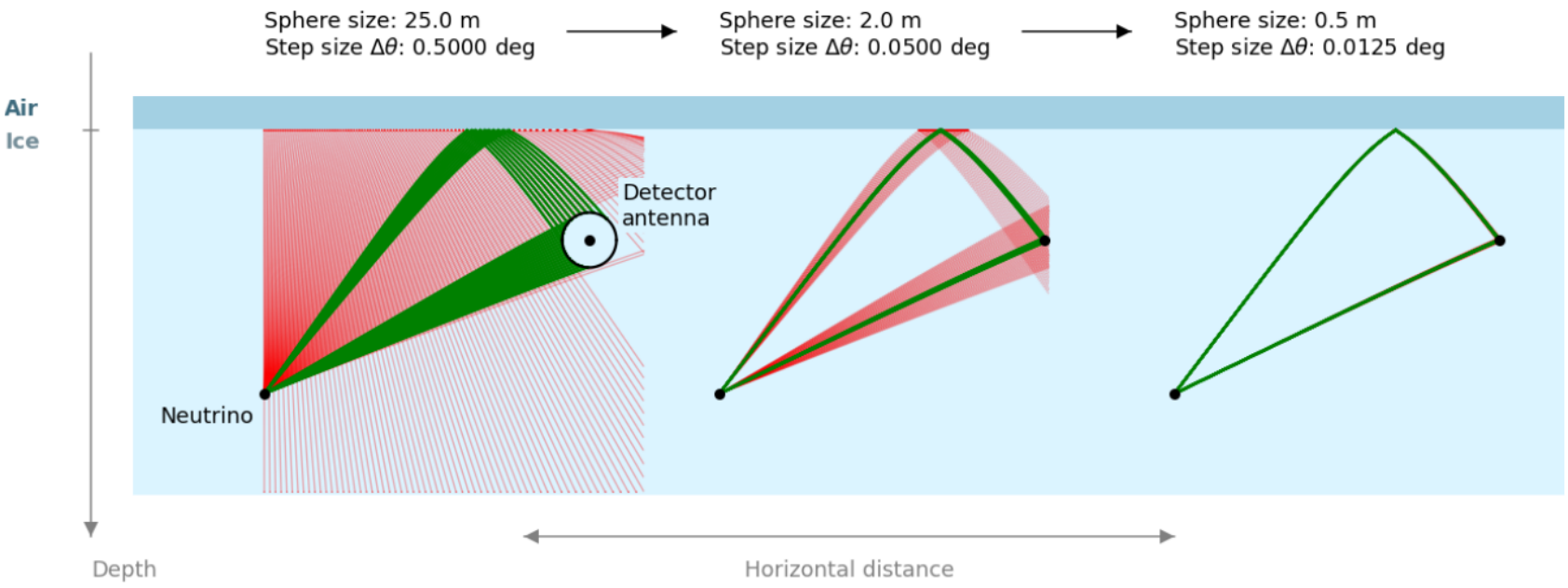
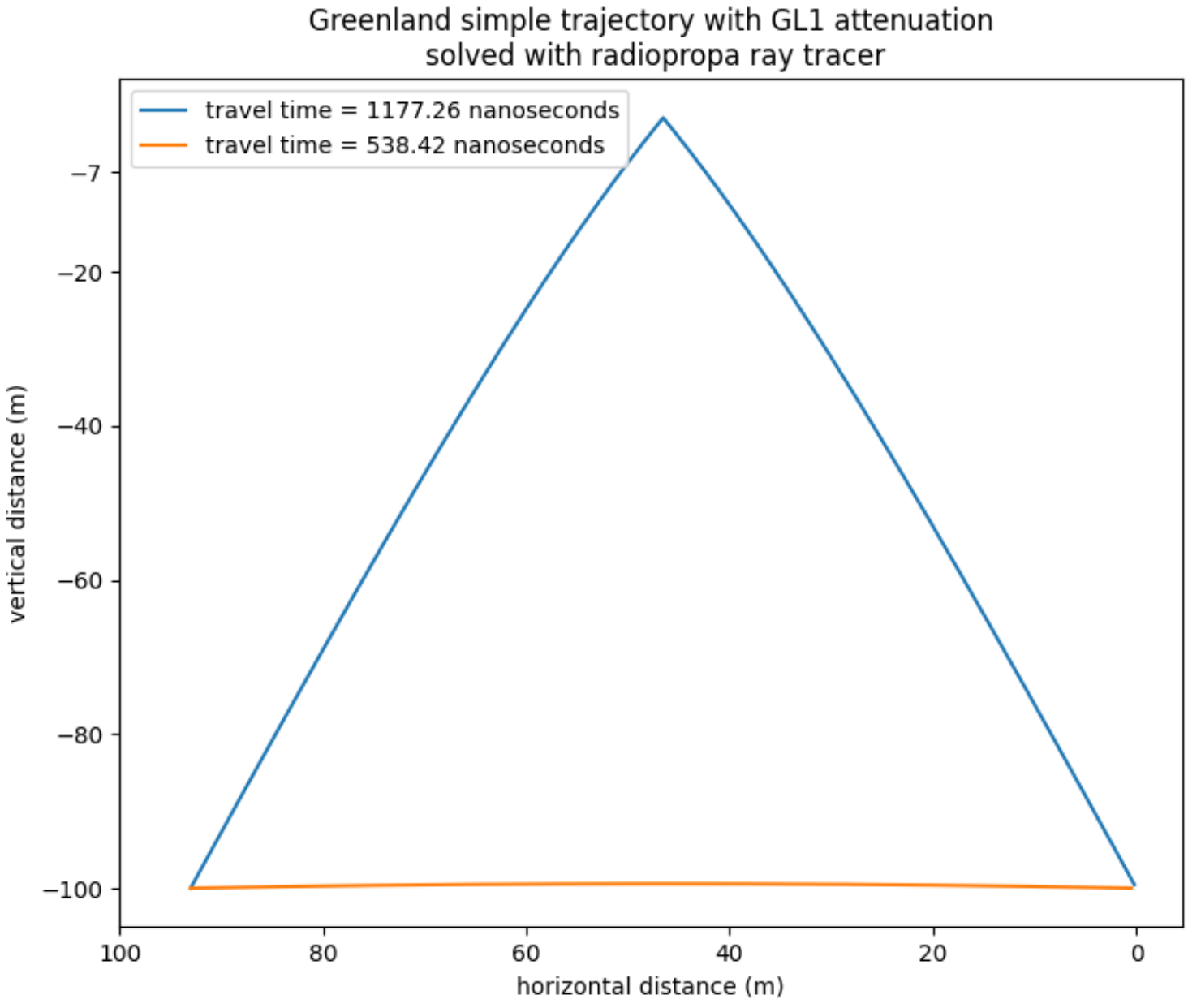
Hybrid ray tracer

