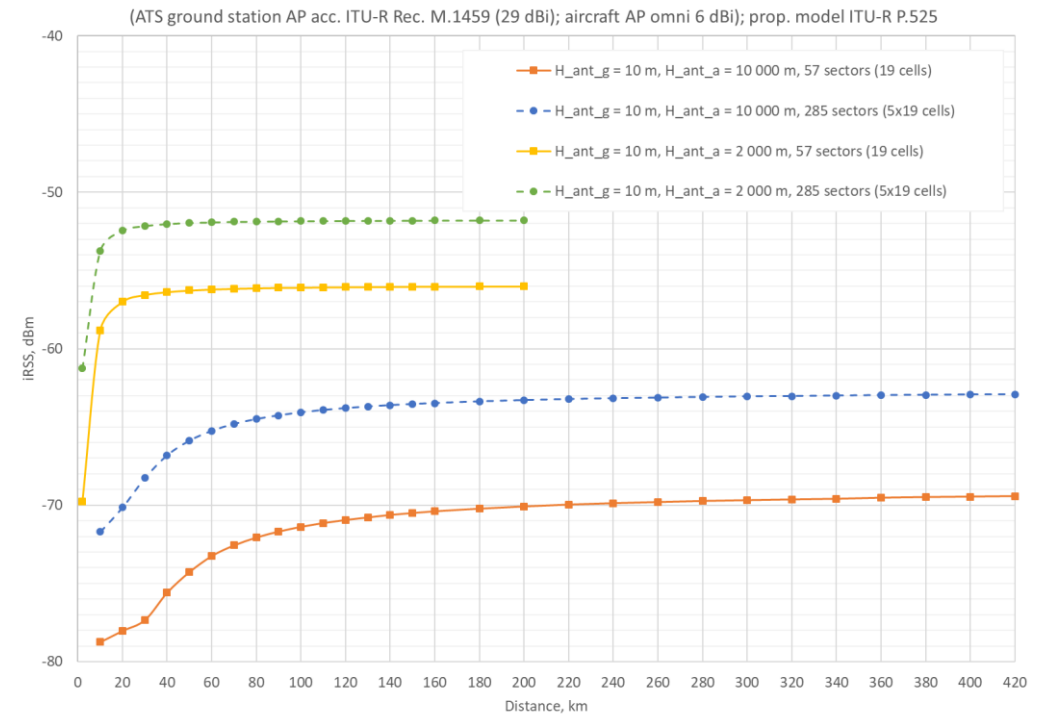
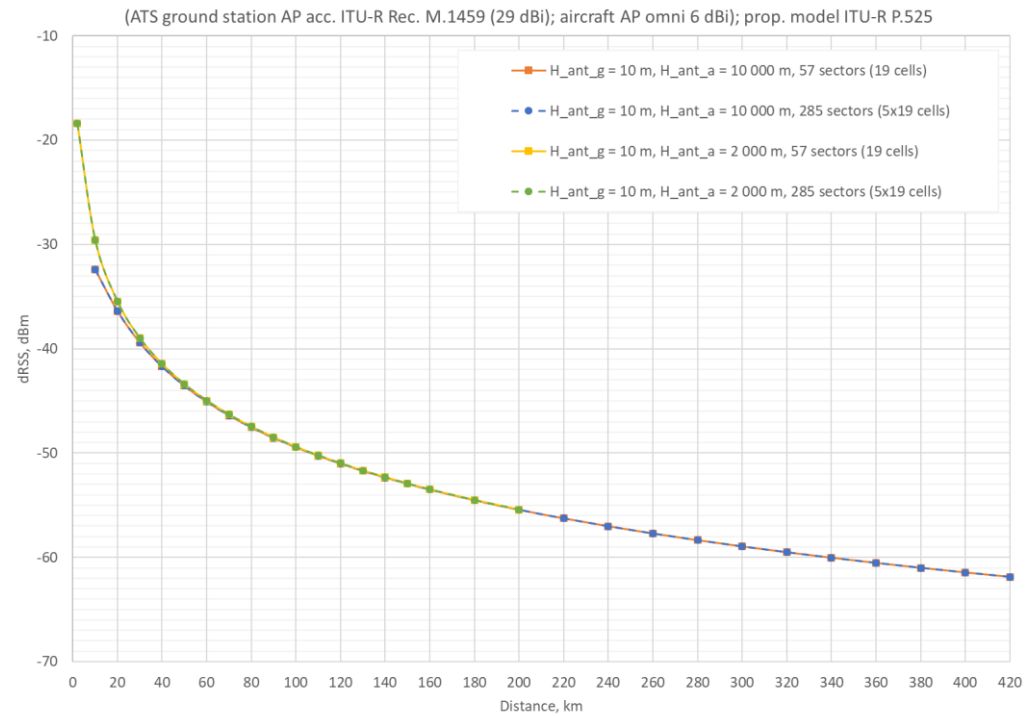
Multicountry interference (LTU & POL)



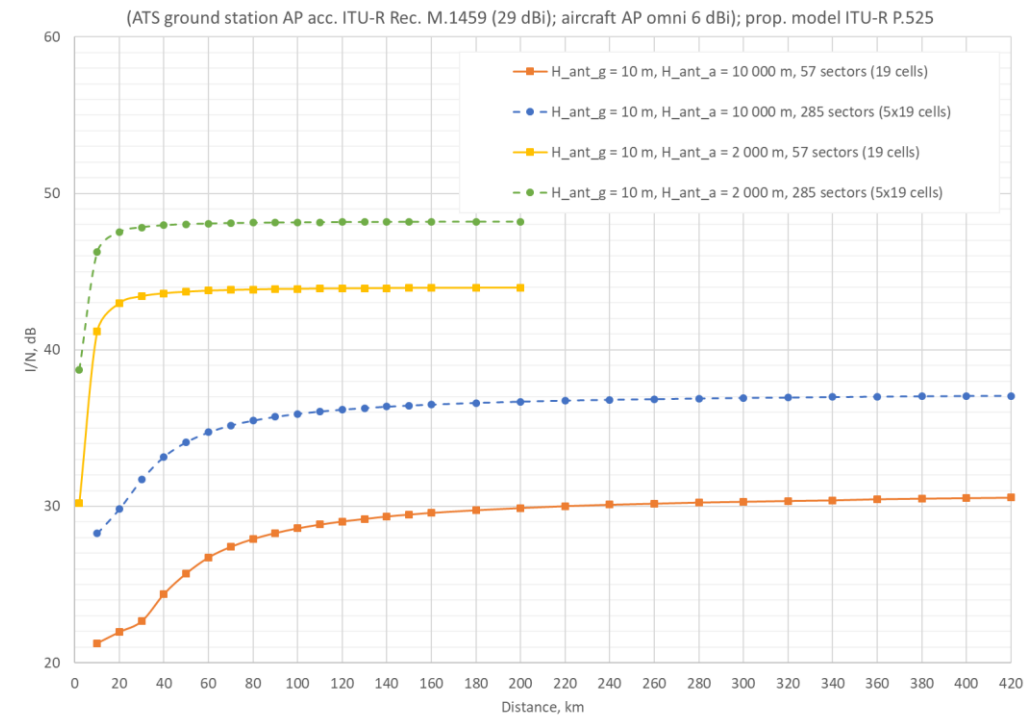
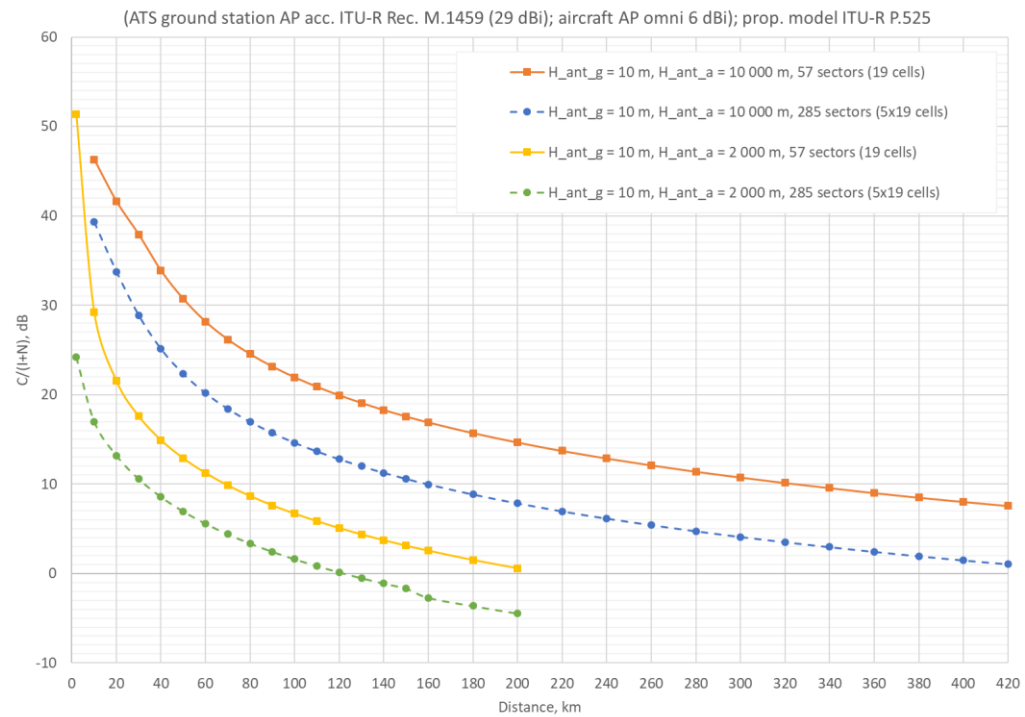
SEAMCAT, interference to airborne



