354 KM ON MESHTASTIC BY TROPOSPHERIC DUCT

On the night of 1 to 2 November 2026, in two openings totalling 7 h 04 min, the Viedma and Carmen de Patagones network linked by radio with SOMesh, the network of Bahía Blanca and its region, in Argentina. The longest hop, with nothing in between, joined a tower in Patagones with another in Tres Arroyos.

QSL PAT1 ⇄ C-3A

LORA LINK CONFIRMATION · MESHTASTIC

TROPO 354 km 01/02-11-26

FROM	PAT1 · !65d34d89 · Carmen de Patagones · **FE89me**	**TO**	C-3A · !826eb03a · Tres Arroyos · **FF91uo**
DATE	01-02 NOV 2026	**TIME**	20:41-21:49 and 02:31-03:31 (UTC-3) · 23:41-00:49 and 05:31-06:31 UTC
FREQ.	915 MHz	**MODE**	LoRa SF9, 250 kHz (MediumFast)
QRB	**354.3 km** · bearing 42°	**RPRT**	SNR -6.5 dB at PAT1 · -7 dB at C-3A · 22 readings
ANTENNAS	PAT1 on a tower, 55-65 m ASL · C-3A on a 90 m tower (190 m ASL)	**PROP.**	Tropospheric duct over the sea

DIRECT LINKS BETWEEN NETWORKS
4
all with PAT1 at one end

NODES FROM THE REGION
70
240 to 420 km from Viedma

END TO END
416 km
ElArroyoMesh (Carhué), round trip through the mesh

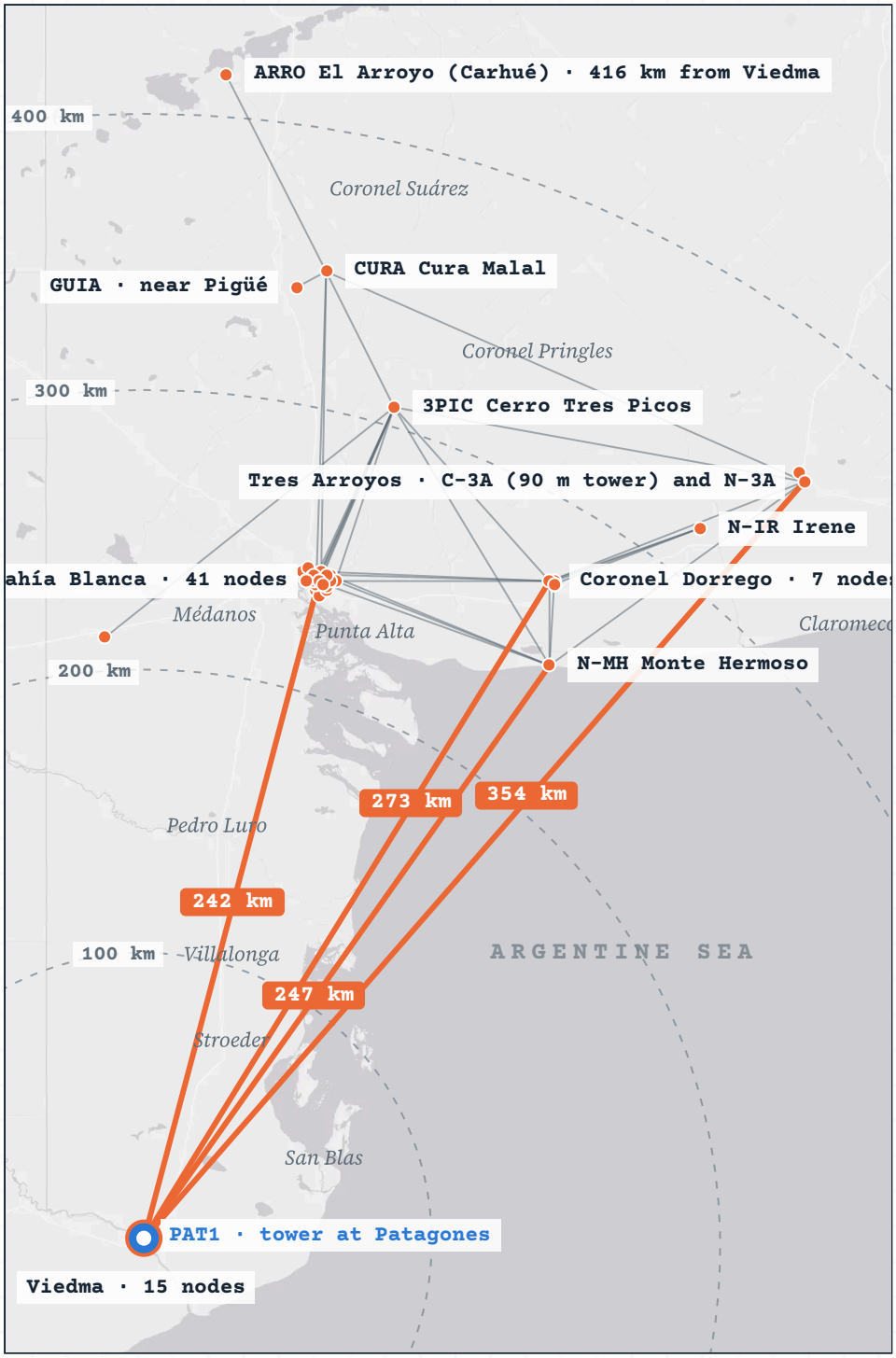
OPENINGS
7 h 04 min
20:36-23:43 and 00:33-04:30

