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# A Comprehensive Data Driven Evaluation of Wide Area Probe Data: Opportunities and Challenges.

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# A Comprehensive Data Driven Evaluation of Wide Area Probe Data: Opportunities and Challenges.

## **Abstract**

There is a growing desire, among transportation organizations and state DOTs, to consider augmenting traditional traffic data collection with probe - based services for expanded coverage under constrained budgets. The nature of traffic data collection with probes is however dramatically different from traditional traffic data collection techniques. This affects how the new technology is applied and used to solve current traffic problems such as traffic incident management and roadway performance assessment. The current paper summarizes the experiences and lessons learned while using probe data for traffic operations and safety management and makes recommendations on opportunities to maximize the use of probe data in light of its limitations.

## **Keywords**

Probe data, Incident Management, Sensor Data, Work Zone Performance Assessment

## **Disciplines**

Civil and Environmental Engineering | Transportation Engineering

## **Comments**

This paper was peer-reviewed by TRB and presented at the Annual Meeting of the Transportation Research Board, Washington, D.C. and can be cited as Adu-Gyamfi, Yaw Okyere, Anuj Sharma, Skylar Knickerbocker, Neal Hawkins, and Michael Jackson. "Comprehensive Data Driven Evaluation of Wide Area Probe Data: Opportunities and Challenges." In Transportation Research Board 95th Annual Meeting, no. 16-6482. 2016. Posted with permission.

**From:** [Weeks, Jennifer](#)  
**To:** [Marron, D. S \[LIB\]](#)  
**Cc:** [Mcleod, William](#); [Craft, Hope C \[LIB\]](#)  
**Subject:** RE: Permission Request [another from Iowas State U.]  
**Date:** Tuesday, September 26, 2017 1:07:53 PM  
**Attachments:** [image001.png](#)

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Dear Scott Marron:

Since none of Halil Ceylan's papers listed below except

Arabzadeh, A., H. Ceylan, S. Kim, K. Gopalakrishnan, and A. Sassani. Superhydrophobic Coatings on Asphalt Concrete Surfaces: Towards Smart Solutions for Winter Pavement Maintenance. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2551, pp. 10–17, 2016. DOI: <https://doi.org/10.3141/2551-02>.

Kim, S., K. Gopalakrishnan, H. Ceylan, and R. F. Steffes. Performance Evaluation of Roadway Subdrain Outlets in Iowa. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2462, pp. 68–76, 2014.  
DOI: <https://doi.org/10.3141/2462-09>.

were published in the *Transportation Research Record* series, TRB does not own the copyrights for the papers. The copyrights belong to the authors. You may deposit the papers into your institutional repository, Iowa State University Digital Repository.

However, because the Dr. Sharma and the coauthors may have incorporated comments from the TRB peer review into this paper, we ask that as a professional courtesy you acknowledge that the papers were peer-reviewed by TRB and presented at the Annual Meeting of the Transportation Research Board, Washington, D.C.

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Sincerely,

Jennifer J. Weeks

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Arabzadeh, A., H. Ceylan, S. Kim, K. Gopalakrishnan, and A. Sassani, A. Superhydrophobic Coatings on Asphalt Concrete Surfaces: Towards Smart Solutions for Winter Pavement Maintenance. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2551, pp. 10–17, 2016. DOI: <https://doi.org/10.3141/2551-02>.

Kim, S., K. Gopalakrishnan, H. Ceylan, and R. F. Steffes. Performance Evaluation of Roadway Subdrain Outlets in Iowa. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2462, pp. 68–76, 2014. DOI: <https://doi.org/10.3141/2462-09>.

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**From:** Marron, D. S [LIB] [mailto:smarron@iastate.edu]  
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**To:** Weeks, Jennifer  
**Cc:** Mcleod, William; Craft, Hope C [LIB]  
**Subject:** RE: Permission Request [another from Iowas State U.]

Dear Jennifer,

I rechecked the citations for Professor **Ceylan** and found that two of the papers from the 2016 and 2014 Annual Meetings, respectively, were published in TRR (see my inline comments beginning with \*\*\*)

None of the remaining titles have been published in TRR.

Cordially,

*Scott Marron*

**D. Scott Marron** | Digital Repository Assistant

Digital Scholarship and Initiatives

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**From:** Weeks, Jennifer [<mailto:JWeeks@nas.edu>]  
**Sent:** Tuesday, September 26, 2017 9:35 AM  
**To:** Marron, D. S [LIB] <[smarron@iastate.edu](mailto:smarron@iastate.edu)>  
**Cc:** Mcleod, William <[wmcleod@nas.edu](mailto:wmcleod@nas.edu)>  
**Subject:** RE: Permission Request [another from lowas State U.]

Dear D. Scott Marron,

I will have to check each paper to see whether or not the paper was published in the *Transportation Research Record*. It will take me a few days. I will get back to sometime next week. Unless you can assure me with absolute certainty that none of the papers was published in the Record, I cannot grant permission at this time.

Sincerely,

Jennifer J. Weeks

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**From:** Mcleod, William  
**Sent:** Tuesday, September 26, 2017 10:29 AM  
**To:** Weeks, Jennifer  
**Subject:** FW: Permission Request [another from lowas State U.]

