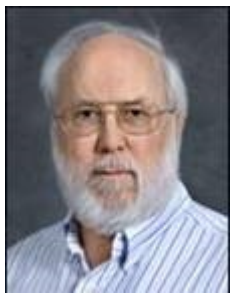
Heat Island Group

LBNL team

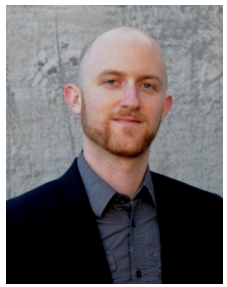
Hugo Destaillats

Ronnen Levinson

Thomas Kirchstetter


Paul Berdahl

Mohamad Sleiman


George Ban-Weiss

Haley Gilbert

Mike Spears

Concordia University

Hashem Akbari

ORNL

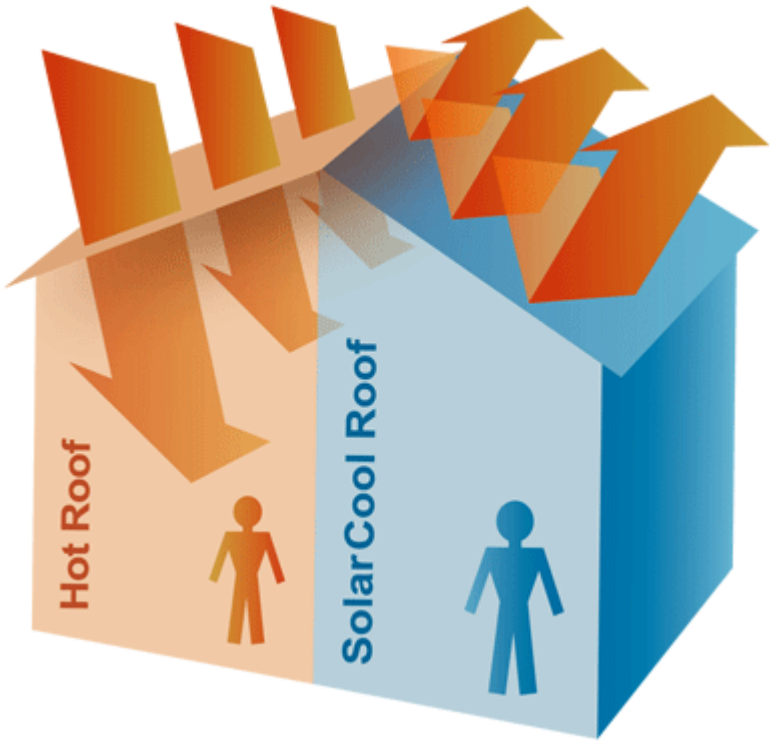
Andre Desjarlais

Bill Miller

Cool roofs

Replacing a dark roof with a cool (highly reflective) roof can :

- √ Reduce annual cooling energy use by 5-20%
  (*Levinson et al. 2005*)
- √ Lower the outside air temperature and the rate of smog formation
  (*Rosenfeld et al. 1998; Akbari et al. 2001*)
- √ Delay global warming (10 tonnes of CO_2 offset by 100 m^2 of white roofing)
  (*Menon et al. 2010; Akbari et al. 2009; Oleson et al. 2010*)



