

My (simulated) Sky at Night

Presented by: Christopher Kyba (GFZ Potsdam)

Partners:

Interactive Scape GmbH

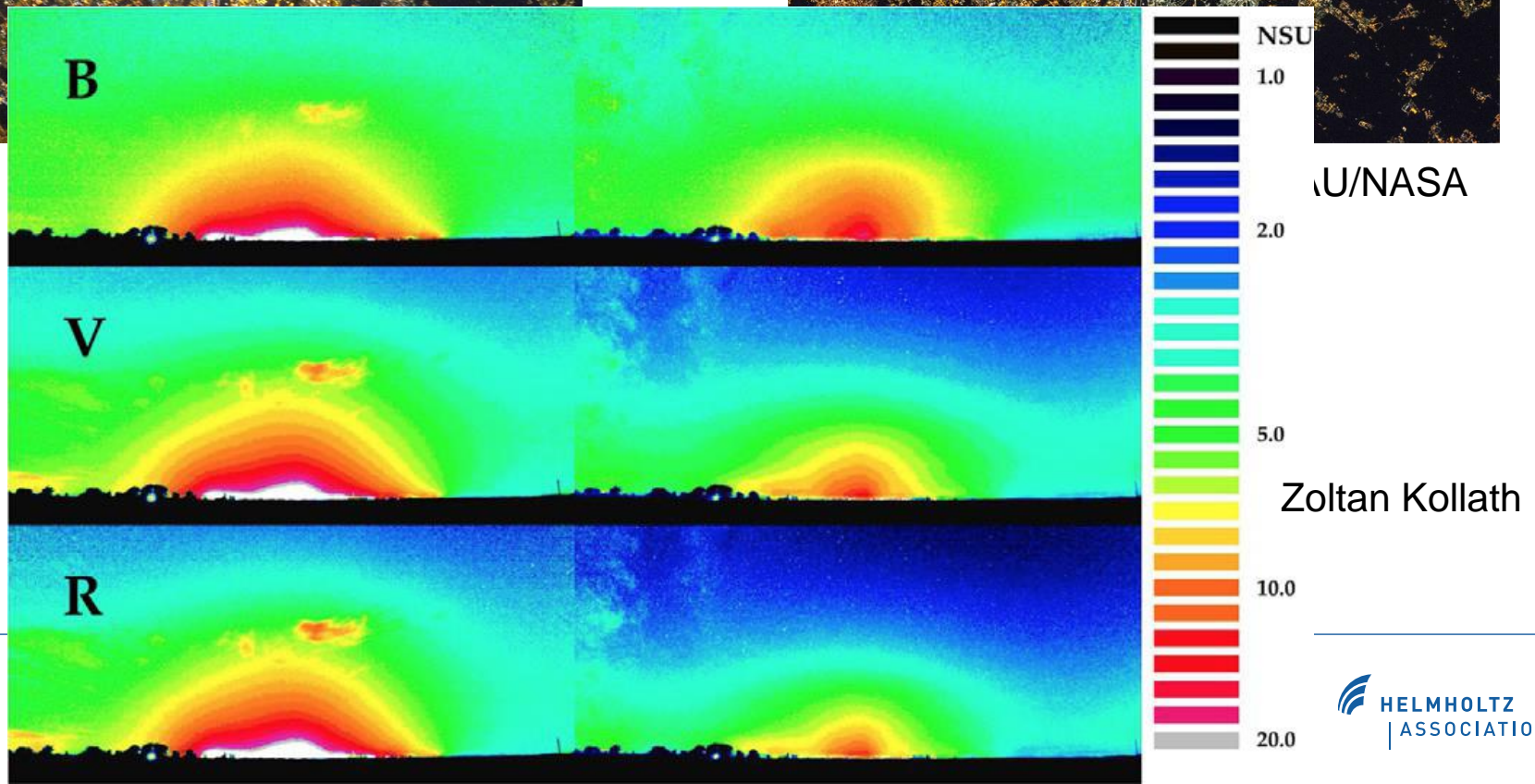
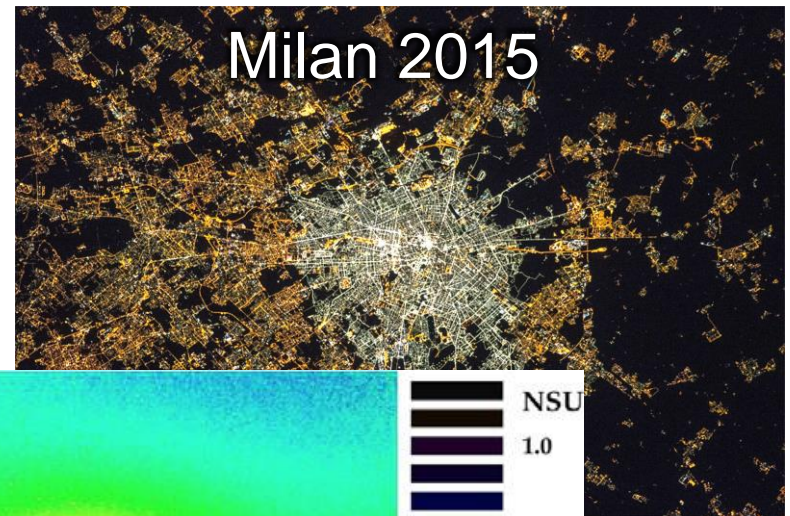
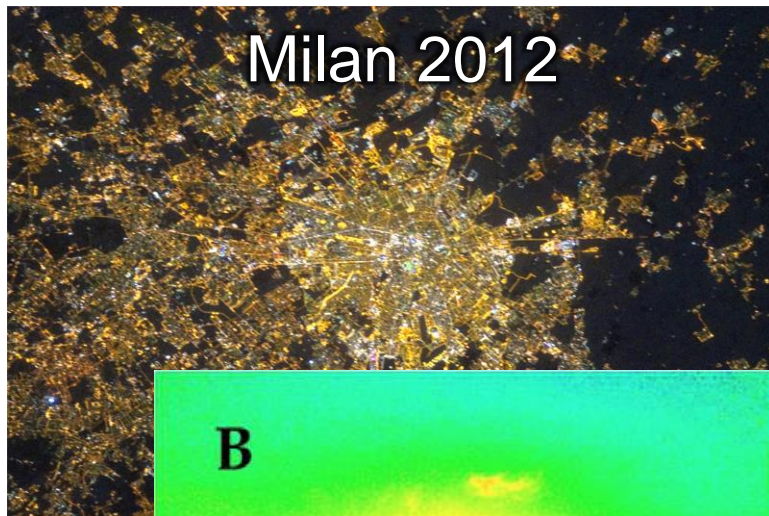
Martin Aubé (Cégep de Sherbrooke)

