STK/Radar Search/Track Input Requirements for STK 12

All of the following options must be set for Radars, unless stated as optional. Below will show each panel where all of the Radar properties are set.

I. Basic Radar data:

A. Monostatic or Bistatic
B. Frequency
C. Power
D. Antenna Type, Properties and Orientation
E. Constant Gains/Losses (optional)
F. Jammer Information (optional)
G. Modulator (optional)
H. Receiver Properties
I. System Temperature Properties and Parameters (optional)
J. Spectrum Filters for transmit and receive side (optional)
K. Polarization for Transmit and Receive Side (optional)
L. Sensitivity Time Control (STC)
M. Radar Cross Section of Target
N. Fixed PRF or Continuous Wave?
O. Pulse Repetition Frequency/Unambiguous Range/Unambiguous Velocity (for Fixed PRF)
P. Pulse Width or Duty Factor (for Fixed PRF)
Q. Probability of False Alarm
R. Goal SNR with maximum number of Pulses or Fixed Number of Pulses
S. Perfect Integrator/Constant Efficiency/Pulse Number Exponent/Integration Gain File
T. Main Lobe Clutter with Bandwidth (optional)
U. Side Lobe Clutter with Bandwidth (optional)
V. Radar Clutter
II. Environment data (optional)
a. Clouds/Fog (optional)
b. Rain (optional)
c. Atmospheric absorption (optional)
d. Urban and Terrestrial (optional)
e. Tropospheric Scintillation (optional)
f. Ionospheric Fading (optional)
g. Custom Loss Models (optional)
III. Sensors:
a. Sensor Shape/Pattern
b. Sensor Spin

STK/Radar Input Requirements for STK 12

All of the following options must be set unless this documents states that the options are optional
I. Basic Radar data:
The following data are required as input to the Radar module in STK (Figure 1):
A. Monostatic, Bistatic Transmitter, Bistatic Receiver or Multifunction
B. Frequency or Wavelength
C. Power

