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TO: Holographers

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SUBJECT: rms variation with elevation: holography and radiometry

John Ball has measured the antenna performance with elevation and finds a sine dependence with the following coefficients:

A] 47 mils with

1] No subreflector ring deformation
2] No thermal control variation with elevation
3] SGH model for focus, coma and astigmatism
4] Zero points for actuators tuned to optimize efficiency at about 35° elevation

B] 41 mils with the above plus ring "C" subreflector

Rich Barvainis has recently taken 3 maps to determine the rms variation with elevation. In the following table I have computed the coefficient of dependence of the rms on the sine of the elevation from holography and get results in reasonable agreement with the radiometry and much larger than the coefficients of the SGH model for the cases observed.

Map #	Case	Holography rms	rms increase 2	inferred elevation coefficient 3
262	39° elevation	9	2.6	
261	19° no thermal	14.3	11.4	46
260	19° with thermal	14.0	11.0	44
261	Software ring C[1]	12.6	9.2	37
260	Software ring C	11.8	8.0	32

Notes:
1] Ring C removed by application of software simulation (by Rich)
2] Increase over an assumed rms at 35° of 8.6 mils
3] Sine coefficient from elevation dependence (i.e. $rms = a(\sin El - \sin 35°)$)
4] Weather was poor and the rain on the radome significantly increased the holography noise via multiple reflections. I assume however,that the elevation dependence is still valid.