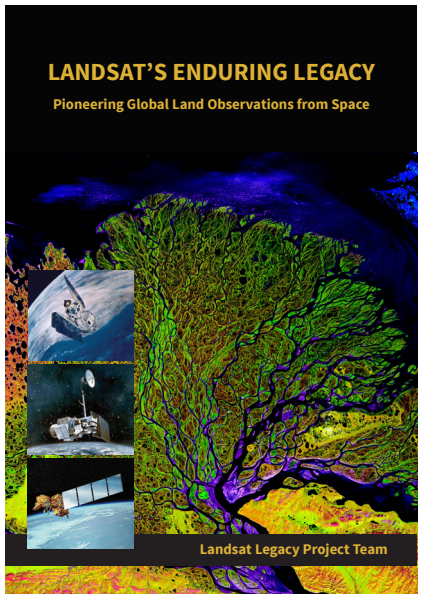

Landsat's Enduring Legacy: Pioneering Global Land Observations from Space

Samuel Goward, Darrel Williams, Terry Arvidson, Laura Rocchio, James Irons, Carol Russell, and Shaida Johnston

American Society for Photogrammetry and Remote Sensing: Bethesda, MD. 2017. XXXIV and 586 pp. diagrams, maps, photos, images, 3 appendices, and an index. Hardback. $100 non-member $80 member, $60 student, ISBN 1-57083-101-7.

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Landsat's Enduring Legacy: Pioneering Global Land Observations from Space by Goward, Williams, Arvidson, Rocchio, Irons, Russell, and Johnston could easily have been titled, *Everything You Might Ever Want to Know About Landsat*. It is an amazing book that anyone who has worked with Landsat imagery will want to have as a valued part of their library. This book was 15 years in the making and tells the inside story of the Landsat system from the early ideas following World War II through the actual development of ERTS (Earth Resources Technology Satellite) [i.e., Landsat 1] and all the way up to today and Landsat 8. It would be virtually impossible to find all of the information and background material provided in this book in any other single place. The remote sensing community owes a tremendous debt of gratitude to the team of authors and the many others that contributed to this book for putting all this material together for all of us to share.

Landsat's Enduring Legacy is divided into an introduction, six chapters, an epilogue, and three appendices. The book begins with a Foreword by two giants in the Landsat community, Virginia Norwood and Vincent Salomonson, both winners of the prestigious Pecora Award. The Introduction provides the highlights regarding Landsat including the most significant images and time series, the value of the synoptic view, the power of the imagery archive, and a list of dedicated visionaries that took the concept to fruition. Each of the first five chapters then covers a specific time period. Chapter 1, entitled "The Vision – Earth Rising", encompasses the time right after World War II until the Launch of Landsat 1. While I have been a student of remote sensing and Landsat since 1979, there were many stories and information in this chapter that were new and fascinating to me. Chapter 2, entitled "Beyond Expectations", covers the period from 1972 to 1980. This chapter was so much fun to read as the potential of what Landsat could do, especially the MSS (MultiSpectral Scanner), became a reality. Reading about the responses of so many of the true pioneers of this technology as they experienced first the shock and then the awe of what could be accomplished reminded me of what a privilege it is to be part of the remote sensing community. Chapter 3 was all about Landsat in transition and the attempt to privatize the satellite during the 1980's. While most of us suffered through this period trying to find funds to buy Landsat images, again there are more stories in this chapter than I was ever aware of despite considering myself an active participant during this tenuous time. The miracle that is Landsat 5 which acquired imagery for well over 25 years is also described in this chapter. Chapter 4 is entitled, "Light on the Horizon", and covers the period from 1992-1999. Landsat 4 all the way through to 7 are discussed in this chapter. During this time there were a number of ups and downs as the Department of Defense removed their funding of Landsat and Landsat 6 failed to achieve orbit. However, there was more determination than ever to collect a continuous imagery record of monitoring the Earth. Also, during this time, OhioView – the precursor to the AmericaView Program – was begun with the goal of sharing imagery, experience, and remote sensing training at the grassroots, state level. Chapter 5 completes the time periods with the theme of "Approaching the Vision" from 1999-2013. A number of highlights are covered in this chapter including the launch of Landsat 7 with the ETM+ sensor and the fur-

