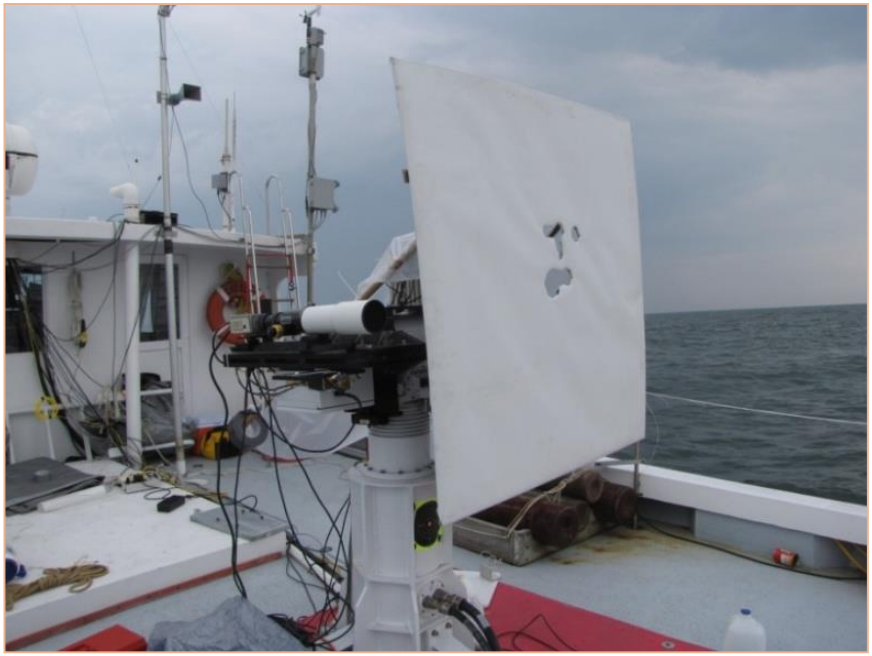
Introduction

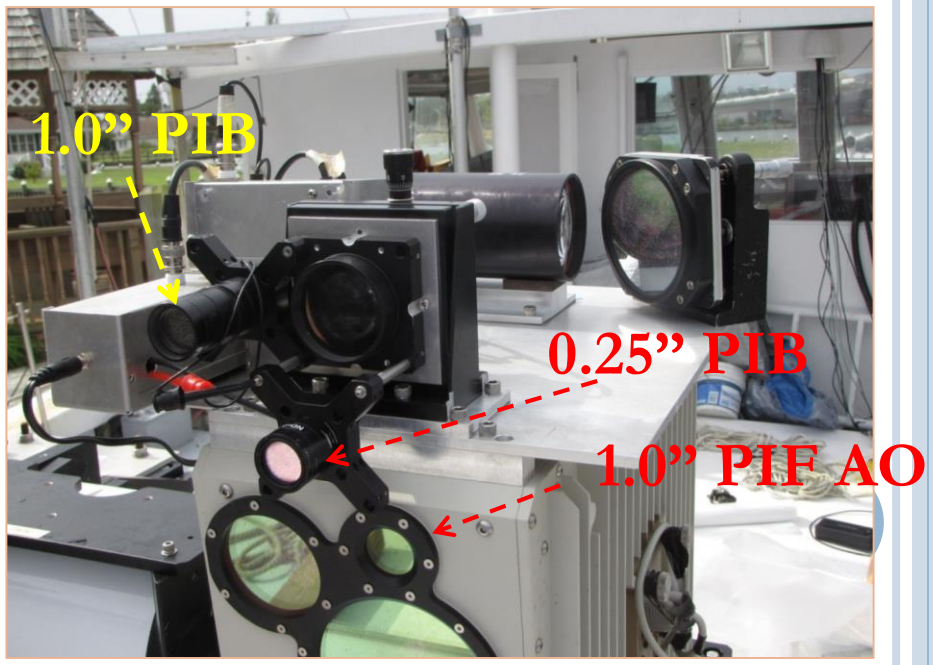
- Field Test off of Atlantic Coast
- 2 – 22 km optical horizon
- Bi-directional shore-to-ship data link between old 56' Coast Guard lookout tower and JHU Applied Physics Laboratory (APL) research vessel, "Chessie".