SUMMARY

In the two openings, 20:36-23:43 and 00:33-04:30, 656 packets from 70 nodes in Bahía Blanca, Monte Hermoso, Coronel Dorrego, Tres Arroyos, Irene, Pigüé and Carhué reached Viedma. There were traceroutes in both directions and a chat between the two cities on the MediumFast channel. The farthest node was ElArroyoMesh, on the El Arroyo farm 15 km north-east of Carhué: at 01:56 it answered a traceroute from MRCO across 416 km, with five nodes in between each way.

Everything came in through PAT1, a SenseCAP Solar P1 with the ROUTER role installed the day before on a tower in Carmen de Patagones. In the previous 31 hours it had heard nothing from that area. Of the 656 packets from the region received by the Viedma gateway, 654 had been relayed last by PAT1.

MAP



PAT1 · Viedma-Patagones · Bahía Blanca region · Direct hop between networks · Other hops seen

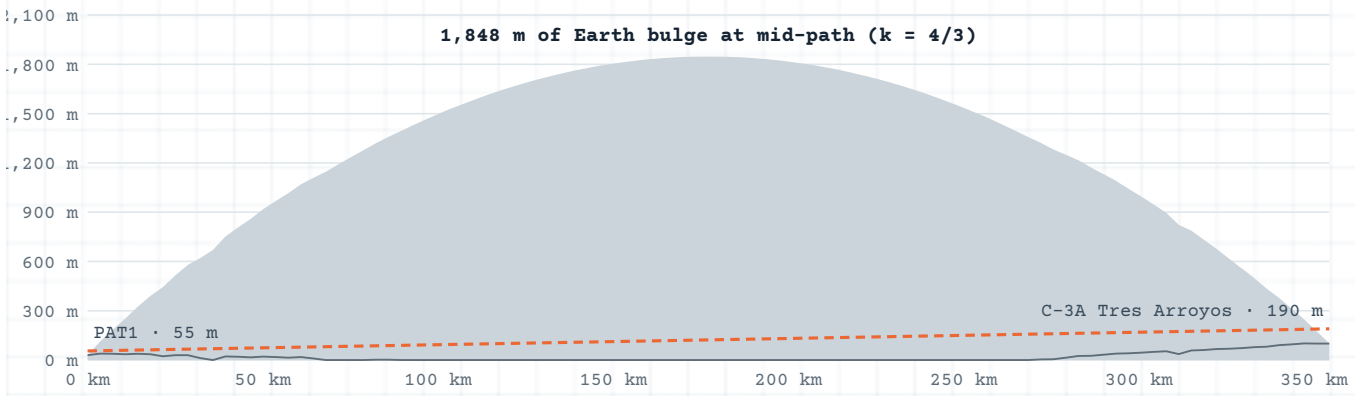
Rings every 100 km from PAT1. Positions rounded to 1 km. Positions that never reached Viedma by radio, C-3A and Tres Picos, come from the SOMesh map. Base map: Esri, HERE, Garmin, © OpenStreetMap.