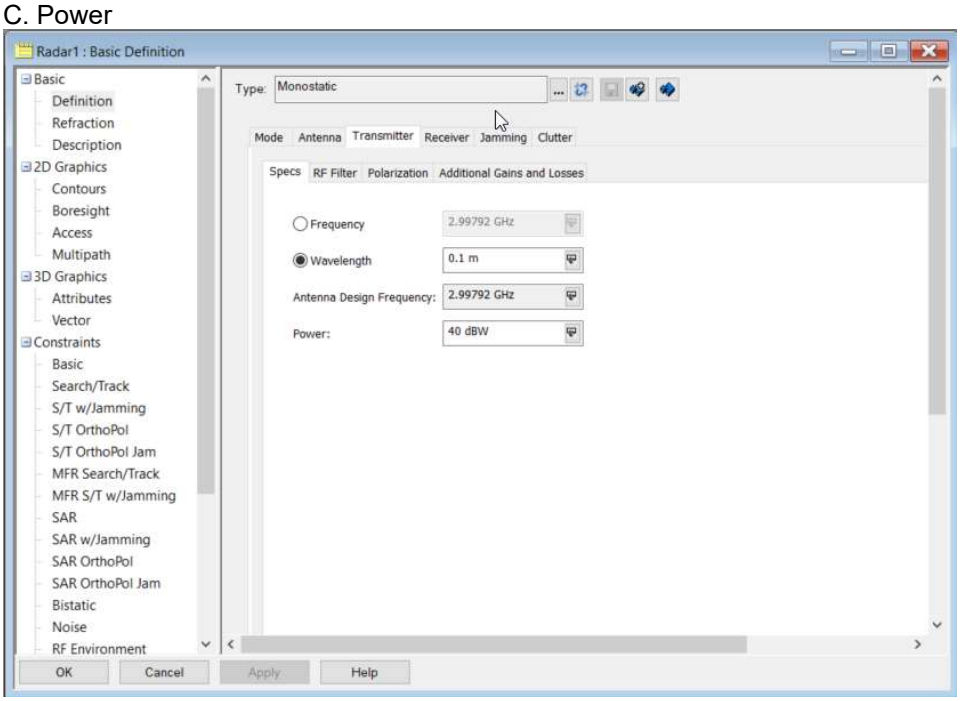


Figure 1 – Radar Transmitter Inputs

D. Antenna Type (Figure 2), Properties (Figure 3) and Orientation (Figure 4)

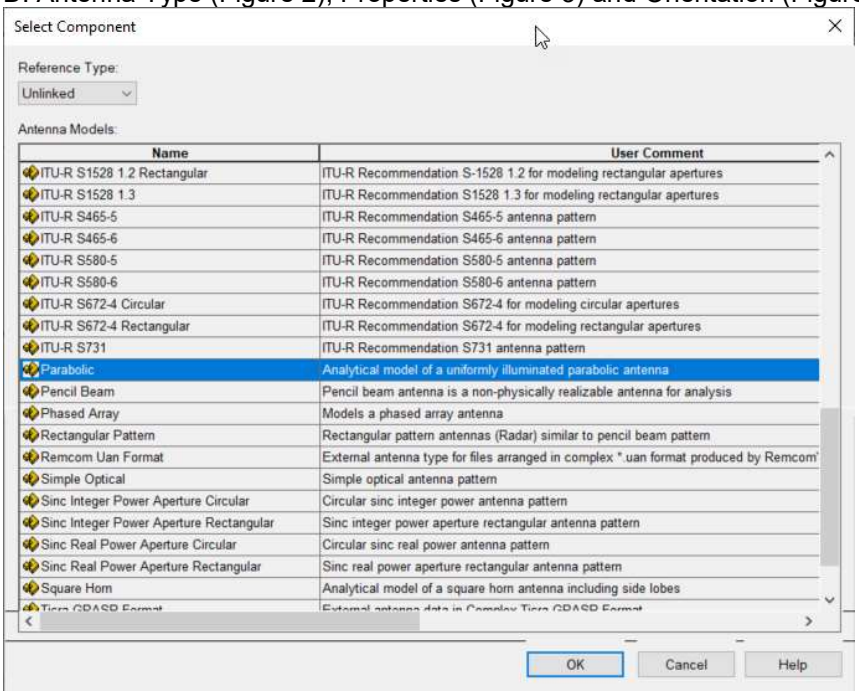


Figure 2 – Available Antenna Types

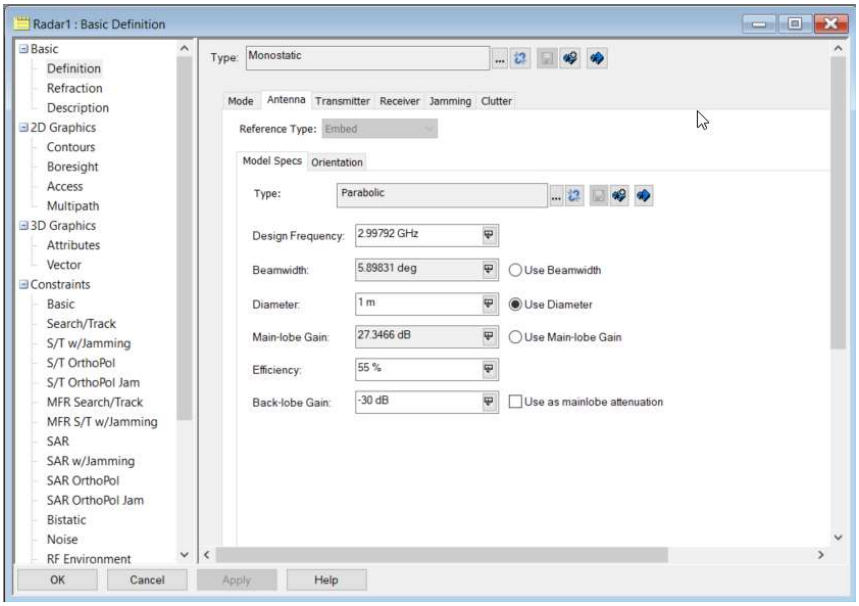


Figure 3 – Antenna Properties

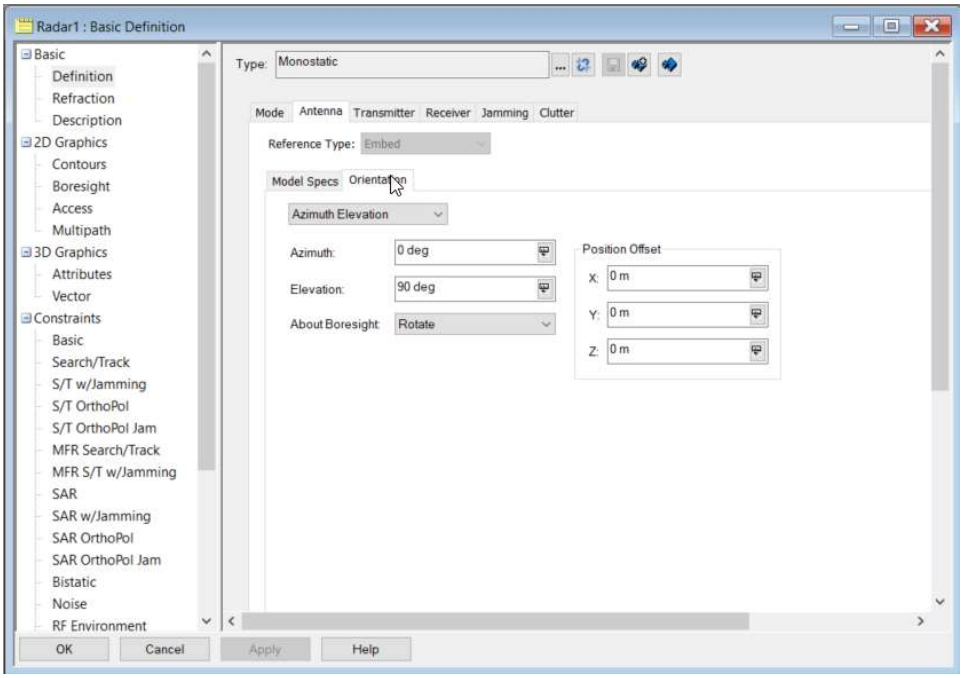


Figure 4 – Antenna Orientation Inputs

E. Constant Gains/Losses (optional) (Figure 5 and 6)

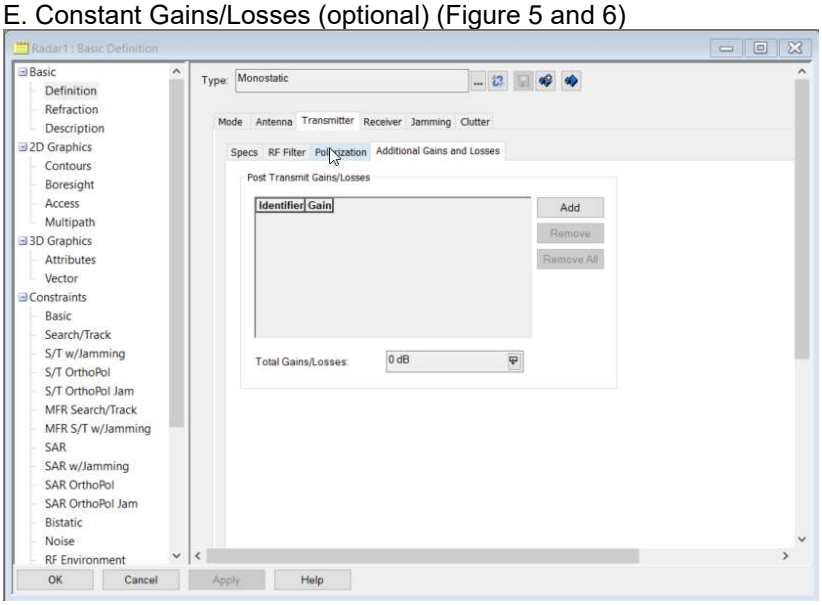


Figure 5 – Post Transmit Gains/Losses

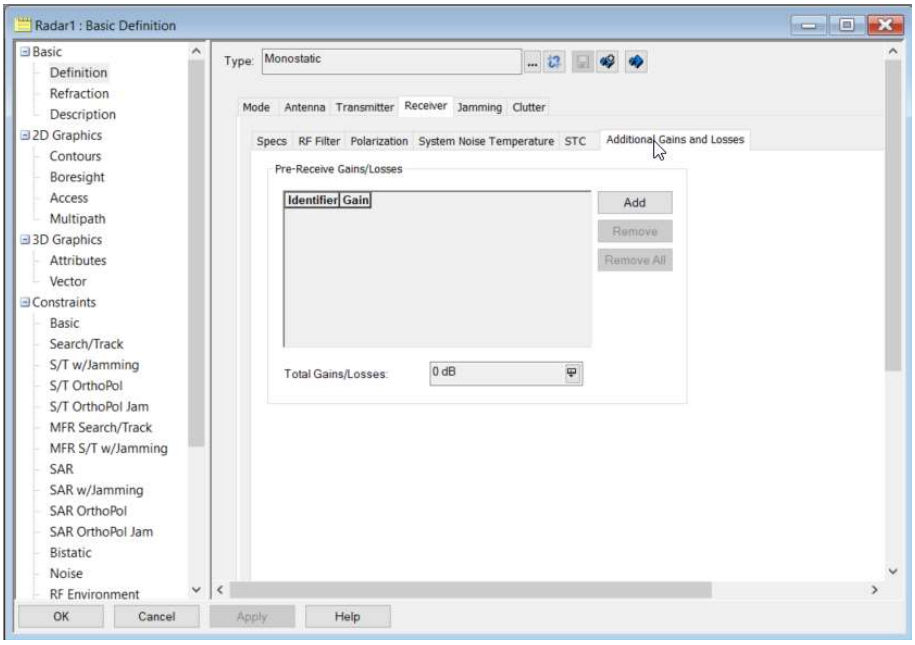


Figure 6 – Pre Receive Gains/Losses

F. Jammer Information (optional) (Figure 7)

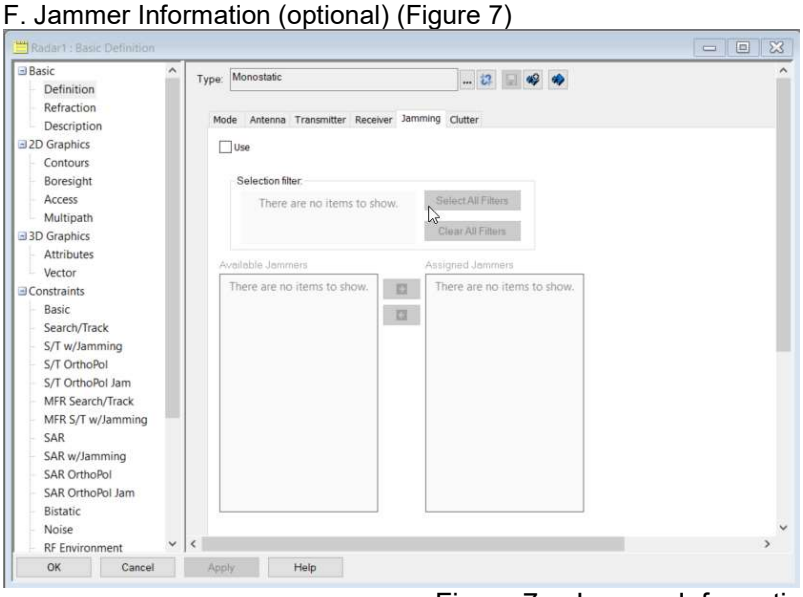


Figure 7 – Jammer Information

G. Modulator (optional) (Figure 8)

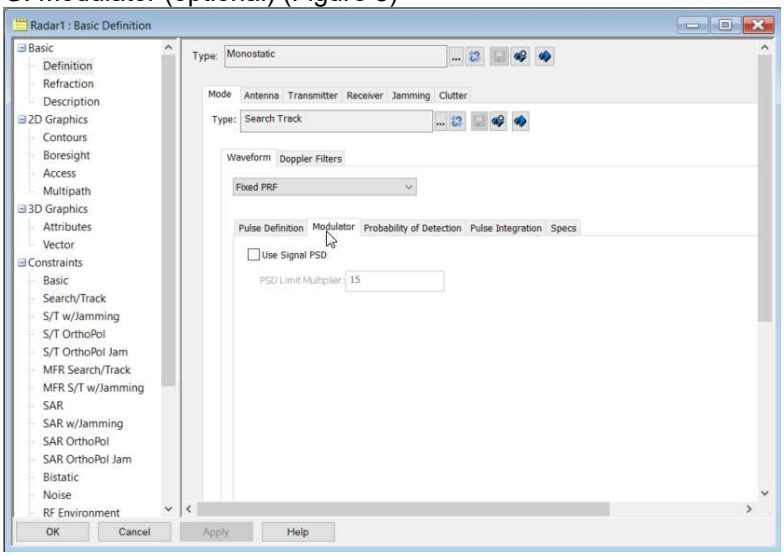


Figure 8 – Modulator

H. Receiver Properties (Figure 9)

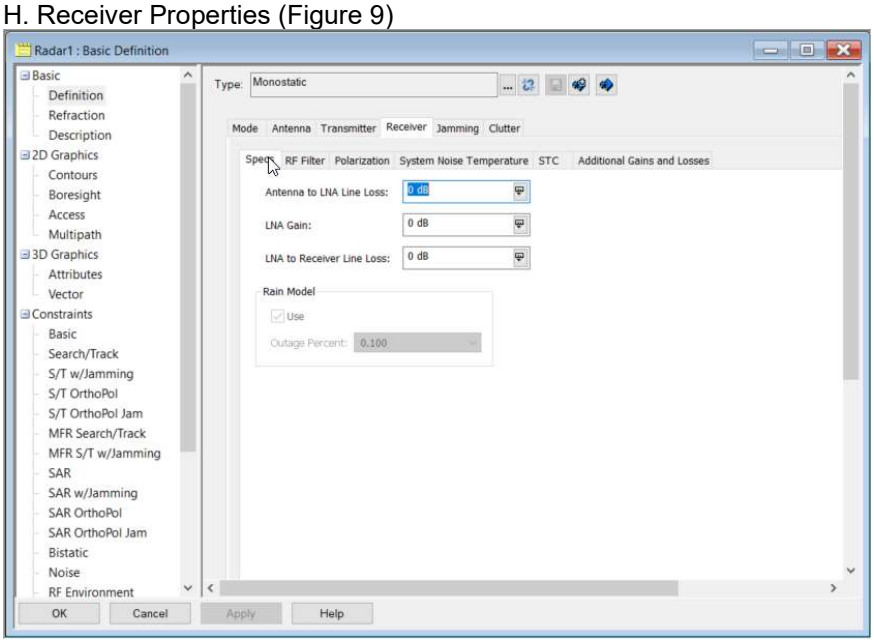


Figure 9 – Receiver Properties

I. System Temperature Properties and Parameters (optional) (Figure 10 and Table 1)

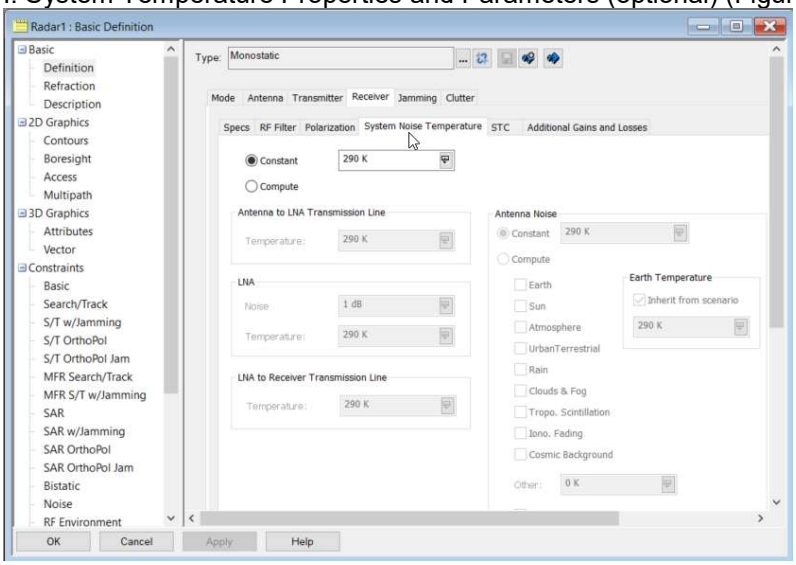


Figure 10 – System Temperature Properties

Table 1 – System Temperature Parameters

Parameter	Description
Antenna to LNA Transmission Line Temperature	The physical temperature of the transmission line between the antenna and the LNA.
LNA Noise Figure	The noise figure represents the contribution to the total system noise by the gain stages of the receiver. It can be thought of as a factor that describes the noise level in a receiver relative to that in a theoretically perfect receiver. The noise figure is always greater than 0 dB.
