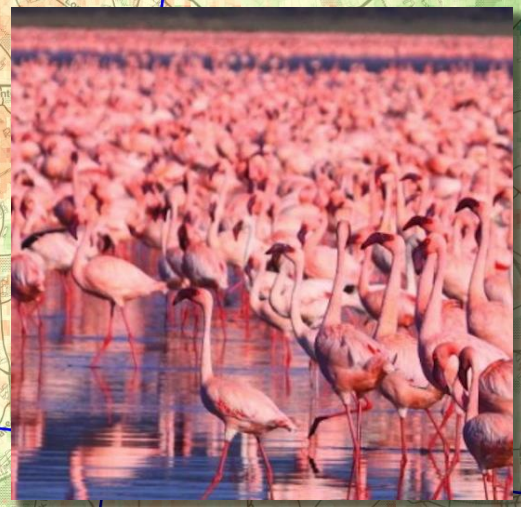
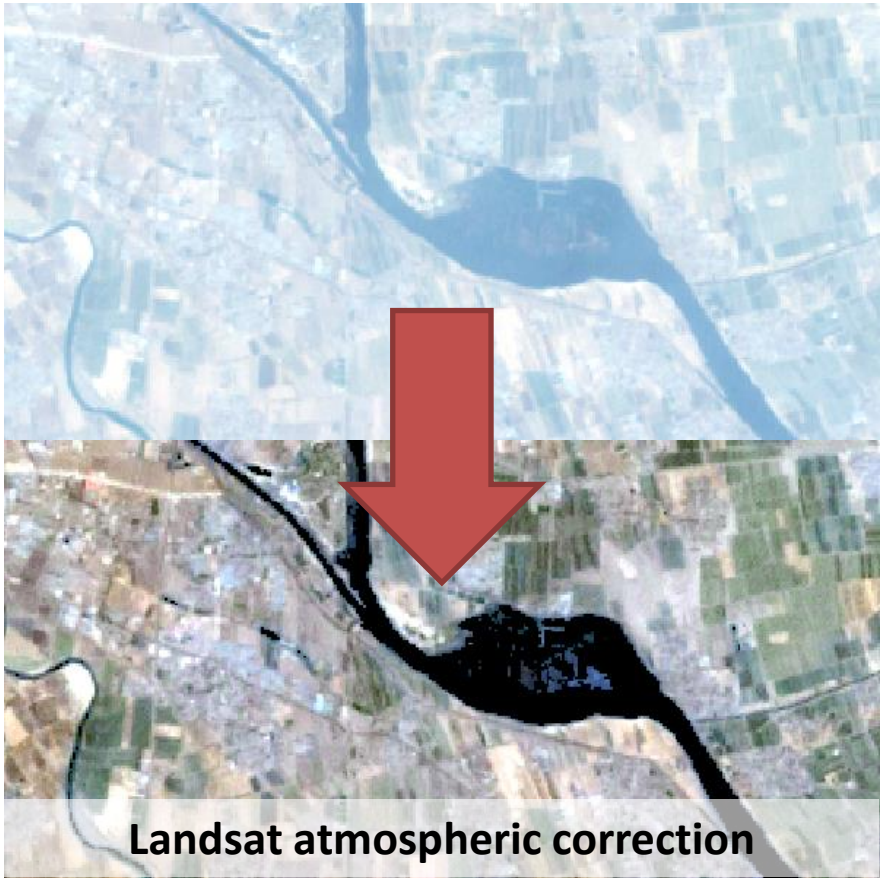
Robin Wilson