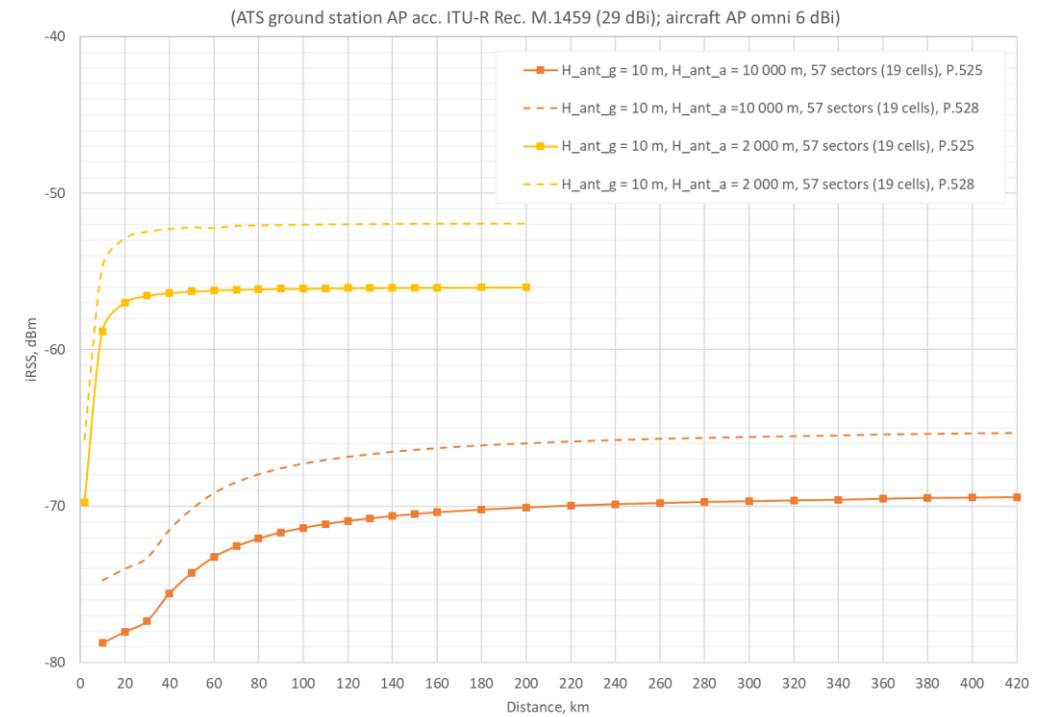
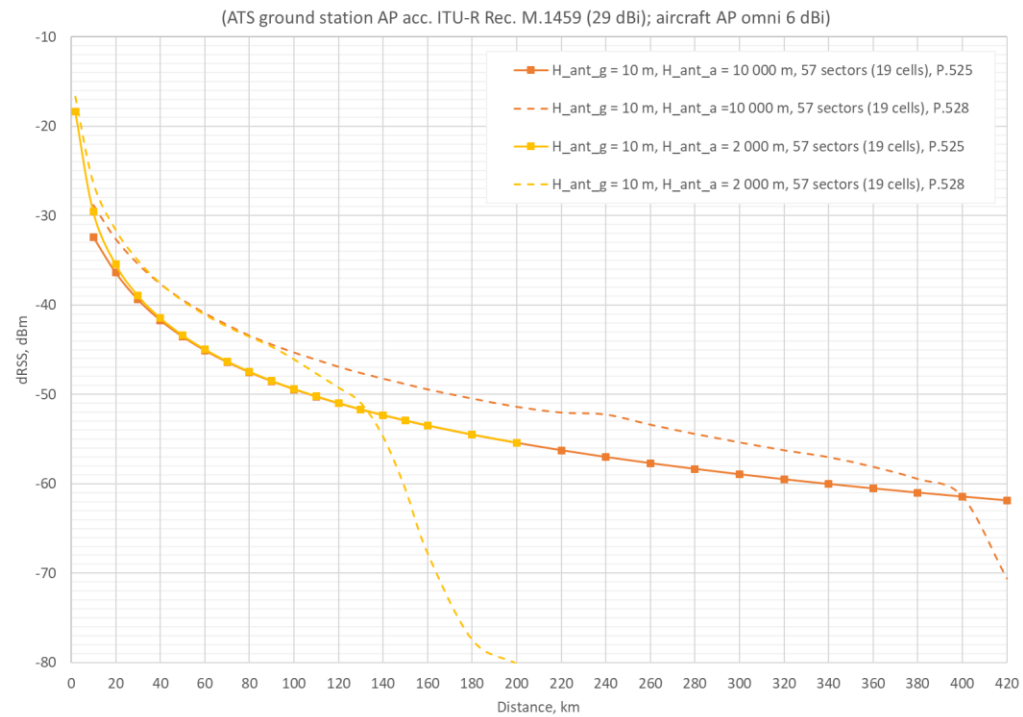
SEAMCAT Network cluster case (1 & 5 cluster)