LNA Temperature	The physical temperature of the low noise amplifier (LNA).
LNA to Receiver Transmission Line Temperature	The physical temperature of the transmission line between the LNA and the receiver.
Antenna Noise	Noise that the antenna picks up from radiating bodies within its radiation pattern - a function of the direction in which the antenna is pointing, its radiation pattern and the state of the surrounding environment. The following options are available: • Constant - Enter the desired value. • Compute - Select whether to use Earth, Sun, Atmosphere, Urban Terrestrial, Rain, Clouds & Fog, Tropo Scintillation, and/or Cosmic Background noise in the calculation. You can also enter a constant value for Other Sources. Also, you can select an external **antenna noise file**. Click the ellipsis button to browse for the file name. The file allows you to specify the antenna noise temperature as a function of the ground elevation angle. Also, you can opt to take Sun and/or Rain noise into account. The Rain, Atmosphere, and external noise options are available only for facilities and targets, while Cosmic Background noise is available only for vehicles. Earth noise is always included in the calculation for facilities and targets.
Earth Temperature	If you select **Compute** and **Earth** under Antenna Noise, you can optionally set the Earth temperature at the local receiver level. To set the Earth temperature, clear **Inherit from Scenario** and enter a new value. The default value is 290 degrees Kelvin, which is the Earth's blackbody radiation temperature.

