



**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

*M. Biskupič, F. Kyzek, M. Lizuch, J. Richnavský, I. Žiak*

## Avalanche transceivers test 2015



**IKAR Conference 2015, Killarney, Ireland**

# AIMS

- Present the results obtained during the avalanche transceiver test in Zelené pleso (Vysoké Tatry, Slovakia)
- Test objectives:
  - Verify the transceivers range gained in real conditions
  - Test the functionality of beacons
  - Comparison of the results from TEST 2011



MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

# TEST 2015

- Test participants:
  - Mountain Rescue Service (HZS), Slovakia
  - Mountain Rescue Service (HS ČR), Czech republic
  - UIAGM (Slovakia)
  - Jagiellonian University in Cracow (Poland)
  - Avalanche Prevention Centre (Slovakia)
- 10 testers
- 40 beacons – 8 types from 5 manufacturers
- Randomly 3 from 5 beacons of each type
- 360 measurements + 28 km



MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

# TESTED BEACONS

## TEST 2011

- Arva 3 Axes
- Arva Evo 3
- bca Tracker 2
- bca Tracker DTS
- Mammut Barryvox Pulse
- Mammut Barryvox VS 68
- Mammut Barryvox VSOpto 3000
- Ortovox 3+
- Ortovox F1
- Ortovox Patroller
- Ortovox S1
- Pieps DSP v 5.0
- Pieps DSP v 6.2
- Pieps Freeride

## TEST 2015

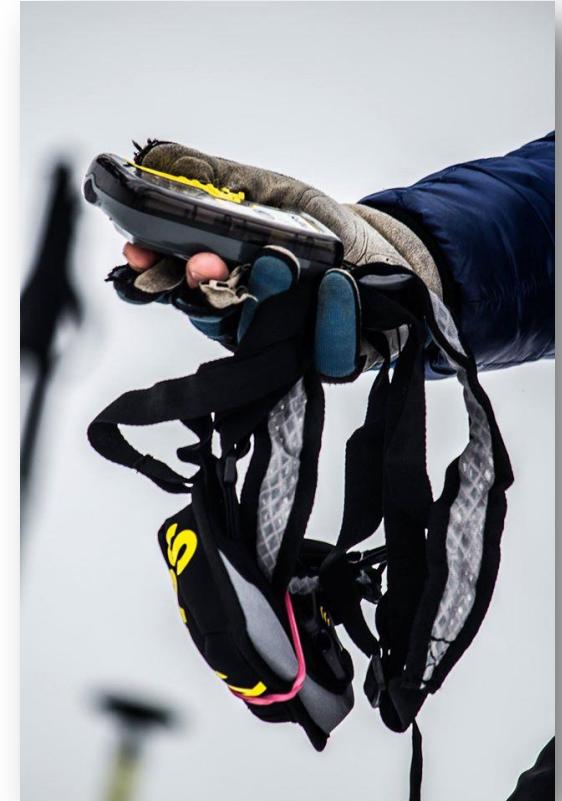
- Arva Neo
- bca Tracker 3
- Mammut Pulse
- Ortovox 3+
- Ortovox S1+
- Ortovox ZOOM+
- Pieps DSP PRO
- Pieps DSP SPORT



# METHODOLOGY

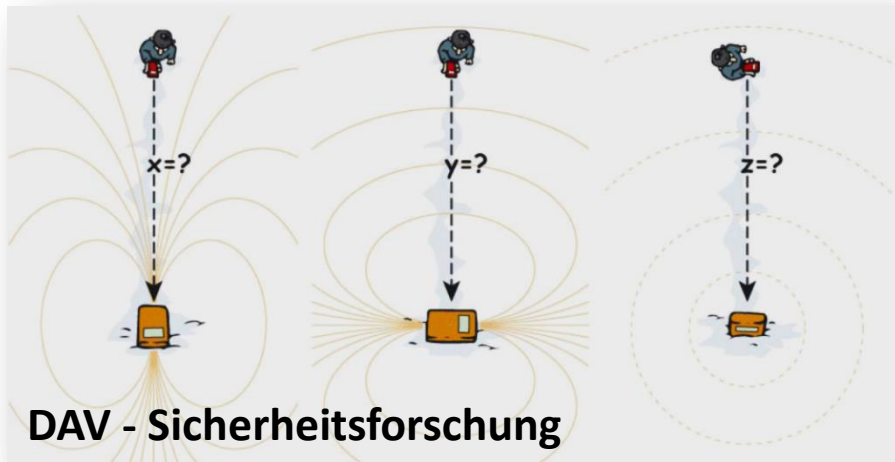
## DAV - Sicherheitsforschung:

- Range - first signal search
- Direction - coarse search
- Accuracy - fine search
- Multiple burials - direct search



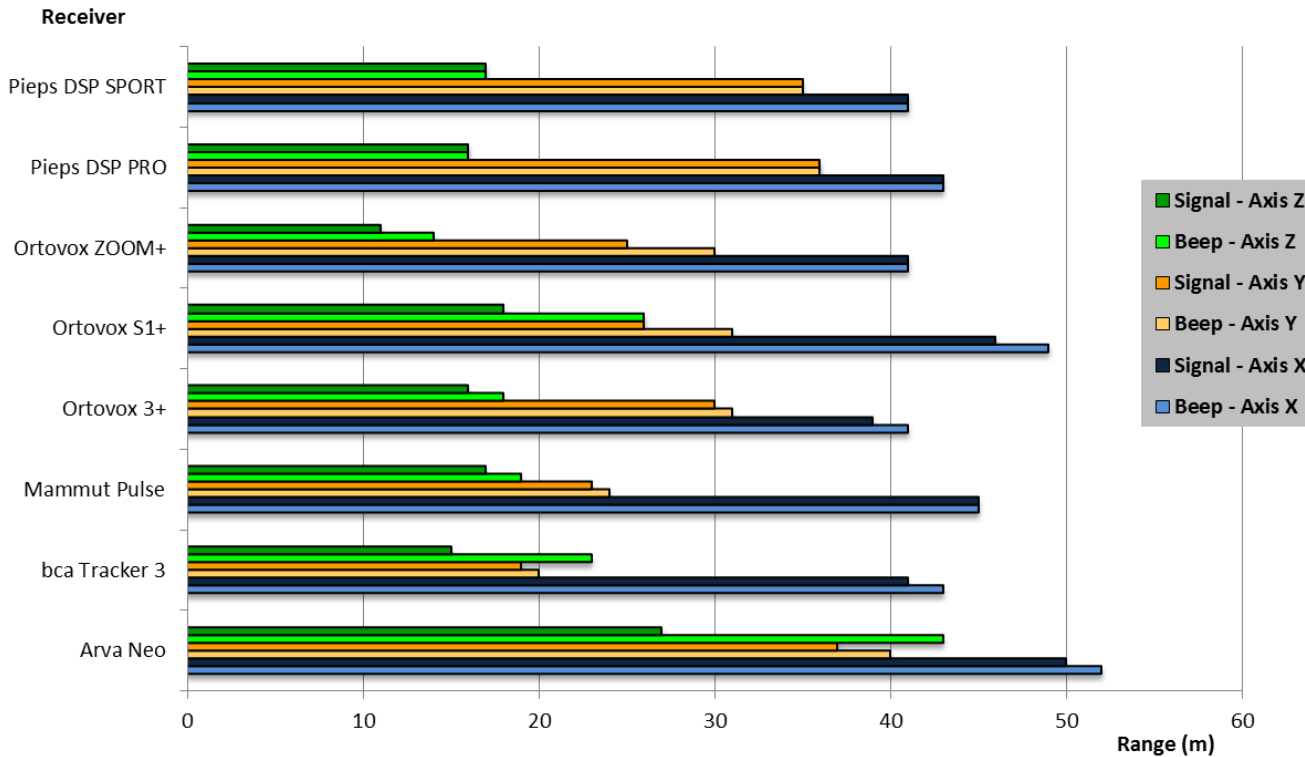
# RANGE TEST

- From no signal to receiving the first signal
- Position of transmitting antenna in 3 axes (X, Y, Z and Ortovox Smart antenna) for each (5) transmitting beacons.