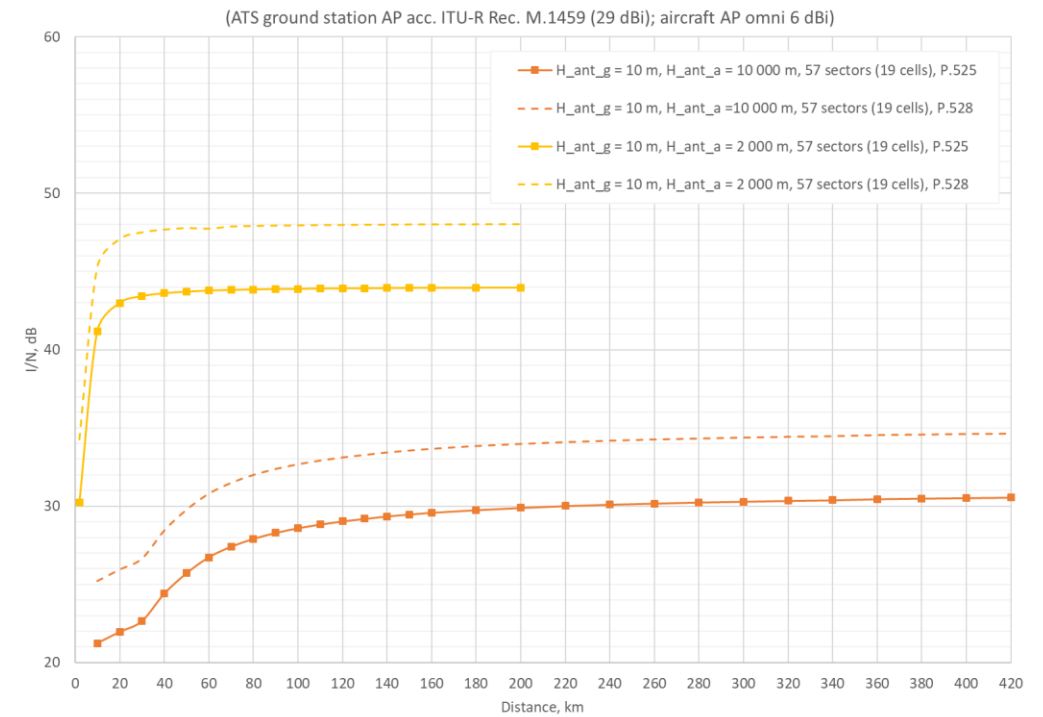
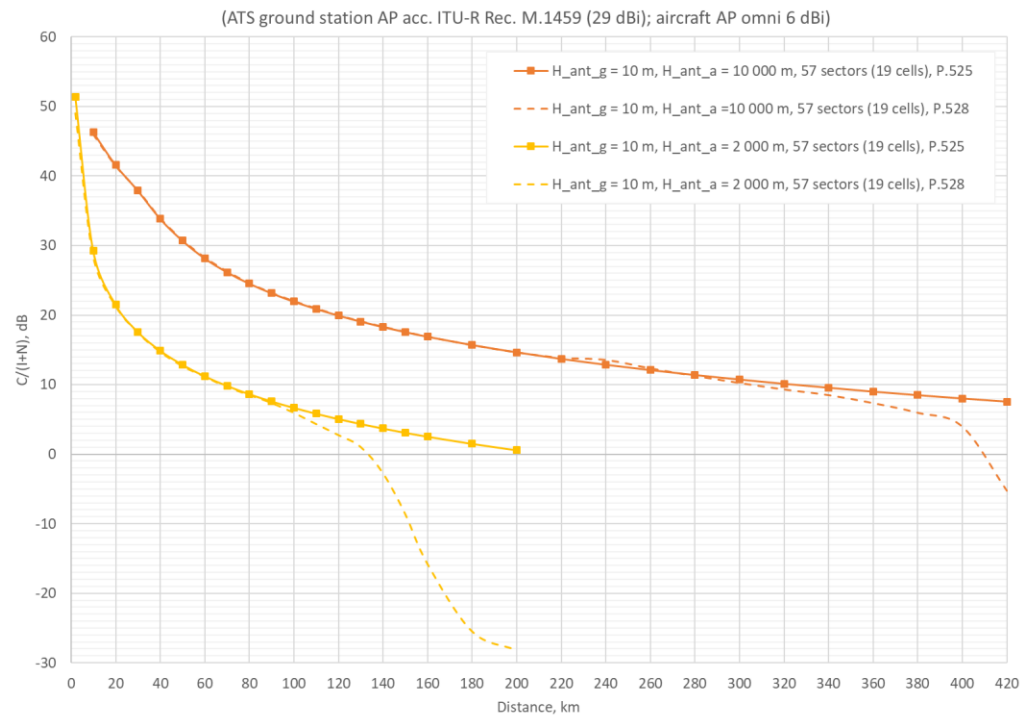
I/N & C(I+N)



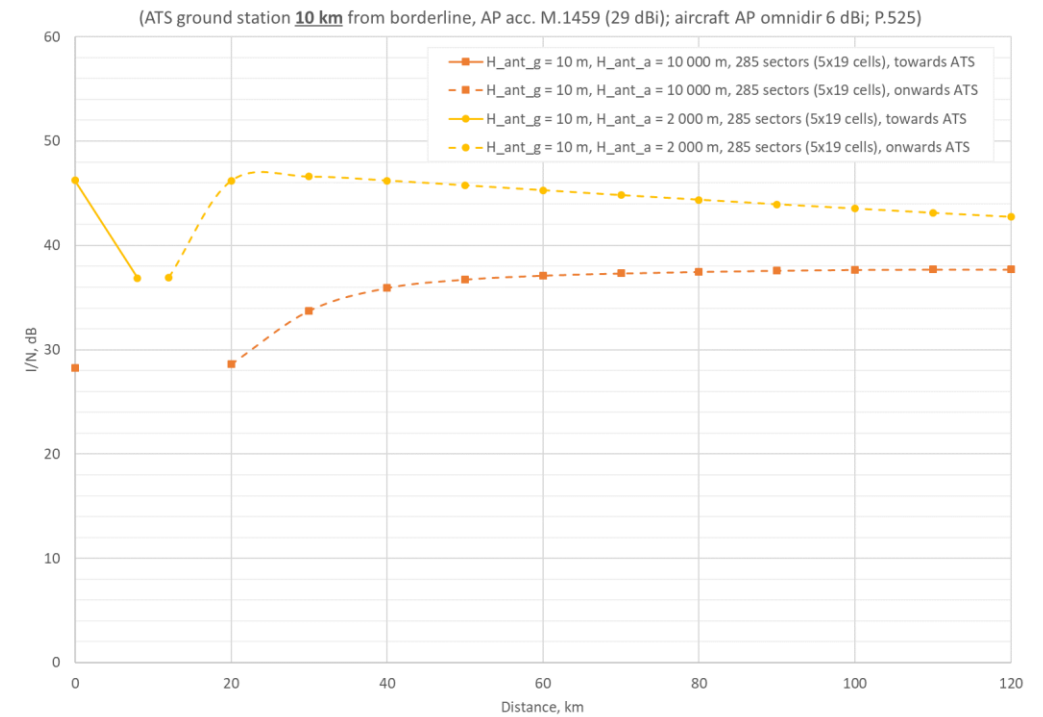
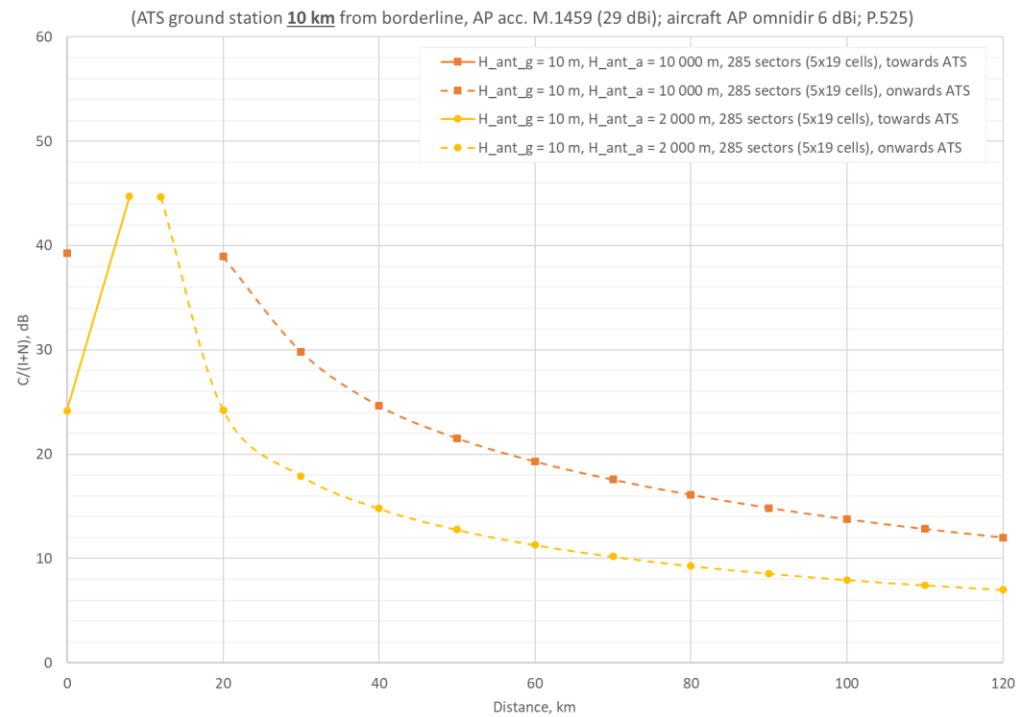
Propagation models: P.525 vs. P.528