J. RF Filters for transmit and receiver side (optional) (Figures 11, 12, and 13)

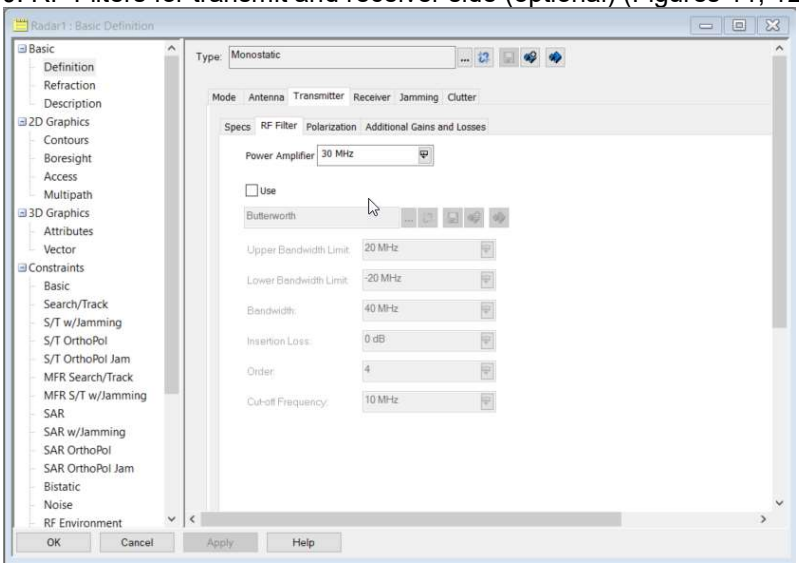


Figure 11 – Transmit Side Filter

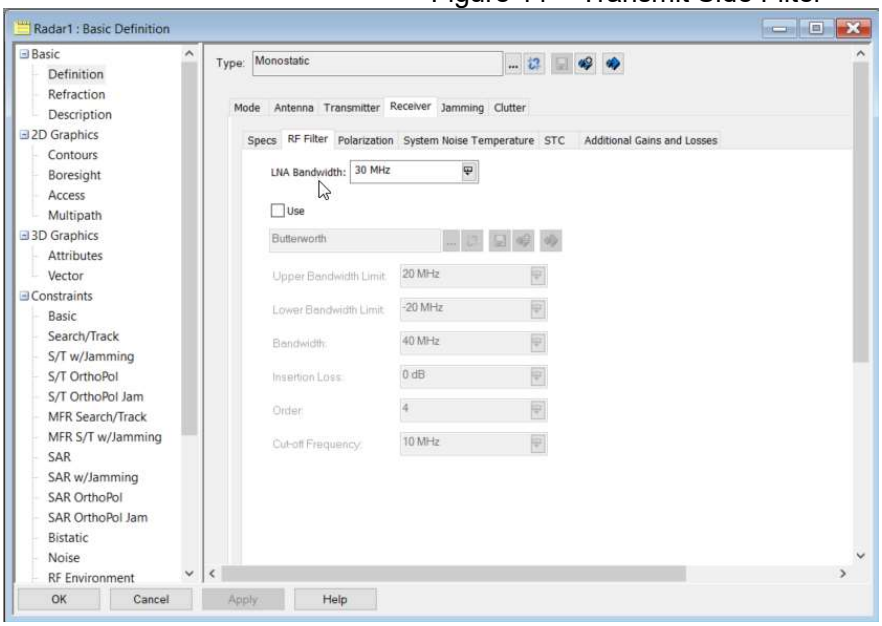


Figure 12 – Receive Side Filter

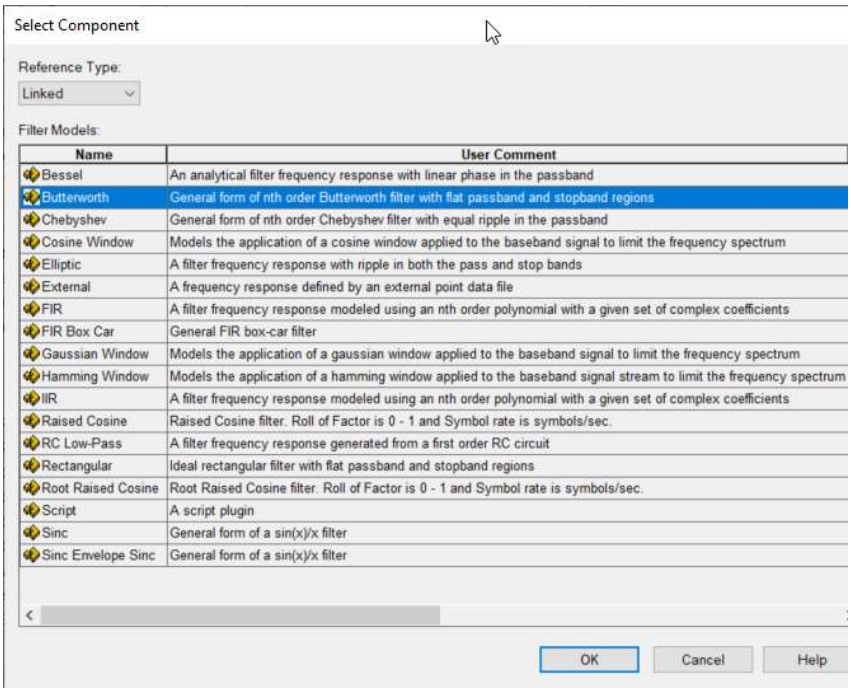


Figure 13 –Filter Types

K. Polarization for Transmit and Receive Side (Optional) (Figures 14 and 15)

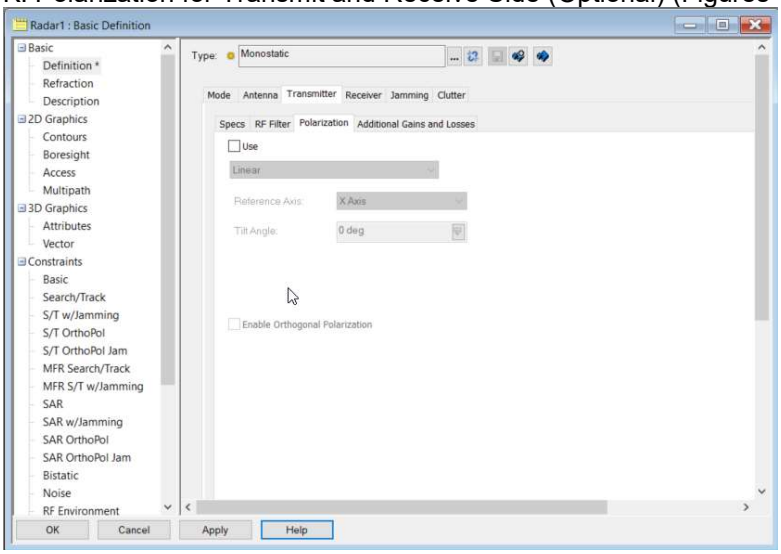


Figure 14 – Transmit Side Polarization

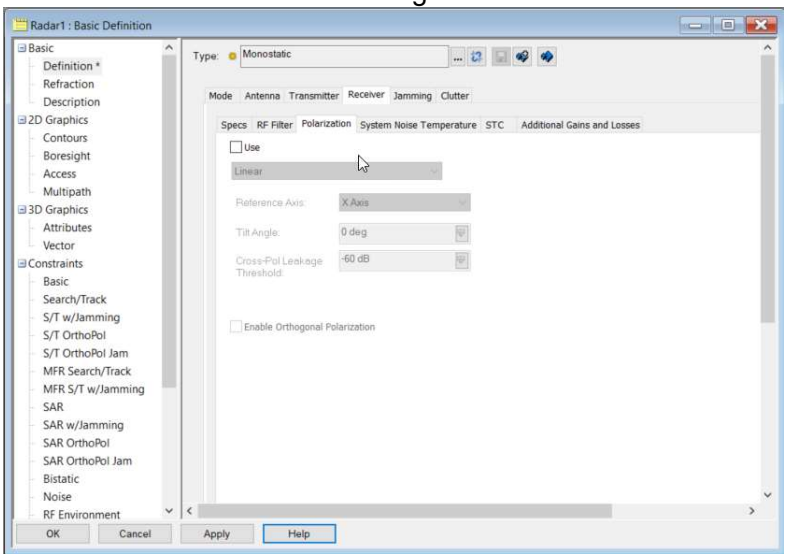


Figure 15 – Receive Side Polarization

L. Sensitivity Time Control (Figure 16)

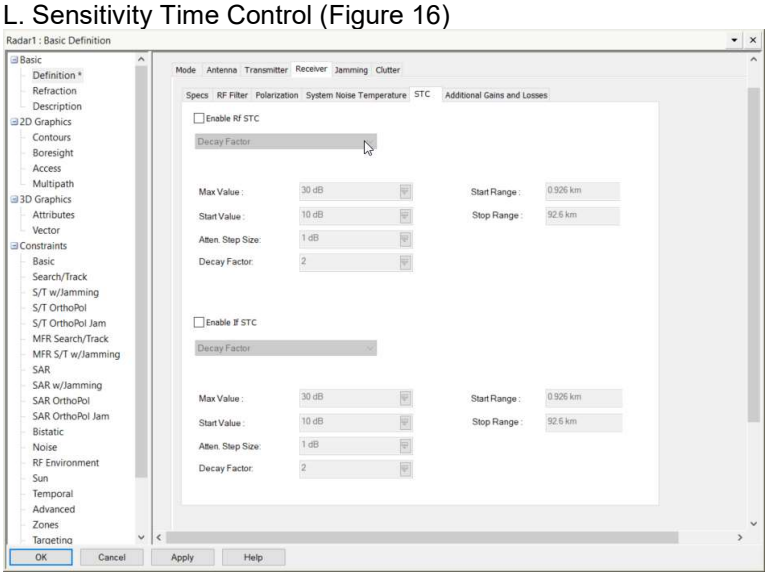


Figure 16 – STC

M. Radar Cross Section of Target (Figure 17)