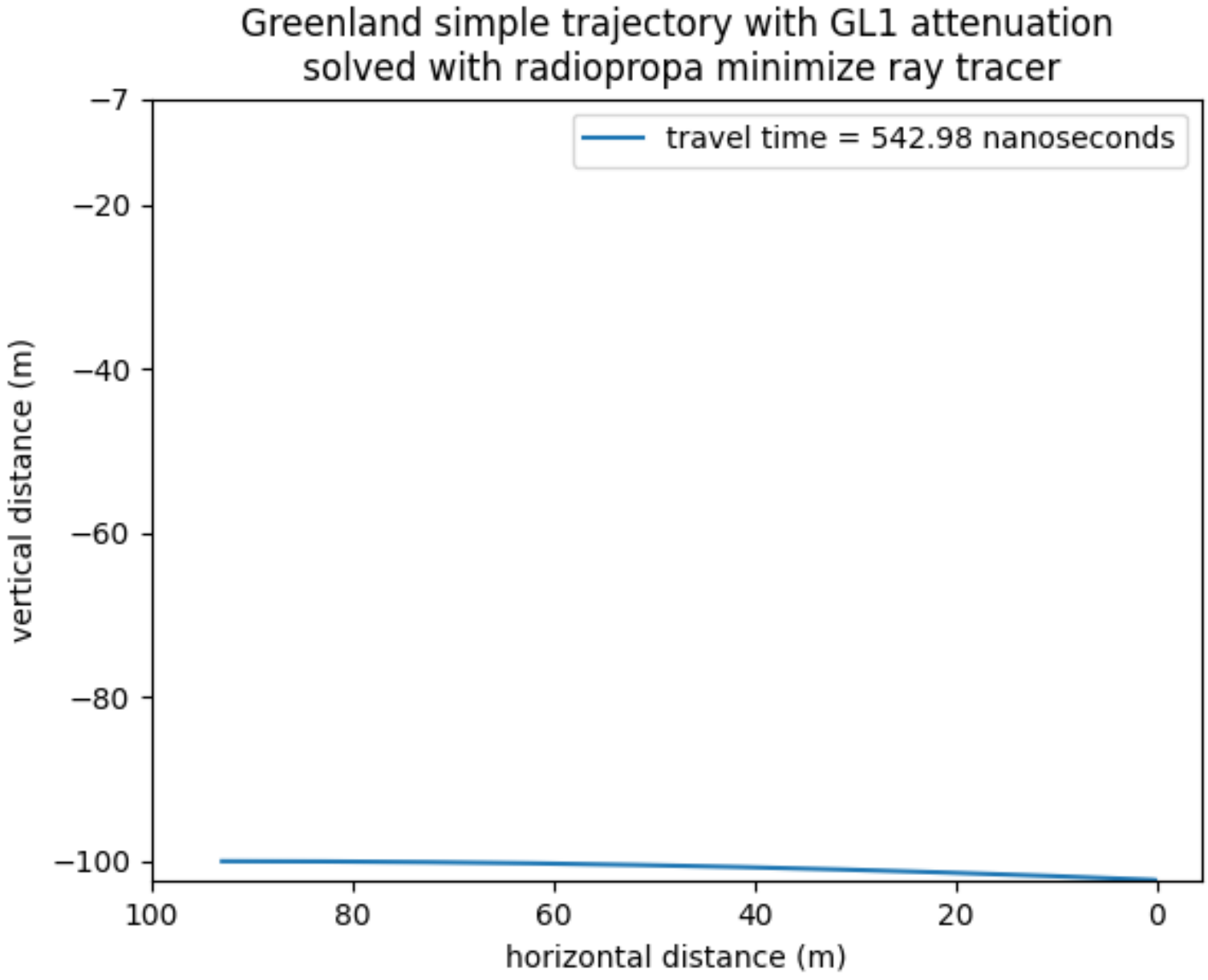
October 25, 2022

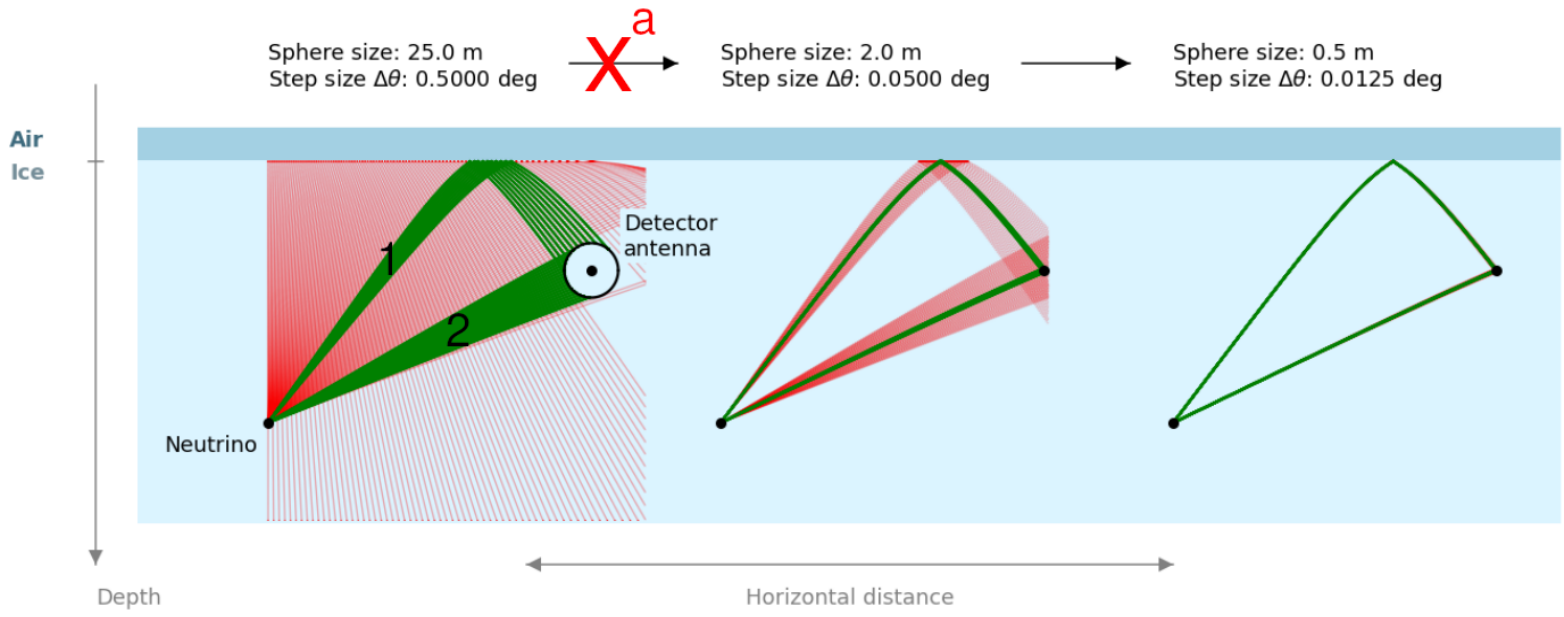
Iterative ray tracer



Python: Slow ($\approx$ 300 Times the execution time of C++)
Solution: scipy.optimize.minimize