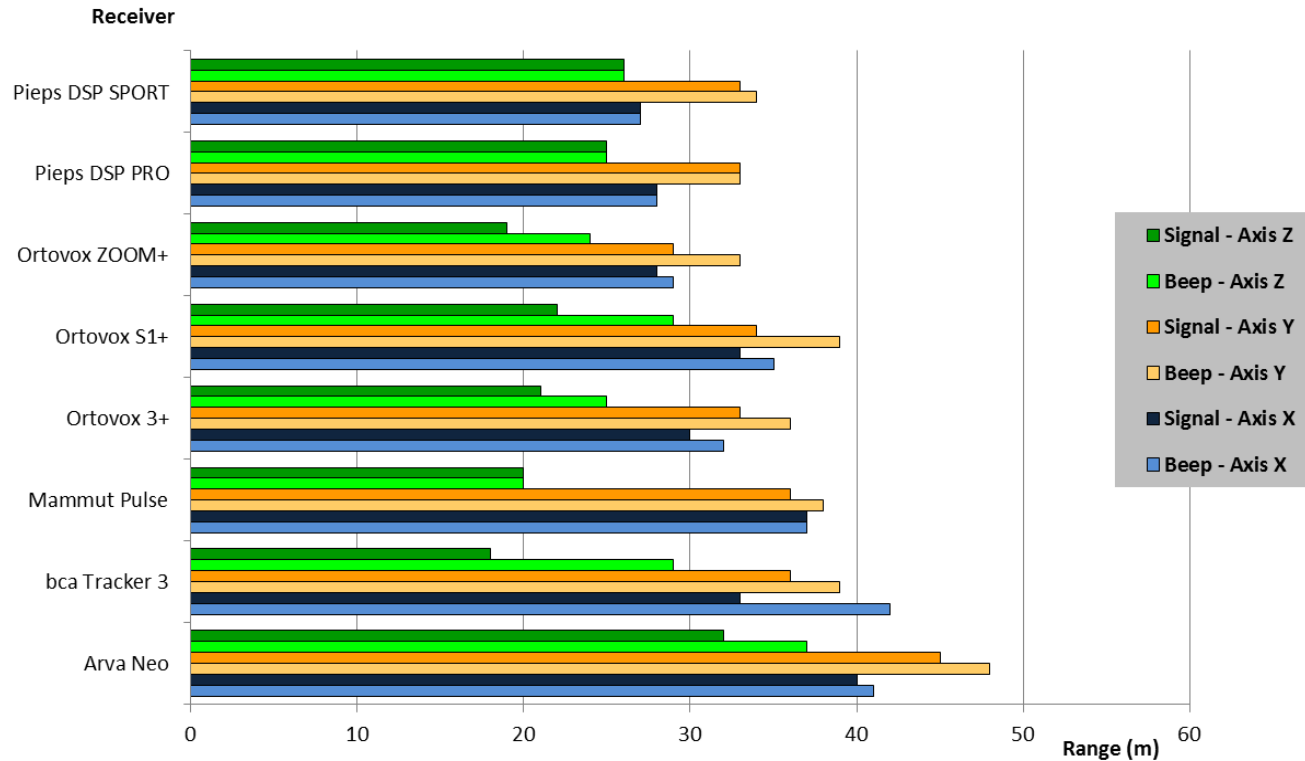
# RANGE TEST

## Transmitter - Arva Neo



# RANGE TEST

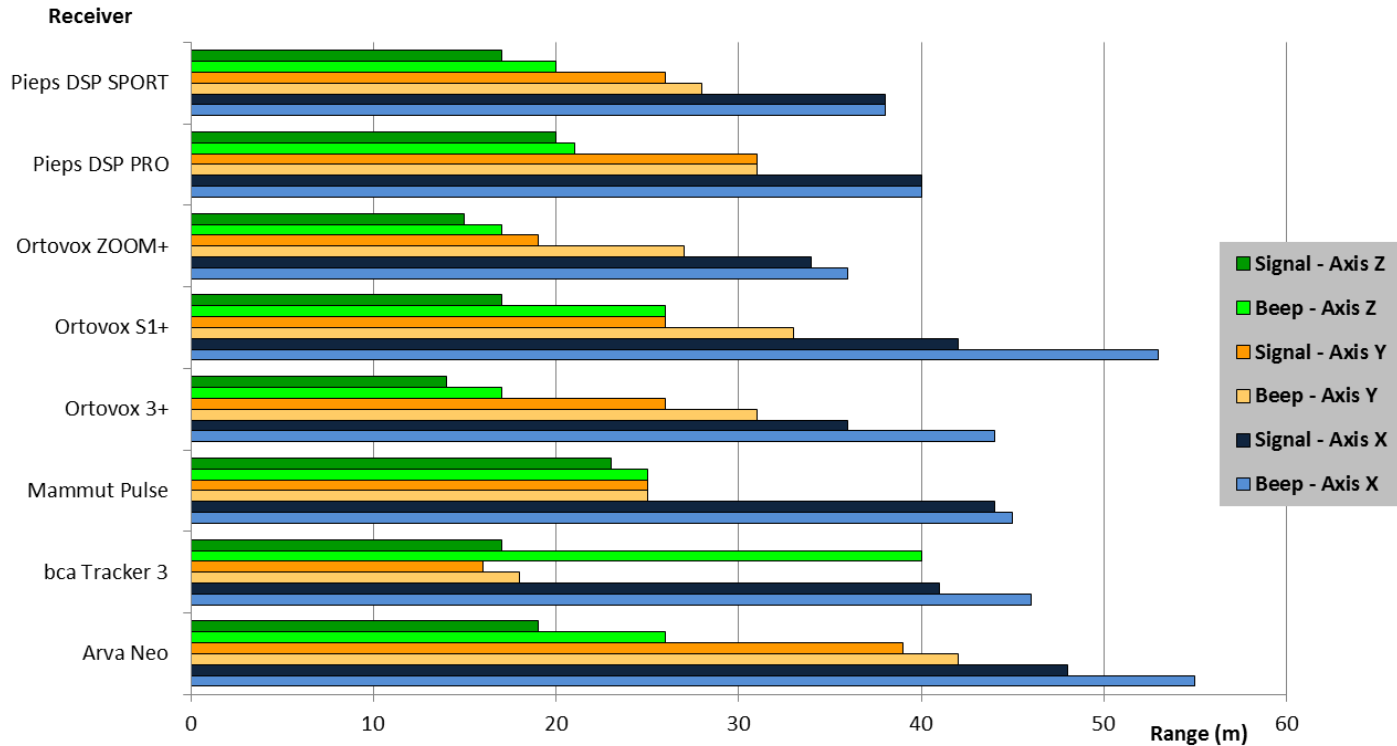
Transmitter - bca Tracker 3





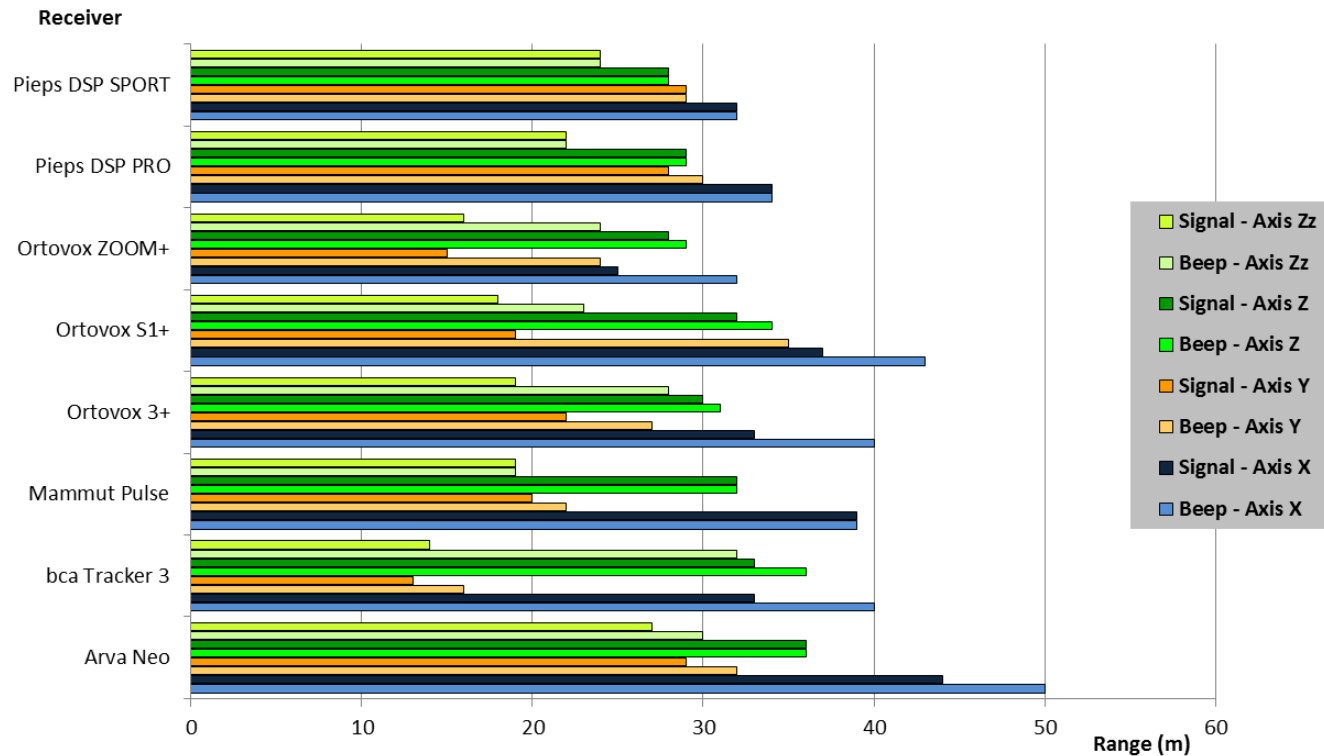
# RANGE TEST

## Transmitter - Mammut Pulse



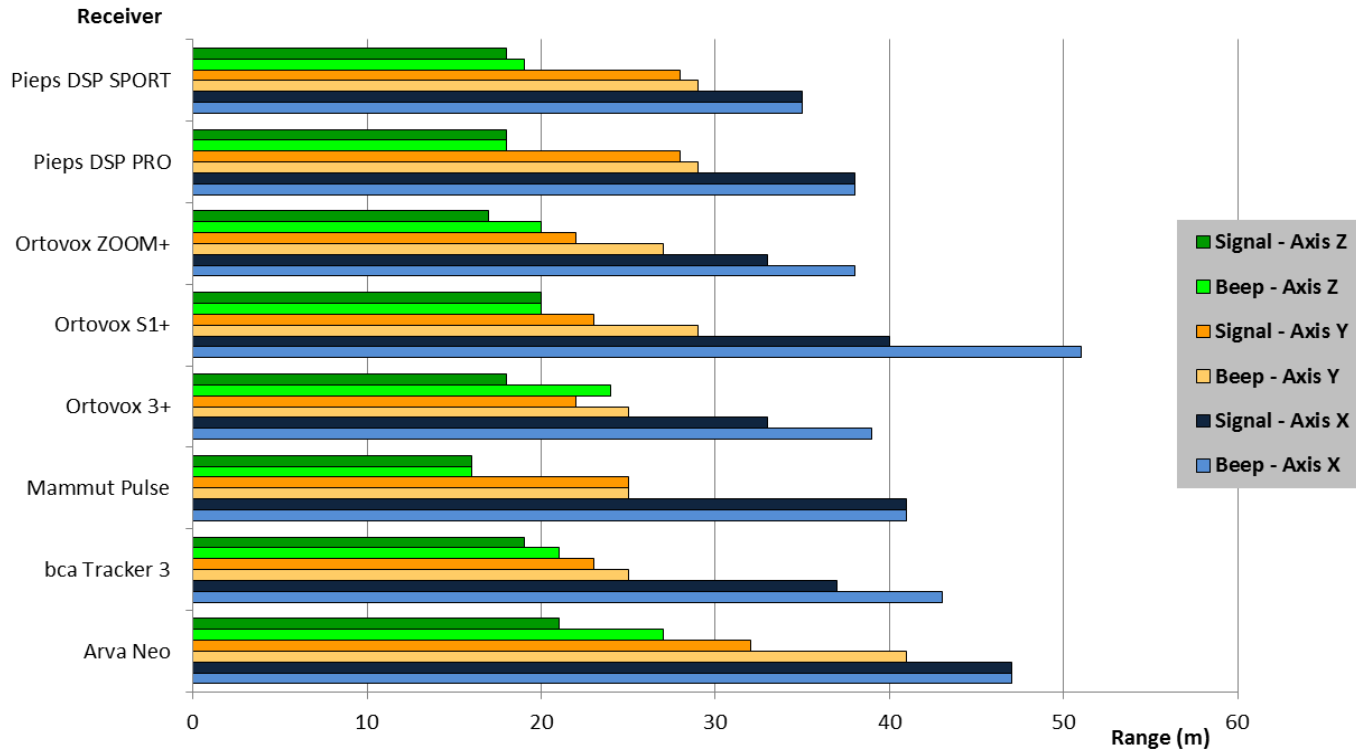
# RANGE TEST

Transmitter - Ortovox S1+ (Smart antenna)



# RANGE TEST

Transmitter - Pieps DSP PRO



# RANGE TEST

## Results:

- If bca Tracker 3 is transmitting, then the best receiver is bca.
- In all other situations the best receiver is Arva Neo.
- Beep and Stable signal

	Beep X (m)	Signal X (m)	Beep Y (m)	Signal Y (m)	Beep Z (m)	Signal Z (m)
Test 2011 (10 types of beacons)	40	37	25	22	26	21
Test 2015 (8 types of beacons)	41	38	31	27	25	21



MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

# RANGE TEST

## Results:

- Difference from the actual distance and the distance of the beacons display

Beacon	Axis X (%)	Axis Y (%)	Axis Z (%)	Average (%)
Arva Neo	30	73	140	81
bca Tracker 3	66	70	216	117
Mammut Pulse	42	79	137	86
Ortovox 3+	29	52	125	69
Ortovox S1+	27	77	134	79
Ortovox ZOOM+	37	64	115	72
Pieps DSP PRO	33	76	126	78
Pieps DSP SPORT	30	79	140	83
<b>TOTAL</b>				<b>83</b>



MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

# RANGE TEST

## Results:

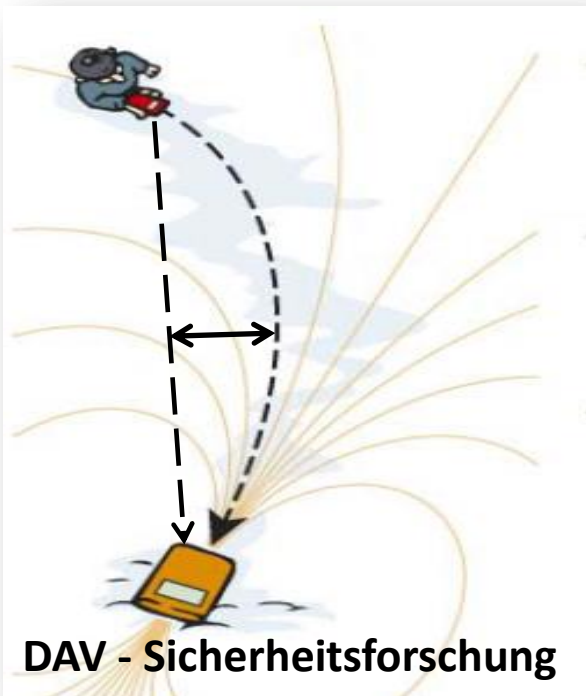
- The recommended search strip width and reality

Beacon	Minimum (m)	Transmitter	Calculated search strip width (m)	Width according to the manual (m)
Arva Neo	19	Mammut Pulse	38	40
Bca Tracker 3	15	Arva Neo	30	40
Mammut Pulse	16	Pieps DSP PRO	32	50
Ortovox 3+	14	Mammut Pulse	28	40
Ortovox S1+	17	Mammut Pulse	34	50
Ortovox ZOOM+	11	Arva Neo	22	40
Pieps DSP PRO	16	Arva Neo	32	60
Pieps DSP SPORT	17	Arva Neo	34	50