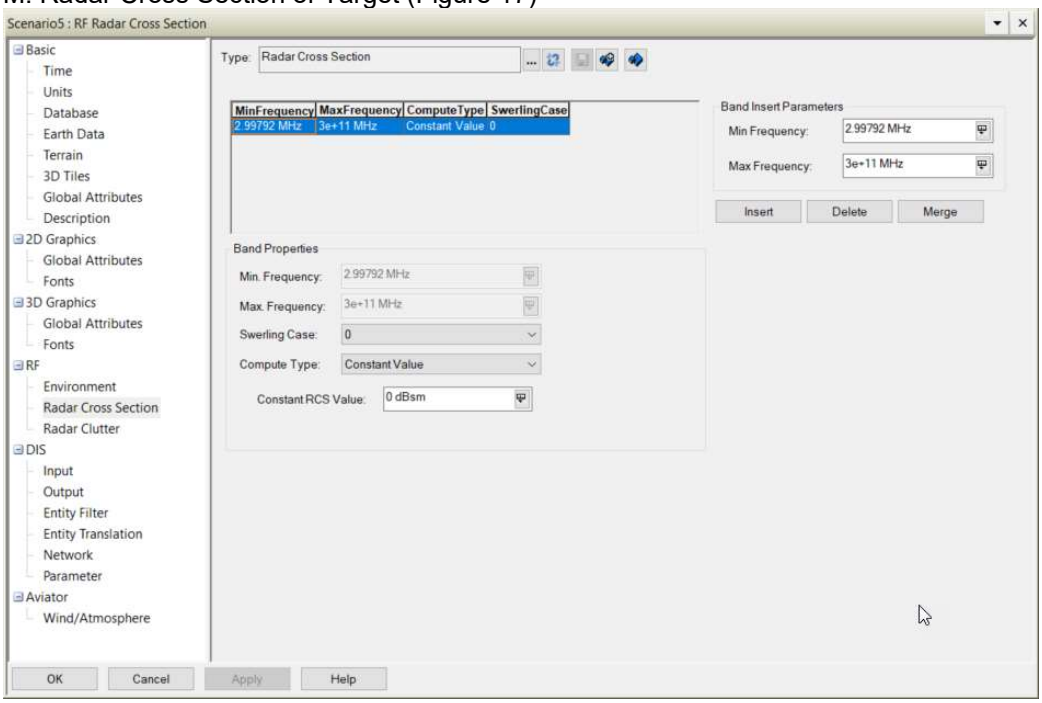


Figure 17 – Radar Cross Section Inputs

N. Fixed PRF or Continuous Wave? (Figure 18)
O. Pulse Repetition Frequency/Unambiguous Range/Unambiguous Velocity (for Fixed PRF) (Figure 18)
P. Pulse Width or Duty Factor (for Fixed PRF) (Figure 18)

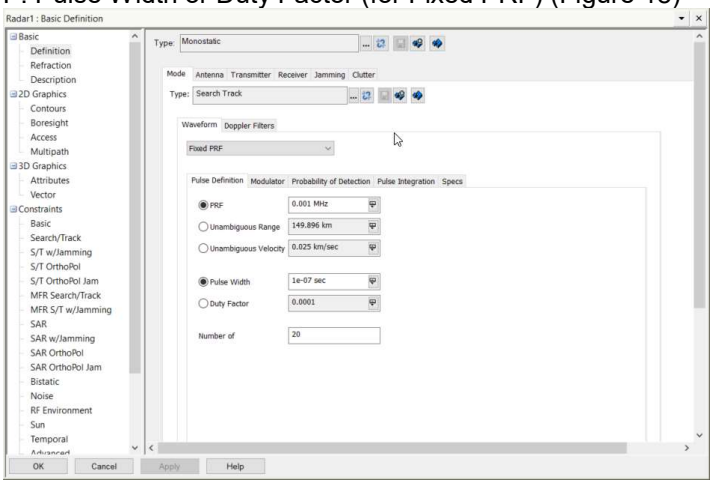


Figure 18 – Radar Pulse Definition

Q. Probability of False Alarm (Figure 19)

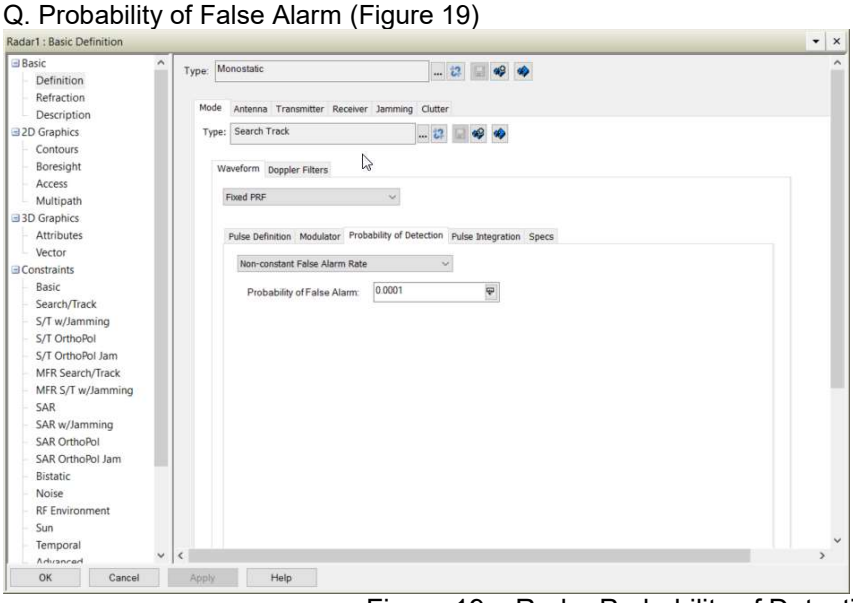


Figure 19 – Radar Probability of Detection

R. Goal SNR with maximum number of Pulses or Fixed Number of Pulses (Figure 20)
S. Perfect Integrator/Constant Efficiency/Pulse Number Exponent/Integration Gain File (Figure 20)

