

Viewing space from space

By Peter Davis

Looking back at the history of humanity, for the longest time people would gaze at the night sky with just their naked eye vision. Remarkably, through this primitive kind of observation, a great deal was learned about the solar system. Most of the major planets, for instance, were identified even before any telescopes were available. However, when technology entered the world of night sky observing, it did so with a vengeance! It has been mainly technological advances that have driven the advancement and development of astronomy. ‘Space astronomy’ is one of the more recent chapters in the history of high-tech astronomy.

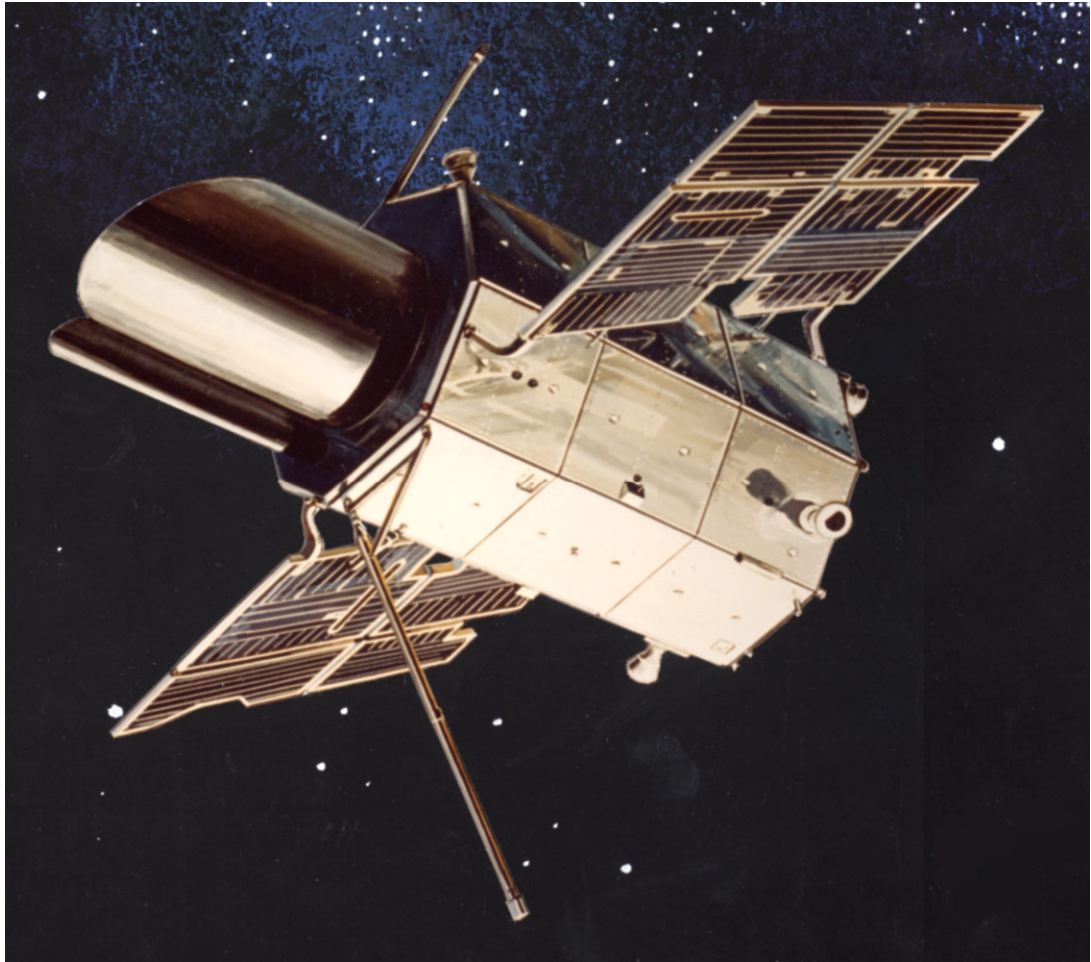
On October 4, 1957, the USSR dealt a major blow to the psyche of the Western world by launching the very first satellite into space: Sputnik 1. Sputnik 1 not only measured the pressure in the upper atmosphere but also triggered the space race between the USSR and the United States, culminating in the moonwalk by Neil Armstrong and Buzz Aldrin during the Apollo 11 mission of July 16th, 1969. Without doubt, space technology is one of the most fascinating feats of engineering, inspiring countless novels, movies, and TV series. The ongoing success of Star Trek and Star Wars is simple proof of our fascination with space. Astronomers are no exception. They lost no time to seize the opportunity to go into space. The British were the first to launch an astronomical satellite: Ariel 1 was launched in 1962 – only five years after Sputnik – to help scientists to understand our sun better. NASA launched the first telescope into space (see image) and many more were to follow.

Astronomy is one of the five core spending areas of the Canadian Space Agency. Space astronomy is not exactly cheap and a lot of excellent work can be done from the ground. So why are astronomers so keen on making their observations from space? Well, observing the night sky from the ground is plagued by a number of problems. First of all, the least little bit of cloud cover makes astronomical observations impossible. Stray light from the city leaves the night sky dressed in a dirty green tint from fluorescent lights. Wind will also smear out the image of a star into a blob rather than a dot. That suggests that Lethbridge is not the world’s best site to make astronomical observations: especially during winter we have many cloudy days, our city likes to be well lit (even when you don’t have all the outdoor Christmas decorations), and there is certainly enough wind for everybody including astronomers! Astronomers can minimize these problems by carefully choosing the site for a large observatory. Most can be found on tall mountains and far away from civilization, say in the Chilean highlands or on top a dormant volcano in Hawaii. Antarctica also turns out to be a prime location – if only it weren’t that unfriendly a place! However, these problems will never go completely away as long as astronomers stay on the ground.

Space astronomy holds so much promise because it gets around all these problems. Space missions very effectively avoid the trouble clouds or winds usually cause. However, that’s not all. Space offers another decisive advantage to astronomers: our atmosphere protects the Earth from a lot of otherwise pretty dangerous radiation, like ultraviolet light or x-rays. Infrared light is also filtered out and almost none of it passes through the atmosphere. That means that astronomers who are interested in infrared, ultraviolet, or x-ray observations of the universe have no choice but to go into space. And just as Murphy’s law predicts, a lot of interesting things can only be explored by

observing in these more unusual ranges of the electromagnetic spectrum: for example stars in the making shine mainly in the infrared and black holes give off preferably x-radiation.

Considering the great benefits that astronomers get from making the leap into space, it is not so surprising that Canada participates in efforts to make astronomical observations from space, such as NASA's James Webb Space Telescope, the successor to the Hubble Space Telescope, or the European Space Agency's Herschel mission.



Caption: OAO-2, the first astronomical observatory in space, launched by NASA in December 1968 to make observations in the ultraviolet © NASA

Peter Davis, University of Lethbridge, project manager for the Canadian contribution to the SPIRE instrument on Herschel, <http://spire.uleth.ca/>