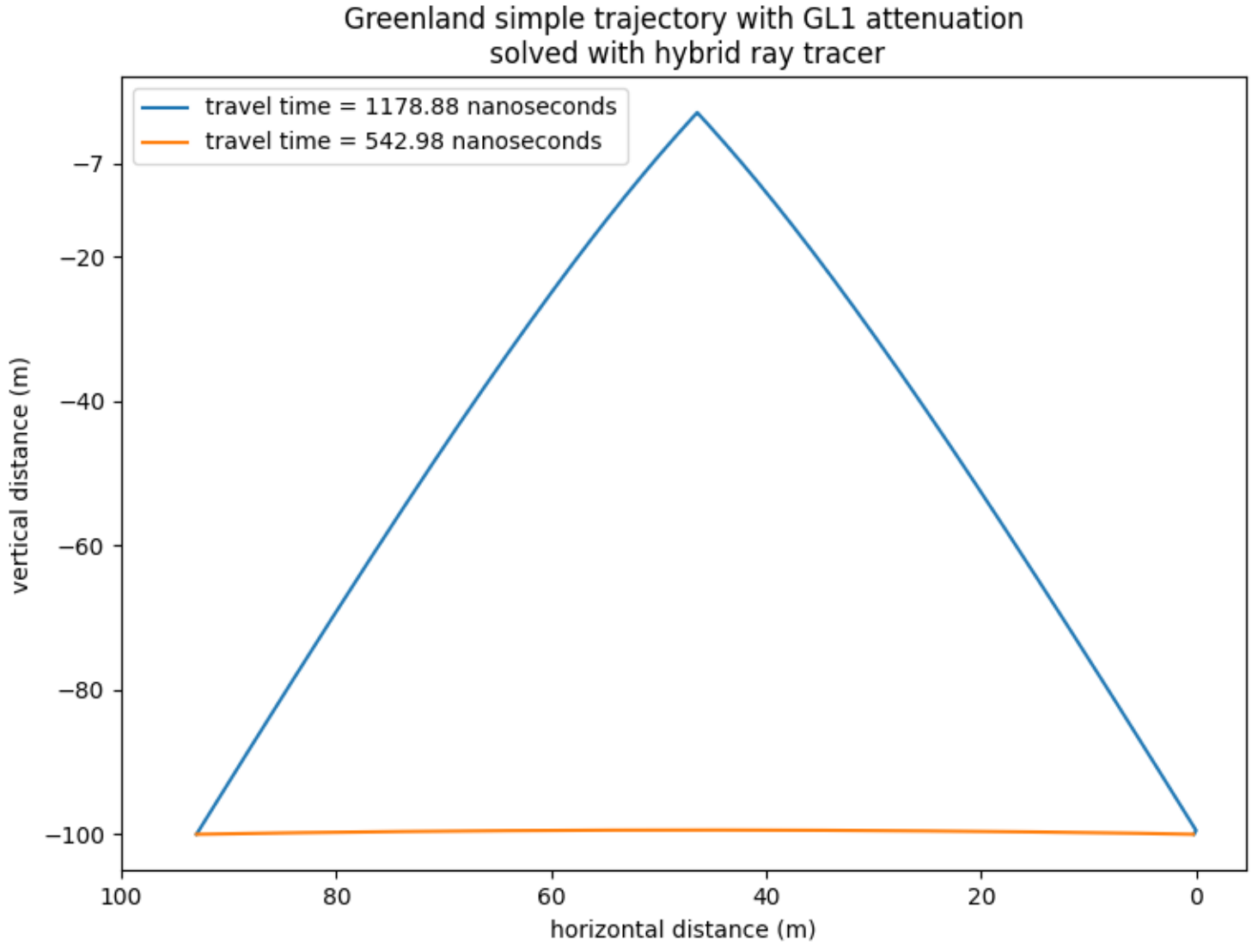

Greenland simple trajectory with GL1 attenuation
solved with radiopropa ray tracer
travel time = 1177.26 nanoseconds
travel time = 538.42 nanoseconds
−7
−20
−40
−60
−80
−100
vertical distance (m)
100
80
60
40
20
0