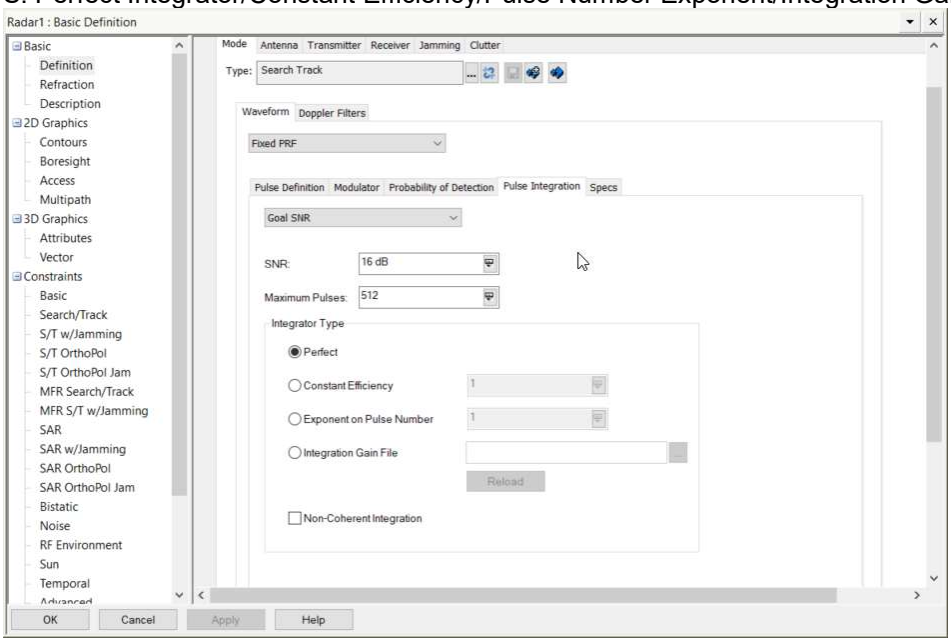


Figure 20 – Radar Pulse Integration

T. Main Lobe Clutter with Bandwidth (optional) (Figure 21)
U. Side Lobe Clutter with Bandwidth (optional) (Figure 21)

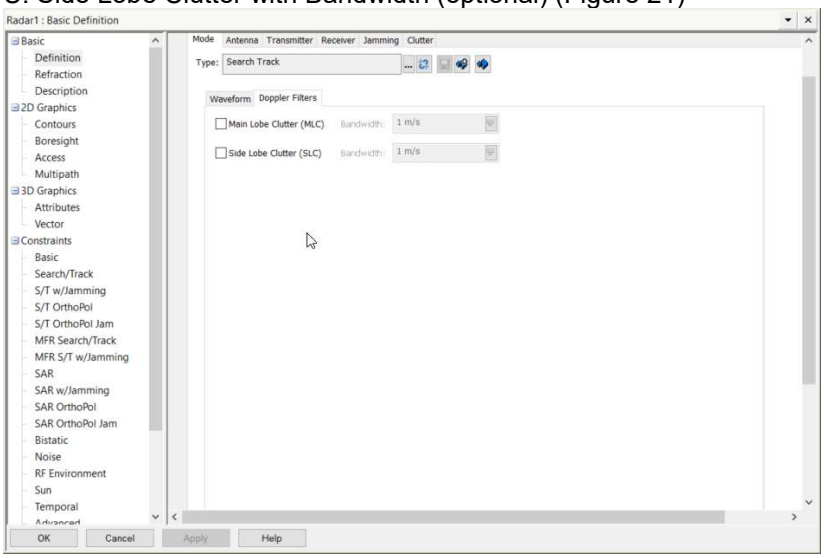


Figure 21 – Radar Doppler Filters

V. Radar Clutter (Figure 22)

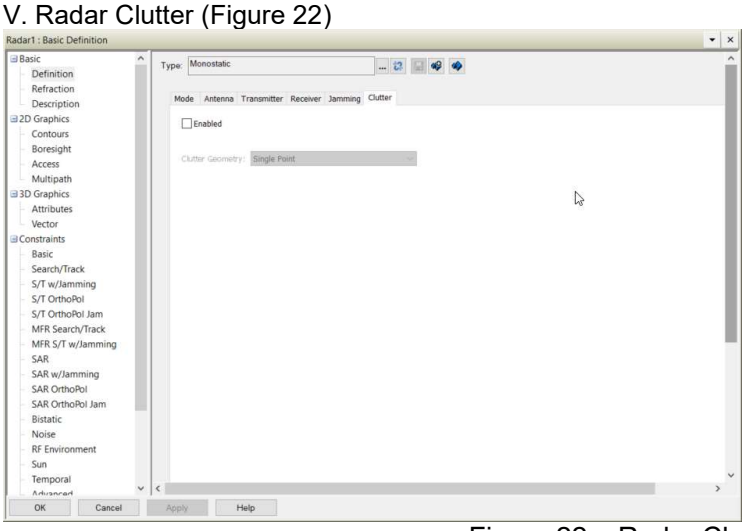


Figure 22 – Radar Clutter

II. Environment data (optional) (Figure 23):

a. Clouds/Fog

- Cloud Ceiling
- Layer Thickness
- Cloud Temperature
- Liquid Water Density
- Water Content

b. Rain (Table 2)