Lecturer in Physical Geography
King's College London

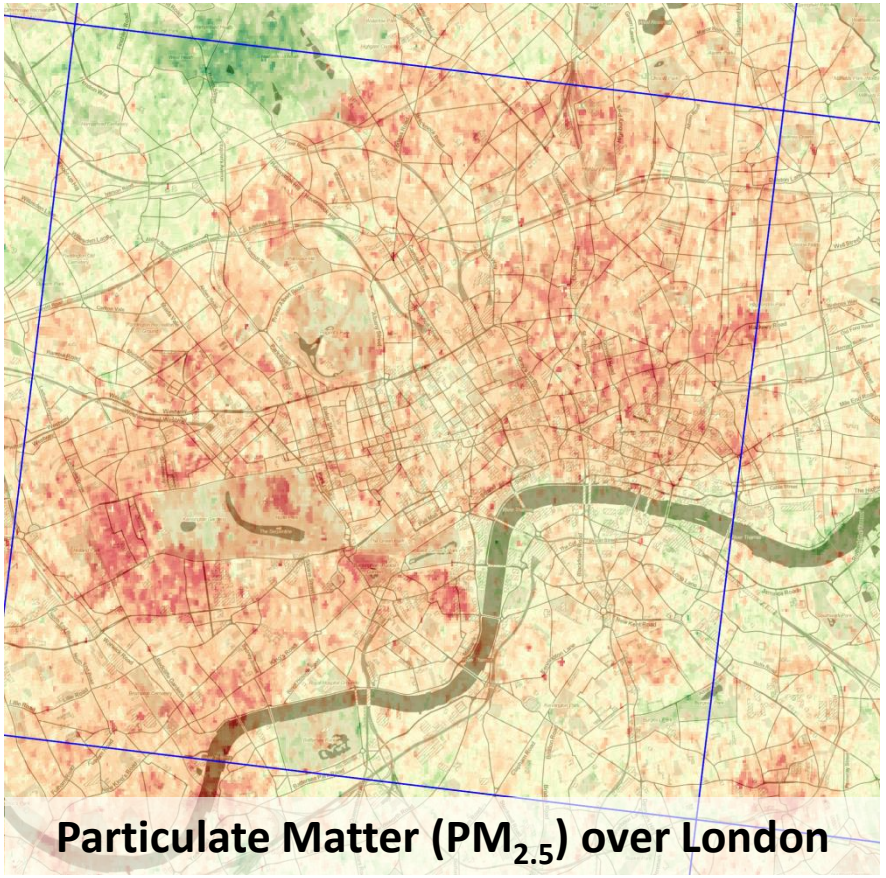


Atmosphere as noise