horizontal distance (m)

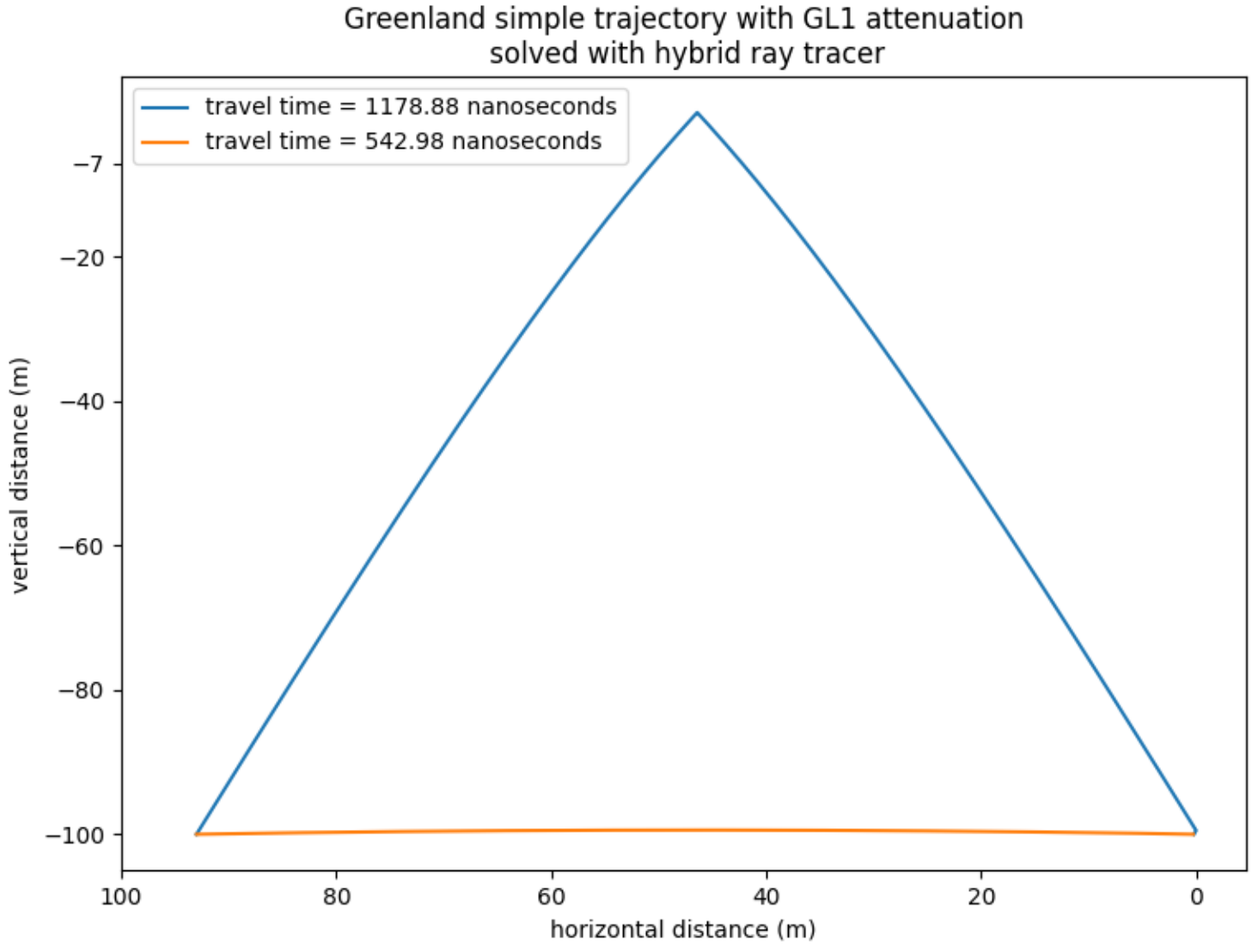

Greenland simple trajectory with GL1 attenuation
solved with radiopropa minimize ray tracer
travel time = 542.98 nanoseconds
vertical distance (m)
−7
−20
−40
−60
−80
−100
100
80
60
40
20
0
horizontal distance (m)

