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A review of imaging results from missions to comets

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Since 1986, four short-period comets 1P/Halley, 19P/Borrelly, 81P/Wild 2, and 9P/Tempel 1 have been visited by spacecraft and their nuclei have been imaged with increasing spatial resolution. All four comet nuclei appear to be different, some are very elongated and indicate possible assemblies from subnuclei, while others are more nearly spherical. There are areas of rugged terrain with valleys and hills as well as smooth areas. There are “inactive” areas on the nuclei that appear to be layers of dust and there are “jet-like” features of dust emissions that suggest active areas on the nuclei. The intensity profile of light scattered by some dust “jets” decreases much slower than the expected 1/distance relation near the nucleus. This suggests overlapping plumes and filaments from extended surface areas of emission on a nucleus, as well as fragmentation of the dust particles. These and other imaged phenomena in the nucleus – coma boundary layer and relevant physical processes will be described and discussed.