Optimizing the Rosetta flyby of asteroid 2867 Steins for OSIRIS

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The ESA comet rendezvous mission Rosetta will fly by the asteroid 2867 Steins on 5th of September 2008. The science output of the OSIRIS cameras onboard the Rosetta spacecraft will depend on the details of the flyby geometry. Various cases within the constraints of the spacecraft performance are investigated and their science outputs are discussed.

Two solutions for the pole orientation of the asteroid Steins were derived (Lamy et al., 2006) from ground based observations and the narrow angle camera (NAC) of OSIRIS. Its size (diameter) was estimated and the rotation period (Weissman et al., 2005) was determined. These quantities together with the constraints on the space-craft slew rate and pointing (solar elongation angle) are used to calculate the science output parameters of the cameras. Main parameters (criteria) are the area coverage (percentage of the total surface area in illumination and imaged by the cameras), the stereo coverage (percentage of the total surface area in illumination and imaged by the cameras with a separation angle of 5˚ between at least two images of the same surface features and with a resolution better than 200 m/pix) and the phase angle coverage for each flyby geometry.

The variation of area coverage for the simulated cases of different pole solutions is within the range 54-83 % assuming a spherical shape of the asteroid. For a given rotation pole orientation the area coverage differs little for the various simulated flybys, but the phase angle coverage and resolution of the images vary.