- Surface Temperature

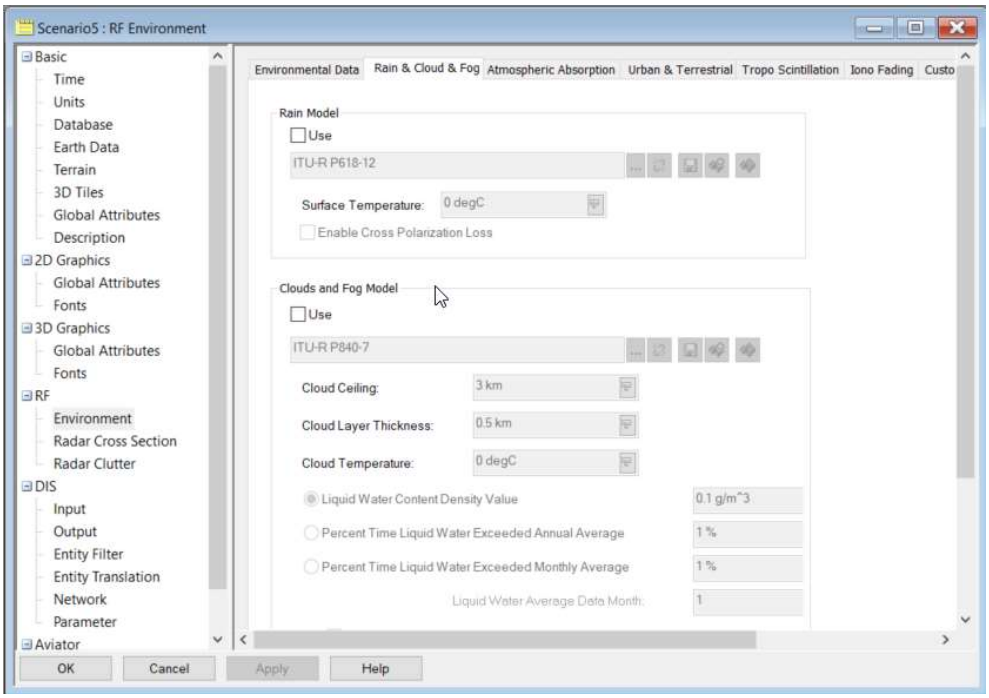


Figure 23 – RF Rain and Cloud Parameters

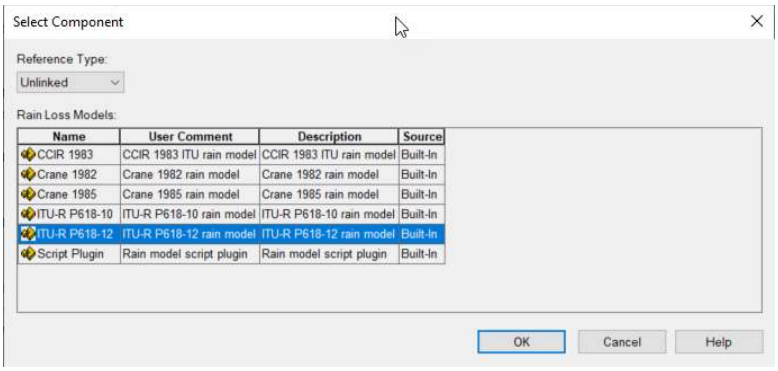


Table 2 - Rain Models

c. Atmospheric absorption (Figure 24 and Table 3)

- Water Vapor Concentration
- Surface Temperature
- TIREM
- Surface Humidity (TIREM)
- Surface Conductivity (TIREM)
- Surface Refractivity (TIREM)
- Relative Permittivity (TIREM)
- VOACAP
- Sun Spot Number (VOACAP)
- Man-made Noise (VOACAP)
- Minimum Take-off Angle (VOACAP)
- Required Reliability (VOACAP)
- Required SNR (VOACAP)
- Multipath Power Tolerance (VOACAP)
- Multipath Delay Tolerance (VOACAP)
- Coefficient Data Type (VOACAP)
- Alternative Frequencies (VOACAP)

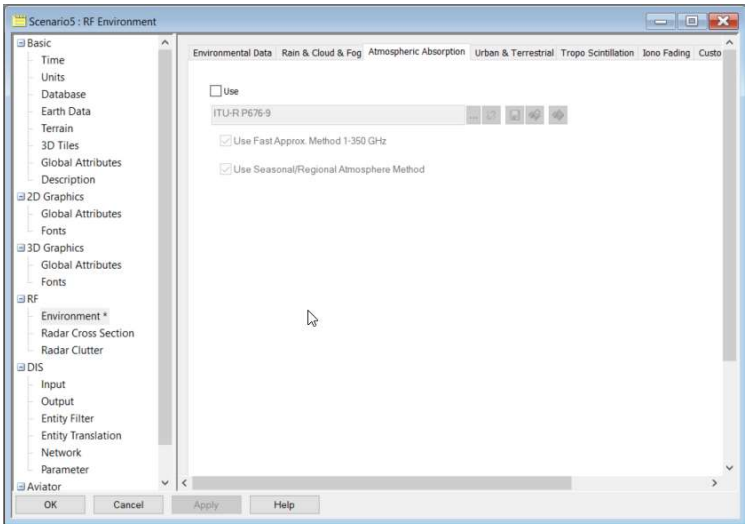
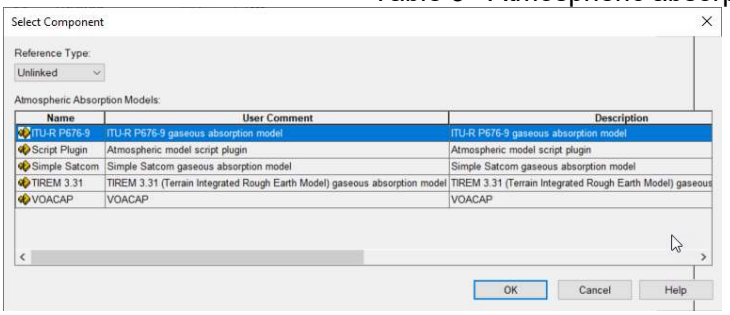


Figure 24 – RF Atmospheric Loss Parameters

Table 3– Atmospheric absorption models



d. Urban and Terrestrial (Figure 25 and Table 4)

- Two Ray

i. Loss Factor

ii. Surface Temperature

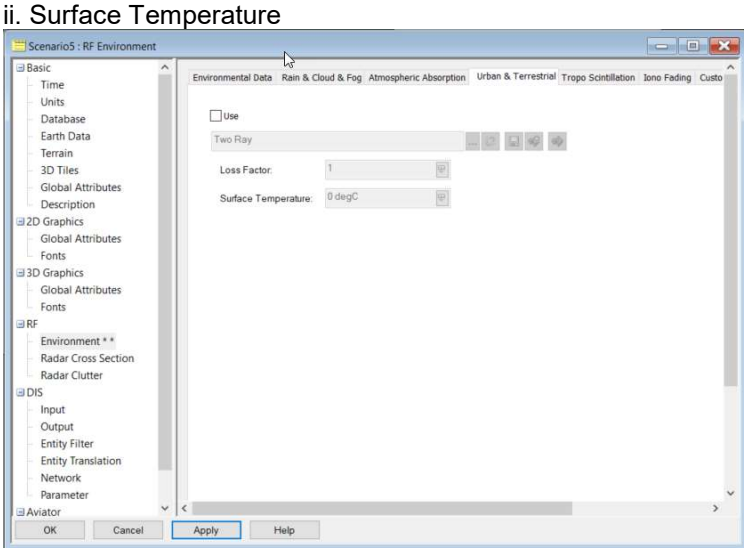
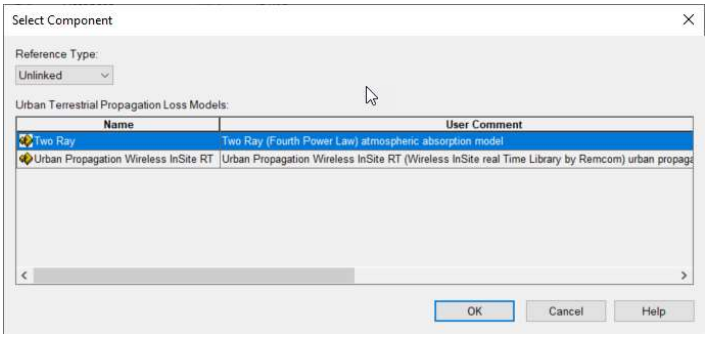


Figure 25 – RF Urban and Terrestrial Loss Parameters

Table 4– Urban & Terrestrial models



e. Tropospheric Scintillation (Figure 26)