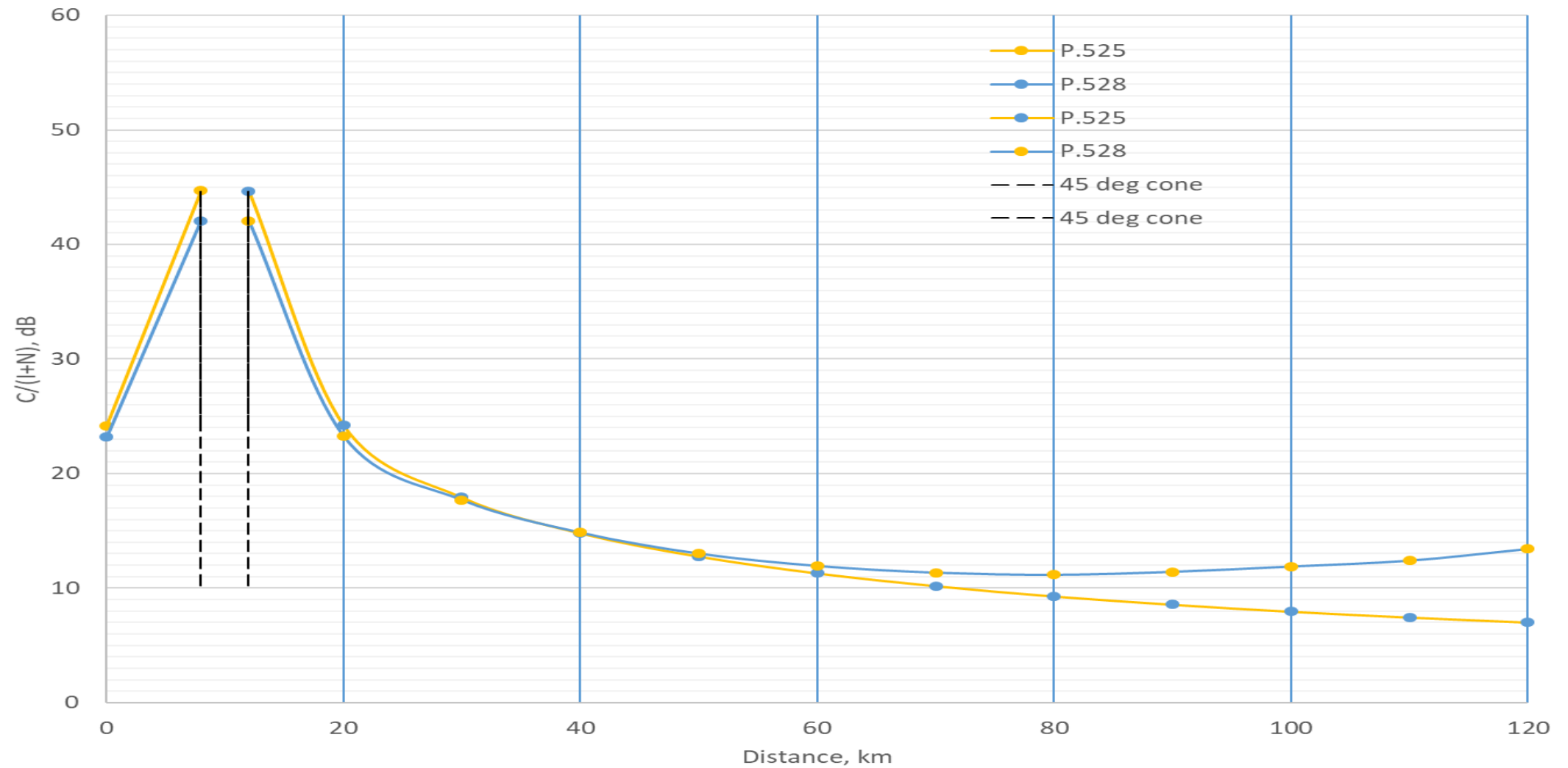
Propagation models: P.525 vs. P.528



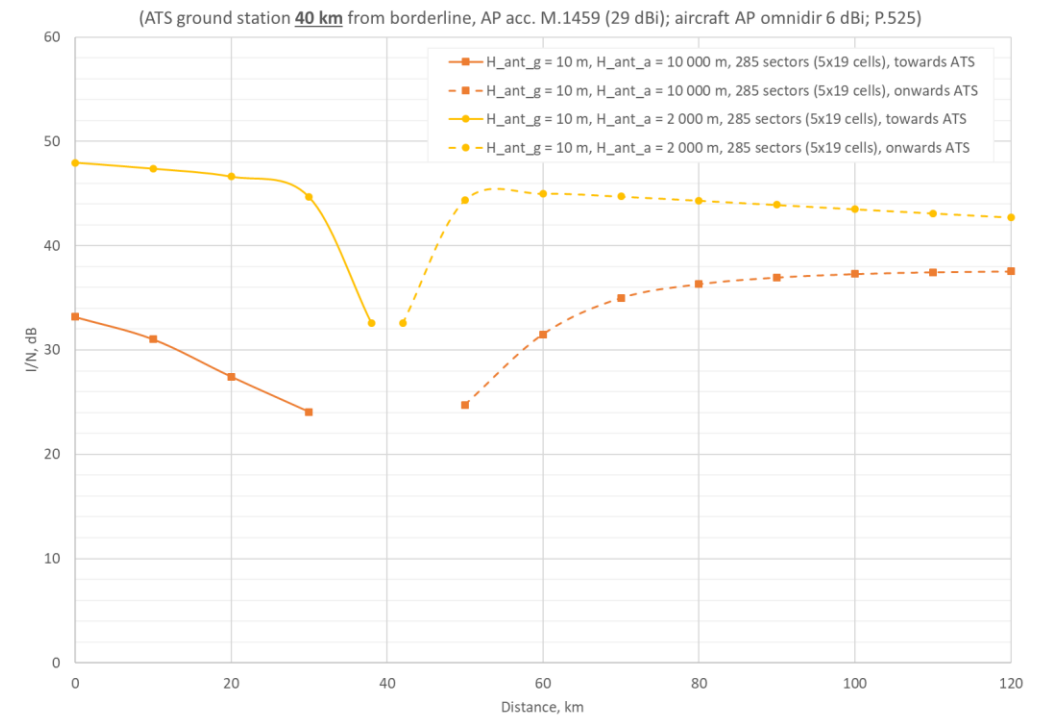
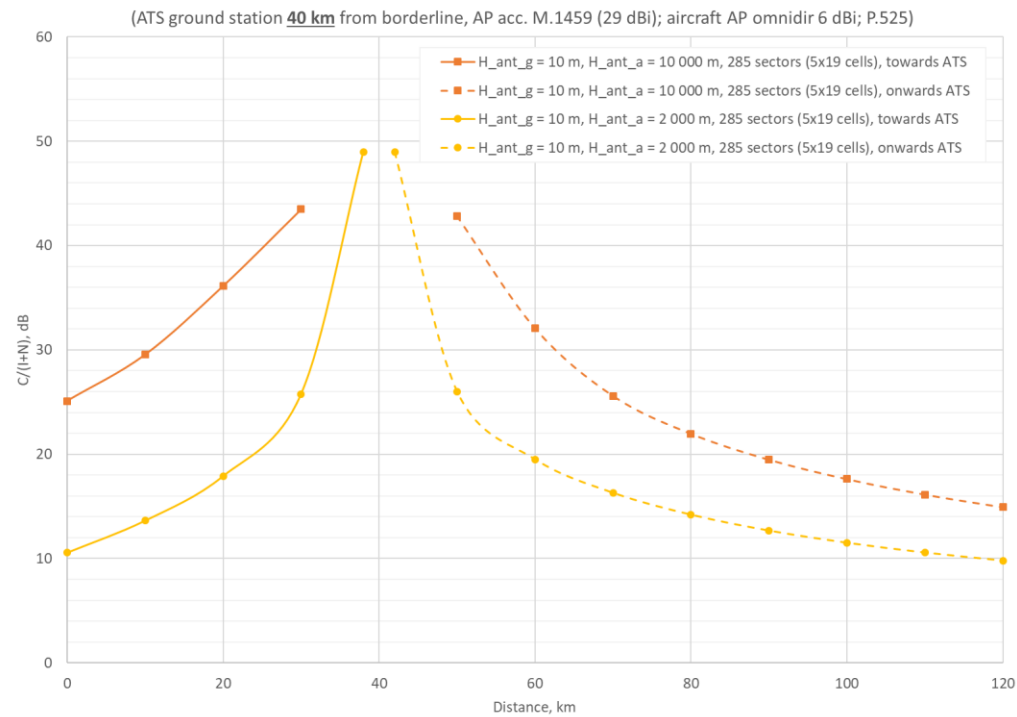
