ITU World Radiocommunication Seminar

Additional Software tools

2-6 December 2024, Geneva, Switzerland

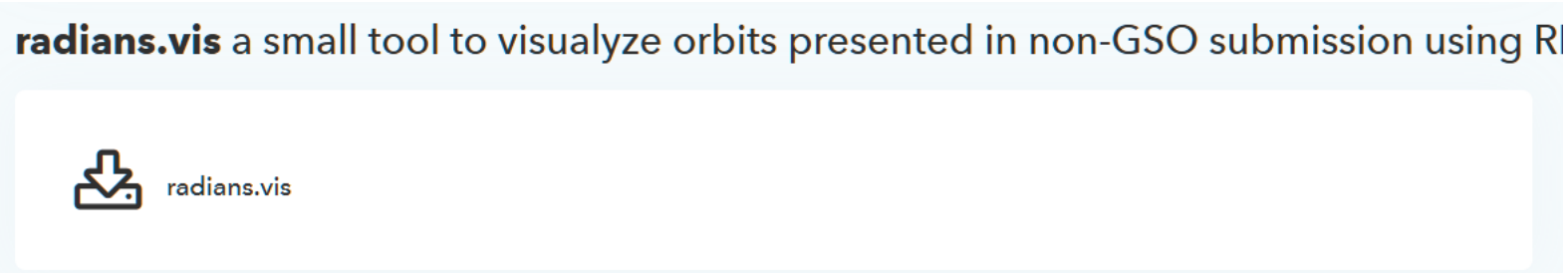
Additional software tools

Orbit simulation

radians.vis

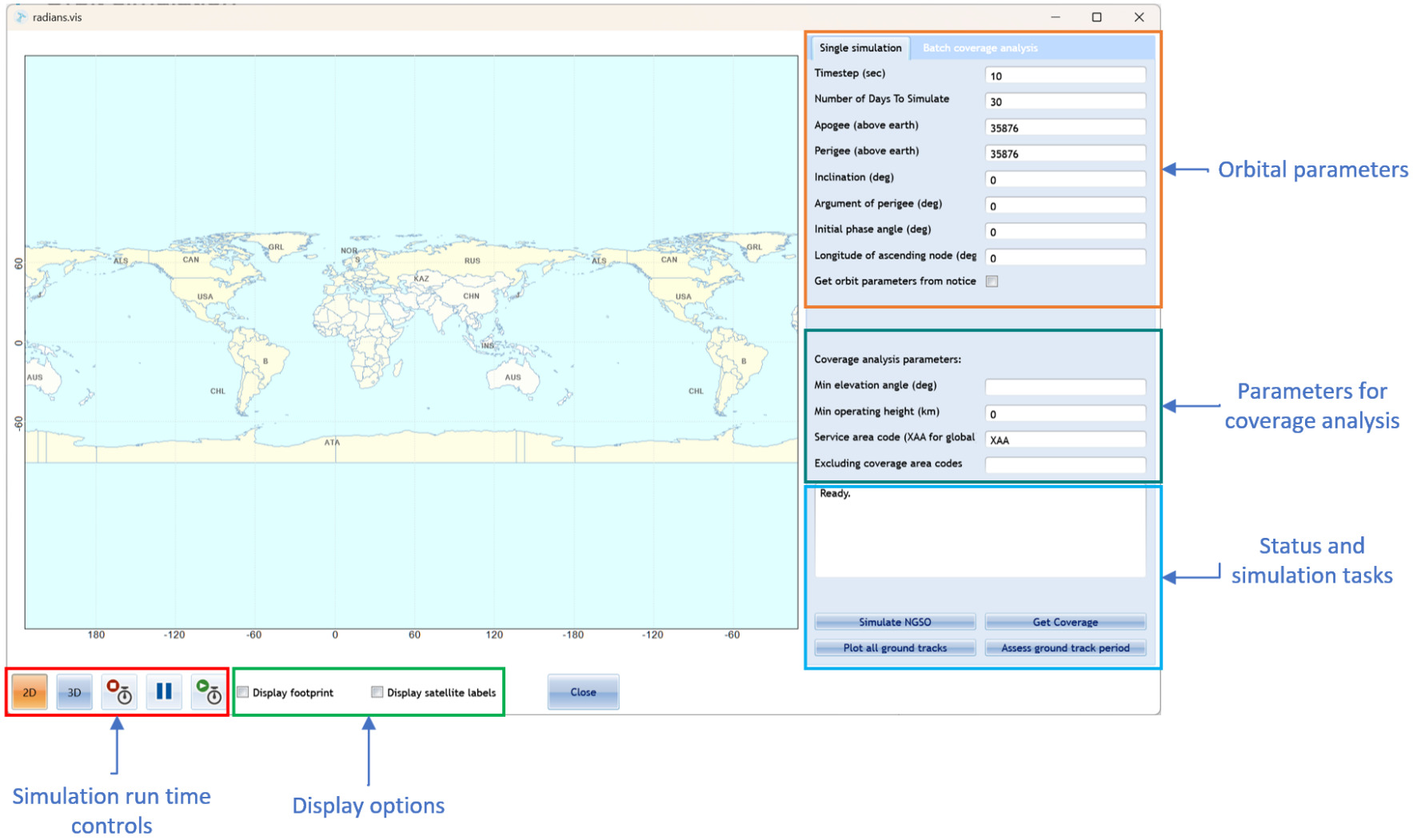
Small tool used to provide orbit visualization of non-GSO system using RR Appendix 4 data elements.