Citizen GEOSS Workshop

St. Petersburg, Russia

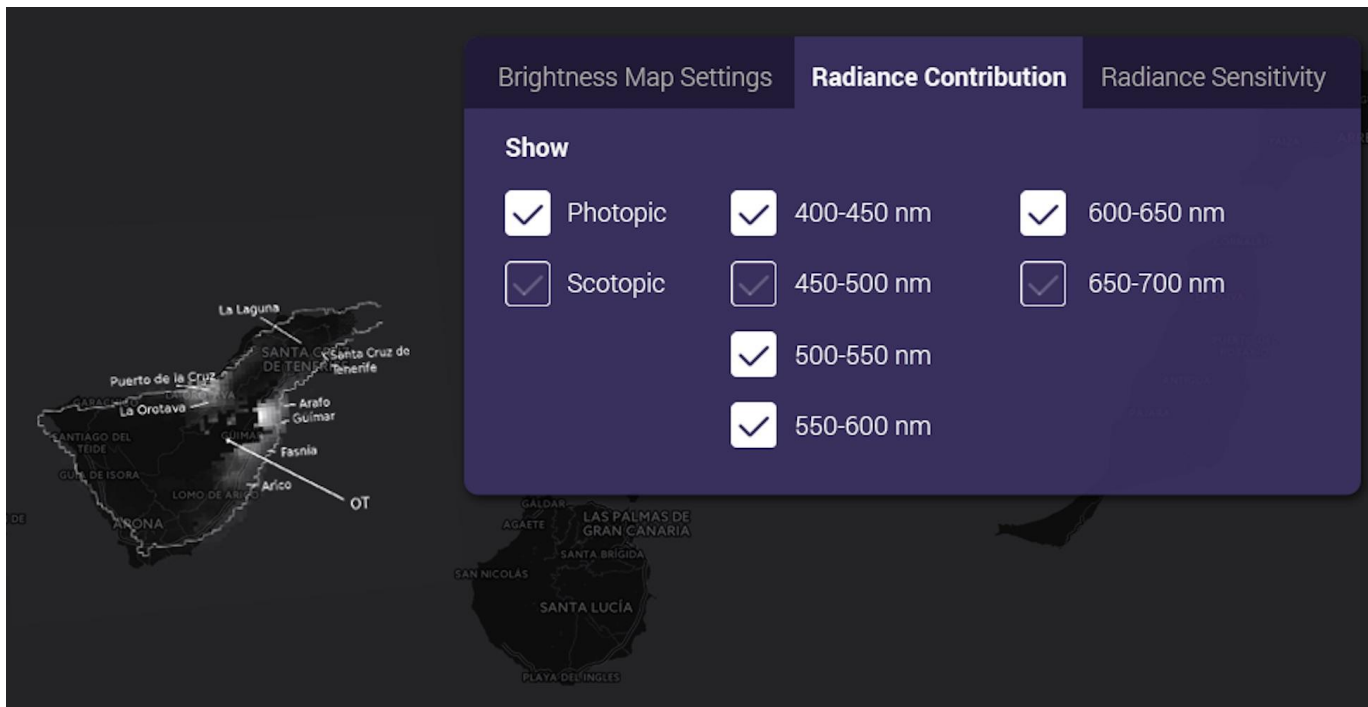
November 8, 2016

The problem



Innovation

- Converts dry academic statements to visible (understandable) data
- Allows assessment of how different areas affect sky:



(open) Data inputs and outputs

- **Model inputs:**
 - VIIRS Day Night Band (Suomi NPP)
 - MODIS BRDF
 - Shuttle Radar Topography Mission
- **Model outputs:**
 - All-sky radiance
 - Radiance Contribution Maps
 - Radiance Sensitivity Maps