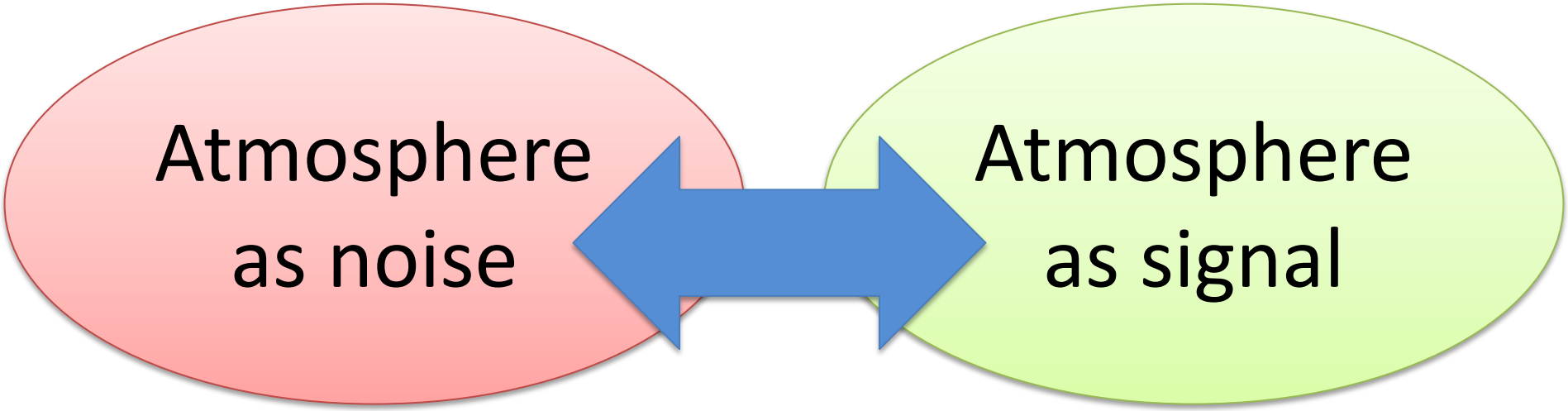
Atmosphere as signal



Landsat atmospheric correction

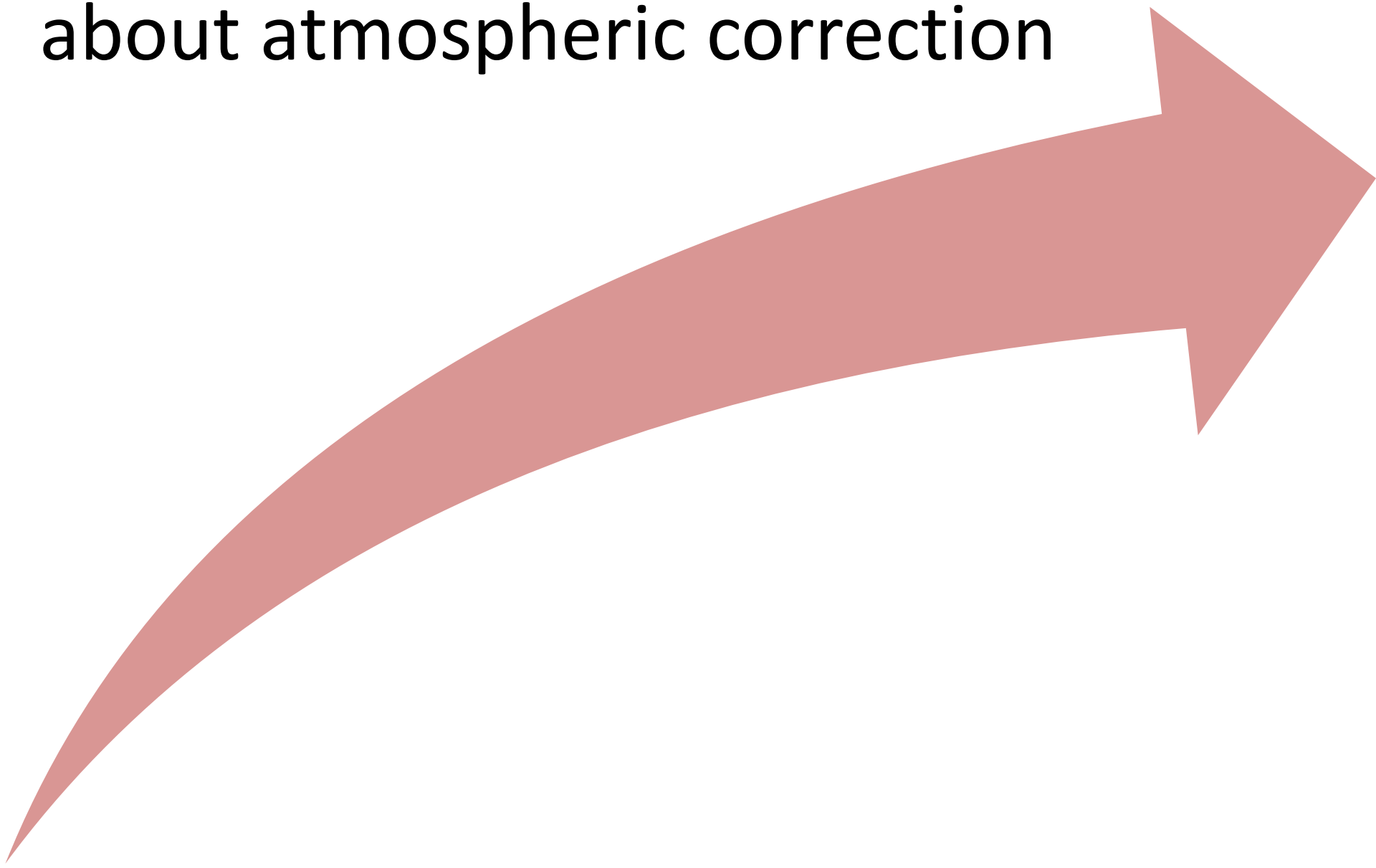