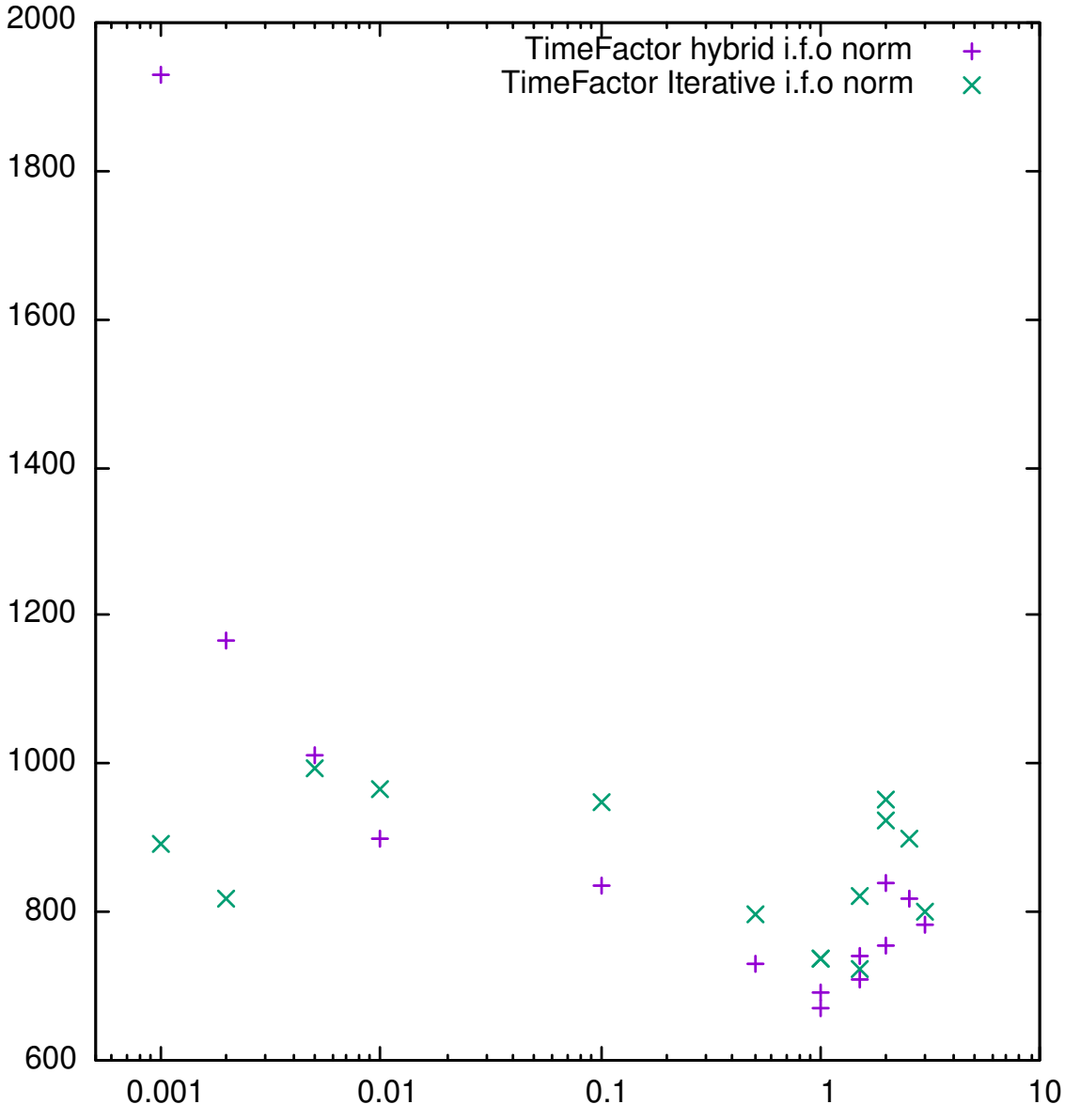


a

process is broken out of as 2 distinct launch regions (region 1 & 2) are found.