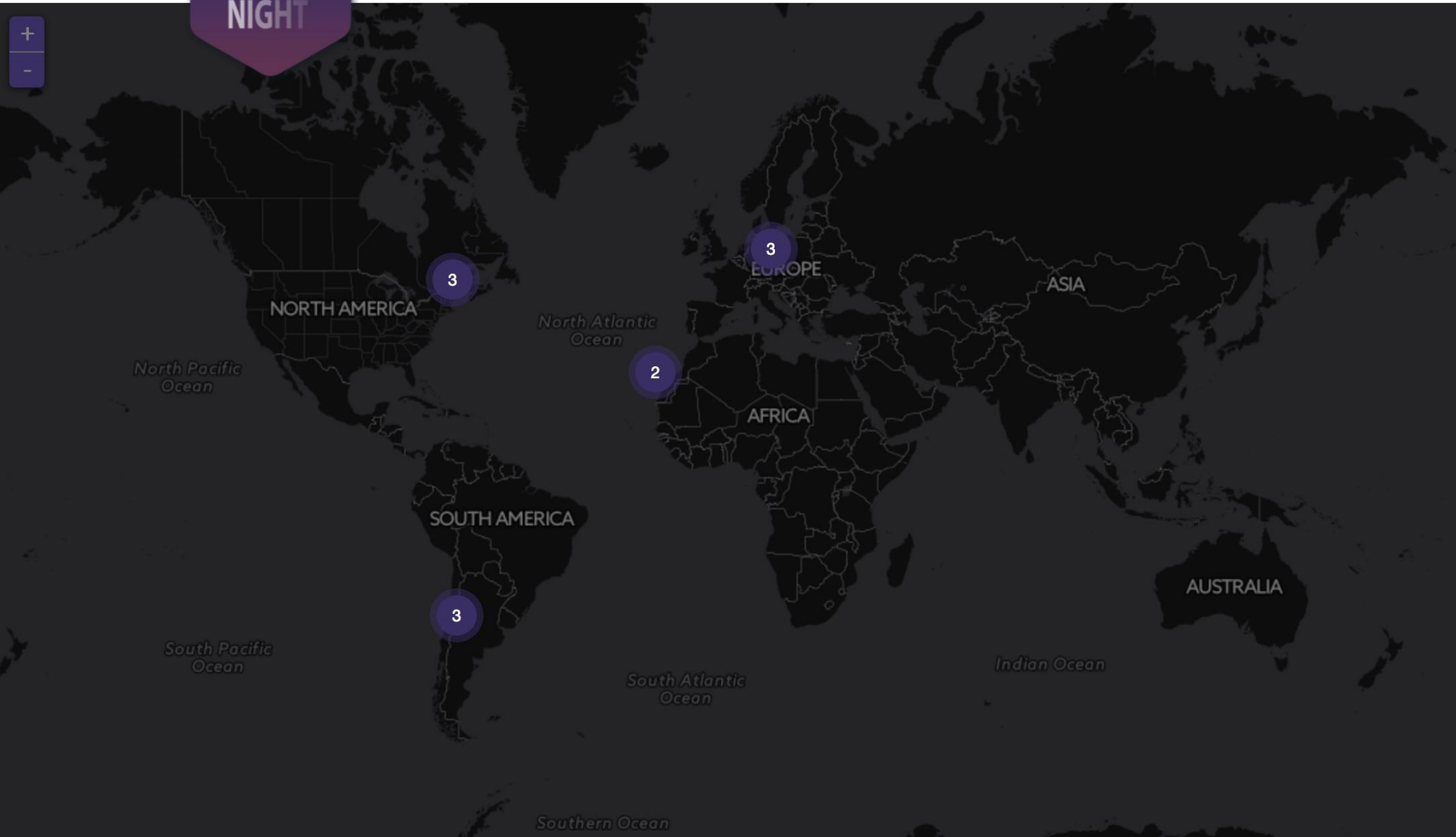
User benefits

- Understanding of effect of light technology on night sky brightness
- Ability to easily simulate different lamp types, color temperature, uplight
- Easy to understand images & maps for communicating with decision makers
- Proposed follow-up project: user simulations (via volunteer computing)

World Map

LOSS
of the
NIGHT

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User interface

| Lamp types | Amount | Color temperature | Uplight |
|--------------|---------------------------|-----------------------------|---------------------------|
| LPS | <input type="range"/> 0% | N/A | <input type="range"/> 1% |
| HPS | <input type="range"/> 75% | 2700K | <input type="range"/> 5% |
| LED | <input type="range"/> 0% | <input type="range"/> 4000K | <input type="range"/> 0% |
| Incandescent | <input type="range"/> 5% | <input type="range"/> 2000K | <input type="range"/> 50% |
