



## **Remote Sensing of the Earth's Environment from Space: Past, Present, and Future**

M. D. King

University of Colorado, Laboratory for Atmospheric and Space Physics, Boulder, United States  
(michael.king@lasp.colorado.edu)

With the wide variety of satellites encircling the Earth, provided by many countries and government agencies, and their various orbits and instrumentation, satellites provide an invaluable means of monitoring our planet with a consistent measurement capability across national and other political boundaries. They play an essential role in alerting us to potentially detrimental or even catastrophic changes taking place on our planet that require actions from our politicians and other policymakers. They also provide important information for verifying compliance with international treaties and other agreements. Furthermore, satellite observations regularly reveal features of the planet that take scientists by surprise and remind us that we remain a long way from fully understanding the behavior of the complex web of physical, chemical, and biological processes that take place on our home planet.

In this presentation, I will review the current state of Earth remote sensing capabilities, with a particular focus on US space observations, many of which have analogs in other space-based systems around the world. I will highlight what we know and how we know it, and will illustrate many applications of 'routine' space-based observing systems that have led to applications across a wide range of environmental issues. In addition to planned environmental observations, such as (i) aerosol and cloud properties, (ii) concentrations and vertical profiles of atmospheric constituents, (iii) land surface properties, (iv) biological and physical oceanography, and (v) cryospheric properties, satellites have led to a large number of unanticipated applications that are of a broad interest to the human condition. Among these are (i) monitoring of air quality, (ii) number, distribution and energy of fires, (iii) floods, (iv) droughts, (v) volcanic eruptions, and other natural disasters. Serendipitous use of satellites to improve numerical weather forecasts based on frequent overpasses of the arctic is also of wide interest.

I will conclude with discussions on the current state of Earth observations now readying for launch or under development by NASA and NOAA, and what we can expect in the next decade.