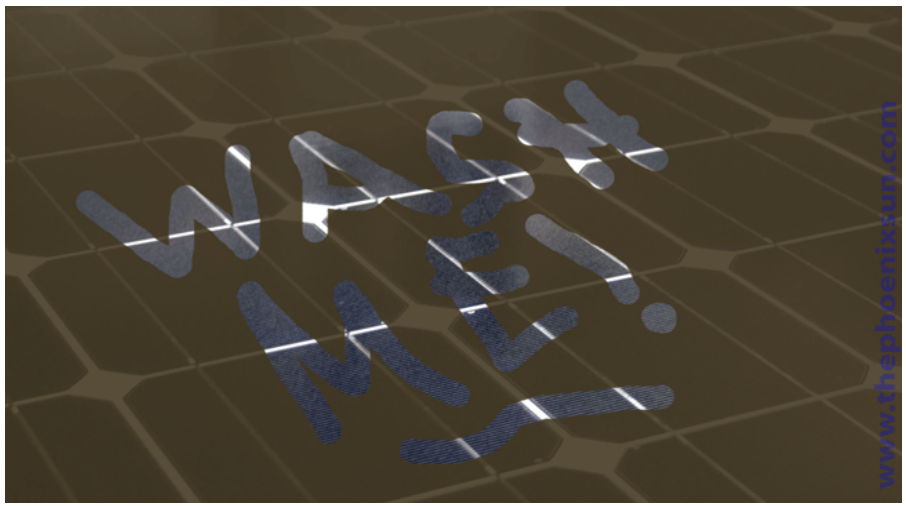
Advanced Surfaces Project

MOTIVATION:

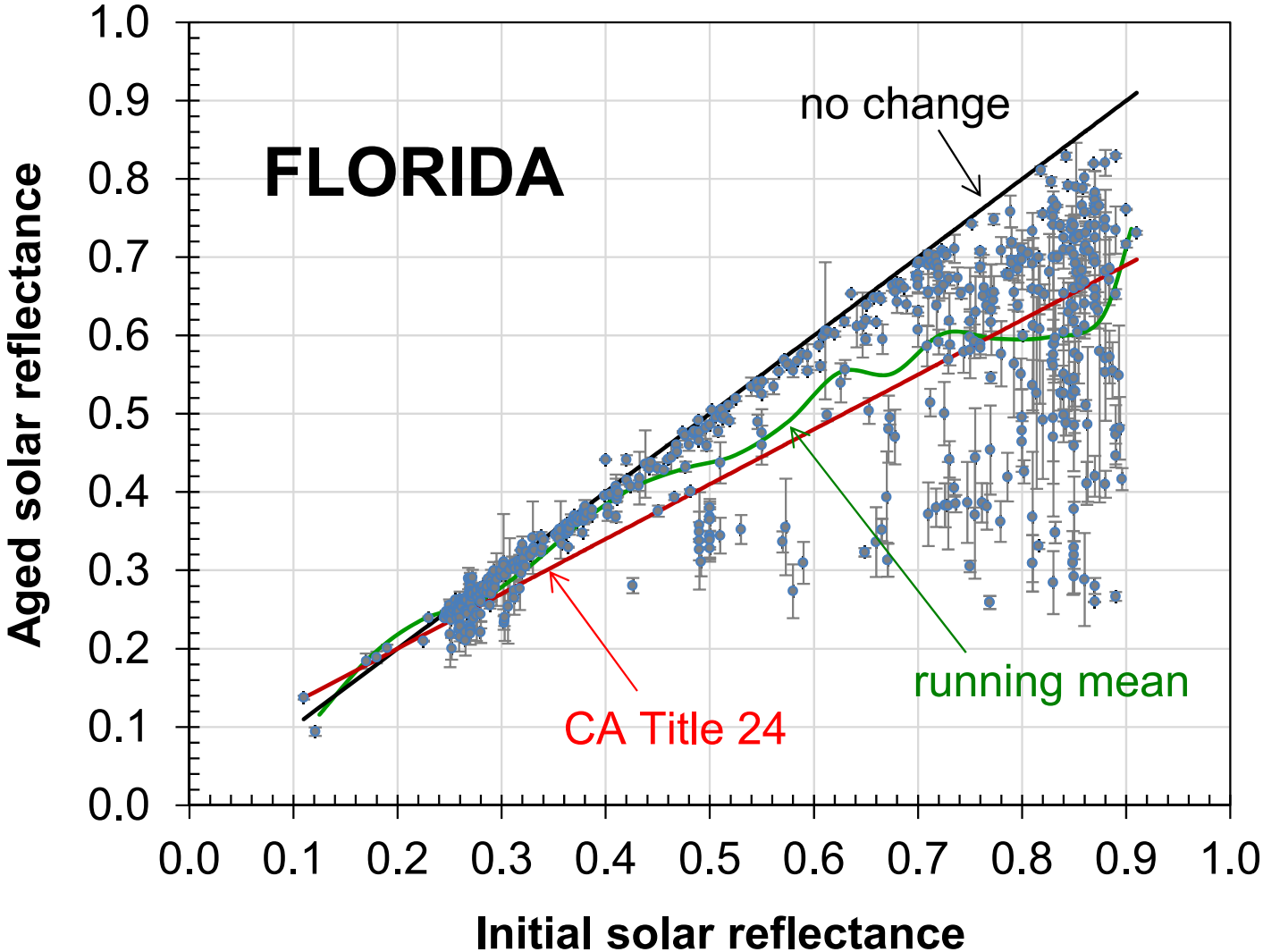
- Facilitate the development, manufacture and consumer adoption of advanced, soiling-resistant roofing products

