Mehmet Kurum, Ph.D.
Chief Researcher
TUBITAK-BILGEM
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Education

George Washington University Washington, DC USA
Ph.D. in Electrical Engineering, ***May 2009***
- Dissertation: L-band Estimation of Forest Canopy Attenuation by Time-Domain Analysis of Radar Backscatter Response

M.S. in Electrical Engineering, ***May 2005***
- Research Project: Forward and Backscattering Measurements of Rainfall using the NASA Microwave LINK

Bogazici University Istanbul, Turkey
B.S. in Electrical & Electronics Engineering, ***Jun. 2003***
- Final Project: Elliptic Curve Cryptosystems

Research Interests

- Microwave remote sensing of vegetation, soil moisture, rain, snow, and other hydrological features
- Characterization of wave propagation in random media, and microwave scattering from rough and vegetated landscapes
- Development of stochastic models of vegetated terrain for use in microwave active/passive remote sensing
- Microwave Radar/Radiometer design, operations, and calibration
- Polarimetric SAR and Inteferometric SAR processing/modeling, applications to Earth remote sensing in space.
- Use of Hyperspectral electro-optic and SAR/InSAR approaches within disaster management and mitigation domain.

Teaching Experience

George Washington University Washington, DC
Teaching Assistant **Sep. 2003-Dec. 2003**
- Introduction to Digital Signal Processing

Adjunct Professor **Sep. 2010-Dec. 2010**
- Electromagnetic Fields and Waves II

Research Experience

TUBITAK-BILGEM Gebze, Kocaeli TURKEY
Information Technologies Institute

- ***Chief Researcher*** **Dec. 2012- present**

– Development of operational algorithms for determining (estimating) degree and extent of natural disasters (including earthquakes, floods, wildfires, etc.) from multispectral electro-optic and SAR/InSAR satellite platforms in support of Turkish Prime Ministry's Disaster and Emergency Management Department.

NASA Goddard Space Flight Center Greenbelt, MD USA
Hydrological Sciences Laboratory, Code 617

- ***Visiting Scientist*** **Jul. 2014- Aug. 2014**
(Sponsored by Scientific and Technological Research Council of Turkey)

– Analysis of microwave simulation and measurements over agricultural crops during a growing seasons

- ***Laboratory Manager of the Hydrology Wet Lab*** **Dec. 2011- Dec. 2012**
(For support of Hydrological Sciences Laboratory Microwave Spaceborne Cal/Val Activities)

– Responsible for the management of all aspects of laboratory operation. This responsibility includes the identification of the resources (equipment, manpower, and training) required to operate the lab, security, inventory, property, safety, facilities management, and compliance to working procedures;

- ***Research Associate*** **Jun. 2011- Dec. 2012**
(Administered by University of Maryland College Park – Earth System Sciences Interdisciplinary Center)

– Research on spaceborne/airborne/ground-based microwave data for estimation and monitoring soil moisture through vegetation.
– Advancing current soil moisture algorithms to be used for space-based microwave remote sensing of the Earth's land surface.
– Development of an improved radiative transfer approach / algorithm for correcting satellite data to take into account vegetation scattering.

- ***NASA Postdoctoral Program Fellow*** **Jun. 2009-Jun. 2011**
(Administered by Oak Ridge Associated Universities)

– Development of a first-order radiative transfer model for microwave radiometry of forest canopies at L-band
– Analysis of passive measurements over conifer forest at L-band: modeling of the forest floor
– Characterization of forest opacity using multi-angular emission and backscatter data
– Calculation of L-band brightness temperature from forest: approximate techniques
– Determination of effective tree scattering and opacity at L-band

George Washington University Washington, DC
Electrical and Computer Engineering

- ***Research Assistant*** **Jan. 2004-Jun. 2009**

- Multi-sensor examination of microwave soil moisture retrieval through tree canopies.
- Development of a ground based L-band combined radar/radiometer system called ComRAD.
- Development of the electromagnetic vegetation models used in analyzing both microwave radar and radiometer data.
- Studying the feasibility of making backscatter measurements from rainfall with the NASA/Microwave Link system at Wallops Flight Facility, Wallops Island, VA.

