WHAT WE LEARN FROM RADAR SHAPE MODELS, Ellen S. Howell[1], Michael C. Nolan[1], Christopher Magri[2], [1]Arecibo Observatory/Cornell University, HC 3 Box 53995, Arecibo PR 00612 USA, ehowell@naic.edu; [2]University of Maine at Farmington.

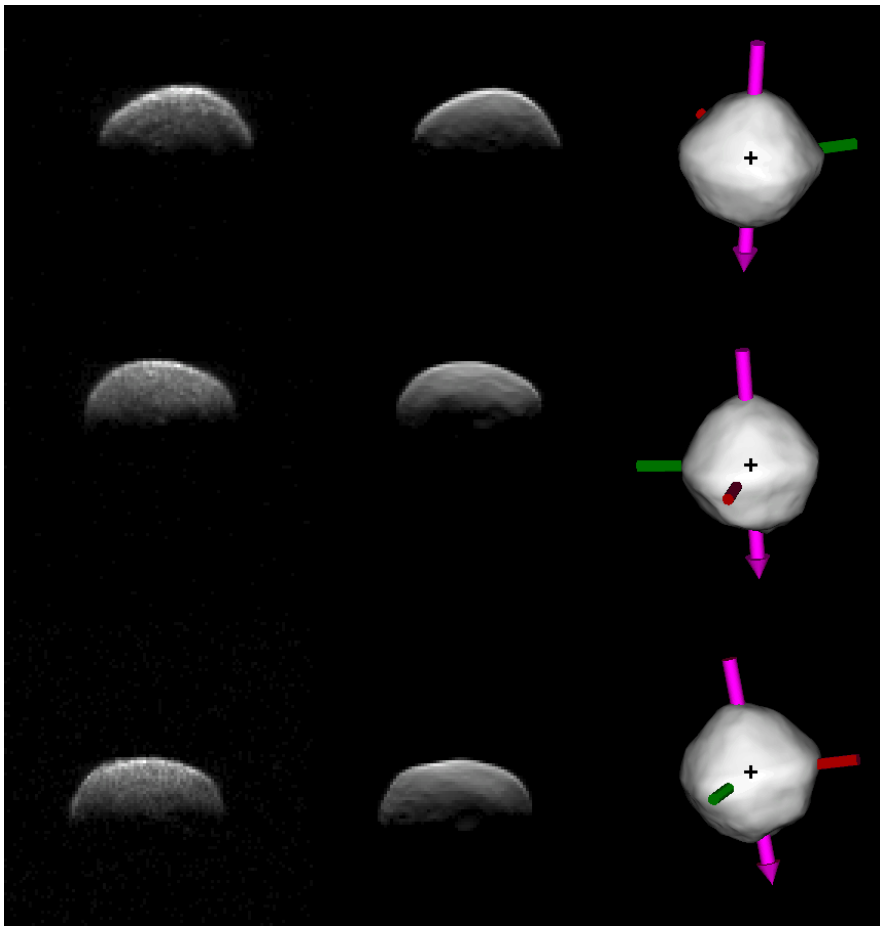

Figure: Each row shows, from left to right, a radar image, the simulated radar image from the model, and the model as it would appear on the sky. The asteroid has an average diameter of 560m. The bars mark the principal axes for reference. The images shown are single frames from (top to bottom) September 16, 20, and 28. The full data set used contains 57 such images taken on four dates spanning a 16 day interval in late September 2005, with additional constraints from lightcurves and radar data taken in 1999.

Radar shape models have now been generated for several asteroids, and more are in progress. Most of these models have 15-m resolution and reveal a variety of shapes from spheroidal to extremely elongated. Ostro et al. (2005) and Scheeres et al. (2005) demonstrate the level of insight into the asteroid structure that can be gained from a sufficiently detailed model. However, in most cases we have much less complete information. Even so, constraints can be placed on basic size, shape and rotation with limited data and can give many useful insights. The shape model for (101955) 1999 RQ36 is shown in the right hand panel of the Figure, along with three of the radar images used to generate it. The addition of optical lightcurve data is particularly helpful in combination with radar imaging. In the case of 1999 RQ36, lightcurve data determined the initial rotation period, which was then further refined in the radar modeling. Important similarities and differences are seen between radar derived shape models and those derived from lightcurves.

Using 1999 RQ36 in addition to other shape models, we are beginning to get a more detailed picture of the nature of near-Earth asteroids. The biases and sources of error, which are quite different from and complementary to those of optical observations, will be explored.