- Deep Fade
- Surface Temperature
- Tropospheric Fade Outage

- Percent Time Refractivity Gradient

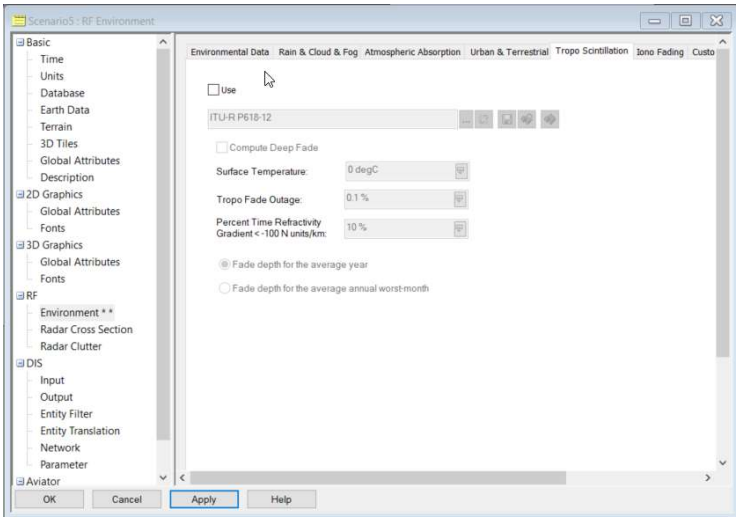


Figure 26 – RF Tropospheric Scintillation Parameters

f. Ionospheric Fading (Figure 27)

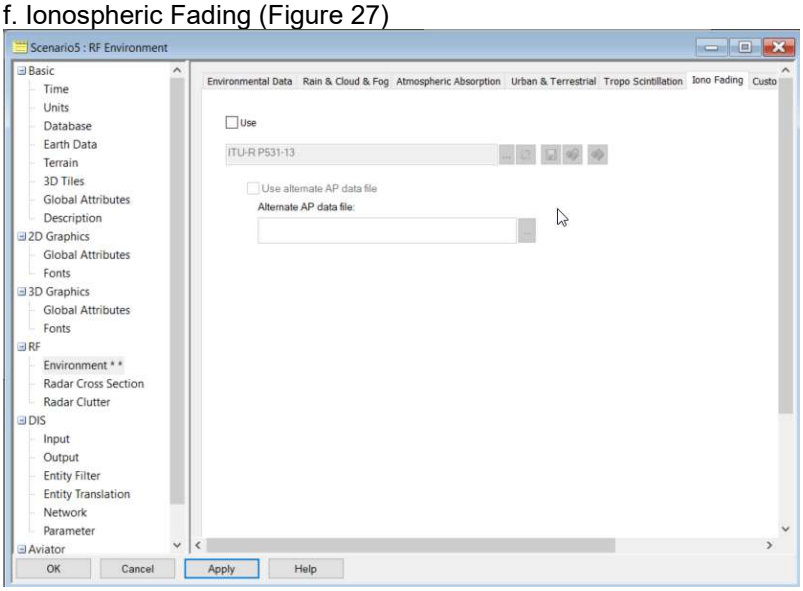


Figure 27 – RF Ionospheric Fading Parameters

g. Custom Loss Models (Figure 28)

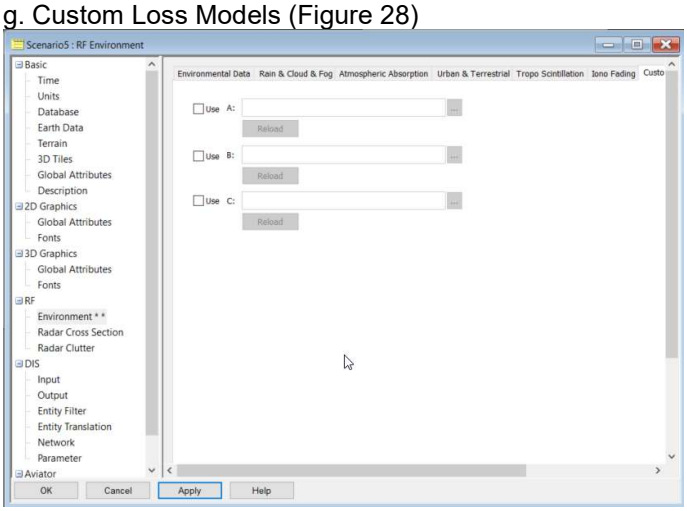


Figure 28 – RF Custom Loss Parameters

III. Sensors:

a. Sensor Shape/Pattern (Figure 29)

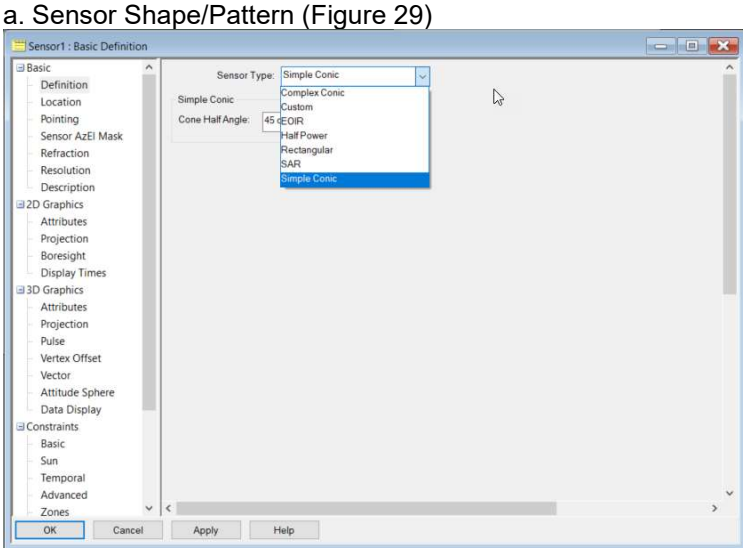


Figure 29 – Sensor Shape

b. Sensor Spin (Figure 30)

- Scan Mode
- Start/Stop Angle
- Spin Rate
- Initial Offset Angle
- Spin Axis (Azimuth/Elevation)
- Spin Axis Cone Angle

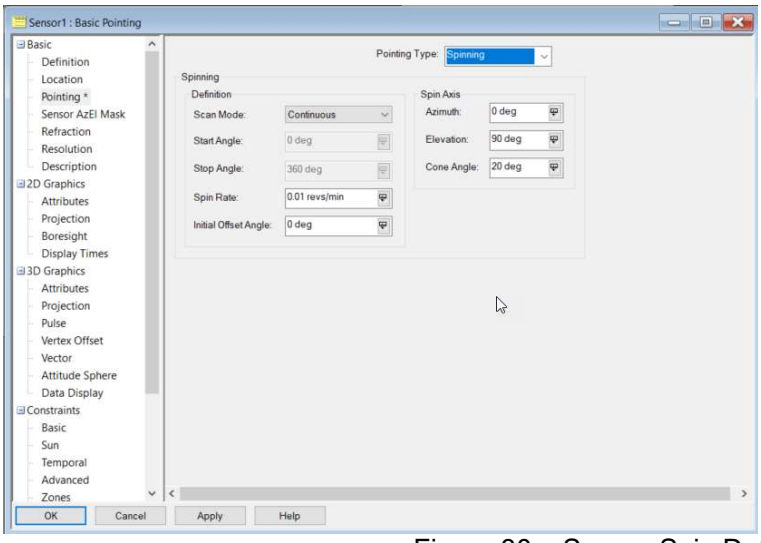


Figure 30 – Sensor Spin Definition