1. Download radians.vis from https://www.itu.int/epfdsupport/resources/



2. Run radians.vis.Install.exe to install it.
3. Run radians.vis from Start Menu

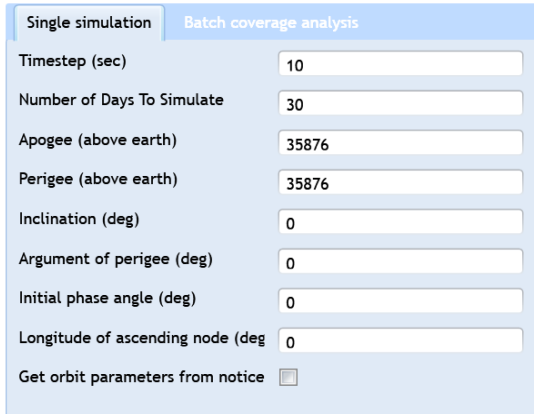
Overview of interface



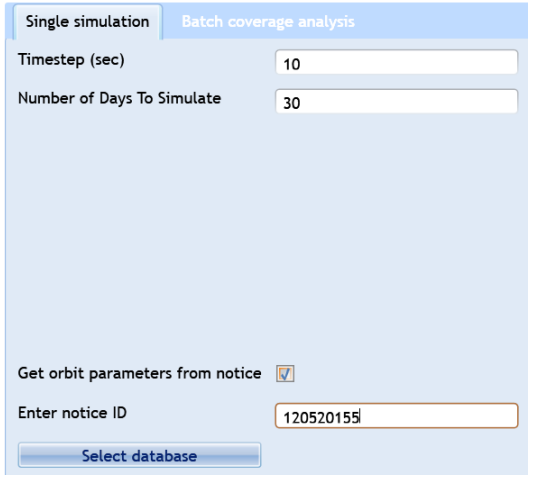
Orbital parameters

Two modes of operation:

