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THE FASCINATING HISTORY OF HOW THE FAMILY PORTRAIT OF THE SOLAR SYSTEM BY
VOYAGER 1 FINALLY CAME TO BE.

Abstract

On Valentine's Day, 1990 February 14, the Voyager 1 spacecraft executed a 60 image mosaic of portions of the Solar System, that came to be known as "The Family Portrait". The set of observations were the 6th request by the Voyager Imaging Science Team, and Mission Planning Office. The fascinating story of why it took 8 years and 6 (ultimately 7) requests to gain approval has never been told.

The Family Portrait taken by Voyager 1 was the first, and still the only, time a spacecraft has attempted to photograph our home Solar System. Only 3 spacecraft have been capable of such an observation, Voyager 1, Voyager 2, and New Horizons. New Horizons just completed its final target body encounter in 2019 January. The observation opportunities have been few and far between in human history.

The first Voyager 1 observation request was for a single set of 3 Narrow Angle camera images of the Earth, and whatever other planetary objects were in the frame at the time. The request was disapproved, for many reasons. The next 4 requests followed this same observation design, with minor variations, and all were disapproved. The 6th request was the first to attempt to image 7 of the then 9 planets (all but Mercury and Pluto), and the first to be approved. 6 planets were imaged. Mars was too dim to detect. The 7th request was to replicate the Voyager 1 observations on Voyager 2, but the request was not approved. The Observation design consisted of slewing the cameras to Neptune, taking Narrow Angle images through 3 separate color filters plus 1 Wide Angle context image, then taking Wide Angle images from Neptune to Uranus, repeating the Narrow and Wide Angle images at Uranus, then stepping in turn to Saturn, Jupiter, Mars, Earth, and Venus. A set of Wide Angle context images around the Sun were taken, with the final image taken of the Sun itself.

The history of the 7 observation requests, the individuals involved in conceiving the various aspects of the ultimately successful observation set, the challenging spacecraft and project resource constraints, the resulting observation design and the phenomenal results are all discussed in depth in this paper. The image of Earth, a pale blue dot, shows us how small, tiny, and vulnerable "spaceship Earth" is in the vast cosmos we live in.