DIRECT HOPS

NODE	LOCATION	LOCATOR	QRB	BEARING	READINGS	BEST SNR AT PAT1	BEST SNR OTHER END
C-3A	Tres Arroyos cemetery, 90 m tower	FF91uo	**354.3 km**	42°	22	-6.5 dB	-7 dB
N-CD	Coronel Dorrego	FF91ig	**272.6 km**	32°	3	-15.25 dB	-13.5 dB
N-MH	Monte Hermoso	FF91ia	**247.2 km**	36°	71	-2.25 dB	2.25 dB
EA01	UNS Agronomía, Bahía Blanca	FF81uh	**242.5 km**	15°	8	-9 dB	-9 dB

Monte Hermoso was the entry used most: 71 readings, with signal up to +2.25 dB. C-3A was the longest and Coronel Dorrego the second.

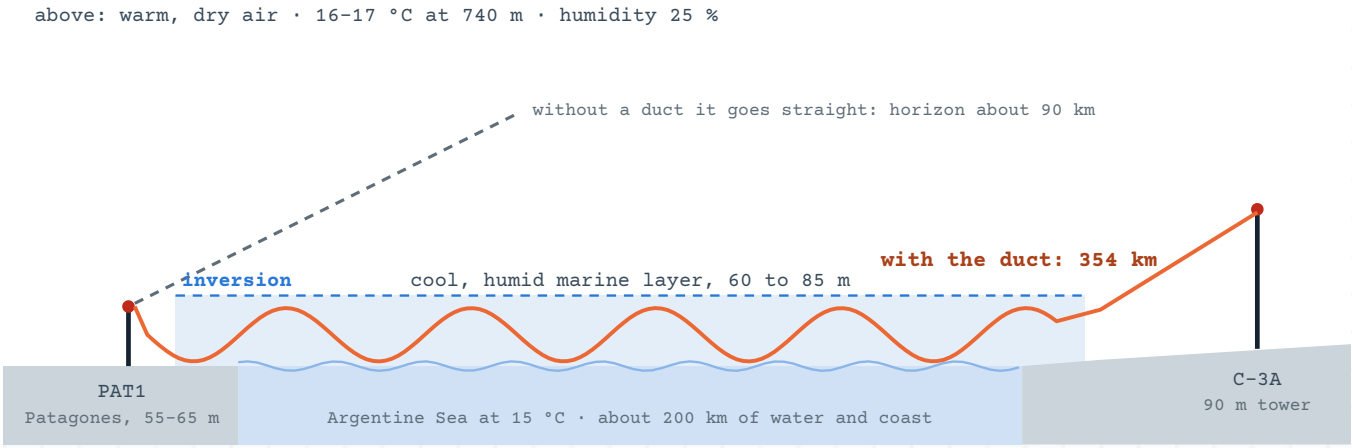
PATH PROFILE PAT1-C-3A



Terrain (Copernicus DEM) added to the Earth's curvature with normal refraction (k = 4/3). The dotted line joins the two antennas.

- Normal radio horizon between the two antennas: about 90 km. The 354 km hop is four times longer.
- At mid-path the Earth rises 1,848 m above the straight line between the antennas.
- In free space, with 22 dBm and 3 dBi antennas, the expected SNR would be about −0.6 dB. The best reading was −6.5 dB: only about 6 dB less.