I/N & C(I+N), ATS at 10 km from borderline, 5 clusters



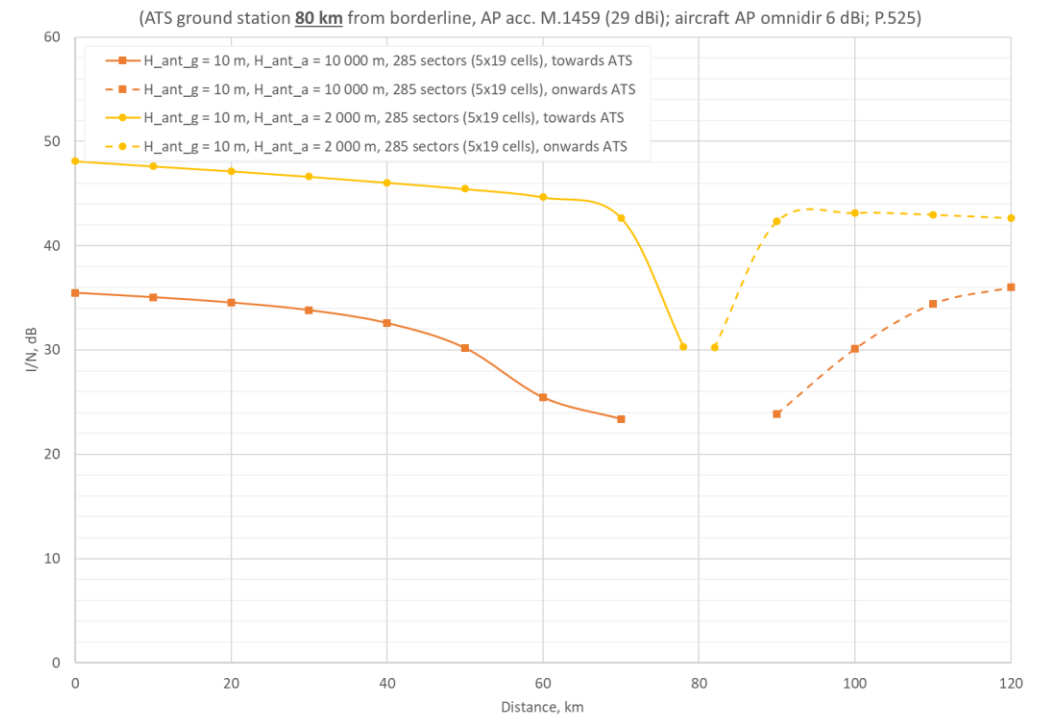
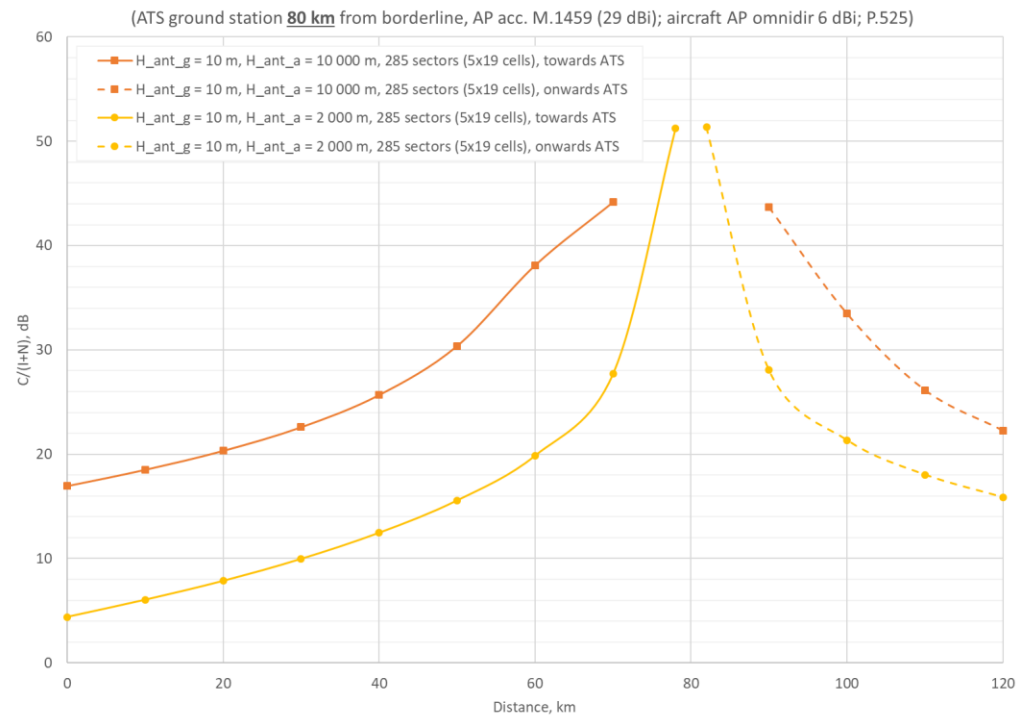
I/N & C(I+N), ATS at 10 km from borderline, 5 clusters



