Base assumptions/approximations of fundamental parameters:

Altitude is approximately 1.4 km (highest peak in Tucson, Wasson peak. Any range around this altitude hardly changes the Cn^2 value; no matter what mountains we’re looking at I think this will work)

Temp around 18 C

Pressure around 84 – 85 kPa

Index of refraction:

n = 1.000293 (index for air. this does not include the wavelength dependence, but adding that shouldn’t be difficult. This also ignores index as a function of temperature/pressure. I tried to find something for index as a function of wavelength, pressure, and temperature and I was having a hard time finding anything. I might be able to find something through Norwoods lab, we did that lab with the sagnac interferometer and changed the pressure of the air and noted the change in index…)

Kinematic viscosity:

v is around 1.5e-5 m^2/s

Epsilon (Average energy dissipation rate. For calculating characteristic time, velocity, and length):

e = velocity^3/(altitude)

Reynolds Number

R = VL/v

V = velocity

L = height above ground

v = kinematic viscosity

Cn^2

= 10^-16 m^-2/3

I found this from the plot at the end of lecture 6

Index structure function:

Dn(r) = (Cn^2)\*r^(2/3)

(From lecture. Here I’m assuming r is the distance between our source and our receiver)

Phase structure function:

Dphi = 6.88(r/r0)5/3

(From lecture. Again, assuming r is distance between source and receiver)

Isoplanatic angle:

Theta0 = r0/z

z = distance to phase screen

(From lecture)

Scattering angle:

Thetas = lambda/r0

(From lecture)

Velocity structure function (specifically, the velocity structure constant)

Dv(r) = (Cv^2)\*r^(2/3)

Cv^2 = 2\*epsilon^(2/3)

Not fully understanding/can’t find the information I’m looking for:

Mutual coherence function (I’ve made some sense out of this but only some)

Coherence length approximately 3\*r0

Coherence time = coherence length/velocity