a) Define orbital parameters of a single satellite



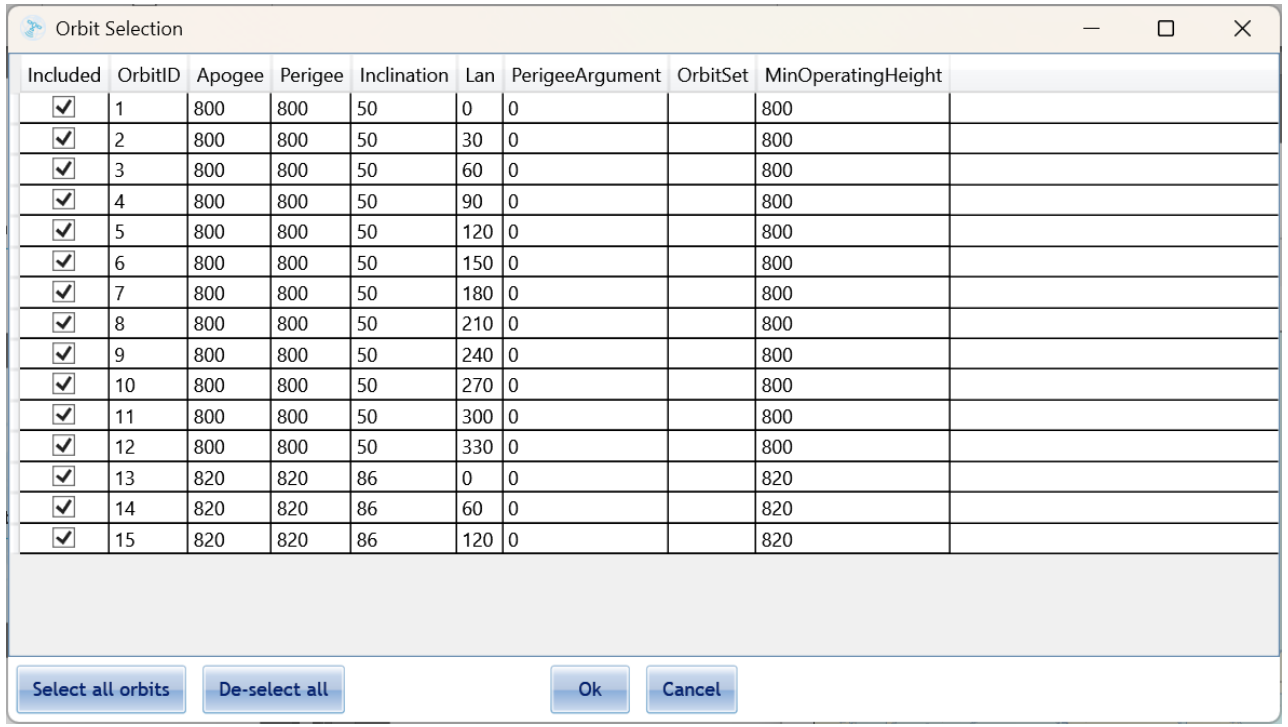
b) Read orbital parameters from the SRS database (BR IFIC)



Orbital parameters from the notice

When option is selection ‘Get orbit parameters from notice’