| Fluorescent | <input type="range"/> 20% | <input type="range"/> 3000K | <input type="range"/> 5% |

CalculateCompare

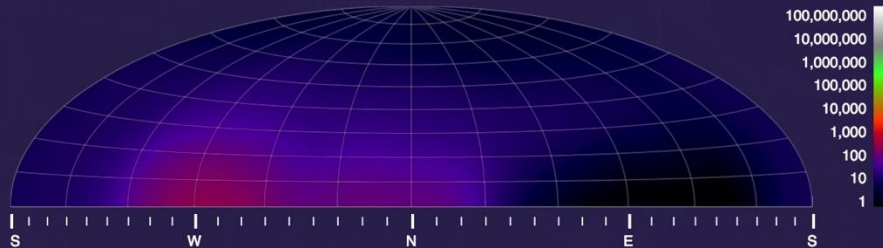
Wavelengths



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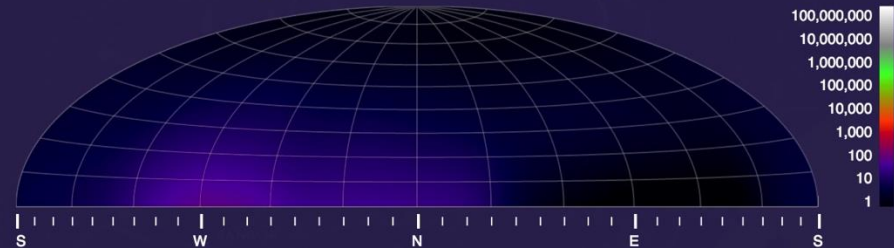
| Lamp types | Amount | Color temperature | Uplight |
|--------------|----------------------------|-----------------------------|--------------------------|
| LPS | <input type="range"/> 0% | N/A | <input type="range"/> 0% |
| HPS | <input type="range"/> 0% | 2700K | <input type="range"/> 0% |
| LED | <input type="range"/> 0% | <input type="range"/> 2000K | <input type="range"/> 0% |
| Incandescent | <input type="range"/> 100% | <input type="range"/> 2000K | <input type="range"/> 0% |
| Fluorescent | <input type="range"/> 0% | <input type="range"/> 2000K | <input type="range"/> 0% |