Hi Jennifer,

This is similar to the previous request but for a different author.

**Bill McLeod**

TRIS Manager - Transportation Research Information Services

Transportation Research Board

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Washington, DC 20001

USA

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**From:** Marron, D. S [LIB] [<mailto:smarron@iastate.edu>]  
**Sent:** Tuesday, September 26, 2017 10:21 AM  
**To:** TRIS-TRB  
**Cc:** Craft, Hope C [LIB]  
**Subject:** Permission Request

Dear Bill McLeod,

I work for the Iowa State University Library and I have been working with Dr. Halil Ceylan to get his scholarship deposited in our institutional repository, Iowa State University Digital Repository. Dr. Ceylan is a contributing author to the below publications, and I am writing for permission to deposit portions of his work in our repository.

- Sassani, A. (§), Ceylan, H., Kim, S., Gopalakrishnan, K., Arabzadeh, A. (§), and Taylor C. P. (2016). "Factorial Study on Electrically Conductive Concrete Mix Design for Heated Pavement Systems," the 96th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 8-12, 2017.
- Abdulla, H. (§), Gopalakrishnan, K., Ceylan, H., Kim, S., Mina, M., Taylor C. P., and Cetin, K. S. (2017). "Development of A Finite Element Model for Electrically Conductive Concrete Heated Pavements," the 96th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 8-12, 2017.
- Yang, S. (§), Ceylan, H., Gopalakrishnan, K., Kim, S., Taylor C. P., and Alhasan, A. (2017). "Using Light Detection and Ranging Technology for Concrete Pavement Curling and Warping Measurement," the 96th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 8-12, 2017.
- Kaya, O. (§), Rezaei-Tarahomi, A. (§), Ceylan, H., Gopalakrishnan, K., Kim, S., and Brill, D. R. (2017). "Developing Rigid Airport Pavement Multiple-Slab Response Models for Top-Down Cracking Mode using Artificial Neural Networks," the 96th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 8-12, 2017.
- Rezaei-Tarahomi, A. (§), Kaya, O. (§), Ceylan, H., Gopalakrishnan, K., Kim, S., and Brill, D.

R. (2017). "Using Sensitivity Evaluations for Studying Multiple Slabs Concrete Pavement's Critical Responses Associated with Top-down and Bottom-up Cracking," the 96th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 8-12, 2017.

- Kaya, O. (§), Kim, S., Ceylan, H., and Gopalakrishnan, K. (2015). "Optimization of Local Calibration Coefficients of AASHTOWare Pavement ME Design Jointed Plain Concrete Pavement Performance Models," the 95th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 10-14, 2016.
- Arabzadeh, A. (§), Ceylan, H., Kim, S., Gopalakrishnan, K., and Sassani, A. (§) (2016). "Superhydrophobic Coatings on Asphalt Concrete Surfaces: Towards Smart Solutions for Winter Pavement Maintenance," the 95th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 10-14, 2016.

\*\*\*This paper was published in TRR. <https://doi.org/10.3141/2551-02>

- Shen, W. (§), Gopalakrishnan, K., Kim, S., and Ceylan, H. (2015). "Carbon Footprint Analysis of Geothermal Heated Airport Pavements," the 94rd Annual Meeting of the Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 11-15, 2015.
- Gopalakrishnan, K., Ceylan, H., Kim, S., Yang, S. (§), and Hesham, A. (§) (2015). "Self-Heating Electrically Conductive Concrete for Pavement Deicing: A Revisit," the 94rd Annual Meeting of the Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 11-15, 2015.
- Li, M. (§), van Keulen, W., Ceylan, H., van de Ven, M. F. C., and Molenaar, A. A. A. (2015). "Statistical Model of Tyre-Road Noise for Thin Layer Surfacing," the 94th Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 11-15, 2015.
- Ceylan, H. (2014). "Transverse Cracking Distress on Jointed Plain Concrete Pavement in Iowa: A Case Study," 93rd Annual Meeting of the Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 12-16, 2014.
- Kim, S., Gopalakrishnan, K., Ceylan, H., and Steffes, R. F. (2014). "Review and Evaluation of Iowa Roadway Subsurface Drainage Practices," the 93rd Annual Meeting and Journal of the Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 12-16, 2014.

\*\*\*Published in TRR as: [Performance Evaluation of Roadway Subdrain Outlets in Iowa.](#)

<https://doi.org/10.3141/2462-09>.

- Li, M., van Keulen, W., Ceylan, H., van de Ven, M. F. C., and Molenaar, A. A.A. (2013). “Modelling the Tyre/Road Noise from Thin Layer Surfacing.” the 92nd Annual meeting of Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 13-16, 2013.
- Kim, S., Ceylan, H., Ma, D. (§), and Gopalakrishnan, K. (2013). “Local Calibration Studies on DARWin-ME/ Mechanistic-Empirical Pavement Design Guide Jointed Plain Concrete Pavement Performance Prediction Models,” the 92nd Annual Meeting of the Transportation Research Board, Transportation Research Board, NRC, Washington, D.C., January 13-16, 2013.

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Cordially,

*Scott Marron*

**D. Scott Marron** | Digital Repository Assistant

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