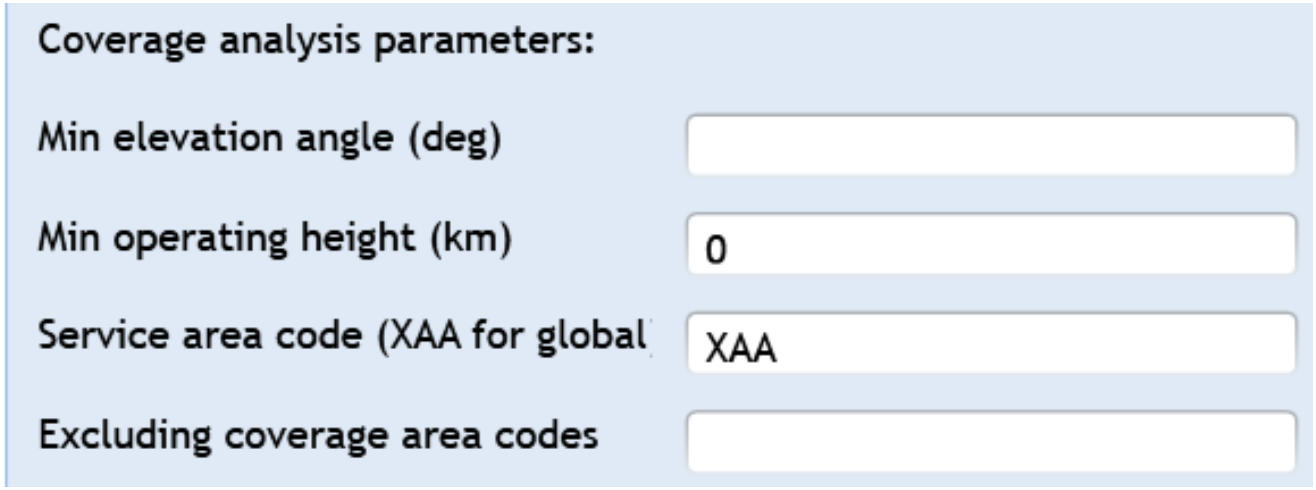
1. Select source database
2. Enter notice ID
3. Select orbits do use in simulation:



Included	OrbitID	Apogee	Perigee	Inclination	Lan	PerigeeArgument	OrbitSet	MinOperatingHeight
☑	1	800	800	50	0	0		800
☑	2	800	800	50	30	0		800
☑	3	800	800	50	60	0		800
☑	4	800	800	50	90	0		800
☑	5	800	800	50	120	0		800
☑	6	800	800	50	150	0		800
☑	7	800	800	50	180	0		800
☑	8	800	800	50	210	0		800
☑	9	800	800	50	240	0		800
☑	10	800	800	50	270	0		800
☑	11	800	800	50	300	0		800
☑	12	800	800	50	330	0		800
☑	13	820	820	86	0	0		820
☑	14	820	820	86	60	0		820
☑	15	820	820	86	120	0		820

Coverage analysis parameters

1. Min elevation angle – to define minimum elevation angle at which satellite would transmit/receive
2. Min operating height – for non-circular orbits defines minimum operating height above which satellite transmits
3. Service area code – define service area using ITU Space Preface codes
   There could be multiple codes. For example, “UZB KAZ TJK”
4. Excluding coverage area codes. Additional option to indicate that a satellite would not transmit when in visibility from any country indicated in this field.