OBJECTIVES:

- Develop an accelerated soiling and weathering method for roofs and PVs
- Develop standards for accelerated exposure
- Study how to make roofs and PVs stay clean

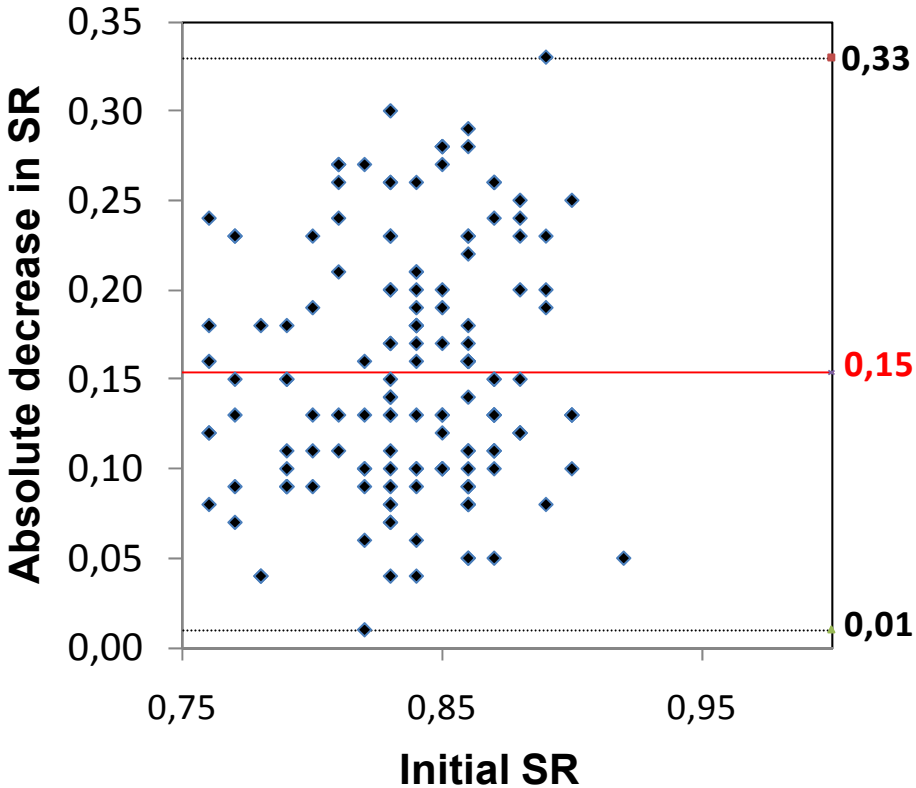


Effect of aging on solar reflectance (CRRC data)



Soiling of white roofs

White products with initial SR > 0.75



- Building surfaces act as sinks for both gas-phase and particulate pollutants
- White roofs can experience up to 0.33 reduction of initial SR over time