Particulate Matter ($PM_{2.5}$) over London

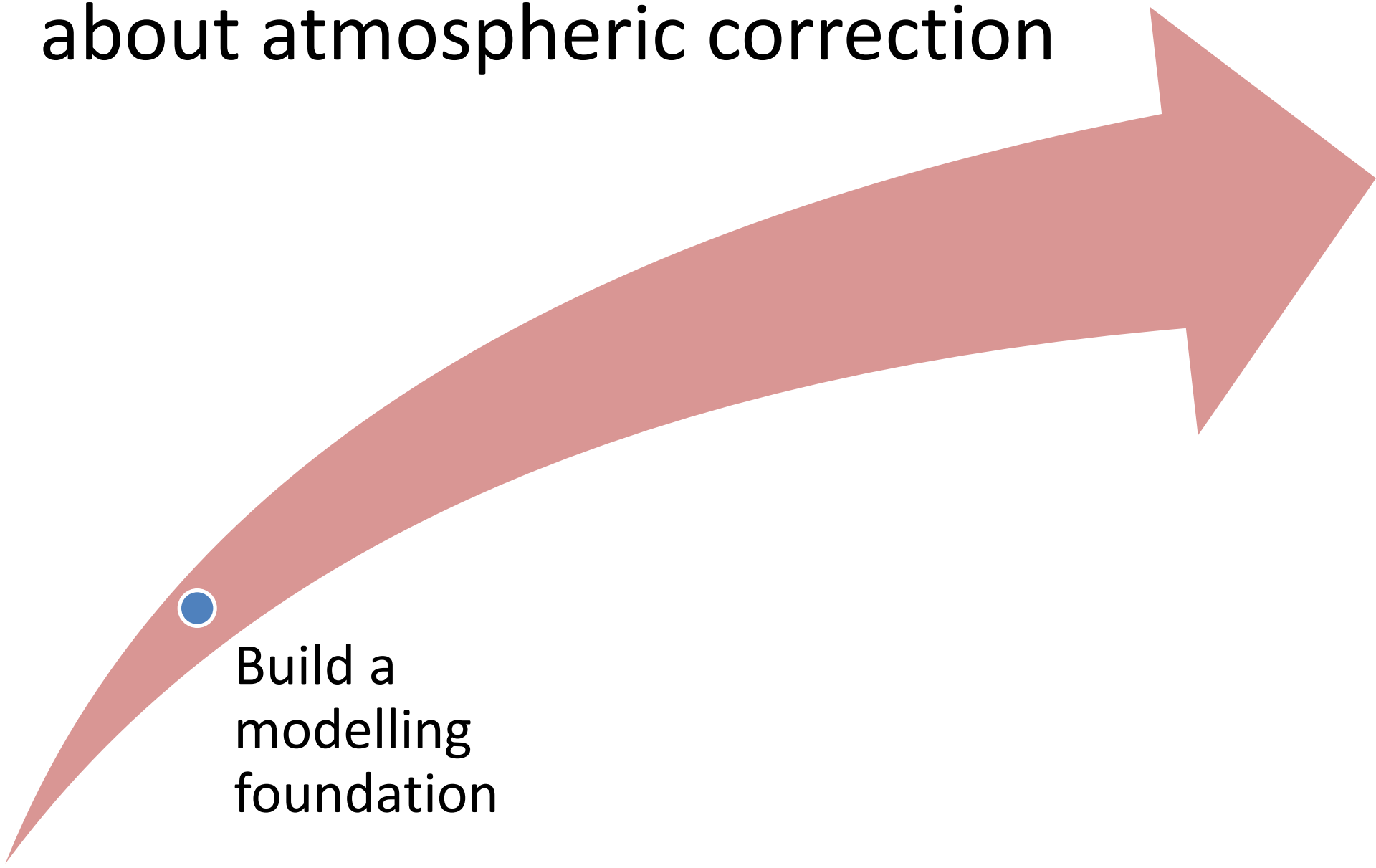


Applied quantitative remote sensing