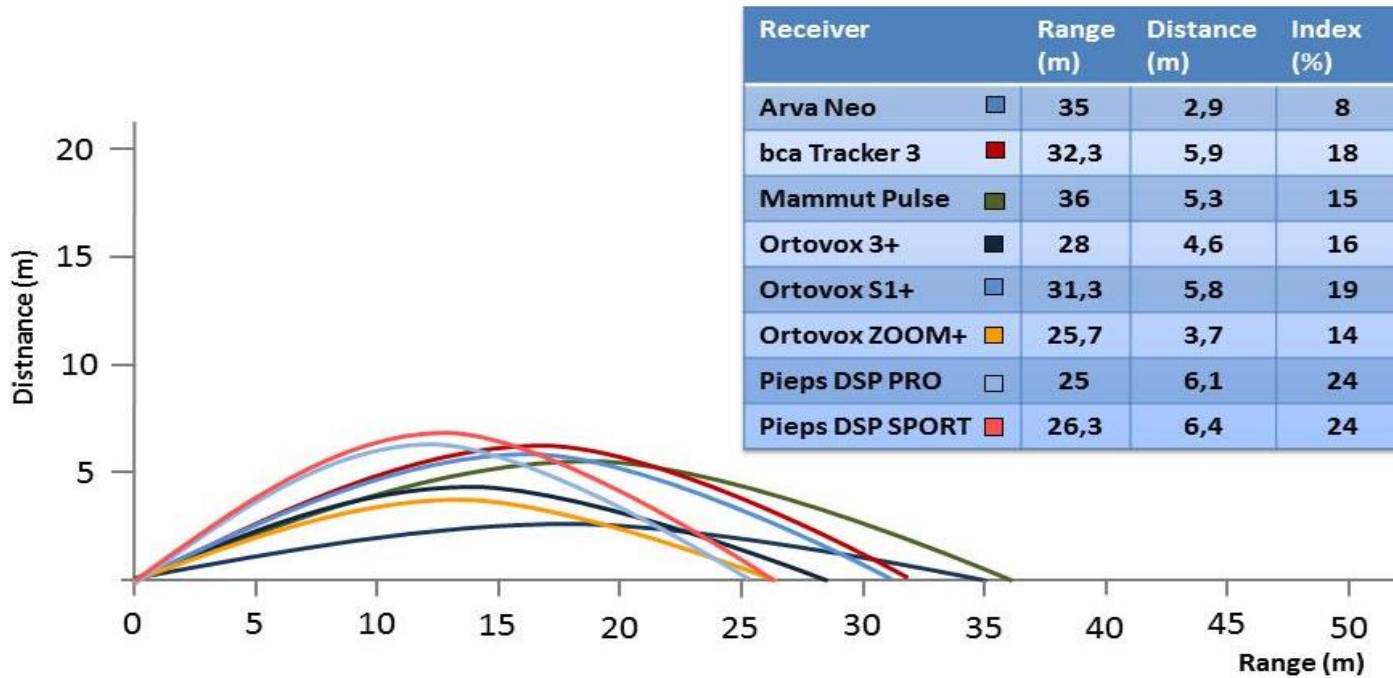
# DIRECTION TEST

- Stable signal to immediate vicinity of search target



# DIRECTION TEST

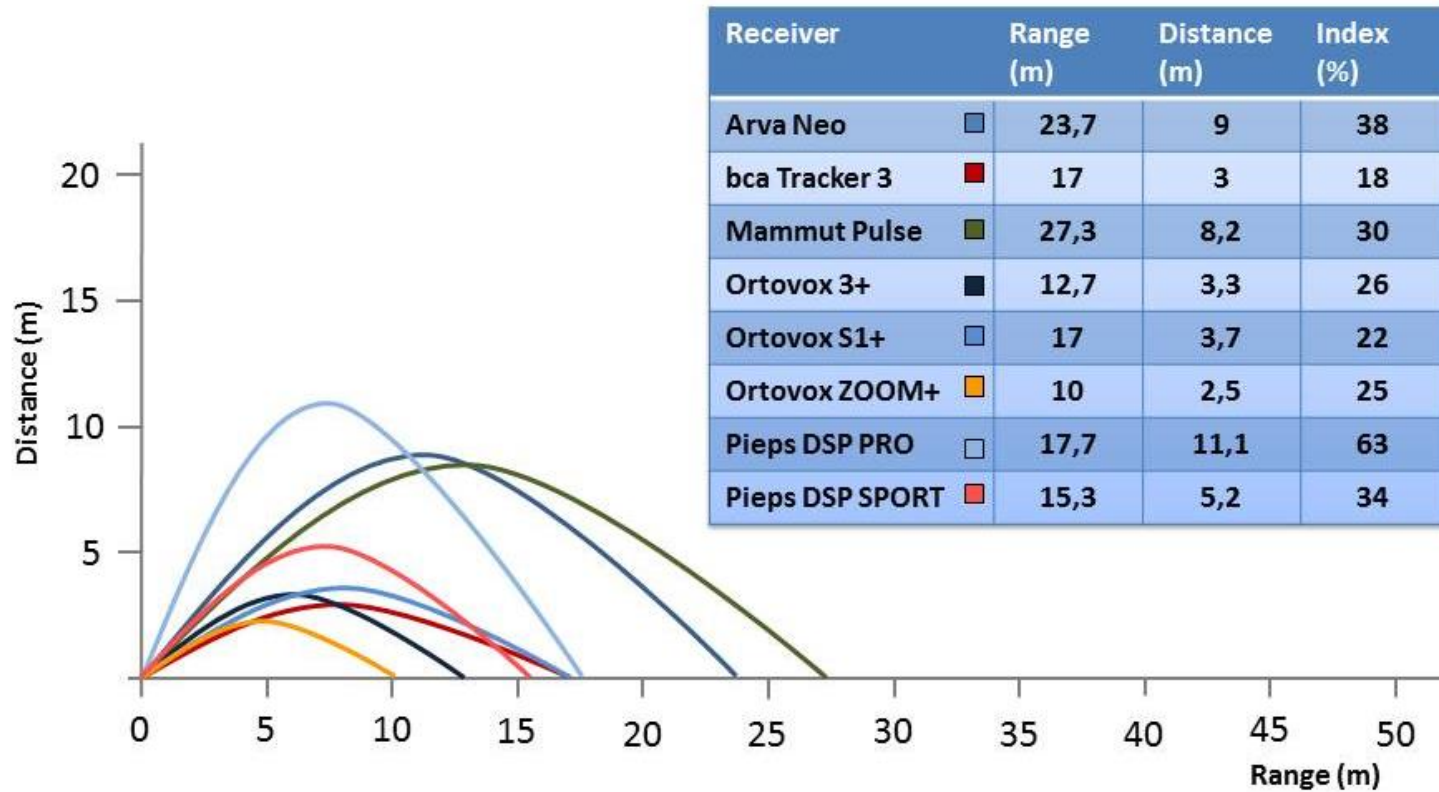
Transmitter - Pieps DSP – Axis Y





# DIRECTION TEST

Transmitter – Pieps DSP - Axe Z



MOUNTAIN RESCUE SERVICE  
**AVALANCHE PREVENTION CENTER**

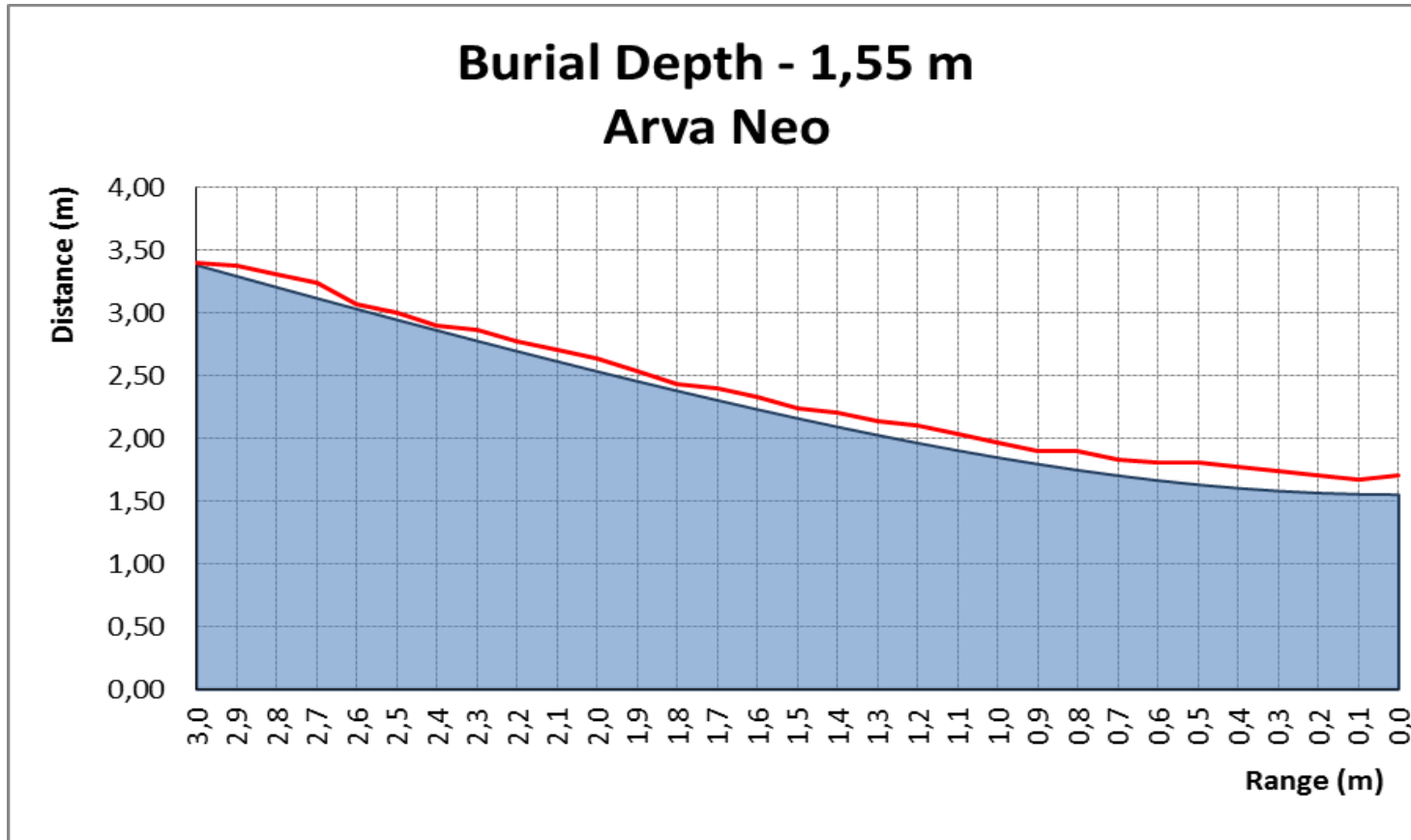
# DIRECTION TEST

Results:

- If the transmitter antenna in Z axis – this means most unfavourable position of all (for the victim and for the rescuer)
- **Time of search increase**
- **Distance is longer**
- Test 2011 vs. 2015 - without improvement