Roofing products used in our study

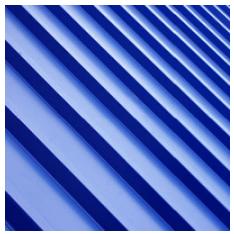
- We screened 100 roofing materials from 40 suppliers
- Selection of different materials:

  - √ Asphalt shingles
  - √ Concrete tiles
  - √ Clay tiles
  - √ Single-ply membrane
  - √ Metal roofing
  - √ Factory applied coatings
  - √ Field applied coatings

shingles

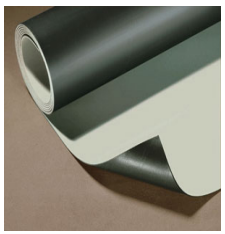
concrete tiles

metal roofing



clay tiles

single-ply membrane

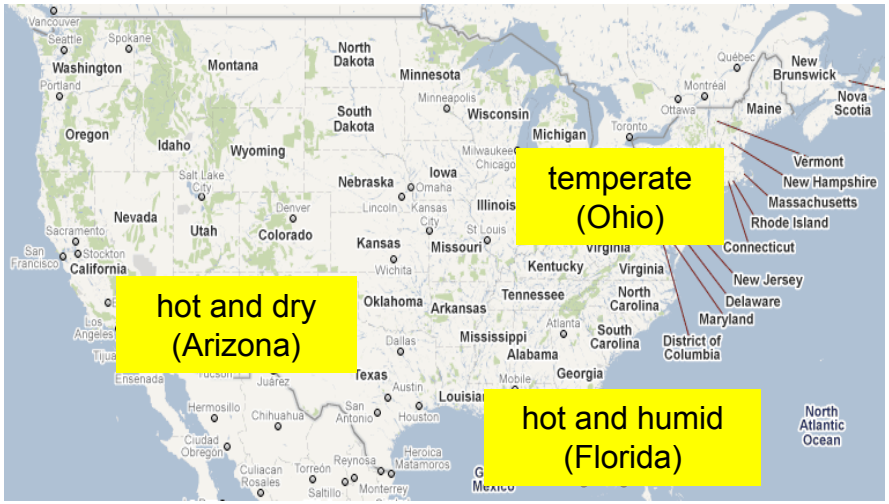


coatings

- Selection criteria included diversity of products & colors, market presence, sample uniformity and availability of aged samples

