

Optical observations of artificial Earth satellites by the Smithsonian Astrophysical Observatory grew from a concept in the mind of Dr. Fred Whipple, which he expounded sixty years ago at a gathering of artificial satellite enthusiasts in June 1954 in Washington, DC. The timeline of events that followed represents an historical saga that reached a milestone only a decade later with the advent of laser ranging to satellites. At the same 1954 Washington gathering, Wernher von Braun described a multi-stage rocket that could launch a small satellite using a Redstone Rocket as a first stage and clusters of solid propellant rockets as upper stages. The attendees at the gathering, including Fred Whipple, agreed to continued work on a development effort, which subsequently was named Project Orbiter. In spring 1955, the Project Orbiter team was encouraged when it witnessed a successful Redstone launch at Cape Canaveral. The Astrophysical Observatory of the Smithsonian Institution was moved to the Harvard campus on July 1, 1955 with Fred Whipple as its Director. Four weeks later, on July 29, the White House announced that the U.S. planned to launch a satellite for the International Geophysical Year and later in the year the U.S. National Academy of Science assigned SAO to optically track the satellites. Whipple and his colleagues immediately initiated a crash effort to establish a global network of Baker-Nunn cameras, timing systems, communication equipment and a central computing and analysis capability. By the time that the USSR launched Sputniks I and II, in fall 1957, the SAO optical satellite and orbit determination programs were ready for preliminary operations, and soon expanded to a full capability. In January, 1958, the von Braun team, derived from Project Orbiter, launched a first USA satellite. In the following months and years, many more satellites were launched, and the SAO satellite tracking participants became very busy. The accuracy of their results improved with experience. As a means to further improve orbit accuracy, laser ranging to corner reflectors on satellites was invoked. Following the pioneering laser ranging efforts by GSFC in 1964, SAO introduced laser ranging into its tracking activities in 1965. Another milestone in the evolution of optical satellite observations occurred in November 1969 when the first array of retroreflectors was placed on the Moon, which facilitated laser ranging to the natural satellite of the Earth. Since the lunar retroreflectors were not a primary objective of the Apollo Program, the celestial mechanics community benefited fortuitously from the Apollo Program with what is probably its longest continuing feature. Looking ahead, the celestial mechanics community can contemplate another Apollo-like opportunity. The laser ranging organizations can promote the inclusion of retroreflectors on the asteroid that the US plans to capture and move to an orbit around the Moon. Accurate ranging to a satellite of the Moon could be a future major milestone in the evolution of the discipline.