Movie Clip

Experimental Set-up

- 1.0” Adaptive Optics (AO) Power-in-Fiber (PIF) as will as 0.25” and 1.0” Power-in-Bucket (PIB).
- IR images were collected on screen attached to “Chessie” tracking mount

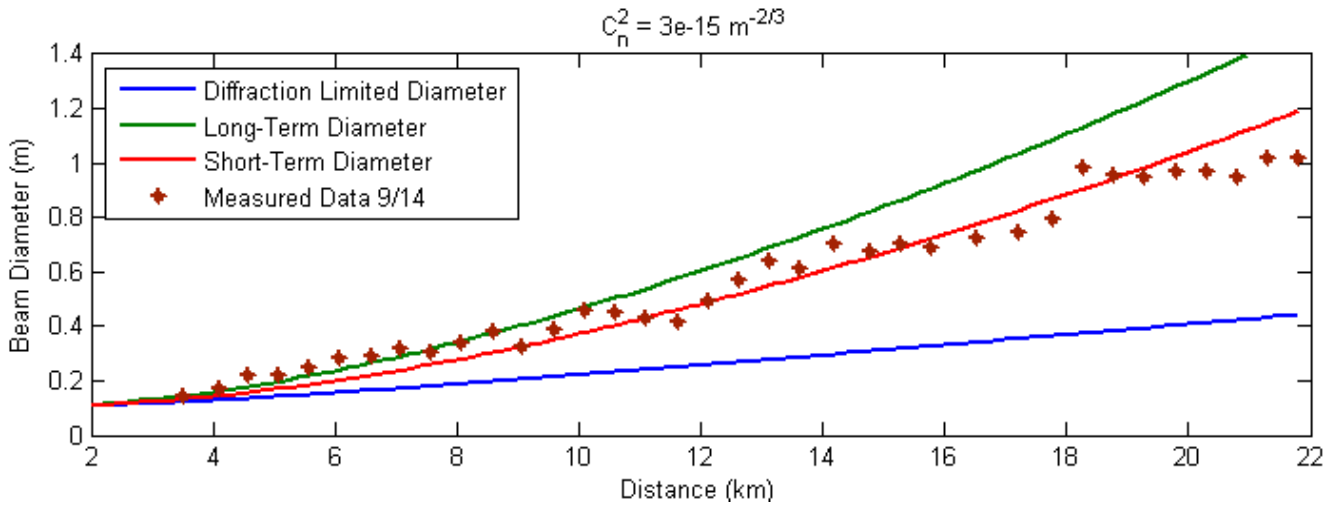




IR Beam Spatial Properties in Maritime Environment: Beam Diameter vs. Range

Experimental Data, 09-14-2009 (evening run, tight beam, ideal conditions 4km → 21.3 km)

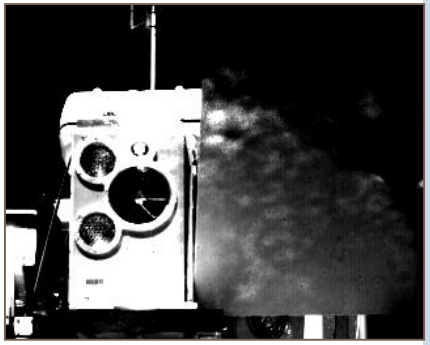
Beam Diameter Estimations and Theoretical Model

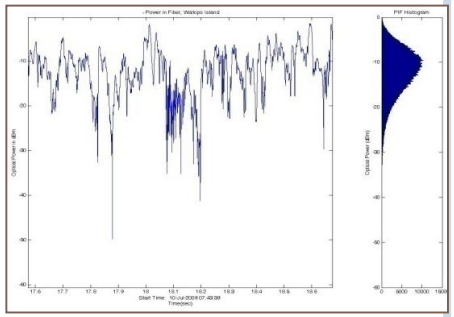


$$W_{LT} = W\sqrt{1+1.63\sigma_R^{12/5}\Lambda}, \quad W_{ST} = \sqrt{W_{LT}^2 - \langle r_c^2 \rangle}$$

L.C. Andrews and R.L. Phillips, *Laser Beam Propagation through Random Media* (SPIE Press, Bellingham, WA, 2005).