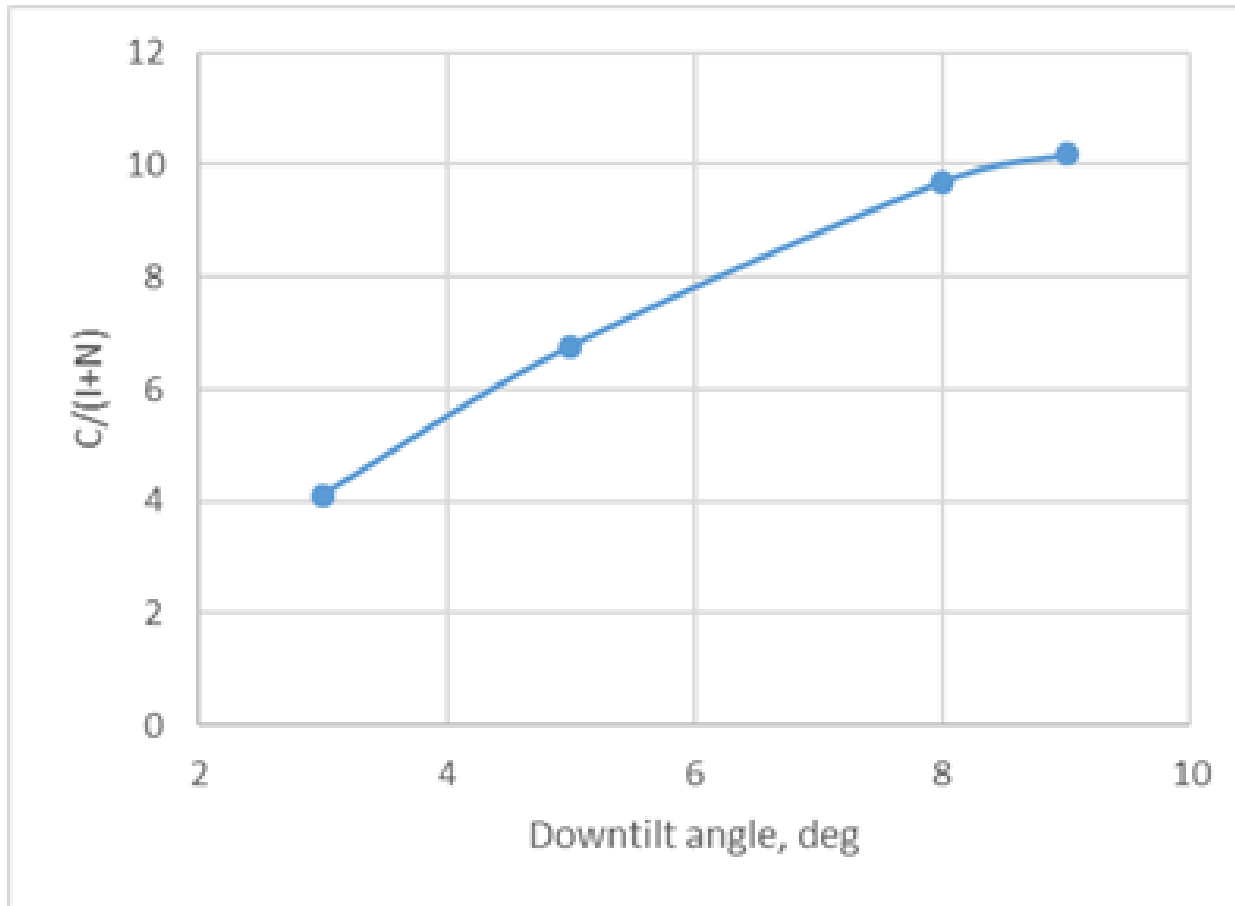
I/N & C(I+N), ATS at 40 km from borderline, 5 clusters