Canada, Quebec, Mont Megantic Cosmolab (45.4232, -71.1259)



450 nm

Canada, Quebec, Mont Megantic Cosmolab (45.4232, -71.1259)



660 nm

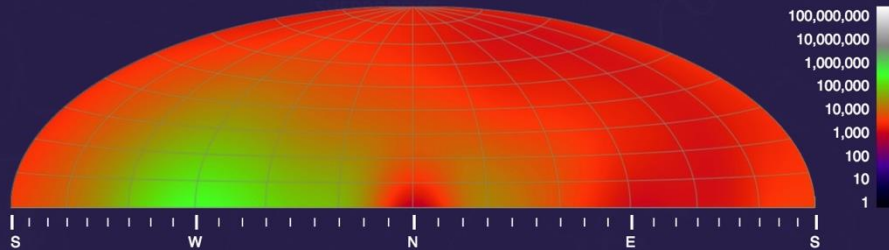
Uplight percentage

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NIGHT

Map My Measurements Simulations Blog About

| Lamp types | Amount | Color temperature | Uplight |
|--------------|----------------------------|-----------------------------|---------------------------|
| LPS | <input type="range"/> 0% | N/A | <input type="range"/> 0% |
| HPS | <input type="range"/> 0% | 2700K | <input type="range"/> 0% |
| LED | <input type="range"/> 100% | <input type="range"/> 2000K | <input type="range"/> 20% |
| Incandescent | <input type="range"/> 0% | <input type="range"/> 2000K | <input type="range"/> 0% |
| Fluorescent | <input type="range"/> 0% | <input type="range"/> 2000K | <input type="range"/> 0% |

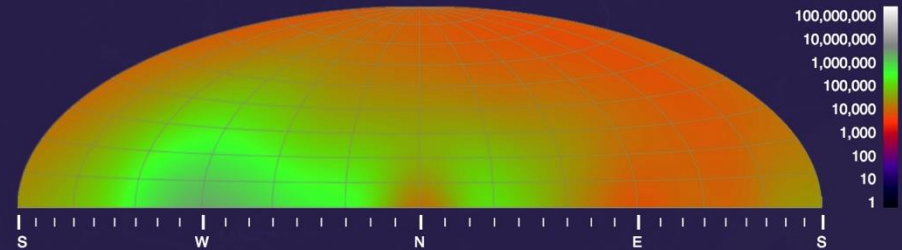
Canada, Quebec, Mont Megantic Cosmolab (45.4232, -71.1259)



| Lamp types | LPS | HPS | LED | Incandescent | Fluorescent |
|-------------|-----|-------|-------|--------------|-------------|
| Amount | 0% | 0% | 100% | 0% | 0% |
| Temperature | N/A | 2700K | 2000K | 2000K | 2000K |
| Uplight | 0% | 0% | 5% | 0% | 0% |

5%

Canada, Quebec, Mont Megantic Cosmolab (45.4232, -71.1259)



| Lamp types | LPS | HPS | LED | Incandescent | Fluorescent |
|-------------|-----|-------|-------|--------------|-------------|
| Amount | 0% | 0% | 100% | 0% | 0% |
| Temperature | N/A | 2700K | 2000K | 2000K | 2000K |
| Uplight | 0% | 0% | 20% | 0% | 0% |

20%

(Proposed) follow on project

- Volunteer computing grid (skyglow@home)
- One site requires ~ 1 year CPU time
- Volunteers decide what to simulate next
- Send all-sky cameras to citizen scientists
- Ground truthing – lamp change results
- Citizen scientists attend conferences and present results