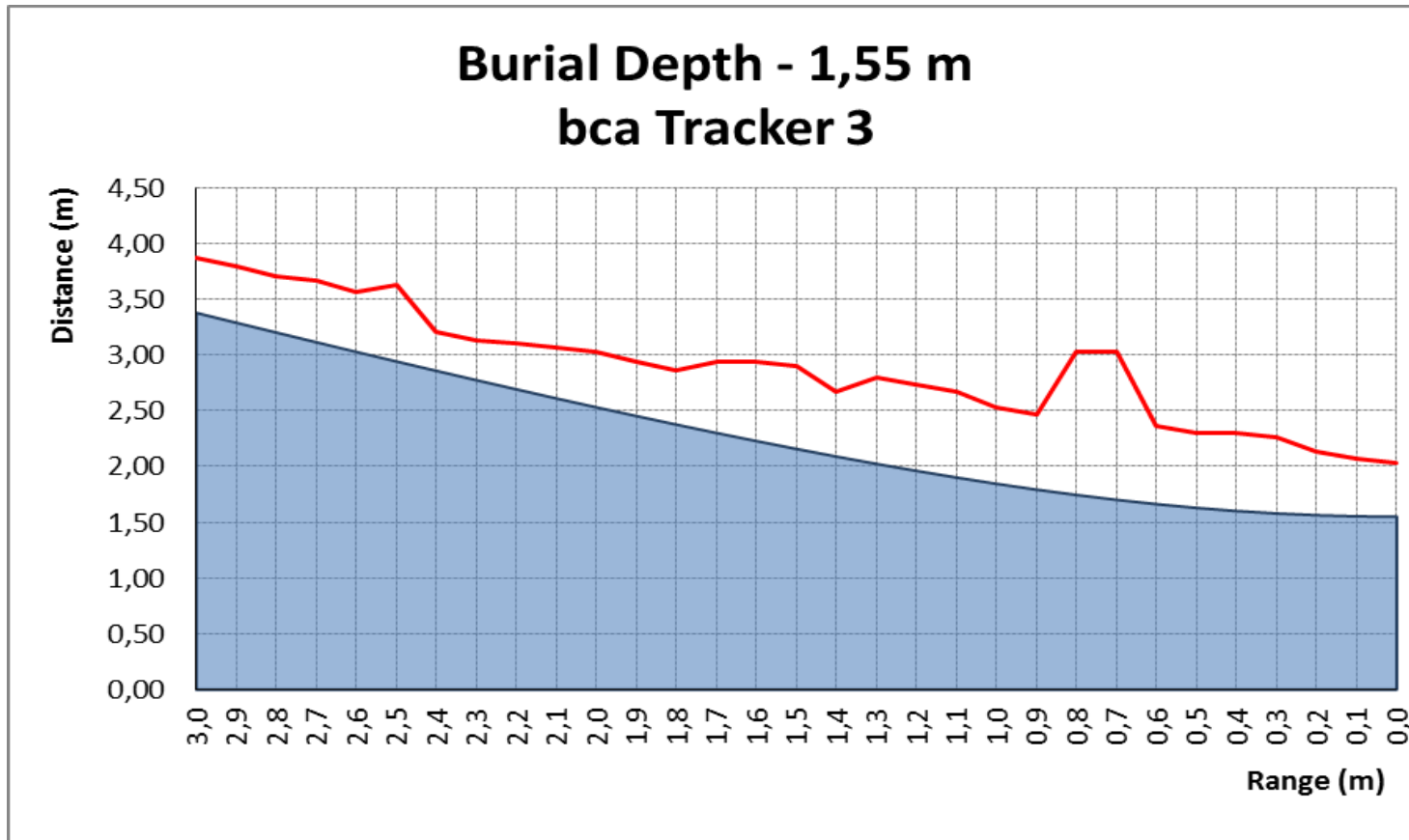


# ACCURACY TEST



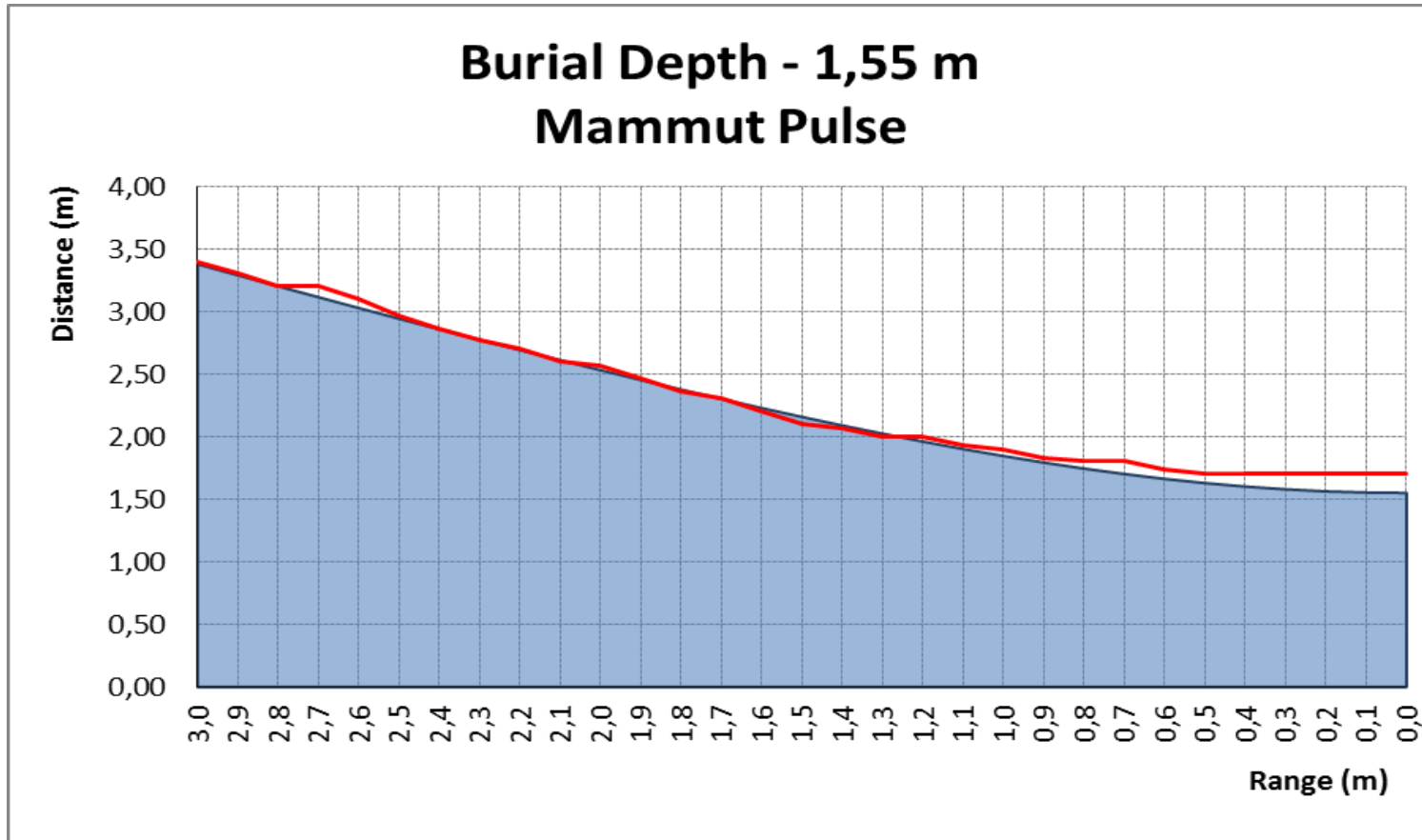
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



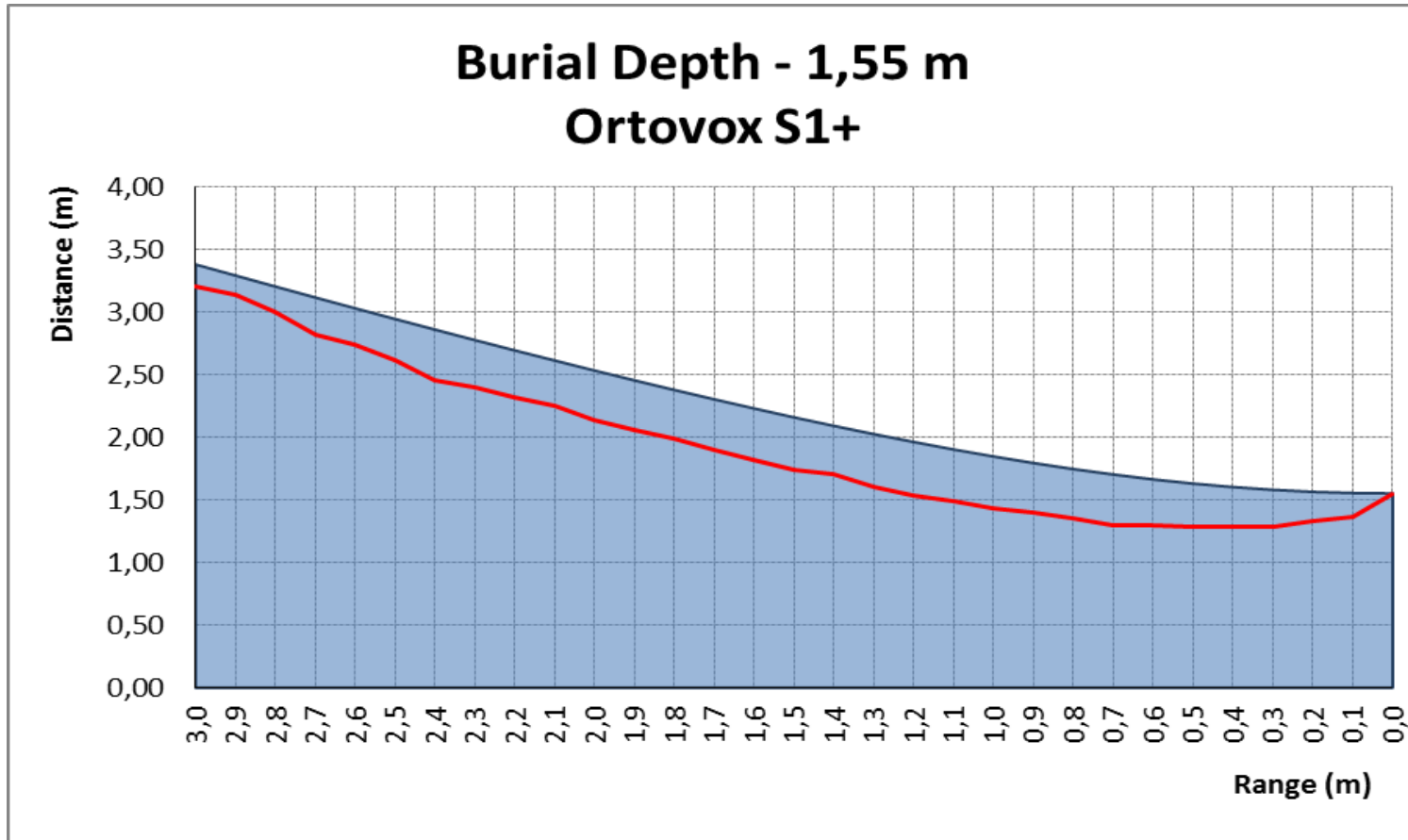
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



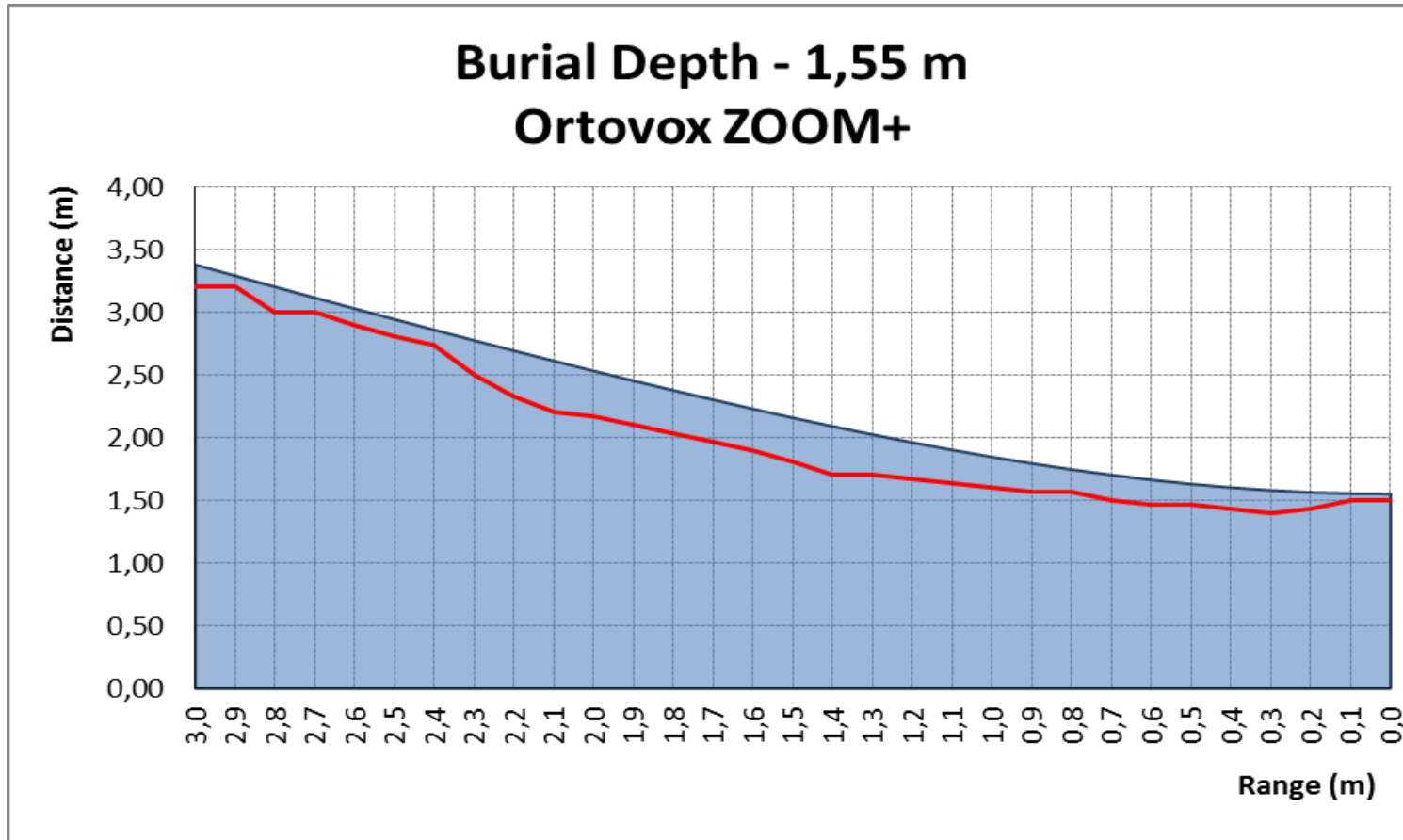
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