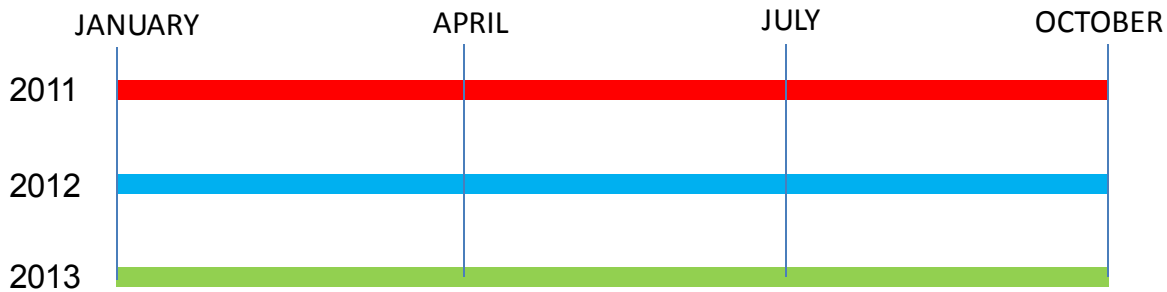
Natural weathering of roofing products

- Samples naturally aged at 3 weathering sites



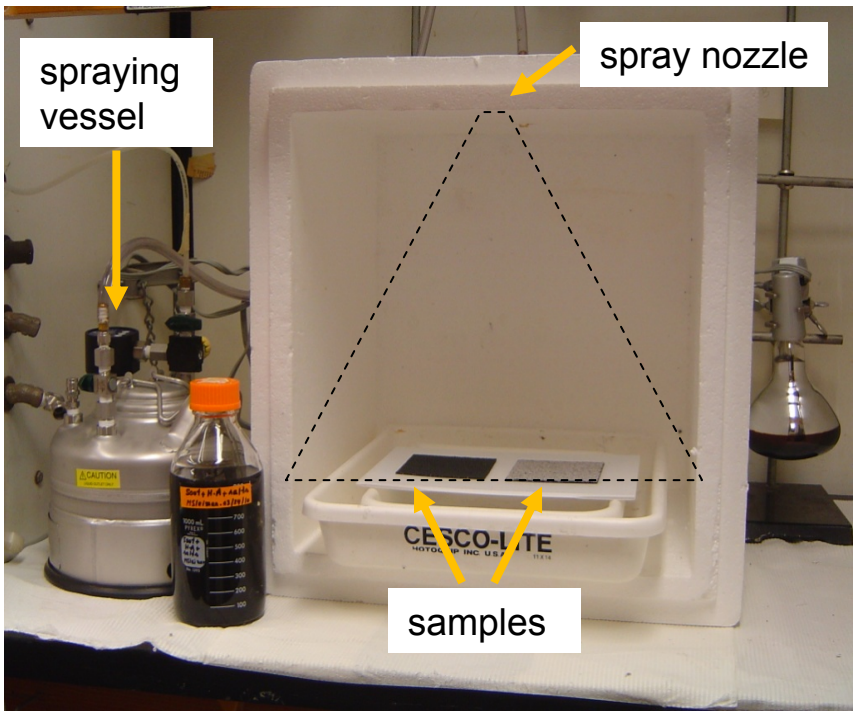
Florida

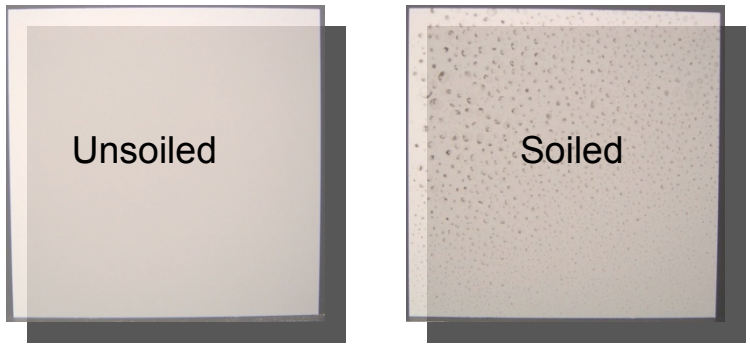
- Samples collected and characterized quarterly