Technology Promotion International College Park, MD USA
Consultant **October 2004 - January 2005**

- Designing an airborne telemetry engagement (usually over ocean) between a set of M airborne sources and an airborne receiver (the Synthetic Beam-forming Antenna) using Simulink

Honors & Awards

- **2014** URSI (International Radio Science Union) Young Scientist Award
- **2013** Leopold B. **Felsen Award** for Excellence in Electromagnetics
- **Science PI for a NASA Grant**: $ 375000 (3-yr total), **Title**: "Modified Tau-Omega Model for Moderately to Densely Vegetated Landscapes," **Sponsor**: NASA, **Program**: Research Opportunities in Space and Earth Sciences (ROSES) NNH09ZDA001N-RST, Remote Sensing Theory, A. 24, **Year**: ***2011-2013***, **PI**: Peggy O'Neill, **Co-I and Science PI**: Mehmet Kurum.
- **NASA Postdoctoral Program Fellowship**, NASA Goddard Space Flight Center, Hydrological Sciences Branch, Code 614.3, **June 2009 – June 2011**
- **Graduate Research & Teaching Assistantship**, The George Washington University, Electrical and Computer Engineering **September 2003 – May 2009**
- Graduate Teaching Assistant Certification from GWU **December 2003**
- **Eight Conference Travel awards** from several international/national symposiums during my graduate study at George Washington University, **2004-2009**
- Ranked 212nd in national university entrance exam in Turkey among 1.5 million applicants in **1998**
- Honors student, Electrical and Electronics Engineering, Bogazici University, **1999-2003**

Professional Activities

- **Associate Editor** for URSI (International Radio Science Union) Radio Science Bulletin, August 2014 to present.
- **Early Career Representative** for URSI Commission F (Wave Propagation and Remote Sensing), 2014 – 2020.

- **IEEE Senior Member**, September 2014
- IEEE Geoscience and Remote Sensing Society **member**, 2008 to present.
- **Chapter Treasurer / Founding Member**, IEEE Geoscience and Remote Sensing Society **TURKEY Chapter**, 2013 to present.
- **General Lectures Committee Member**, URSI Atlantic Radio Science Conference (URSI AT-RASC), the Canary Islands (Spain) in May 18 – 22, 2015.
- **Organization Committee Chair**, The First Earth Observation Applications Summer School (Uydu Yer Gözlem Uygulamaları Yaz Okulu), Gebze (Turkey), June 23-27, 2014.
- **Scientific Committee Member**, Sinyal İşleme ve İletişim Uygulamaları Kurultayı (Signal Processing and Communication Symposium), Uzaktan Algı için Sinyal ve Görüntü İşleme Çalıştayı (Workshop on Signal and Image Processing for Remote Sensing),
  - Trabzon (Turkey), April 23-25, 2014.
  - Malatya (Turkey), May 16-19, 2015.
- **Local Organizing Committee Member** for 11th IEEE Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment, Washington, DC (USA), Mar. 1 – 4, 2010.
- **Co-Chair** for
  - Two technical sessions (entitled "**Vegetation mapping III**" and "**LAI, Reflectance, and Fluroessence**") at International Geosciences and Remote Sensing Symposium, Honolulu, Hawaii (USA), July 25 – 30, 2010.
  - One technical session (entitled **Soil Moisture: Radar I**) at International Geosciences and Remote Sensing Symposium, Munich (Germany), July 22 – 27, 2012.
  - One technical session (entitled **Passive Remote Sensing**) at XXXIth URSI General Assembly and Scientific Symposium, Beijing (China), August 14 – 23, 2014.
  - One general lecture (entitled **Remote Sensing of Ocean Salinity**) at URSI AT-RASC, the Canary Islands (Spain) in May 18 – 22, 2015.
- **Reviewer** for
  - IEEE Transactions on Geosciences Remote Sensing (TGRS),
  - IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS),
  - IEEE Geosciences and Remote Sensing Letters (GRSL),
  - Remote Sensing of Environment (RSE),
  - Progress in Electromagnetics Research Symposium (PIERS),
  - Journal of Applied Remote Sensing (JARS)

Participation in Soil Moisture Calibration/Validation Experiments

- Soil Moisture Active/Passive Validation Experiment (SMAPVEX), Maryland (October 2008)
- Deciduous and Coniferous Tree Experiment by Combined Radar/Radiometer (ComRAD), Maryland (2006 – 2009)
- Soil Moisture Active Passive Experiment (SMAPEx-2), South-Eastern Australia, (December 2010)
- Crop Growing Season Monitoring Experiment by ComRAD, Maryland (May – November, 2012)

Peer-Reviewed Journal Papers

[7] **M. Kurum**, "C-Band SAR Backscatter Evaluation of 2008 Gallipoli Forest Fire," ***accepted for publication*, IEEE Geoscience and Remote Sensing Letters, 2015.**

[6] P. K. Srivastava**,** P. E. O'Neill, M. H. Cosh, **M. Kurum**, R. H. Lang, A. T. Joseph, "Evaluation of dielectric mixing models for microwave soil moisture retrieval using data from the combined Radar/Radiometer (ComRAD) ground based SMAP simulator," ***in press*, IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing, 2014.**

[5] **M. Kurum,** "Quantifying Scattering Albedo in Microwave Emission of Vegetated Terrain", **Remote Sensing of Environment**, vol. 129, pp. 66-74, February **2013**.