continued on page 13

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continuous operation reference stations has been unfolded step by step. The satellite navigation positioning continuous operation reference station network with centimeter-level real-time positioning precision has been completed or is being built in 24 provinces (autonomous regions, municipalities), and over 1,200 continuous operation reference stations have been newly built. The work related to quasi-geoid refinement has been carried out in 26 provinces (autonomous regions, municipalities), of which 25 have completed the work and 23 have reached the centimeter-level precision. Based on the quasi-geoid refinement, GPS C network construction and Class-C leveling survey have been carried out in most provinces, municipalities and autonomous regions.

In June, 2012, the project of infrastructure construction of the national modern datum reference system for surveying and mapping (phase I), which is a major special surveying & mapping project of China during the 12th "Five-year Plan" period, was officially kicked off. The project is expected to, in the next 4 years, build 150 reference stations, reform 60 GNSS positioning continuous operation reference stations and make direct use of 150 reference stations, thus forming a national satellite positioning continuous operation datum network consisting of 360 reference stations; build 2,500 satellite geodetic control points, make direct use of 2000 points, thus forming a 4500-point national satellite geodetic control network, which constitutes the new-generation geodetic datum framework together with the national satellite positioning continuous operation datum network; build and rebuild 27,400 height control points, lay 110 leveling bedrock points, deploy the national Class-A leveling network with a length of 122 thousand kilometers and form the national modern vertical datum framework; deploy 50 national gravimetric datum points, improve the national gravity datum infrastructure; build 1 national surveying & mapping datum data center and form the national modern surveying & mapping datum management service system. Through the implementation of infrastructure construction of the national modern datum reference system for surveying and mapping, China plans to complete a high-precision, geocentric, dynamic, practical and uniform national datum reference system for surveying and mapping in 2015.

At the end of 2012, Beidou (COMPASS) navigation satellite system covered the most areas in the Asia-Pacific region and was officially put in commercial operation. And construction and maintenance of the modern datum reference system for surveying and mapping that is based on GNSS (GPS, GLONASS, GALILEO and COMPASS) have started in some areas in China." *(Approved by: National Administration of Surveying, Mapping and Geoinformation of China 28 Lianhuachi West Road, Haidian District, Beijing, 100830, China, 2013-12-20)*

BOOK**REVIEW**

continued from page 9

ther development of the archive not only of US imagery but worldwide. However, undoubtedly the most significant highlight of this time period was the decision to provide Landsat imagery in the entire archive free of charge to anyone. This development has opened up not only the academic/research components of Landsat imagery but also has provided for countless commercial applications.

Chapter 6, the final chapter, is entitled "Landsat: Dedicated to Continuous Earth Observation" and presents a summary of the overarching themes from the book as well as the lessons that have been learned. This chapter is followed by a short epilogue that contains a little more information about Landsat 8 and some final thoughts. There are then three appendices: the first presenting state of the archive maps for all missions, the second presenting information about concurrent Landsat operations, and the third containing miscellaneous information about many who worked on Landsat including the various Landsat Science Team members through the years. These first two appendices present the USGS archive as of 2008. Fortunately, since that time the USGS has worked hard to almost double the archive by retrieving much of the international imagery that is available. The book concludes with a very extensive bibliography and then an index, both making the information in the book easy to access.

In reading and reviewing this book, I am reminded of all the effort, commitment, and energy that has gone into producing a 45-year continuous archive of amazing imagery of our home planet. It is truly a phenomenal accomplishment. To have all this information, including lots of inside stories that could easily be lost to future generations, all in one place is a great blessing to our remote sensing community and beyond. The Landsat legacy will continue to live on and is more secure than it has ever been. However, this book provides all of us with a great history of where we have been and the struggle to get to where we are today. I guarantee that you will want to read this book to learn about this history and then you will keep it to refer to it often as we continue to grow the Landsat legacy.