PROPAGATION

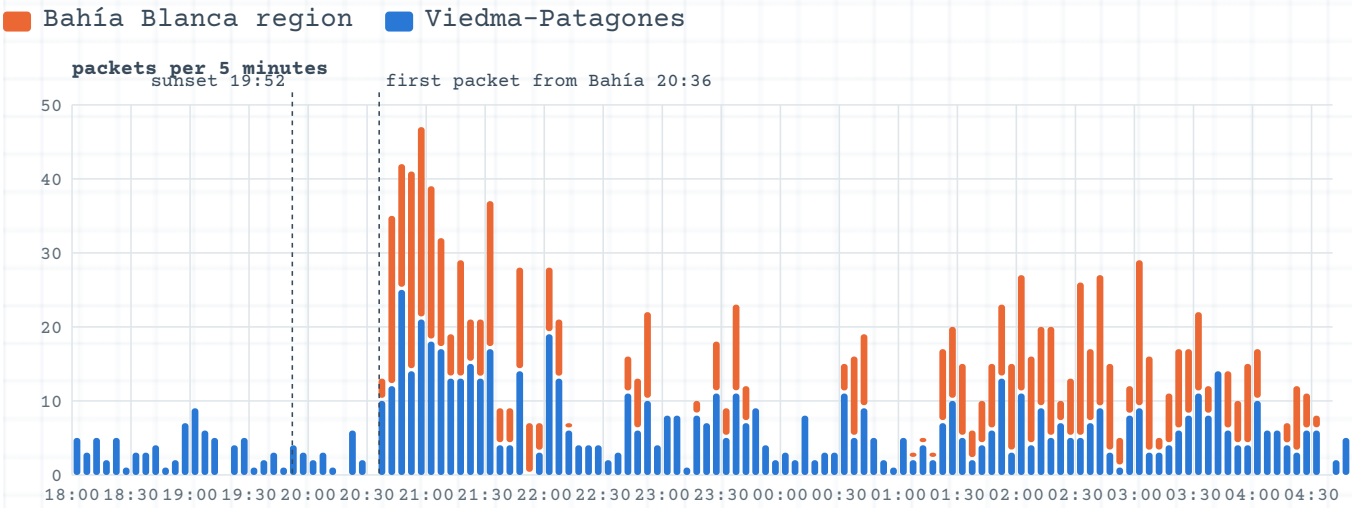


Sketch, not to scale.

After sunset (19:52 at Patagones) the air next to the sea cooled and became humid, while a few hundred metres higher it stayed warm and dry. That inversion forms a duct: a layer 60 to 85 m deep over the water where the signal is trapped and follows the curvature of the Earth. At 915 MHz about 54 m is enough.

The models (ECMWF, GFS and GEM) show a duct over the sea at mid-path from 15:00 on 1 November to 07:00 on 2 November. The first opening came when the land end, at Patagones, cooled after sunset. The second, from 00:33, came with rising pressure (1007 to 1011 hPa at Bahía Blanca), air sinking at about 3,000 m (700 hPa) and the strongest duct around midnight. It closed at 04:30 with the sea still in duct: at that hour ECMWF and GFS weaken both land ends of the Monte Hermoso-PAT1 hop, where the last packet came in. Tropocast.eu and the Hepburn index showed the coastal strip, with the maximum between 01:00 and 06:00: they got the place and the phenomenon right.

TIMELINE



Packets recorded every 5 minutes by the Viedma station. Local time (UTC-3).

19:52	Sunset at Patagones.
20:36	First packet from Bahía Blanca arrives, relayed by PAT1.
20:41	The Bahía Blanca BBS announces the route BBS → STMB → 3PIC → C-3A → PAT1 → MRCO → MRCC.
20:41–21:49	C-3A ↔ PAT1, 354 km: 16 readings.
20:37–04:30	Monte Hermoso ↔ PAT1: 71 readings in both openings, the main entry.
23:40	On Telegram, Ptolomeus suggests a ping from Viedma to ElArroyoMesh, near Carhué.
23:43	The first opening closes.
00:33	The Bahía region comes back, now on 2 November.
01:56	MRCO retries a traceroute to ElArroyoMesh with a hop limit of 7 instead of 3, and the answer arrives in 13 seconds: five nodes in between each way, 416 km through the mesh.
02:31	C-3A answers a traceroute from MRCO through PAT1, with the direct hop in both directions.
03:29	Monte Hermoso answers a position request from the station: the same position SOMesh publishes.
03:32	C-3A answers a position request in 3 seconds, encrypted end to end: the station lacks its key and cannot read it.
04:29	C-3A answers a NodeInfo request in 6 seconds, also encrypted.
04:30	Last packet from the region: N-MH answers a traceroute from MRCO.
04:31	From then on, requests to the region go unanswered: 5 traceroutes up to 06:05.

PEOPLE ON BOTH NETWORKS

People on the two networks talked to each other, in both directions.

MESSAGES FROM PEOPLE ON MEDIUMFAST	PEOPLE WHO WROTE	REPLIES ACROSS NETWORKS	MESSAGES FROM MRCO TO BAHÍA
43	**12**	**9**	**12**
29 from the Bahía region and 14 from Viedma, plus 11 reactions	5 from the Bahía region and 7 from Viedma	messages answering one from the other network	5 on the channel and 7 direct to 5 nodes; 2 acknowledged

From MRCO, the station's roof node, 5 messages went to the channel and 7 direct messages to 5 nodes in the Bahía region; 2 came back with the recipient's acknowledgement, one of them from NJK5 in Bahía Blanca. 3 direct messages came from 2 nodes there; the fastest person to answer a direct message from MRCO took about 2 minutes.

