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ISP Focus Issue: Optical Coherence Tomography (OCT) in Ophthalmology

Introduction

The Optical Society (OSA) is pleased to present this special issue of *Optics Express* on “Optical Coherence Tomography (OCT) in Ophthalmology” as part of the new [Interactive Science Publishing](#) (ISP) project. The project is being performed in collaboration with the National Library of Medicine and represents a new paradigm for the publication of digital image and large dataset information.

This ISP focus issue in *Optics Express* contains invited articles by leading international research groups which feature digital datasets in optical coherence tomography (OCT). With recent advances in high speed OCT using Fourier methods, it is now possible to acquire high definition images as well as large, three-dimensional data sets. The impact of these advances has been especially significant in ophthalmology, where improved image quality, the availability of comprehensive information on retinal structure, and the ability to precisely register data sets across multiple examinations promises to yield many new advances in fundamental research and clinical application.

The purpose of this special issue is to provide benchmark image data sets and case series for the research community. The availability of OCT data in digital form promises to accelerate research and help advance the development of new diagnostic and measurement criteria in retinal disease as well as the development of new image processing and visualization methods for three-dimensional ophthalmic OCT data.

Topics which are addressed by this special issue include:

- Three-dimensional OCT imaging in ophthalmology
- Imaging of the retinal nerve fiber layer in glaucoma
- Data sets for assessing algorithms and measurement reproducibility
- Methods for image analysis and visualization
- Comparative studies using commercial ophthalmic instruments
- Ultrahigh resolution and adaptive optics in retinal imaging
- Functional, Doppler, and polarization sensitive imaging

This special issue contains case studies and cross-sectional surveys of retinal disease. The purpose of these case series and cross-sectional surveys is to provide the research community with controlled, annotated datasets which can be used to develop and validate methods for dataset visualization, image processing, and diagnostic analysis. The research

community has access to these datasets, but is required to cite the primary publication in their future manuscripts.

Three-dimensional data sets can be viewed by special software, Kitware Inc.'s [OSA ISP software](#), which is downloadable and enables real time viewing and rendering. In addition to three-dimensional data sets ready for interactive viewing by OSA ISP software, several papers provide links to original data sets that are either unprocessed or in an early stage of pre-processing. These data are intended to be used by readers who want to develop their own data processing algorithms and compare their results to those provided by the authors.

We especially wish to thank the many research groups who have contributed papers and data to this special issue. In addition to our team of guest editors, Dr. Thomas M. Baer (Stanford Univ. and President of the OSA) worked with OSA as an advisor to the overall ISP project. We thank the National Library of Medicine for their collaboration on this project and acknowledge support from the Air Force Office of Scientific Research. We also gratefully acknowledge support from the Association for Research in Vision and Ophthalmology. Finally, we wish to thank Kelly Cohen, Scott Dineen, Tim Fincham and others on the OSA staff for their support in the many facets of this project. We hope that you will find this special issue of interest and service to our community.

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