PROCEEDINGS OF SPIE

Observatory Operations: Strategies, Processes, and Systems IV

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Editors

4–6 July 2012
Amsterdam, Netherlands

Sponsored by
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Published by
SPIE

Volume 8448

Proceedings of SPIE 0277-786X, V.8448

Observatory Operations: Strategies, Processes, and Systems IV, edited by
Alison B. Peck, Robert L. Seaman, Fernando Comeron, Proc. of SPIE Vol. 8448,
844801 · © 2012 SPIE · CCC code: 0277-786X/12/$18 · doi: 10.1117/12.2006268

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Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *Observatory Operations: Strategies, Processes, and Systems IV*, edited by Alison B. Peck, Robert L. Seaman, Fernando Comeron, Proceedings of SPIE Vol. 8448 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN: 0277-786X
ISBN: 9780819491497

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

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Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

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Introduction

Motivation

While every ground and space observatory has its own individual and unique characteristics, each shares with the others a common need to execute technical and science operations in the most efficient and cost-effective way possible. This need is driven by the upward pressure from users for more services and capabilities in opposition to the downward pressure by funding agencies to contain or reduce costs. Tension at the interface between users and funders is particularly acute in this time of global economic turmoil. At the same time, the technical and logistical challenges are growing with the systems and network complexity of new observing modes, coordinated multi-facility and multi-messenger observing campaigns, fully or partially robotic facilities, integrated instrument pipelines and science archives, and the need to integrate more complex cyber-infrastructure such as the Grid and the Virtual Observatory. The subtle intricacies and mega-scales of new instrumentation will demand correspondingly creative operations modalities.

Building on previous successful conferences, we have invited the observatory operations community to gather to discuss lessons learned, progress made and future initiatives. As before, we are particularly interested in discussions of what works versus what does not work, as well as what was planned versus what actually happened. Discussion of the interplay of science operations, technical operations, data management operations, and observatory development is particularly encouraged - especially as it impacts the maximization of science value return. The interplay of available funding, delivered capabilities/services, and user expectation management and how that informs observatory operations models is another important discussion topic. An additional topic of this conference **is** the rising support challenge of time-domain investigations. Demand for such support is steadily increasing, driven by the desire to study rare, random events as well as long-term, synoptic phenomena. Such studies are particularly challenging when they require coordination, often unpredictable, between multiple space and ground based observatories. While this trend has recently been driven by space-based detections of gamma ray bursts, the startup of ground-based time-domain survey facilities (ramping up to the Large Synoptic Survey Telescope in the second half of this decade) will quickly take this challenge to a new level. Progress reports from new facilities coming on-line and existing facilities facing major new operational challenges are particularly welcome.

Here are some of the main discussion areas that we have tried to address:

Optimizing Operations Management for Scientific Productivity

- Defining effective operations products and goals
- Productivity and efficiency metrics: "lies, damn lies, and statistics"
- Observation execution efficiency: maximizing science target integration time
- Orbit and site selection strategies - impact on observing and calibration efficiencies
- Pre-launch versus post-launch calibrations: What is right balance?
- Calibration standards: quality, re-use, the challenge of increased sensitivity (e.g., more collecting area, more sensitive detectors)
- Calibration strategies: dealing with the effects of weather, atmosphere, and on-orbit conditions
- Fundamental limits to calibration accuracy: physics, process, or variability (instrumental, atmospheric or from the space environment)
- Fault analysis and resource allocation to minimize lost time
- Proposal submission, evaluation, and selection: processes and strategies
- Queue operations and dynamic scheduling: case studies and lessons learned
- Engineering and technical support models, staffing requirements, and costs
- Remote observing: case studies and lessons learned
- The advent of "mobile apps:" observatory operations, remote observing, archive access, and access to literature
- Coping with random events: the impact of atmospheric and space conditions
- Plans versus steady-state reality: lessons learned
- Transitioning from construction to operations: approaches and lessons
- The future: the impact of evolving technology on models, plans, and budgets.

Observatory Operations in the Era of Massive Data

- Science product definition: what is good enough?
- Science product creation: the observatory or the community?
- Science product archiving and curation; in particular, the planning and creation of legacy data sets
- Science product models, staffing requirements, and costs
- End-to-end information management systems: from proposal to product
- Establishing and maintaining bibliographic databases
- Operating survey telescopes
- Data centers: costs and benefits, lessons learned
- The role of the virtual observatory
- System performance monitoring: what is good enough?

- User support models, staffing requirements, and costs
- Innovative operations of small aperture telescopes.

Process Coordination for the Time Domain

- Space-based transient discovery and follow-up
- Radio and non-EM transients
- Observatory operations for target-of-opportunity modes
- Transient event alert publishing in the Virtual Observatory
- Systems architectures for transient follow-up observing
- Integrating data management into time domain workflows
- Distributed QA and user support management
- Coordinated scheduling for multi-wavelength and multi-observatory collaborations.

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