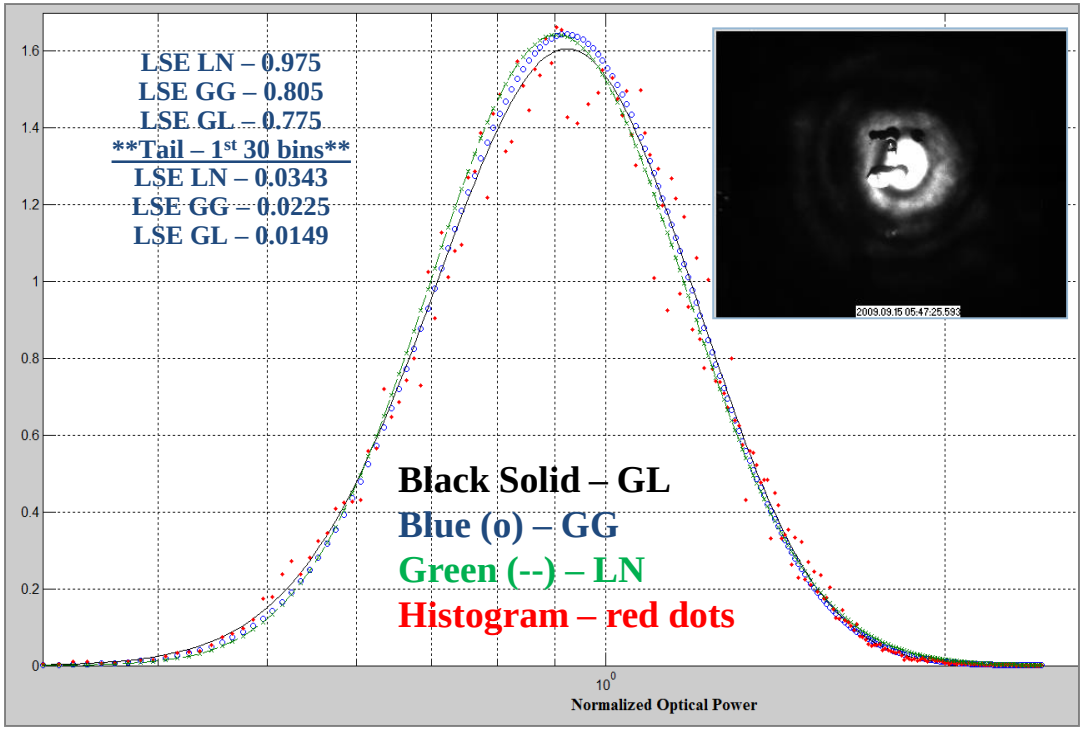
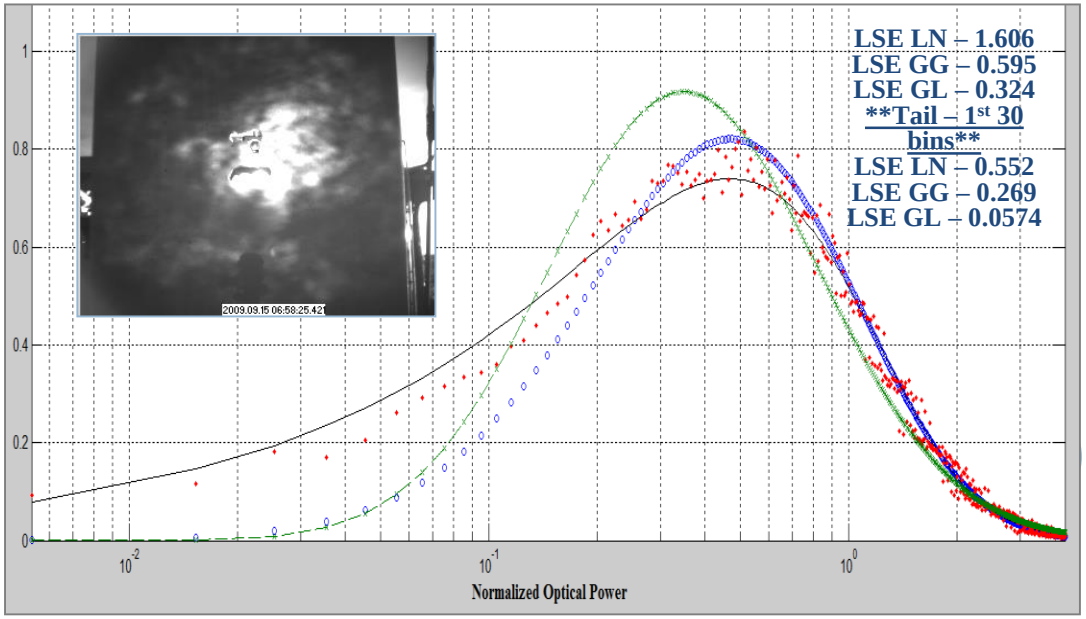
Afternoon, high turbulence, ~14km





1503-7.5nmi.avi

Experimental Data/Results

- Low Turbulence – ($C_n^2 \sim 1.5*10^{-14}\ m^{-2/3}$)
- 1.0" PIF AO
- 5.1 km to 17.8 km
- Good data fits in low turbulence across all of the distributions
- Note – this is aperture averaged data

GL had best LSE fit