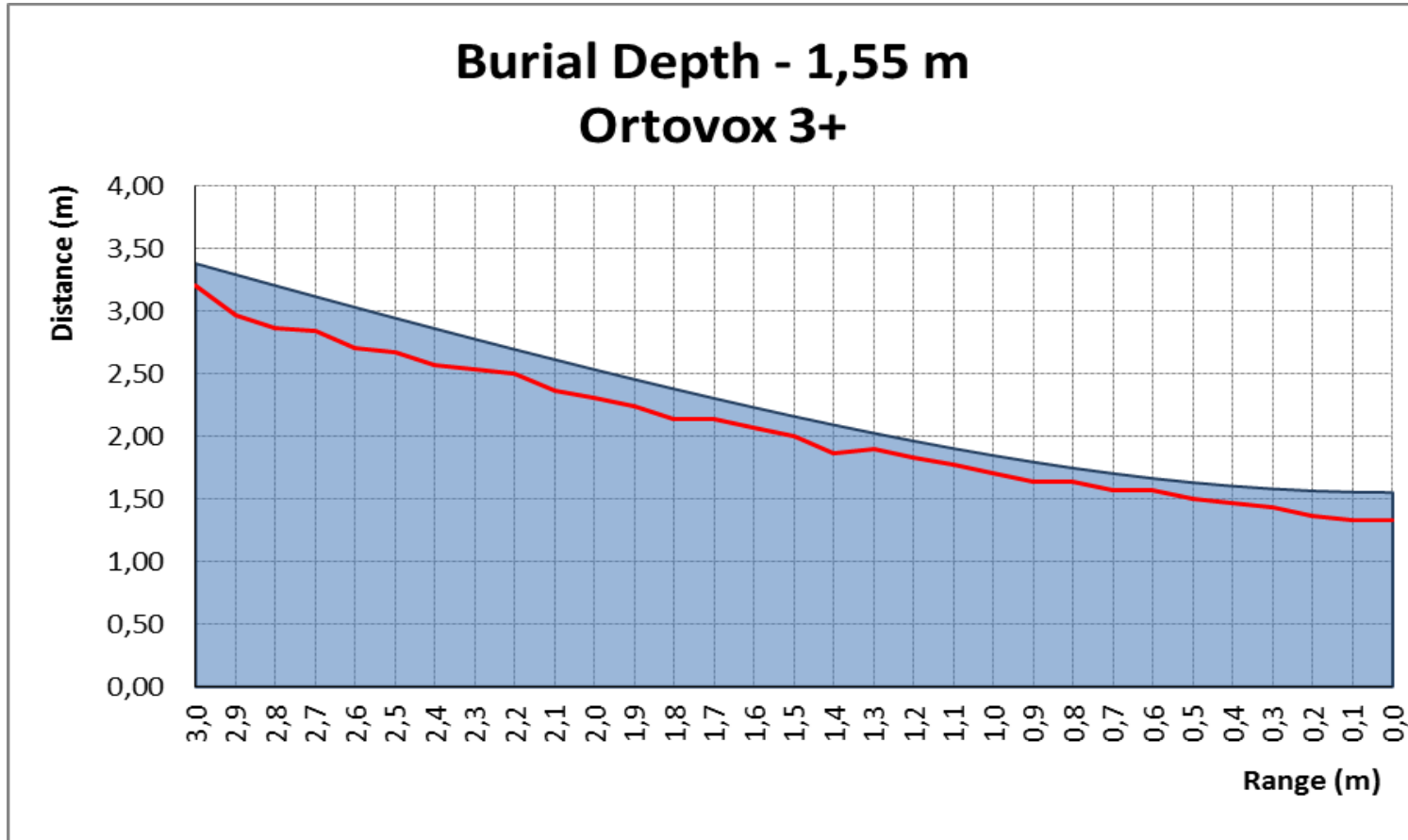
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