Greenland simple trajectory with GL1 attenuation
solved with hybrid ray tracer
travel time = 1178.88 nanoseconds
travel time = 542.98 nanoseconds
−7
−20
−40
−60
−80
−100
vertical distance (m)
100
80
60
40
20
0
horizontal distance (m)


Greenland simple trajectory with GL1 attenuation
solved with hybrid ray tracer
travel time = 1178.88 nanoseconds
travel time = 542.98 nanoseconds
−7
−20
−40
−60
−80
−100
vertical distance (m)
100
80
60
40
20
0
horizontal distance (m)


TimeFactor hybrid i.f.o norm
TimeFactor Iterative i.f.o norm
2000
1800
1600
1400
1200
1000
800
600
0.001
0.01
0.1
1
10

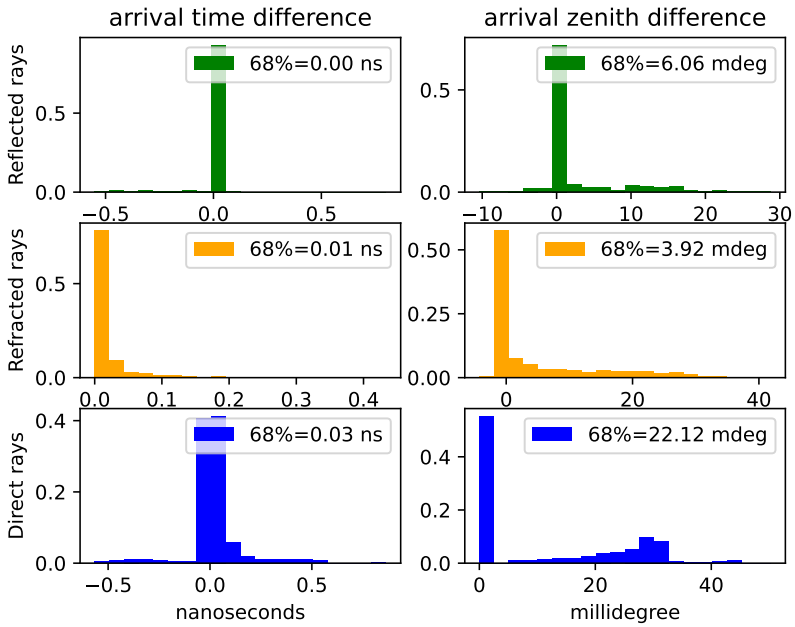


Figure: Hybrid

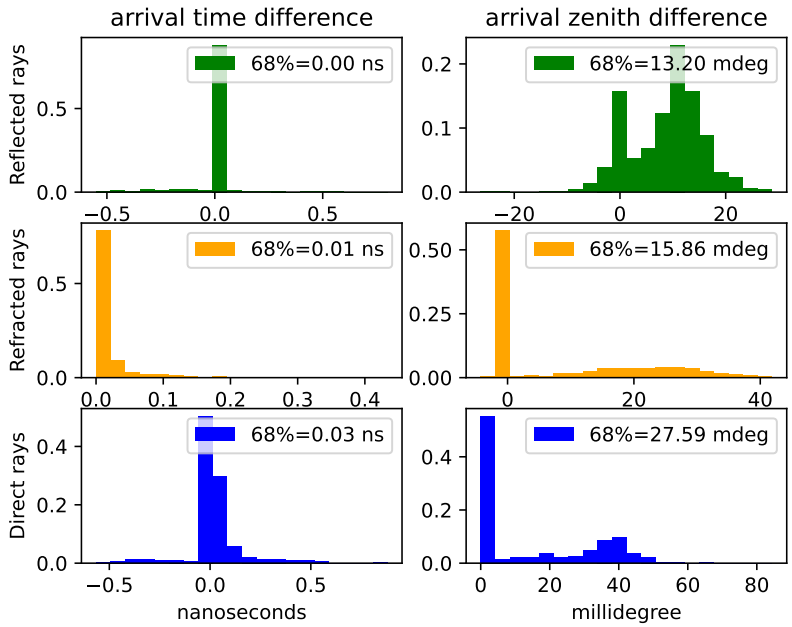


Figure: Iterative

Whilst $\approx 10\%$ faster