[4] **M. Kurum**, P. E. O'Neill, R. H. Lang, A. T. Joseph, T. J. Jackson and M. H. Cosh, "Effective tree scattering and opacity at L-band", **Remote Sensing of Environment,** vol. 118, pp. 1-9, March **2012**

[3] **M. Kurum**, P. E. O'Neill, R. H. Lang, M. H. Cosh, A. T. Joseph, and T. J. Jackson, "Impact of forest litter on forest emission at L-band: modeling the forest floor", **IEEE Transaction on Geosciences and Remote Sensing,** vol. 50, no. 4, pp. 1071-1084, April **2012.**

[2] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, T. J. Jackson and M. H. Cosh, "A First-order radiative transfer model for microwave radiometry of forest canopies at L-band", **IEEE Transactions on Geoscience and Remote Sensing,** vol. 49, no. 9, pp. 3167 - 3179, September **2011. [Cover Article]**

[1] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, T. J. Jackson and M. H. Cosh, "L-Band radar estimation of forest attenuation for active/passive soil moisture inversion", **IEEE Transaction on Geosciences and Remote Sensing,** vol. 47, issue 9, pp. 3026-3040, September **2009.**

Conference Presentations/Proceedings

In 2015

[32] F. Ş. Rende, K. Kırtaç, S. Ertürk, **M. Kurum**, "Hyperspectral image classification using support vector machines and nearest neighbor discriminant analysis," *submitted*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'15)**, Milan (Italy), Jul. 26 – 31, **2015**.

[31] **M. Kurum**, "SAR remote sensing of forest fires: Gallipoli forest fire in 2008," *submitted*, **URSI Atlantic Radio Science Conference** (URSI AT-RASC), the Canary Islands (Spain) in May 18 – 22, **2015**

In 2014

[30] **M. Kurum**, Q. Zhao, and R. Lang, "Angular aspects of microwave single scattering albedo from tapered vegetation constituents", *in proceedings*, **XXXIth URSI General Assembly and Scientific Symposium**, Beijing (China), August 14 – 23, **2014**

[29] R. H. Lang, S. S. Seker, **M. Kurum**, P. E. O'Neill, M. Cosh, "Use of periodic stalks to model L-band returns from corn", *in proceedings*, **XXXIth URSI General Assembly and Scientific Symposium**, Beijing (China), August 14 – 23, **2014**

[28] **M. Kurum**, "Interferometric SAR coherence analysis of Canakkale Intepe forest fire in 2008," *in proceedings*, 22. **Sinyal İşleme ve İletişim Uygulamaları Kurultayı** (22nd Signal Processing and Communication Symposium), Trabzon (Turkey), April 23-24, **2014**

[27] R. H. Lang, S. S. Seker, Q. Zhao, **M. Kurum**, M. Ogut, P. E. O'Neill, M. H. Cosh, "L-band Radar Backscattering from a Mature Corn Canopy: Effect of Cobs," *presented*, **USNC-URSI**, Boulder, Colorado (USA), 8–11 Jan. **2014**

In 2013

[26] P. O'Neill, **M. Kurum**, A. Joseph, J. Fuchs, P. Young, M. Cosh, R. Lang , "L-band active / passive time series measurements over a growing season using the ComRAD ground-based SMAP simulator", *in proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'13)**, Melbourne (Australia), Jul. 21 – 26, **2013**.

[25] M. Ogut, R. H. Lang, W. Wasylkiwskyj. **M. Kurum**, and P. E. O'Neill, "Performance of an L-Band antenna for radiometric measurements", *in Digest*, **USNC/URSI Meeting**, Boulder, CO (USA), January 9 – 12, **2013**.

In 2012

[24] **M. Kurum**, P. E. O'Neill, and R. H. Lang, "A multiple-scattering effective albedo formulation at L-band," *presented*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'12)**, Munich (Germany), July 22 – 27, **2012**.

[23] **M. Kurum**, P. E. O'Neill, and R. H. Lang, "Effected albedo of vegetated terrain at L-band," *in proceedings*, **12th IEEE Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRAD'12)**, Villa Mondragone, Rome (Italy), March 5 – 9, **2012**.