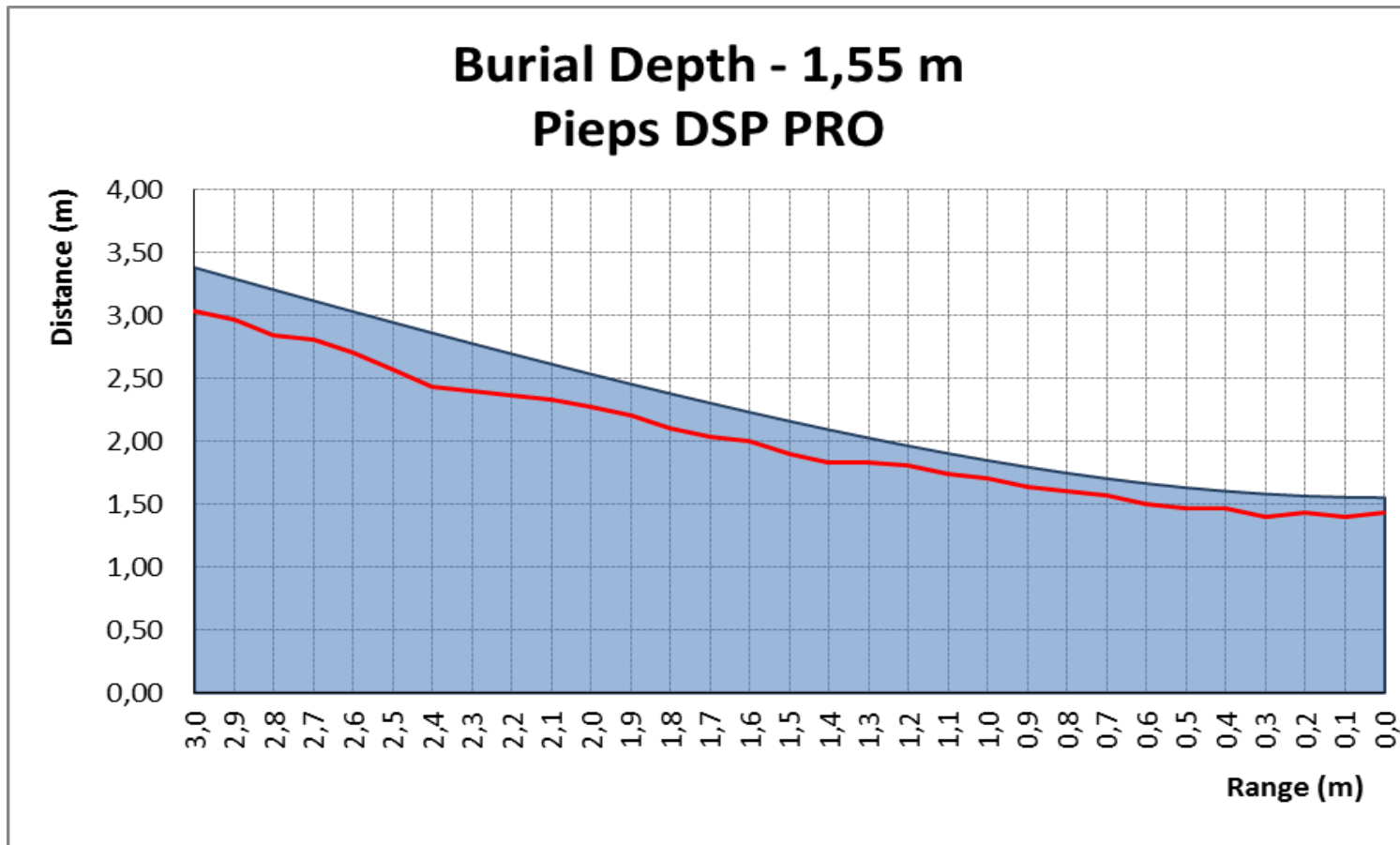
# ACCURACY TEST



**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

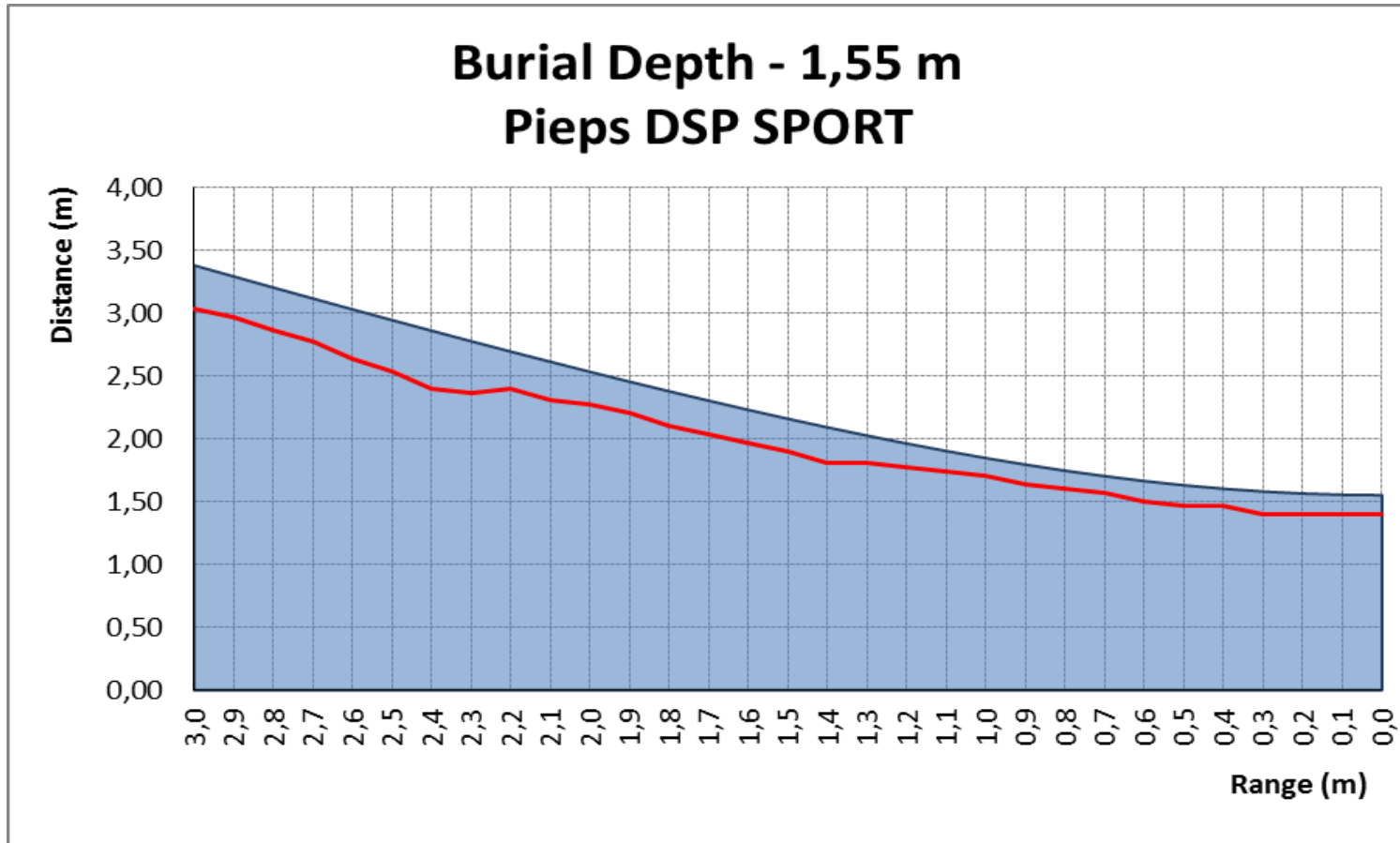


# ACCURACY TEST



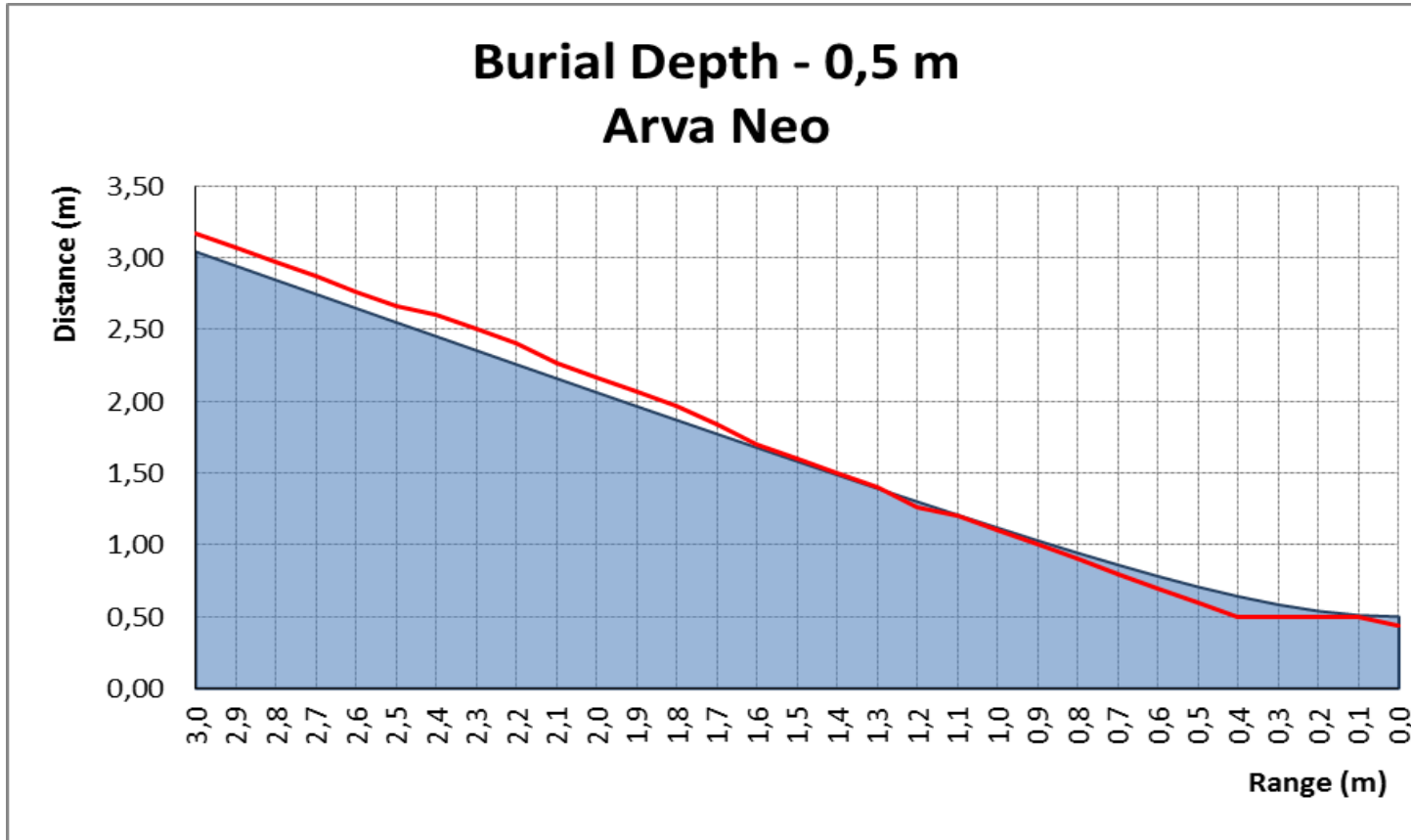
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



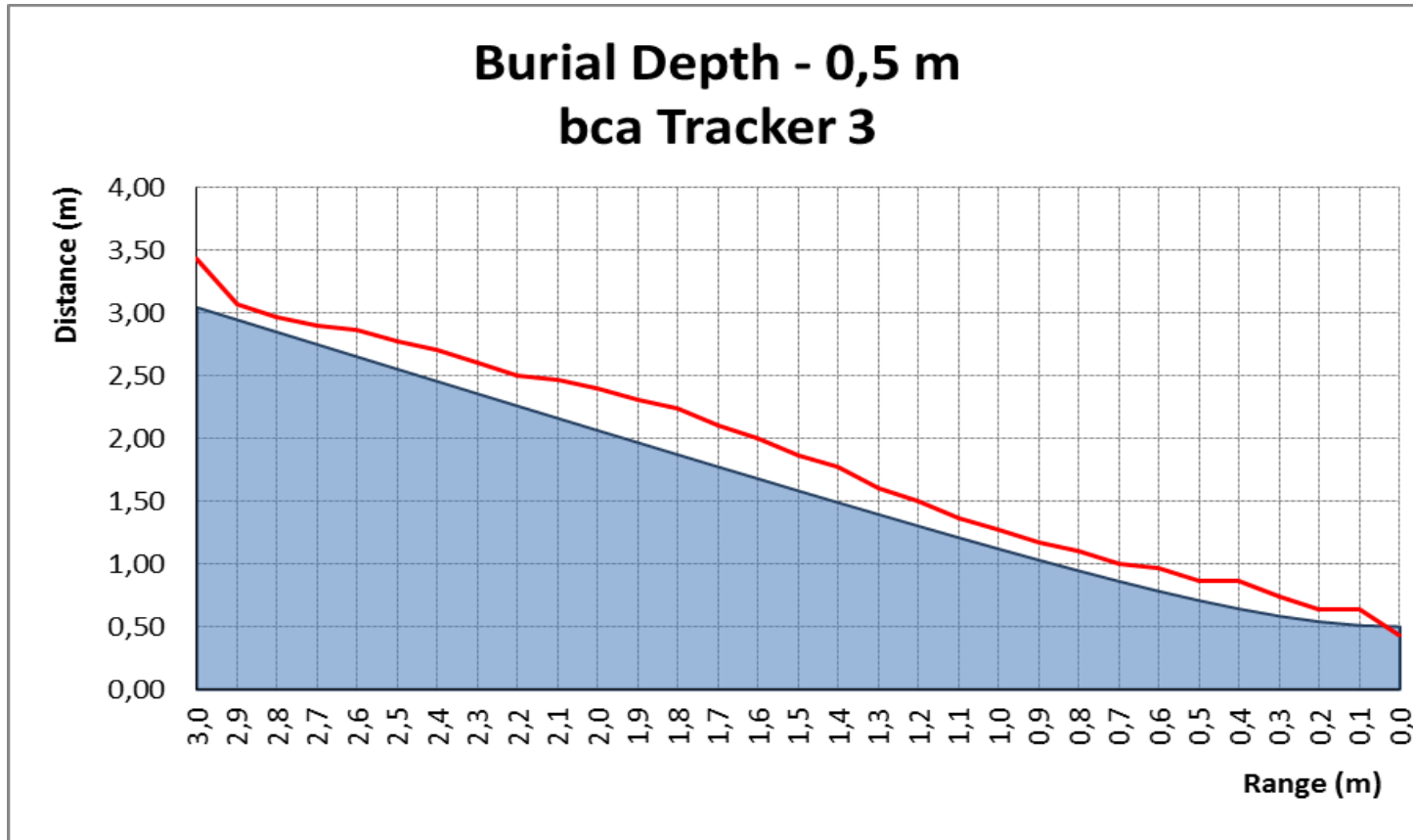
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST



MOUNTAIN RESCUE SERVICE  
AVALANCHE PREVENTION CENTER

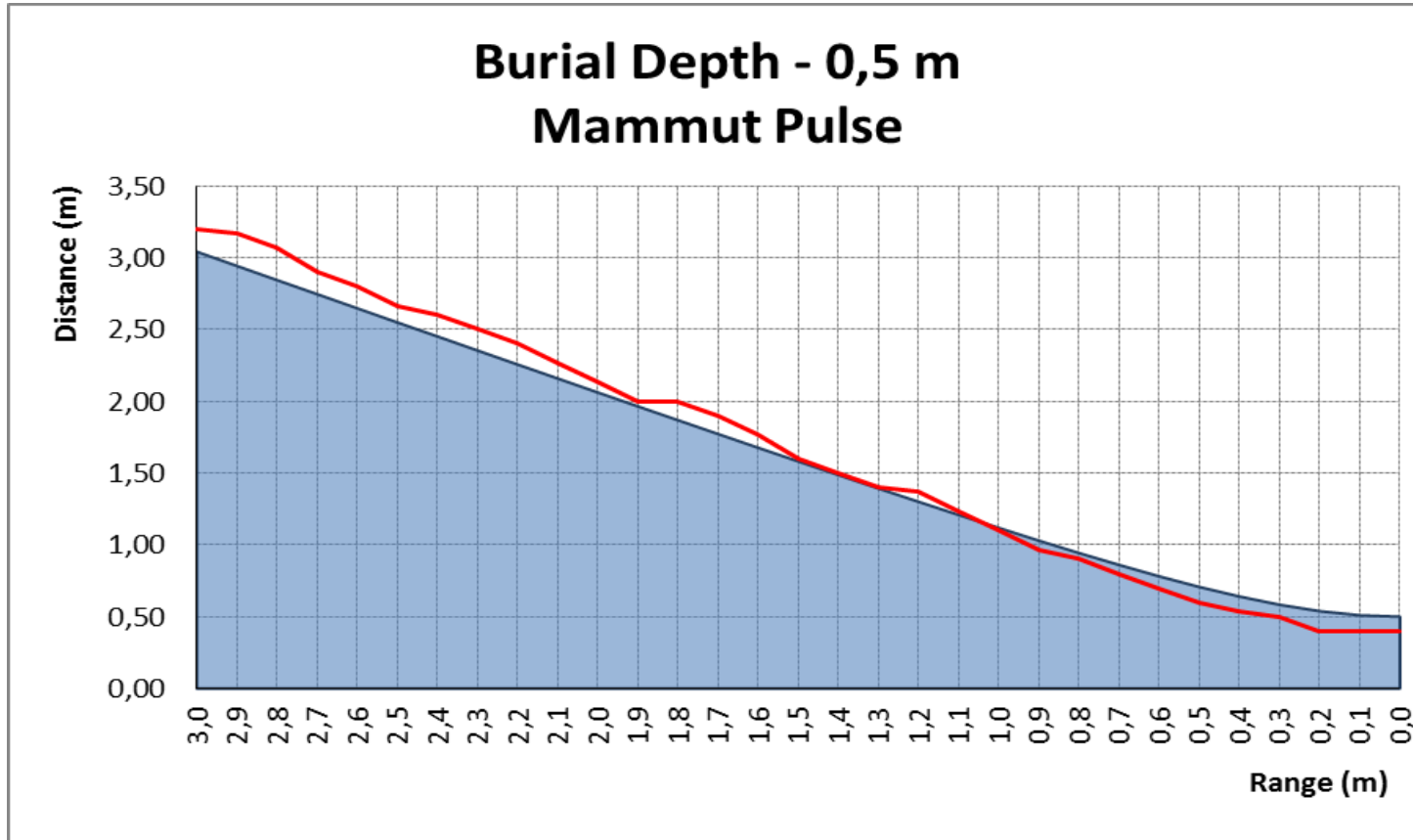
# ACCURACY TEST



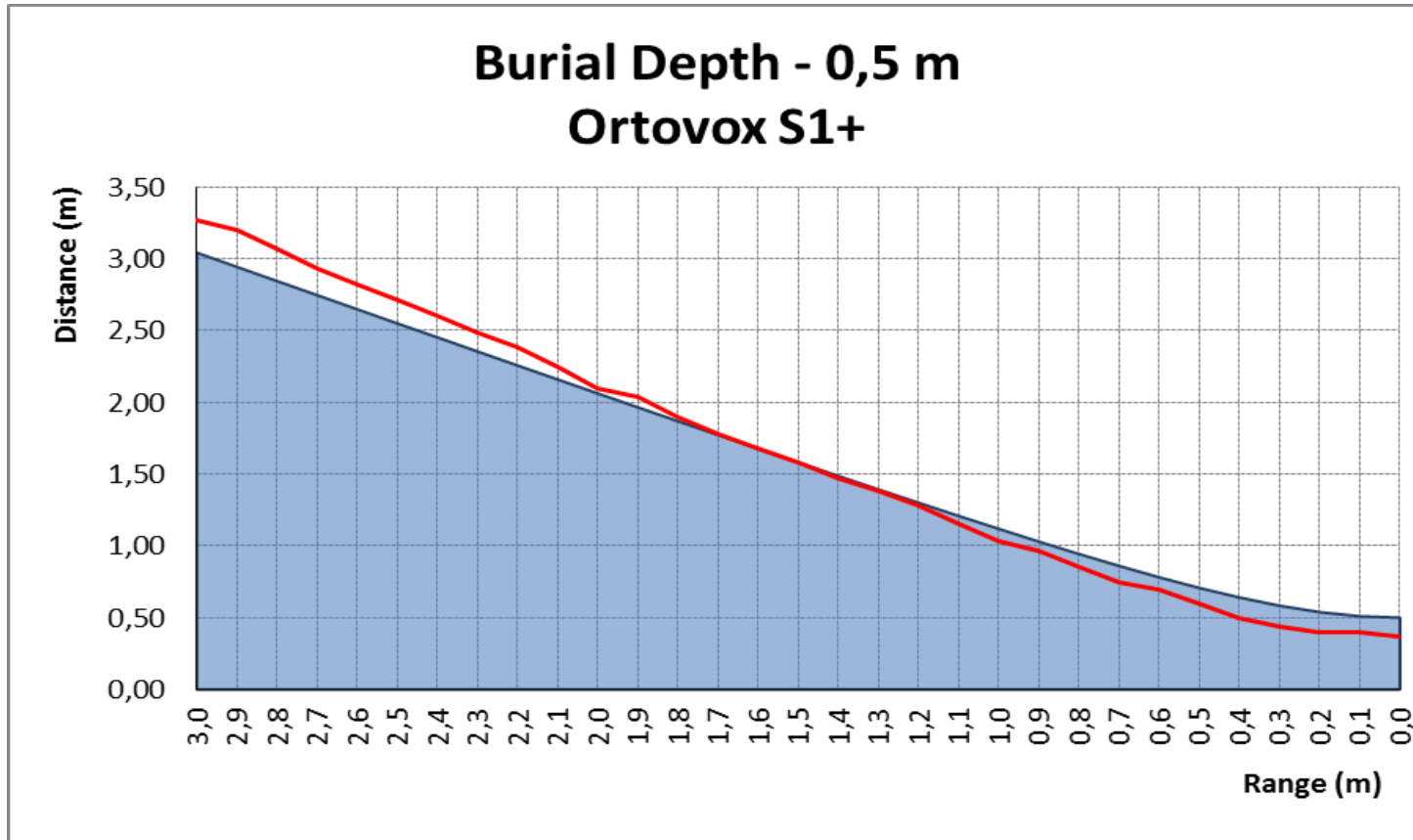
MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

