# Call for Papers

# Special Issue of GPS Solutions

Advancements in Atmospheric and Ionospheric Research, Meteorology, Climate Change, Weather Prediction, Oceanography, and Geodesy from GPS Radio Occultation Methods

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## INTRODUCTION

Over the past decade, significant, and substantial progress has been made in the science and technology of ground-based and space-based atmospheric remote sensing. The GPS atmospheric sensing data have shown impacts on climate monitoring, global and regional weather prediction, ionospheric research, and space weather forecasting. GPS radio occultation (RO) technique has emerged as a powerful and relatively inexpensive approach for sounding the global atmosphere in all weather conditions over land and ocean and has been identified as a very promising atmospheric observing system for both weather and climate. Various RO space missions have proved successful in addressing a broad range of scientific questions on climate change analysis, validating of climate simulations, operational weather prediction, ionospheric research and space weather forecasting, calibrating other observing systems (e.g., radiosonde and other satellite observations), ionosphere studies (layered structures of the F and E layers and global distribution of the Sporadic Es layers), and Geodesy. Stimulating results obtained from the GPS signals, reflected back by the ocean surface, have unveiled a new era of GPS research. Therefore apart from the retrieval algorithm research, the RO data is being used in various fields of research as well. In April 1995, USA launched a pioneering small satellite Microlab-1 to examine and explore the RO method for investigating the atmosphere and ionosphere using two GPS L-bands signals (GPS/MET experiment). Following the amazing success of the GPS/MET experiment, various countries undertook their own scientific missions of RO monitoring and launched satellites like CHAMP (Germany), OERSTED (Denmark), SAC-C (Argentina), GRACE, METOP, and FORMOSAT-3/COSMIC(Taiwan). NASA-EOS, NASA-GFZ, and Korea are planning to launch RO programs ICESAT/GLAS, TERRA-SAR, and KOMPSAT-5, respectively.

## AIM OF SPECIAL ISSUE

**Formosat-3/COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate)** is a joint scientific mission between Taiwan and the U.S., launched on 14 April, 2006 with the goal of demonstrating the use of GPS RO data in operational weather prediction, climate analysis, and space weather forecasting. The mission placed six small micro-satellites into six different orbits at 700~800 kilometer above the earth surface. These satellites form a unique low-earth-orbit constellation that receives signals from the US GPS satellites. Each satellite carries three atmospheric science payloads: (1) a GPS RO receiver for ionospheric and neutral atmospheric profiling and precision orbit determination; (2) a Tiny Ionospheric Photometer (TIP) for monitoring the electron density via nadir radiance measurements along the sub-satellite track; and (3) a Tri-Band Beacon (TBB) transmitter for ionospheric tomography and scintillation studies. With the ability of performing both rising and setting occultation, Formosat-3/COSMIC has been producing approximately 2,500 soundings of the ionosphere and atmosphere data per day, uniformly distributed around the globe since mid 2007. Such remarkable near-real time data with almost uniform global coverage have never been available to atmospheric scientists before, and are being used extensively to demonstrate the need of improved weather forecasting, increased capability of climate research, better prediction of space weather, and advances of fundamental global gravity research. The results have shown that the GPS RO data from Formosat-3/COSMIC are of better quality than those from previous missions and penetrate much farther down into the troposphere; between 70 to 90 percent of the soundings reach to within 1 km of the surface on a global basis. Formosat-3/COSMIC data are making a positive impact on operational global weather forecast models and particularly over regions void of data such as oceans and polar regions. Presently the European Centre for Medium-Range Weather Forecasts, the National Centers for Environmental Prediction and the UK Meteorological Office are using Formosat-3/COSMIC data operationally. Formosat-3/COSMIC data are shown to be useful in improving the skill of weather prediction models. With the ability to penetrate deep into the lower troposphere using an advanced open loop tracking technique, the Formosat-3/COSMIC RO instruments have shown the capability to observe the structure of the tropical atmospheric boundary layer, providing valuable information on low level atmospheric water vapor.

Regarding precision, accuracy, and resolution, the RO approach has reduced reliance on existing methods, for example used in instruments onboard weather balloons and radiosondes. Precise measurements of the atmospheric and ionospheric parameters with global coverage from space have never been available since the beginning of RO research until now. As a consequence, encouraging results are continuously obtained in climate change research, climate simulation research, operational weather prediction research, ionospheric research and space weather forecasting research. The “Special Issue of GPS Solutions” is intended to publish original peer-reviewed manuscripts on recent achievements of RO approaches in the various areas of atmospheric research mentioned above. The focus will be on applications where accuracy is required. Topics of interest include results of investigations and simulations associated with GPS RO Experiments. The special issue will bring together recent scientific results and critical thought from

atmospheric physicists, meteorologists, remote sensing researchers, hydrologists, space physicists, and oceanographer and provide a platform to further our knowledge and technical solutions for various RO missions with GPS occultation. Submissions by scientists and researchers worldwide are strongly encouraged.

## PAPER PREPARATION AND REVIEW:

All manuscript submissions will be reviewed by two peers. The general procedure for publishing in GPS Solutions is outlined in http://www.springer.com/earth+sciences/geophysics/journal/10291. Only manuscripts of type ORIGINAL will be accepted for this special issue. Introductory material, historical prospective, etc will be the subject of one REVIEW paper. This approach maximizes the space for other authors to focus on new theoretical developments and results. You are encouraged to observe the word limitation of 3000-5000 words per manuscript.

## DEADLINES:

Papers should be submitted electronically via https://www.editorialmanager.com/gps/ before **January 31, 2009** in order to be considered for the special issue. As soon as the review is successfully completed the papers will be published online. Manuscripts completed before **June 30, 2009** will comprise the special issue which will be printed in September. The issue will be limited to about 80 pages. Additional manuscripts will be published in subsequent issues as needed. When submitting, authors should mention that they wish to include the paper in the **"Radio Occultation (RO) Experiments Special Issue**" and also contact the Guest Editor, Yuei-An Liou.