Simulation tasks

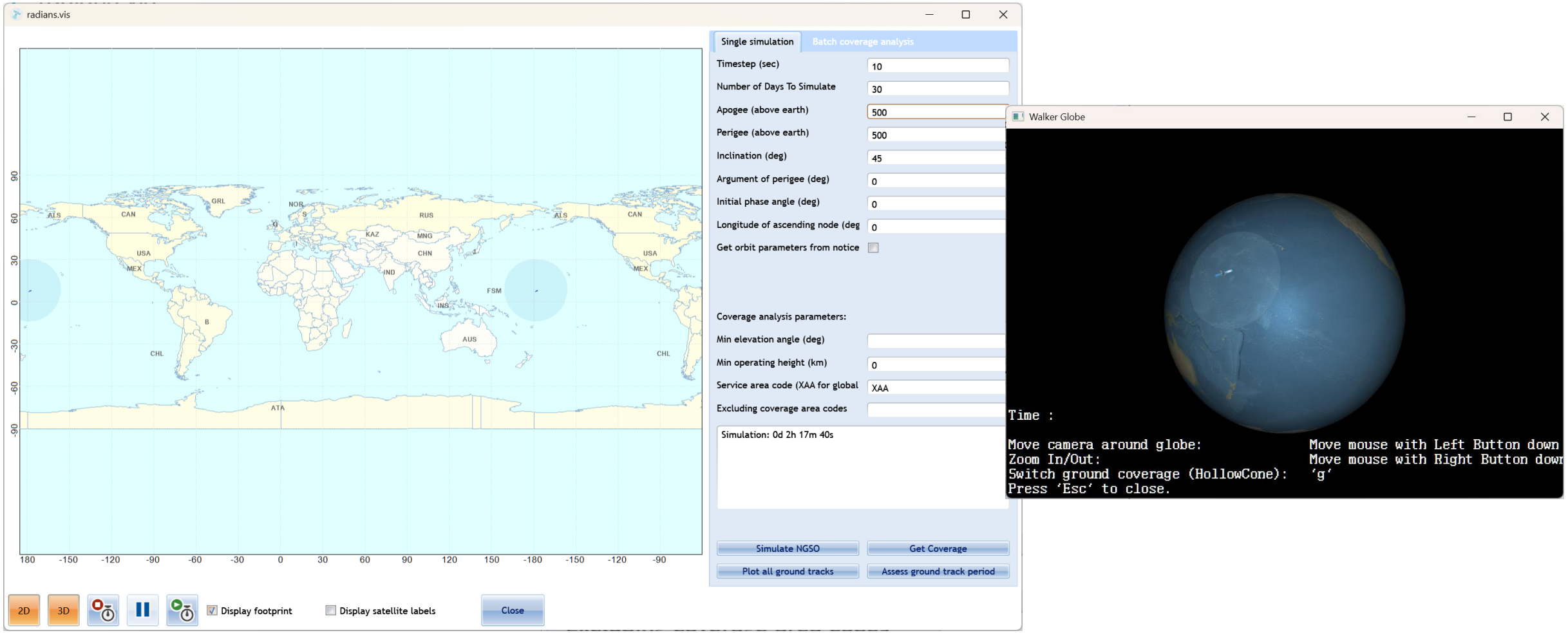
1. Simulate NGSO – run orbit simulation and display dynamic position of the satellite(s)
2. Get coverage – conduct coverage analysis using coverage analysis parameters and display countries covered by the satellite(s)
3. Plot all ground tracks – run orbit simulation and plot all ground tracks
4. Asses ground track period – estimate a period when ground tracks will repeat