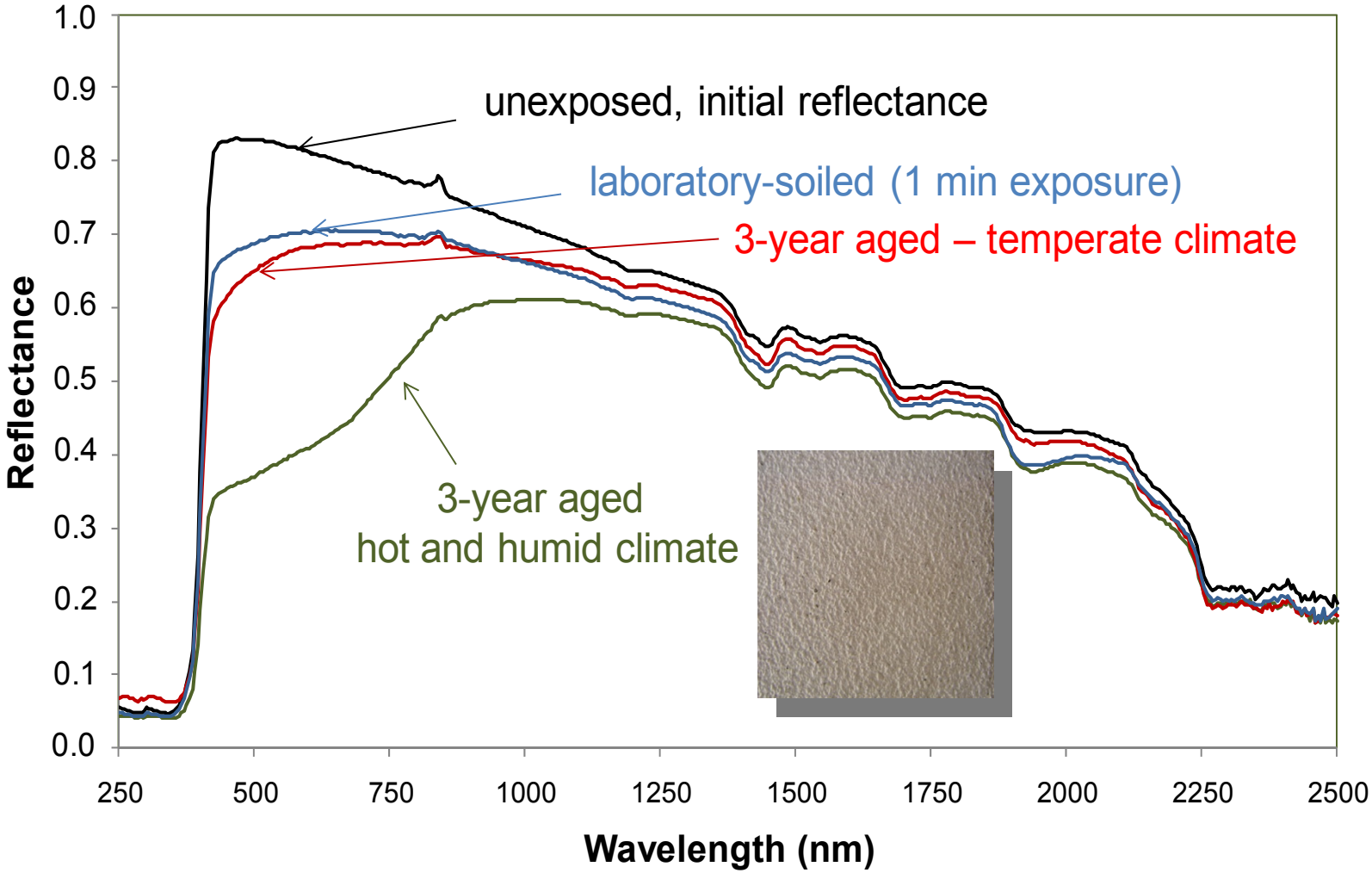
Laboratory accelerated aging

Prototype system for application of soiling agents to roofing samples





Validation with naturally exposed samples



Workshop on Advances in Cool Roof Research:

Protocols, Standards & Policies for Accelerated Aging

Thursday, July 28 - Friday, July 29, 2011
Doubletree Hotel at Berkeley Marina,
Berkeley, California USA

Contact
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HEGilbert@LBL.gov
http://coolroofs2011.lbl.gov/

Agenda

- Accelerated soiling and weathering methods for roofing materials
- Incorporation of accelerated aged ratings into policies, standards and rating systems
- Benefits of soiling- and weathering-resistant cool urban surfaces
- Development of next generation cool roofing (and pavement) materials with enhanced soiling and weathering resistance
- Marketplace trends in cool roofing

Intended audience

- Roofing industry, weathering firms (e.g., Atlas, Q-Lab)
- US DOE, US EPA, California Energy Commission, California Air Resources Board
- US CRRC, EU Cool Roof Council, international cool roof rating bodies (e.g., China, India, Japan)
- Energy efficiency and measurement code bodies (e.g., ASTM International, ASHRAE, ISO, US Green Building Council)
- Utilities and other stakeholders (e.g., Global Cool Cities Alliance)