I/N & C(I+N), ATS at 80 km from borderline, 5 clusters

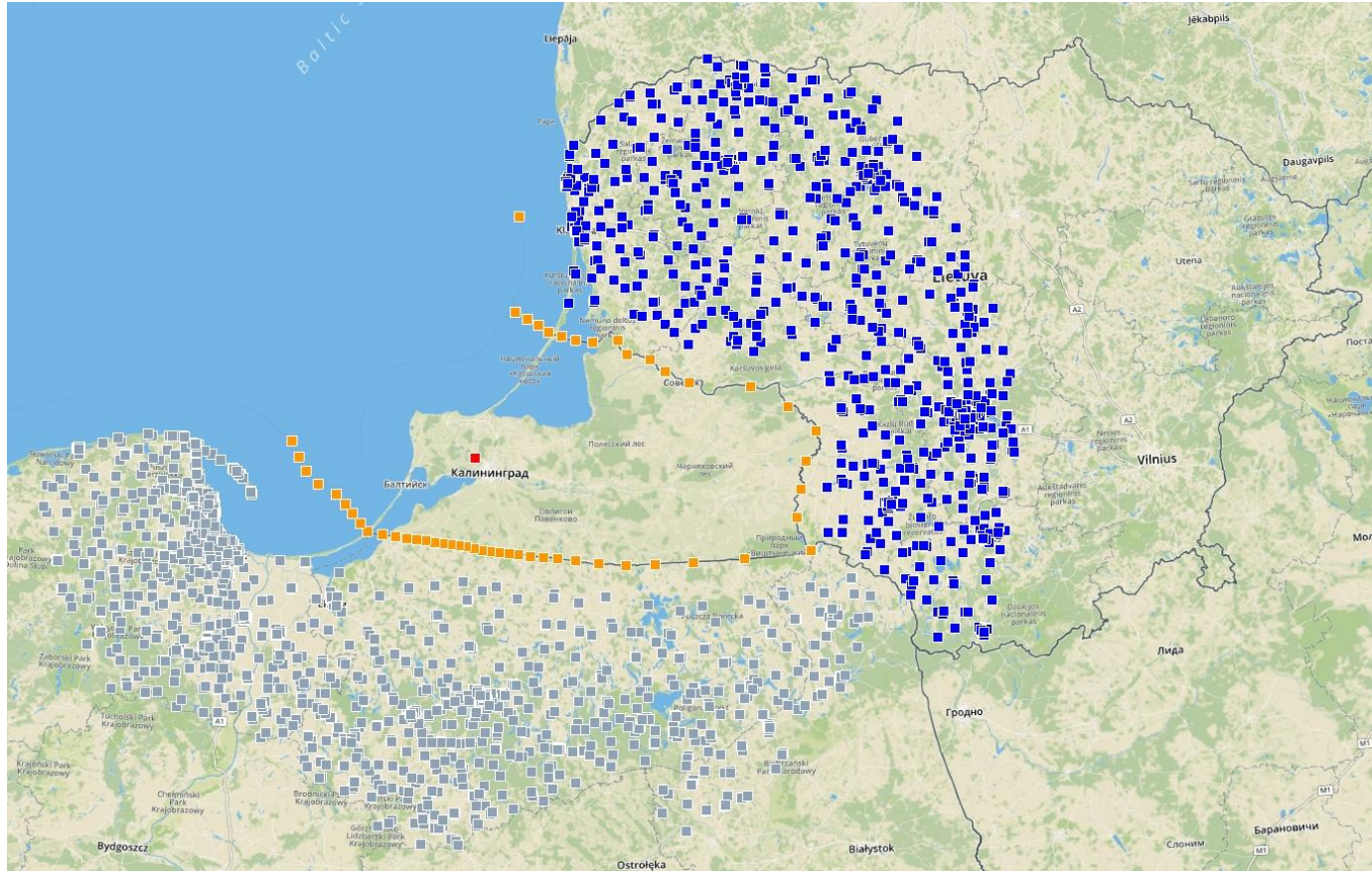


I/N & C(I+N), ATS at 80 km from borderline,
5 clusters

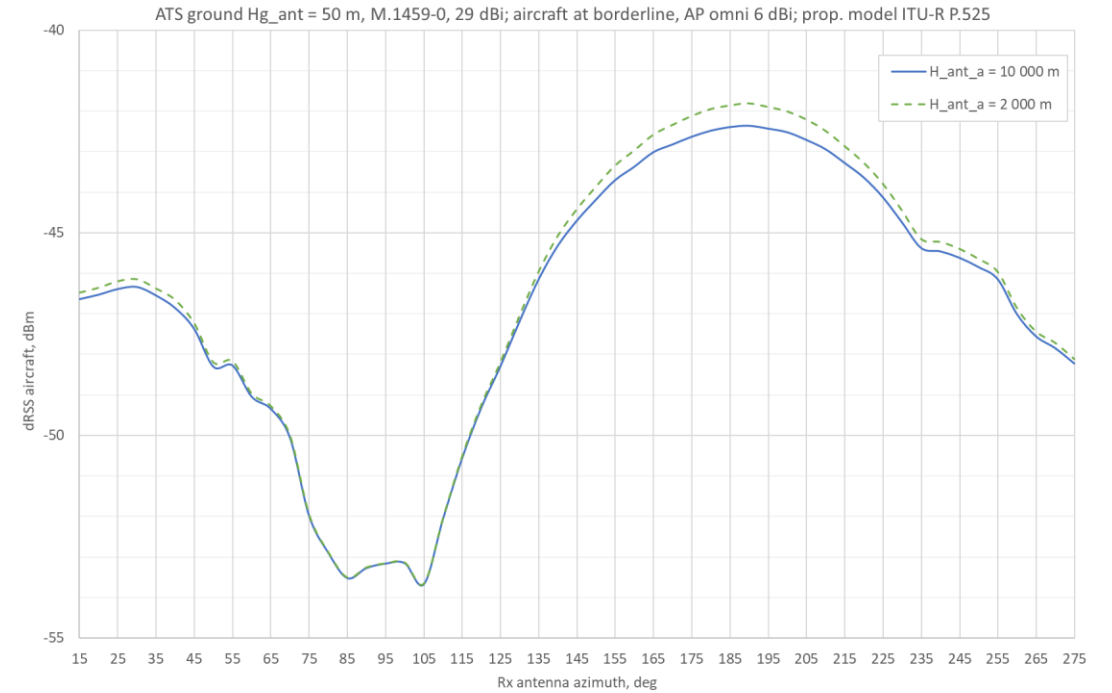
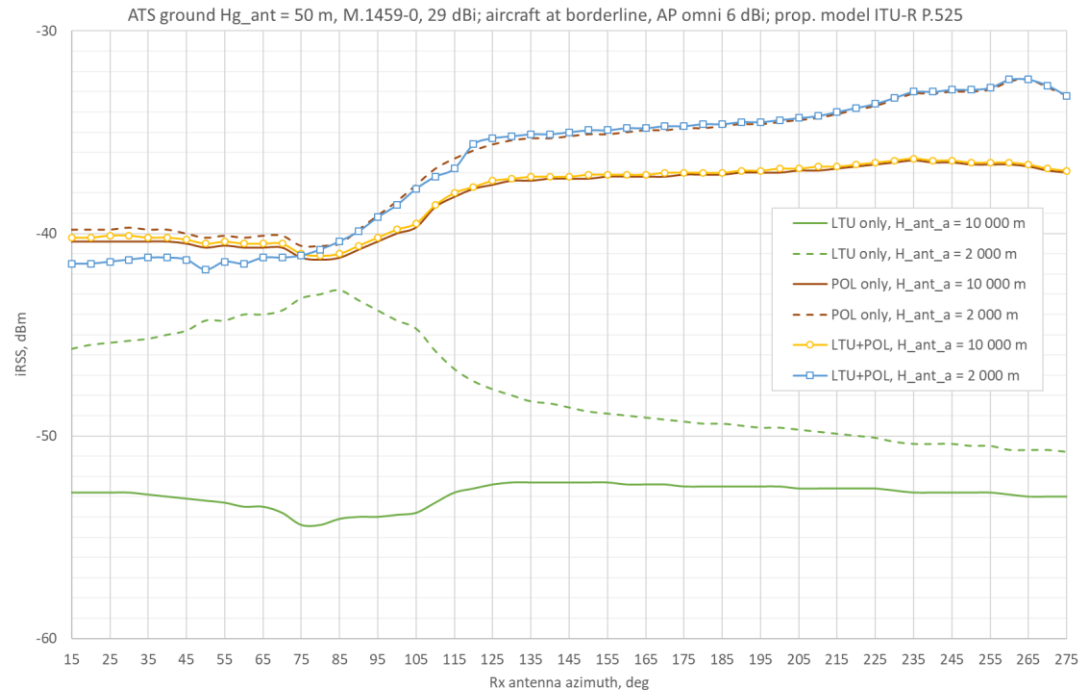


$h = 2000\text{m}$.