Additional options

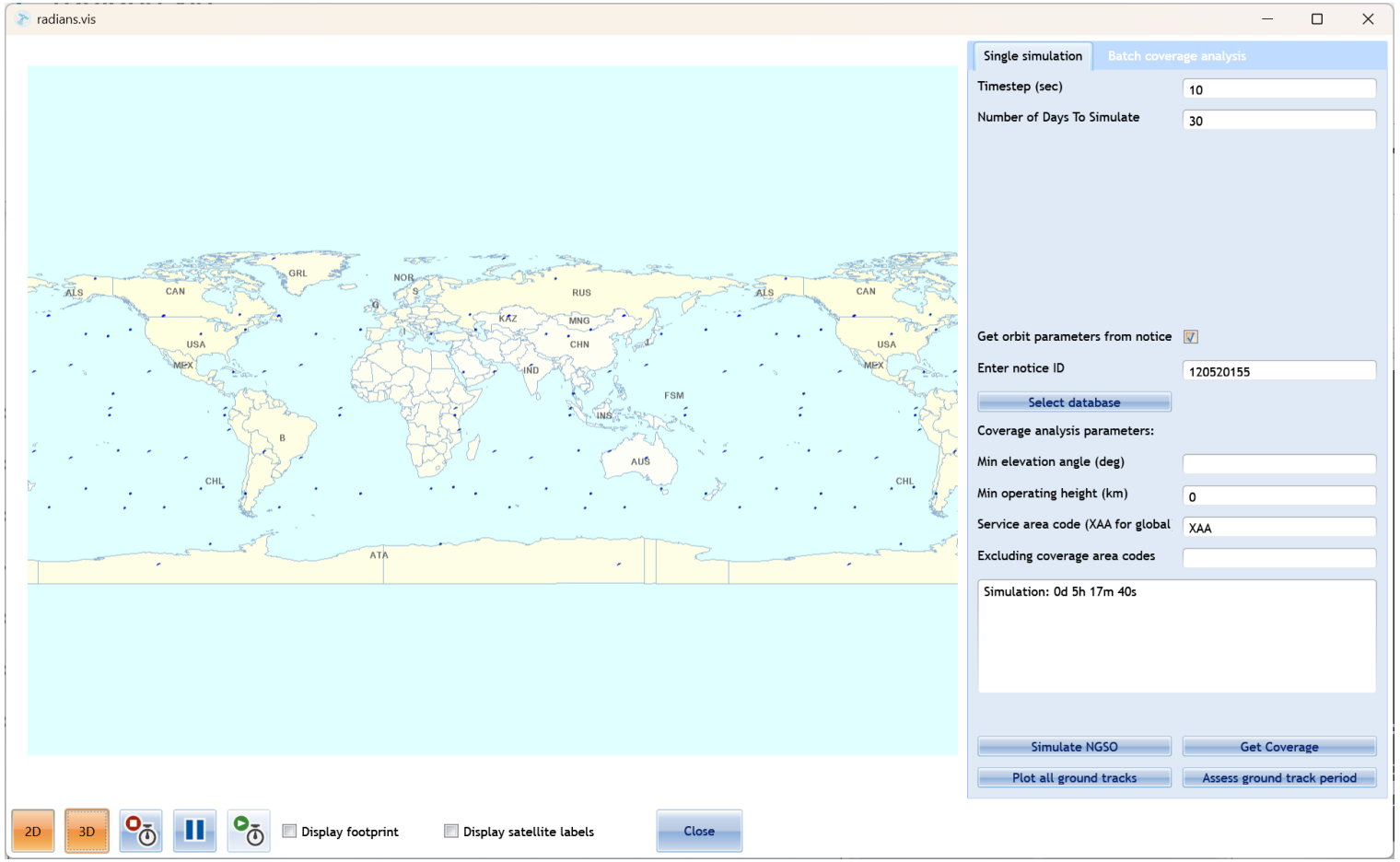
1. Display simulation in 2D and/or 3D 

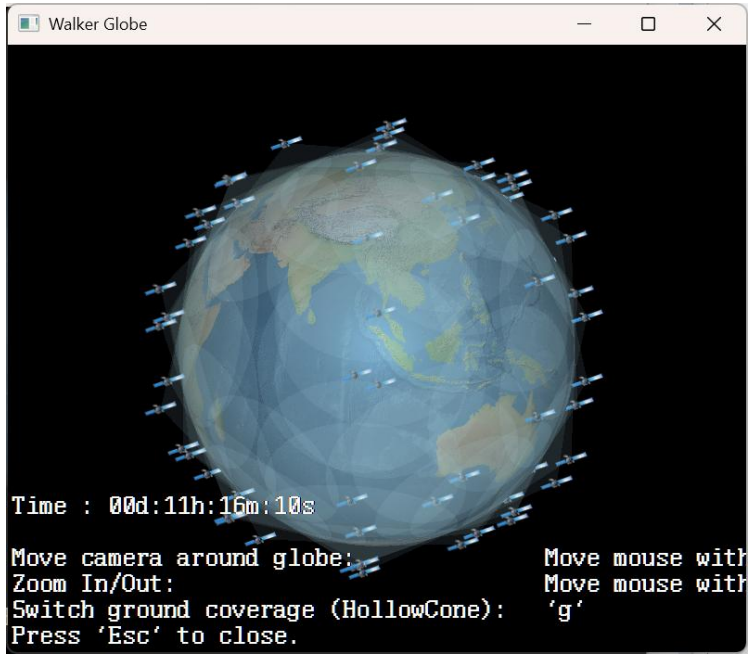
2. Display satellite footprints (defined by minimum elevation angle)

Example orbit simulation – using single satellite



Example orbit simulation – using orbit parameters from notice





Example orbit simulation – coverage analysis