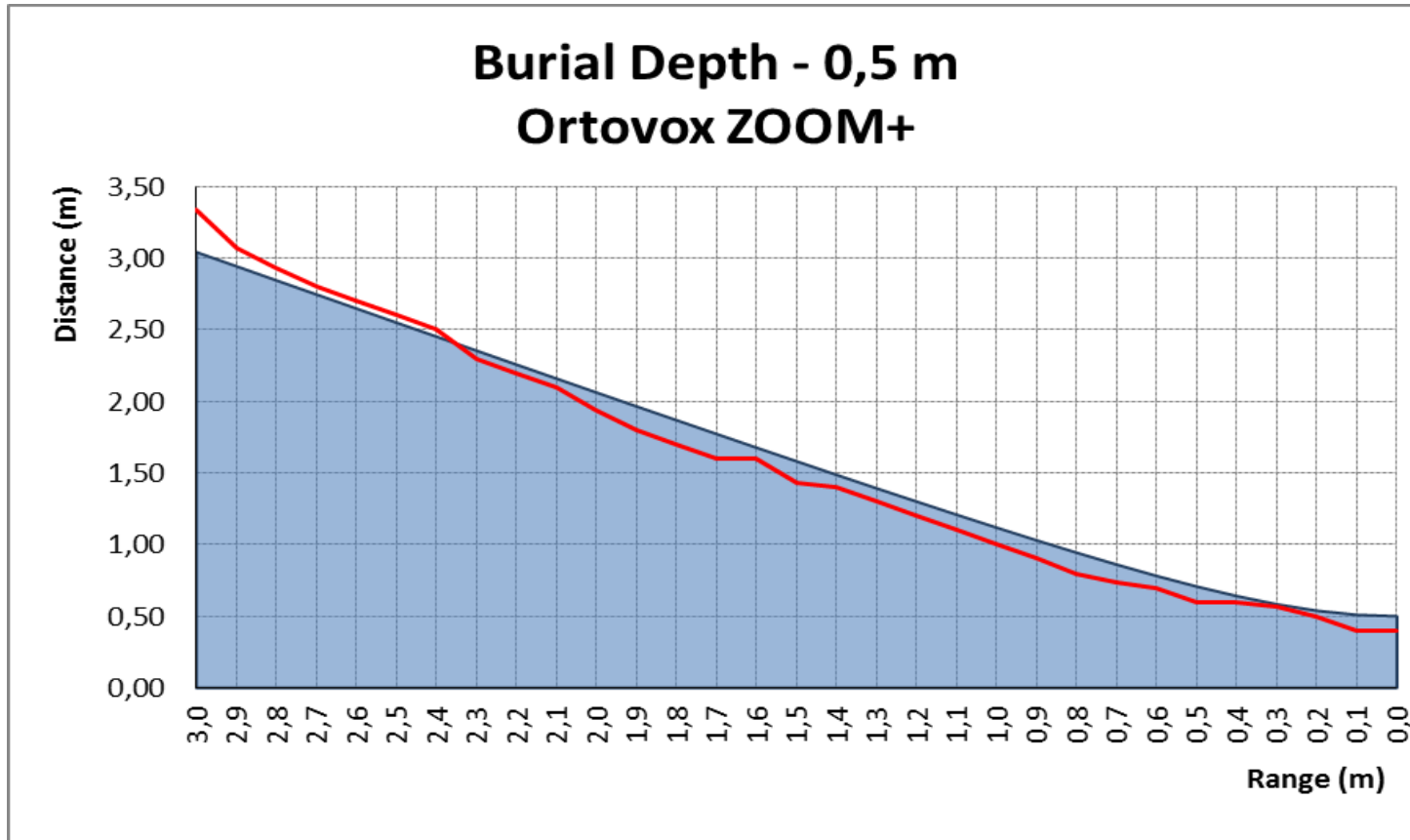
# ACCURACY TEST



# ACCURACY TEST

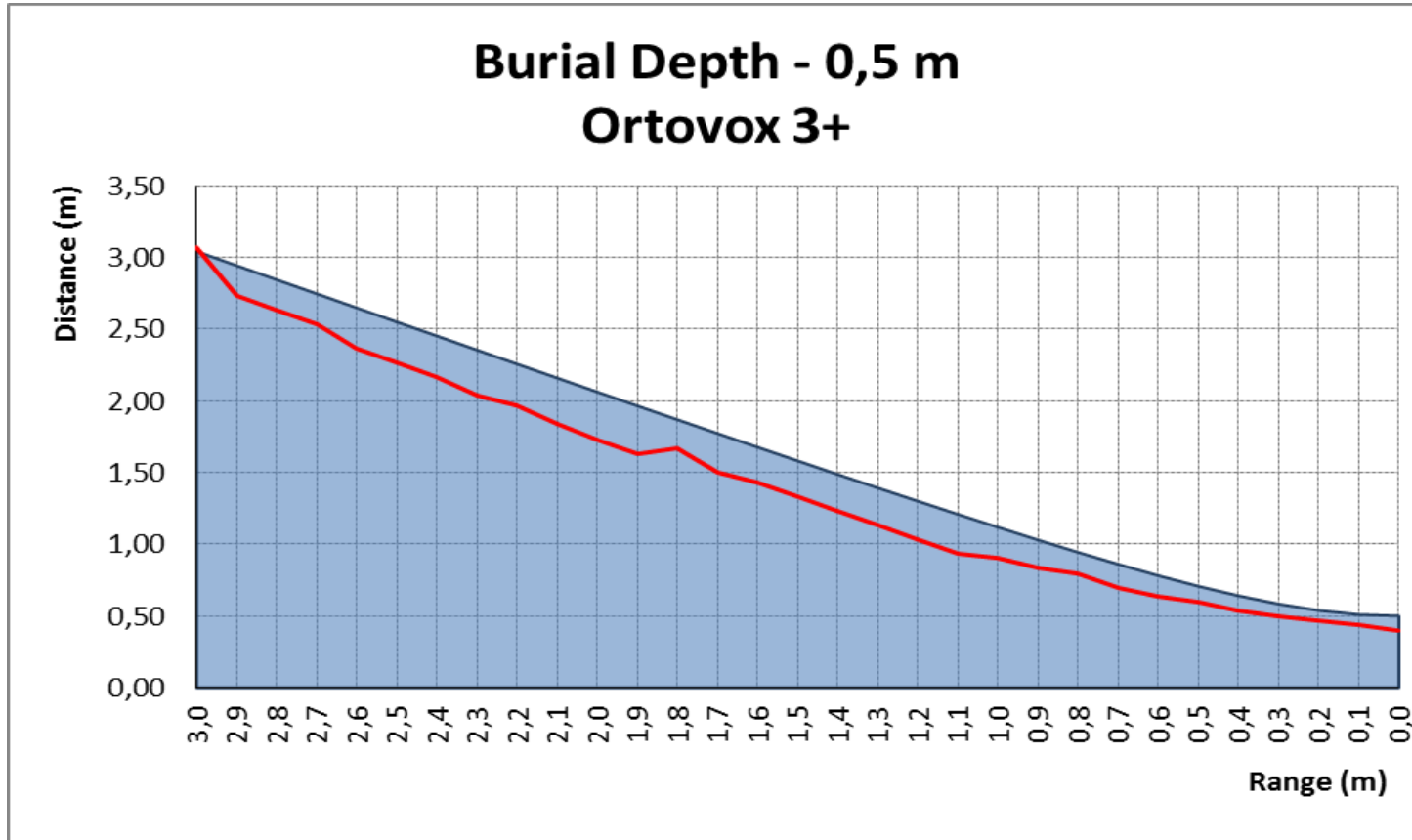


# ACCURACY TEST



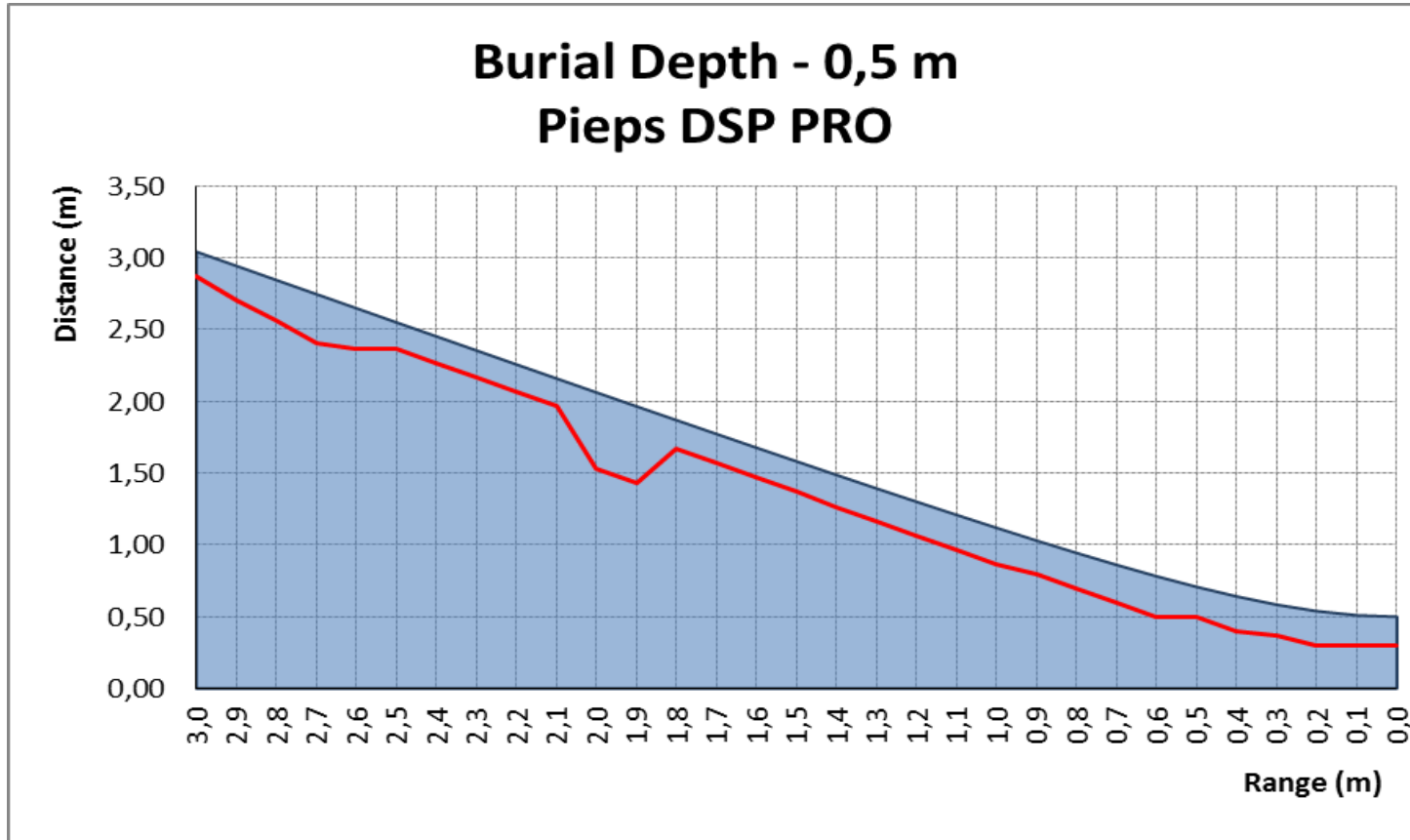
**MOUNTAIN RESCUE SERVICE**  
**AVALANCHE PREVENTION CENTER**

# ACCURACY TEST

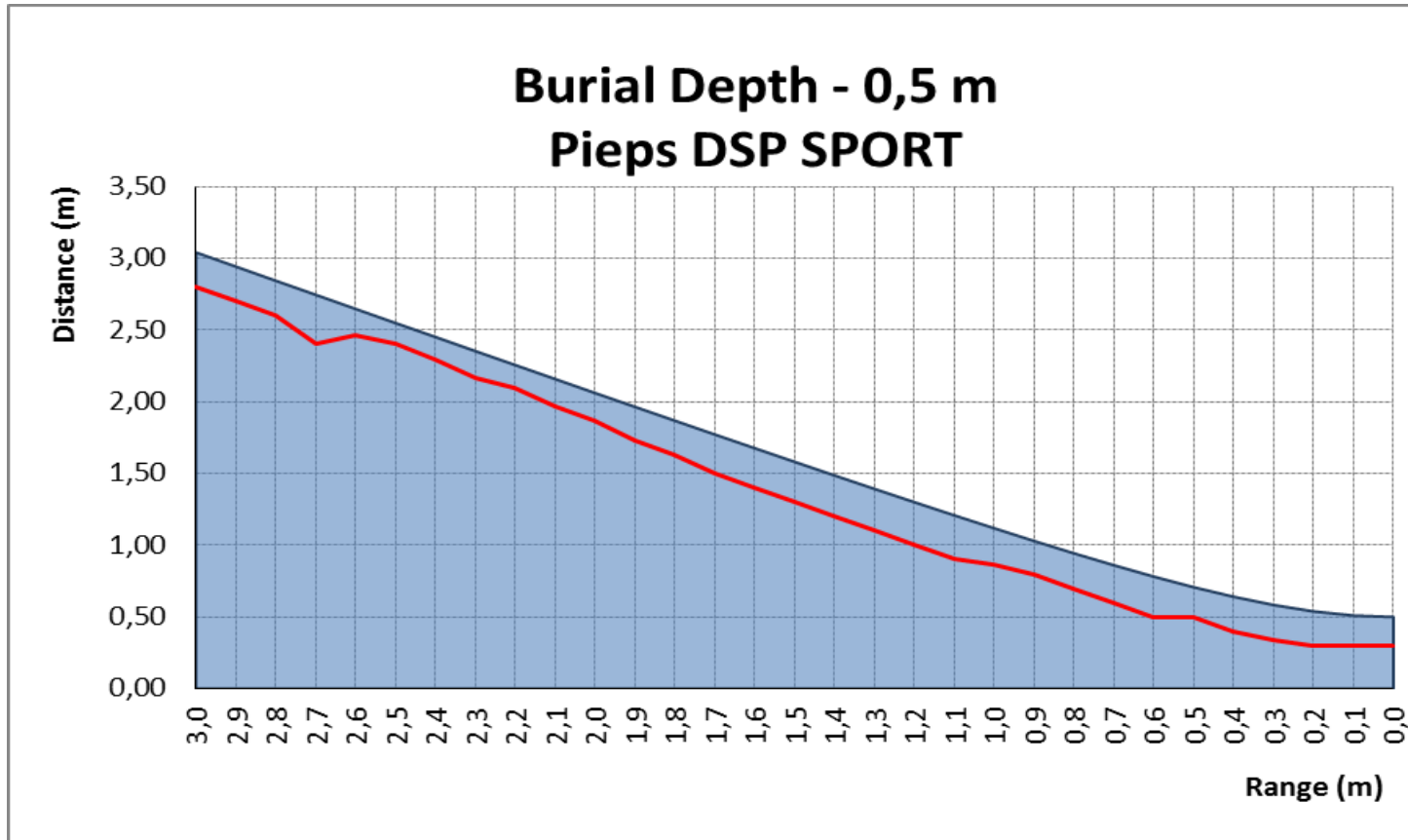




# ACCURACY TEST



# ACCURACY TEST



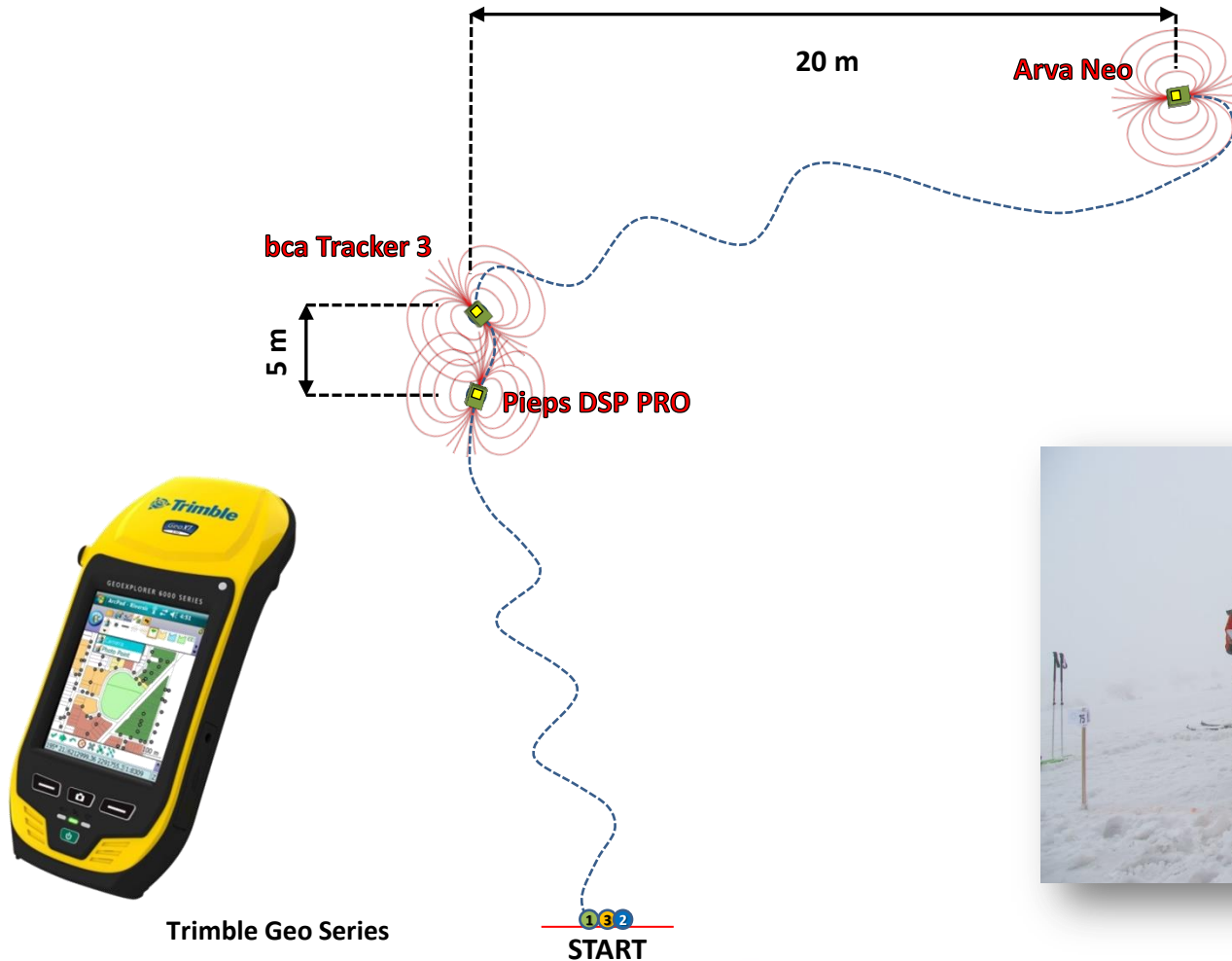
# ACCURACY TEST

## Results:

- Simply, most of the beacons has displayed shorter distance than real one, approximately 10 – 20 %.
- Keep this fact in mind when probing!



# MULTIPLE BURIAL TEST (GPS measurement)

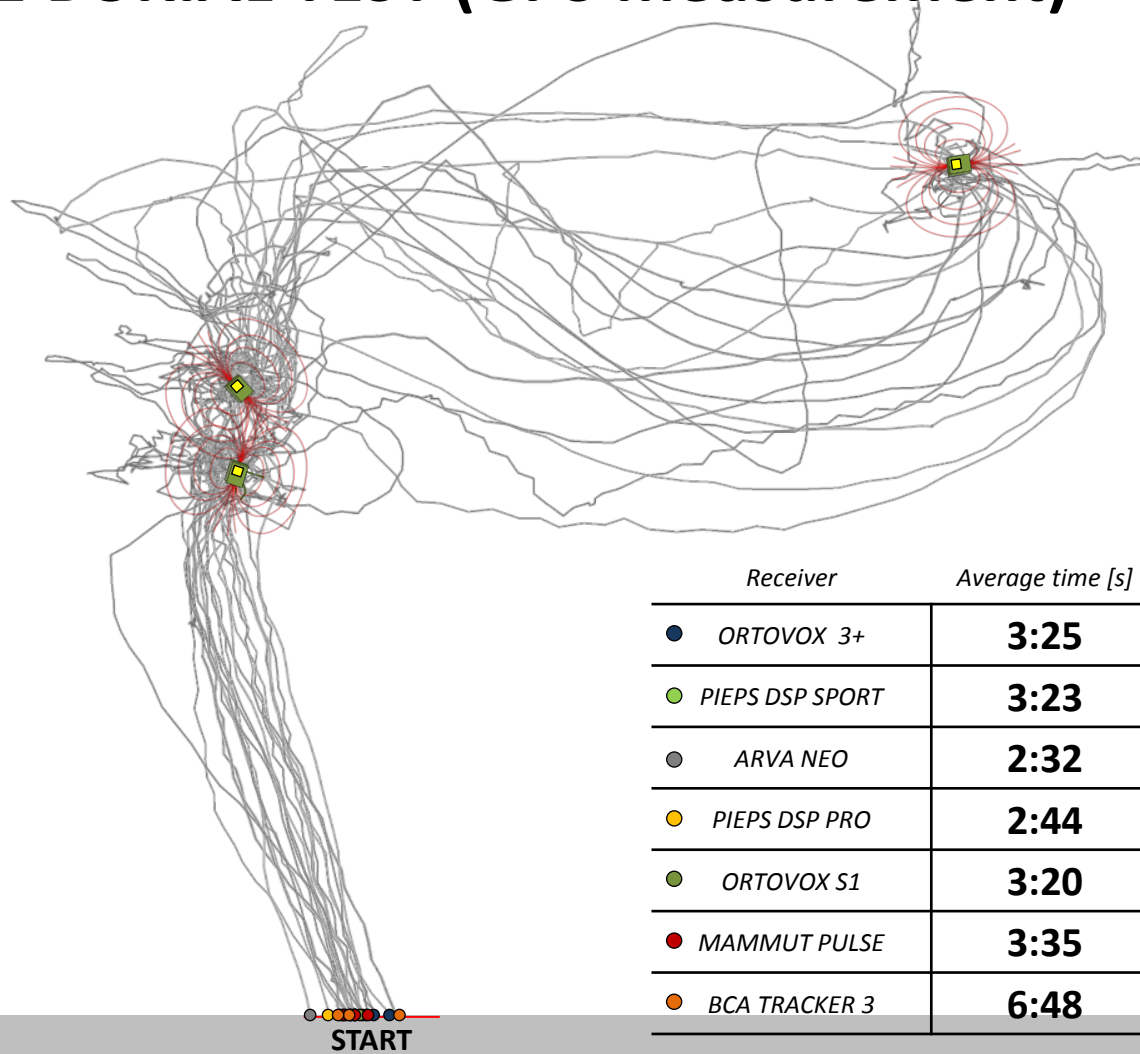


Trimble Geo Series



MOUNTAIN RESCUE SERVICE  
AVALANCHE PREVENTION CENTER

# MULTIPLE BURIAL TEST (GPS measurement)



Receiver	Average time [s]	Average Distance [m]
● ORTOVOX 3+	<b>3:25</b>	<b>90</b>
● PIEPS DSP SPORT	<b>3:23</b>	<b>91</b>
● ARVA NEO	<b>2:32</b>	<b>91</b>
● PIEPS DSP PRO	<b>2:44</b>	<b>94</b>
● ORTOVOX S1	<b>3:20</b>	<b>106</b>
● MAMMUT PULSE	<b>3:35</b>	<b>113</b>
● BCA TRACKER 3	<b>6:48</b>	<b>151</b>

# MULTIPLE BURIAL TEST (GPS measurement)

Results:

- All beacons have found all 3 buried beacons except bca Tracker 3. Marking function has been improved!
- This result is a major improvement regarding results of 2011 testing!
- bca Tracker 3 is able to mark only once at a time!



MOUNTAIN RESCUE SERVICE

AVALANCHE PREVENTION CENTER

# CONCLUSIONS

## RANGE TEST

- Improvement only in Y axis
- Differences between real distance and displayed one is bigger then in 2011 Test
- **Width of search strip is misleading according to manuals**

## DIRECTION TEST

- Unfavourable position Z axis without change

## ACCURACY TEST

- Without major changes

## MULTIBURIAL TEST

- Over all improvement, all buried beacons detected. Different marking function manufacturer approach causes time delay (bca)





**Know your beacon and read the manual!**



**MOUNTAIN RESCUE SERVICE**

**AVALANCHE PREVENTION CENTER**