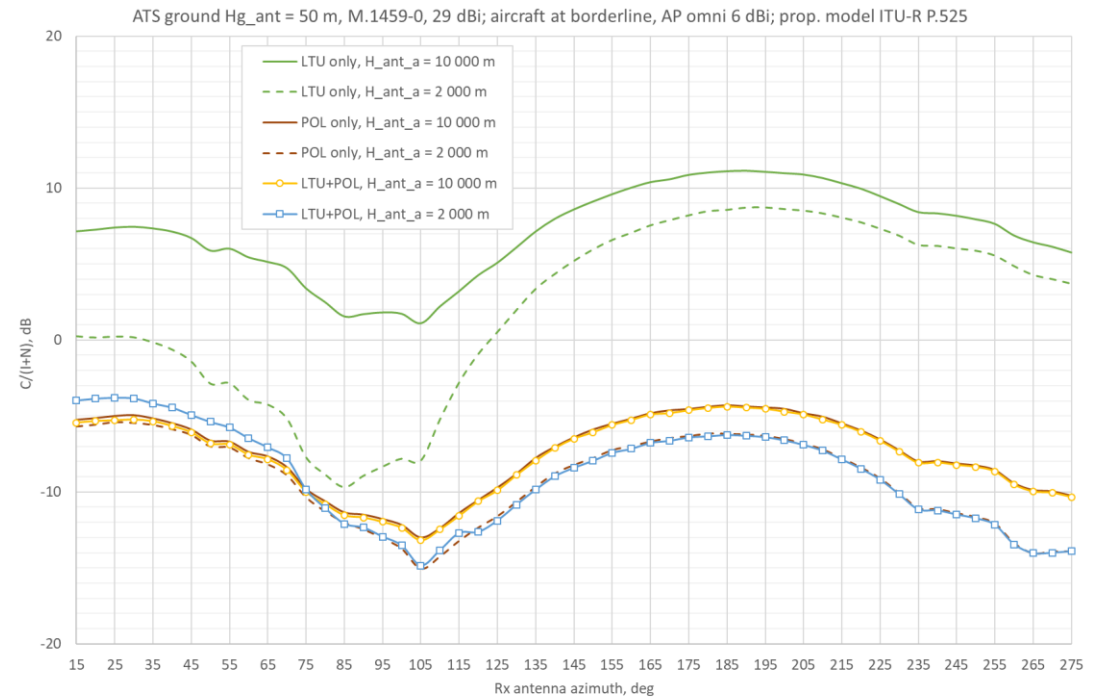
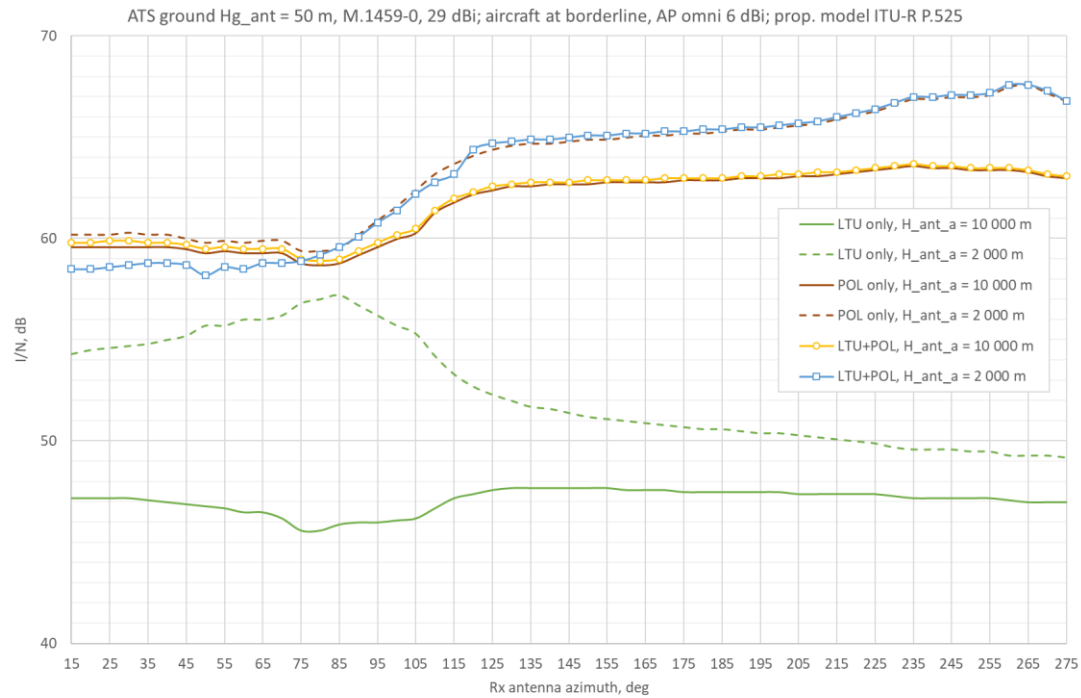
Example of ATS in Kaliningrad region, interference into airborne



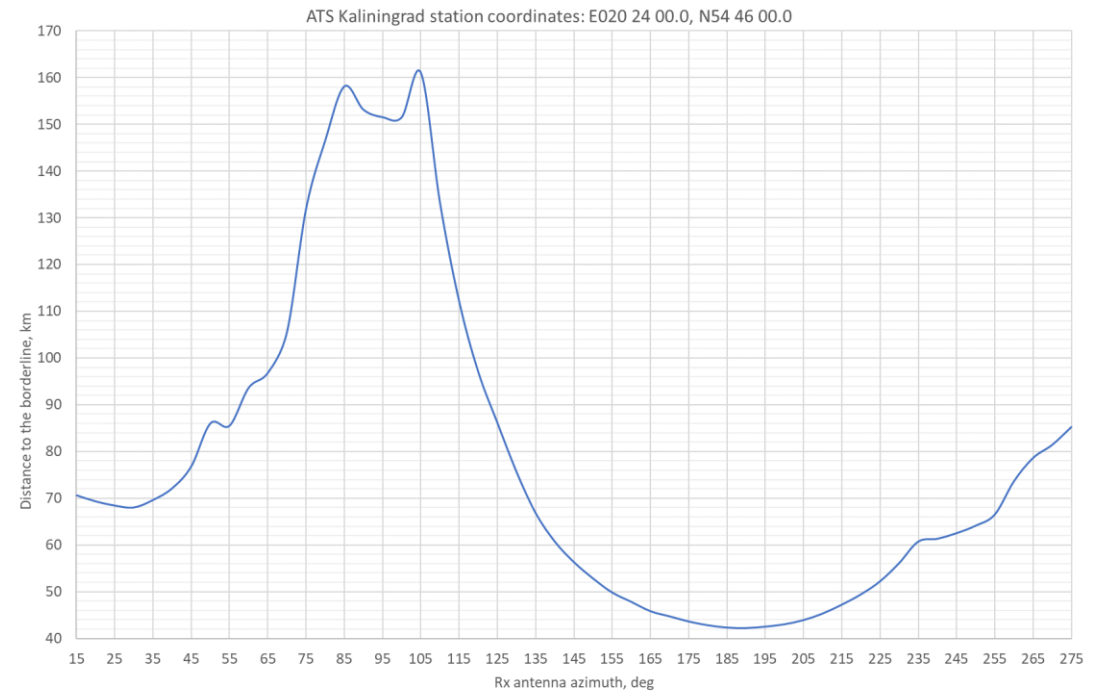
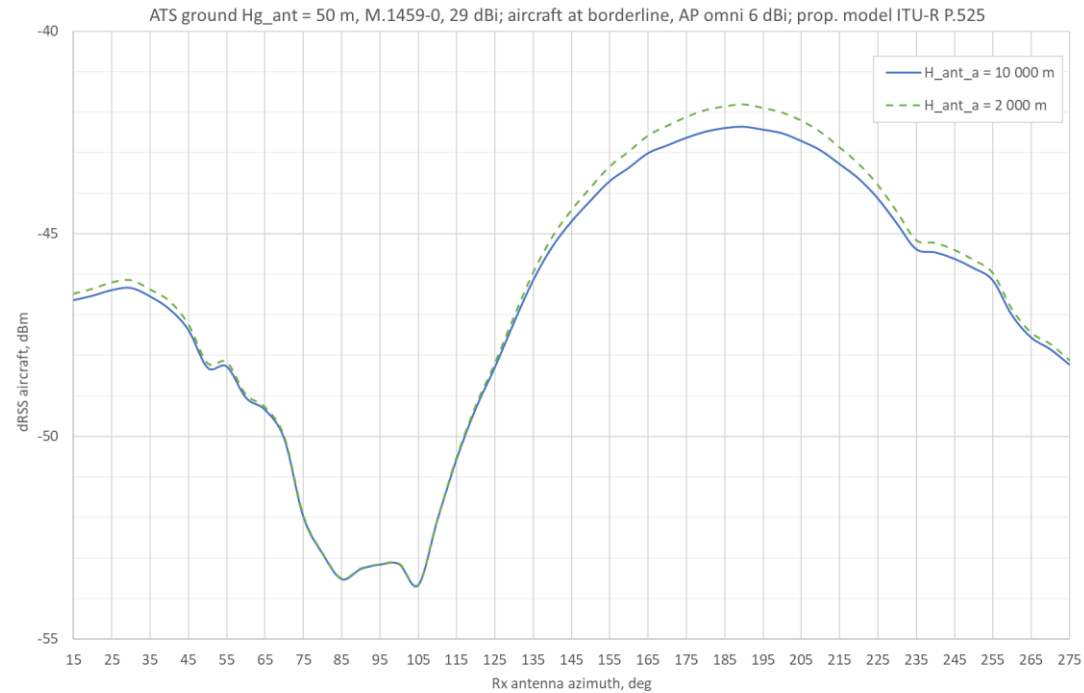
iRSS & dRSS



I/N & C/(I+N)



Correlation to distance to the borderline



- Thank you

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