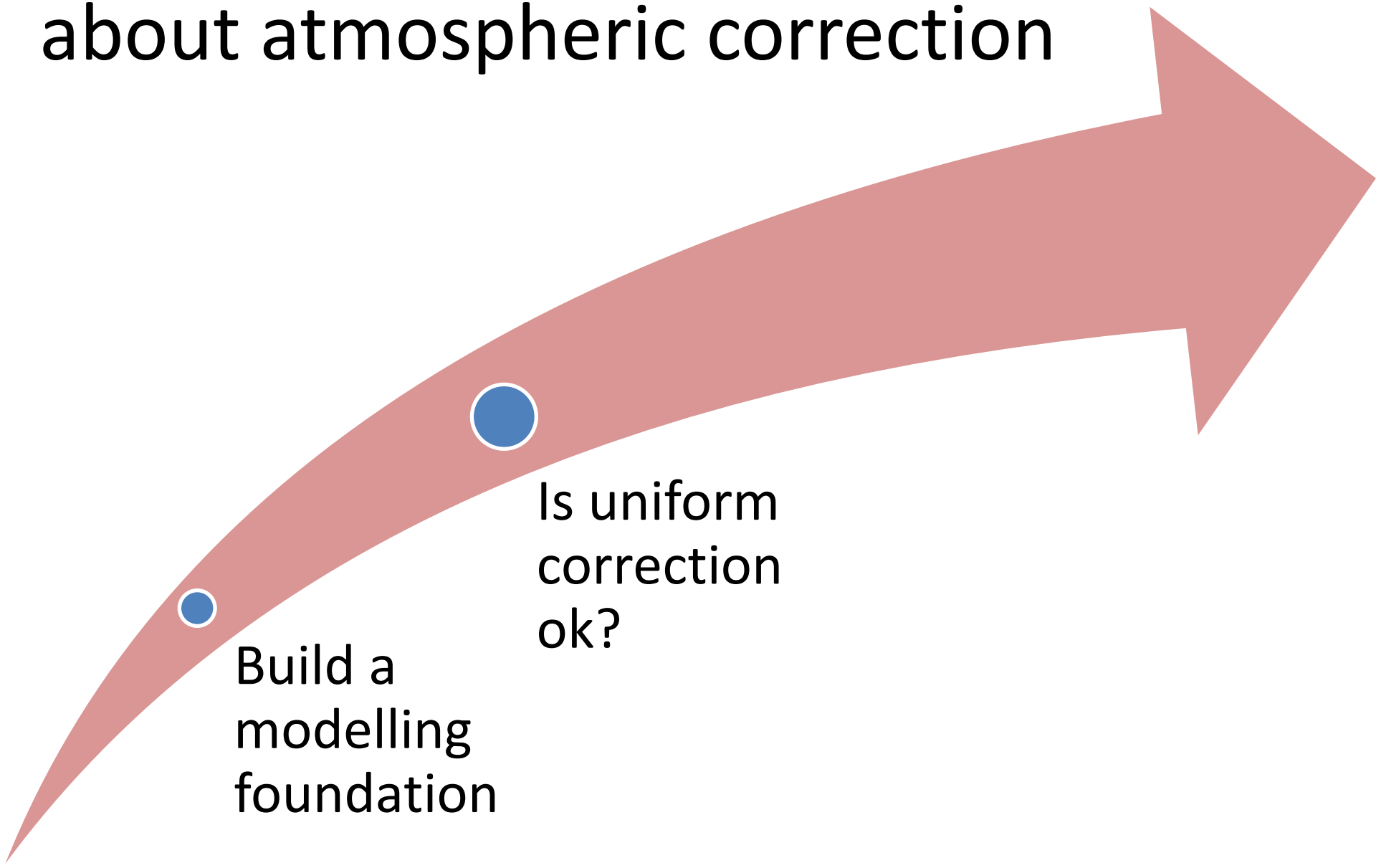
Answering **practical** questions about atmospheric correction