In 2011

[22] **M. Kurum** and P. E. O'Neill, "Backscatter measurements over vegetation by ground-based microwave radars," *in Digest*, **XXXth URSI General Assembly and Scientific Symposium**, Istanbul (Turkey), August 13 – 20, **2011** (**invited**).

[21] **M. Kurum**, P. E. O'Neill, R. H. Lang, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Effective tree scattering at L-band", *in Proceedings,* **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'11)**, Vancouver (Canada), July 24 – 29, **2011**.

[20] **M. Kurum**, "Microwave radiometry of forest canopies at L-band", *presented*, **Recent Advances in Space Technologies (RAST'11)**, Istanbul (Turkey), June 9 – 12, **2011**.

In 2010

[19] **M. Kurum**, P. E. O'Neill, R. H. Lang, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Characterization of forest opacity using multi-angular emission and backscatter data", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'10)**, Honolulu, Hawaii (USA), July 25 – 30, **2010**.

[18] **M. Kurum**, R. H. Lang, P. E. O'Neill, "L-Band brightness temperature from forest: approximate techniques", *presented*, **Progress in Electromagnetics Research Symposium (PIERS'10),** Cambridge, MA (USA), on 5 – 8 July, **2010** (**invited**).

[17] **M. Kurum**, P. E. O'Neill R. H. Lang, C Utku, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Passive measurements over conifer forest at L-Band: modeling of the forest floor", *presented*, **11th IEEE Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRAD'10)**, Washington, DC (USA), March 1 – 4, **2010**.

In 2009

[16] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "A physical model for microwave radiometry of forest canopies", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'09)**, Cape Town (South Africa), July 12 – 17, **2009.**

[15] P. E. O'Neill, R. H. Lang, **M. Kurum**, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Microwave soil moisture retrieval under trees using a modified tau-omega scattering model", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'09)**, Cape Town (South Africa), July 12 – 17, **2009.**

[14] **M. Kurum**, R. H. Lang, C. Utku, and P. E. O'Neill, "Modifying tau-omega model to account for forest canopy scattering", *in Digest*, **USNC/URSI Meeting**, Boulder, CO (USA), January 5 – 9, **2009**.

In 2008

[13] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, T. J. Jackson and M. H. Cosh, "Forest canopy attenuation modeling", *presented*, **the International Workshop on Microwave Remote Sensing for Land Hydrology Research and Applications**, Oxnard, CA (USA), October 20 – 22, **2008**.

[12] **M. Kurum**, R. H. Lang, P. E. O'Neill, "Estimation of canopy attenuation at L-band by a time domain analysis of radar backscatter response", *in Digest*, **XXIXth URSI General Assembly**, Chicago, IL (USA), August 7 – 16, **2008**.

[11] R. H. Lang, C. Utku, **M. Kurum**, "New results in microwave sensing of vegetation", *in Digest*, **XXIX URSI General Assembly**, Chicago, IL (USA), August 7 – 16, **2008**.

[10] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Forest canopy effects on the estimation of soil moisture at L-band", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'08)**, Boston, MA (USA), July 7 – 14, **2008 (invited)**.

[9] P. E. O'Neill, R. H. Lang, **M. Kurum**, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Microwave soil moisture retrieval under trees", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'08)**, Boston, MA (USA), July 7 – 14, **2008**.

[8] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Estimation of canopy attenuation for active/passive microwave soil moisture retrievals", *in Proceedings*, **10th IEEE Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRAD'08)**, Firenze (Italia), March 11 – 14, **2008**.

[7] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, M. H. Cosh, and T. J. Jackson, "Transient response from a vegetation canopy to ttepped frequency radar", *in Digest*, **USNC/URSI Meeting**, Boulder, CO (USA), January 3 – 6, **2008**.

In 2007

[6] **M. Kurum**, R. H. Lang, P. E. O'Neill, A. T. Joseph, T. J. Jackson, M. H. Cosh, and R. Nelson, "Microwave soil moisture estimation through tree canopies by an L-band active/passive system", *in Digest*, **USNC/URSI Meeting**, Ottawa, ON (Canada), July 22 – 26, **2007**.

[5] P. E. O'Neill, R. H. Lang, **M. Kurum**, A. T. Joseph, T. J. Jackson, M. H. Cosh, and R. Nelson, "ComRAD active/passive microwave measurements of tree canopies", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'07)**, Barcelona (Spain), July 23 – 27, **2007**.