Separately, MRCO sent 8 queries to the Bahía Blanca BBS (Sentinel BBS), which answered 6 times automatically. MRCC, on USB at the station, only listened: it recorded everything and sent nothing to the other side.

Data from 20:36 to 06:48. Text messages on the MediumFast channel count as messages from people; reactions (an emoji on a message) are counted apart. The BBS's 6 automatic notices on the channel, the queries to the BBS and its answers are not counted.

ON THE CHANNEL

20:40	HamL	Que bueno que Viedma esta en mediumfast tmb
20:42	MIKE	hay contacto con bahia?
20:42	HamL	Lo hay
20:43	ZERO	Bienvenidos!
20:43	plgm	Estará entrando por el mar?
20:45	VDM	Hola Zero desde Viedma!
20:51	HamL	Será propa?
20:51	HamL	O es estable?
20:55	plgm	Q está con rol Router
21:03	BASE	¡Saludos a todo Bahía!
21:12	7EEA	Y quien paga el asado?
22:03	MRCO	Que pasó?? vemos Bahía desde patagones???
22:14	MRCO	Mis saludos a todo Bahía Blanca. Estamos entrando por el nodo !b03cbf0c no veo el nombre

Messages as written, in Spanish. Orange: Bahía region; blue: Viedma.

COMPARISON

LINK	DISTANCE	MODE	TYPE
PAT1-C-3A (this night)	**354 km**	915 MHz · MediumFast, SF9	duct over the sea; both directions
PAT1-Coronel Dorrego (this night)	273 km	915 MHz · MediumFast, SF9	duct over the sea
Meshtastic, official record: Slovenia-Italy (2024)	331 km	868 MHz · Very Long Slow, SF12	mountain to mountain
Meshtastic, previous record: Alberta-Montana (2023)	254 km	915 MHz · LongFast, SF11	mountain to mountain
Meshtastic, reports in Europe (2025-2026)	475-822 km	868 MHz · LongFast and MediumFast	over the sea; one way, unverified
LoRa, Sardinia-Barcelona (2020)	573-584 km	868 MHz · SF12	duct confirmed by radiosonde
LoRaWAN, Portugal-Canary Islands (2023)	1,336 km	868 MHz	over the sea; 3 packets, one way

PAT1 and C-3A talked in a single hop, with no repeater in between, over 354.3 km: 18 traceroutes record the hop and 4 show it in both directions. That is more than the 331 km of the record listed on the official Meshtastic page for links without balloons or aircraft, and in the sources we reviewed we found no longer direct link confirmed in both directions between fixed stations. In Europe there are reports of direct receptions from 475 to 822 km, at 868 MHz and over the sea, in one direction and without independent verification; one of them, 756 km, also on MediumFast. At 915 MHz the longest documented single hop we found was 254 km, and in South America we found none over 250 km. For ducted LoRa the distance is not unusual: links of almost 600 km have been confirmed.

This one was almost half sea and half land: about 200 km over the sea and the low coast, and the rest over the plain to Tres Arroyos.

Sources: meshtastic.org/docs/overview/range-tests; LoRa Italia; r/meshtastic; Zennaro et al., "TROPPO", arXiv 2004.02802; The Things Network. Open-web search in 14 languages on 02/11/2026.

FOR THE NEXT OPENING

- The routers of the chain should mark each other as favorites: STMB, 3PIC, N-MH, C-3A, EA01, PAT1 and MRCO. Since firmware 2.7.11 a router does not spend a hop when it relays what a favorite router passes to it. A message from a client in Bahía then reaches Viedma using a single hop of the default limit of 3.
- The antenna height of 3PIC (Cerro Tres Picos) is still missing.
- C-3A's NodeInfo, with its public key, is still missing, so the station can read its answers and confirm its position by radio. meshbox can now request it from the panel during the next opening.
- PAT1 stays as ROUTER on the Patagones tower, and the Viedma station records every opening.

ComarcaMesh, Viedma-Patagones Meshtastic network · comarcamesh.com.ar · data from the meshbox station in Viedma. Thanks to SOMesh Bahía Blanca (somesh.com.ar) for C-3A's height and for its public map, the source of the positions of C-3A and 3PIC. Terrain: Copernicus DEM via Open-Meteo. Forecasts: Tropocast.eu and W. Hepburn. A full technical report with every traceroute, message and data of the night is available.

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73