In 2006

[4] P. E. O'Neill, R. H. Lang, **M. Kurum**, K. R. Carver, C. Utku, "Multi-sensor microwave soil moisture remote sensing: NASA's Combined Radar/Radiometer (ComRAD) System", *in Proceedings*, 9th Specialist Meeting on **Microwave Radiometry and Remote Sensing of the Environment (MicroRAD'06)**, San Juan (Puerto Rico), February 28 – March 3, **2006**.

In 2005

[3] R. H. Lang, **M. Kurum**, C. Utku, "UHF backscatter from forest with underlying rough surface", *in Digest*, **XXIII URSI General Assembly**, New Delhi (India), October 23 – 29, **2005**.

[2] **M. Kurum**, R. F. Rincon, R. H. Lang, R. Meneghini, "Backscatter algorithm development and testing using the NASA microwave LINK", *in Digest*, **USNC/URSI Meeting**, Boulder, CO (USA), January 5 – 8, **2005**.

In 2004

[1] R. F. Rincon, R. H. Lang, R. Meneghini, **M. Kurum**, J. Stich, "Forward and backscattering measurements of rainfall using the NASA microwave LINK", *in Proceedings*, **IEEE International Geosciences and Remote Sensing Symposium (IGARSS'04)**, Anchorage, AL (USA), September 20 – 24, **2004**.

Seminars

[16] M. Kurum, "SAR remote sensing of forest fires: Gallipoli forest fire in 2008," **Gebze Yüksek Teknoloji Enstitüsü**, June 12, **2014**, Gebze, Turkey

[15] M. Kurum, "Quantifying vegetation scattering in soil moisture retrieval algorithms," **Institute Agrosphere IBG-3, Forschungszentrum Jülich GmbH**, September 6, **2012**, Jülich, Germany.

[14] M. Kurum, "Microwave remote sensing of soil moisture through vegetation," **TUBITAK UEKAE**, July 27, **2012**, Gebze, Turkey.

[13] M. Kurum, "Rederiving the tau-omega model for vegetated terrain at L-band," **Terrestrial Water Cycle Seminar, NASA/GSFC**, B33, Room A128, April 11, **2012**, Greenbelt, MD.

[12] M. Kurum, "Microwave radiometry of forest canopies at L-band," **TUBITAK UEKAE**, August 10, **2011**, Gebze, Turkey.

[11] M. Kurum, "Microwave radiometry of forest canopies at L-band," **TOBB Economics and Technology University**, August 2, **2011**, Ankara. Turkey.

[10] M. Kurum, "Effective tree scattering and opacity at L-band," **Terrestrial Water Cycle Seminar, NASA/GSFC**, B33, Room A128, June 22, **2011**, Greenbelt, MD.

[9] M. Kurum, "Microwave radiometry of forest canopies at L-band," **University of Maryland College Park, Earth System Sciences Interdisciplinary Center**, April 11, **2011**, College Park, MD.

[8] M. Kurum, "Active/Passive examination of deciduous and coniferous forests at L-band," **NASA / Caltech Jet Propulsion Lab**, November 22, 2010, Pasadena, CA.

[7] M. Kurum, "L-band brightness temperature for vegetated landscapes: comparison of approximate techniques," **Second 2010-2011 meeting of the National Capital Section of the Optical Society of America**, NASA/Goddard Visitors Center, Greenbelt, MD, October 19, **2010**.

[6] M. Kurum "Estimation of canopy attenuation at L-band by a time domain analysis of radar backscatter response", **Electromagnetics Seminar, NASA/GSFC**, Greenbelt, MD, Februrary 13, **2008**.

[5] M. Kurum "Radiometer sensitivity analysis", ComRAD meeting, **USDA ARS Hydrology and Remote Sensing Lab**, Beltsville, MD, March 6 **2008**.

[4] M. Kurum "Analysis of Radar/Radiometer measurements over calm water", ComRAD meeting, **USDA ARS Hydrology and Remote Sensing Lab**, Beltsville, MD, November 6, **2007**.

[3] M. Kurum "Design of an L-band radiometer calibration target", ComRAD meeting, **USDA ARS Hydrology and Remote Sensing Lab**, Beltsville, MD, May 31, **2006**.

[2] M. Kurum "L-band radiometer development", **Electromagnetics Seminar, NASA/GSFC**, Greenbelt, MD, April 11, **2006**.

[1] M. Kurum with R. F. Rincon, R. H. Lang, R. Meneghini "Forward and backscattering measurements of rainfall using the NASA microwave LINK", **NASA Goddard Space Flight Center Director's Discretionary Fund (DDF) Project Showcase**, Greenbelt, MD (USA), December 17, **2004**.

References

Available upon request.