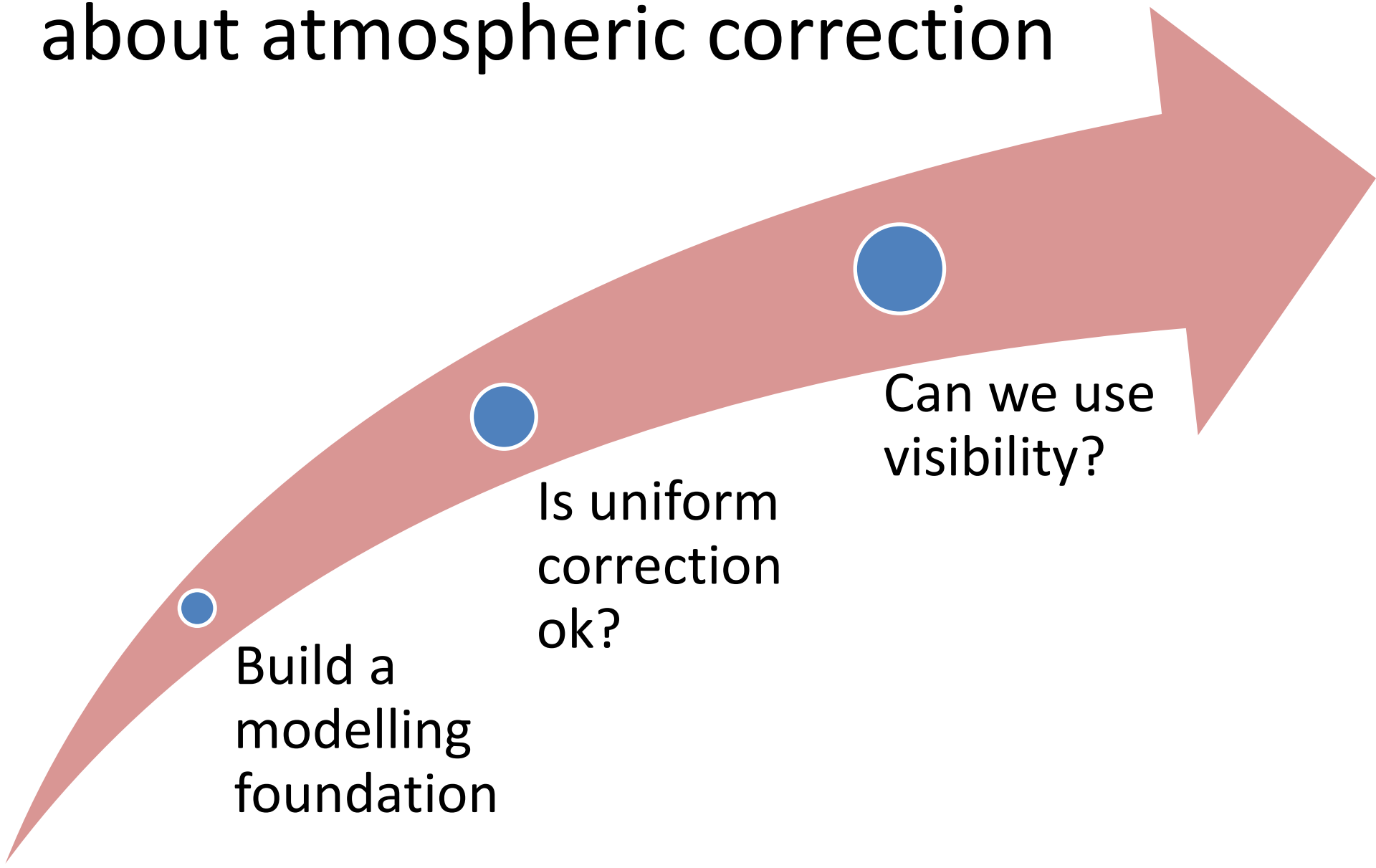
Answering **practical** questions about atmospheric correction



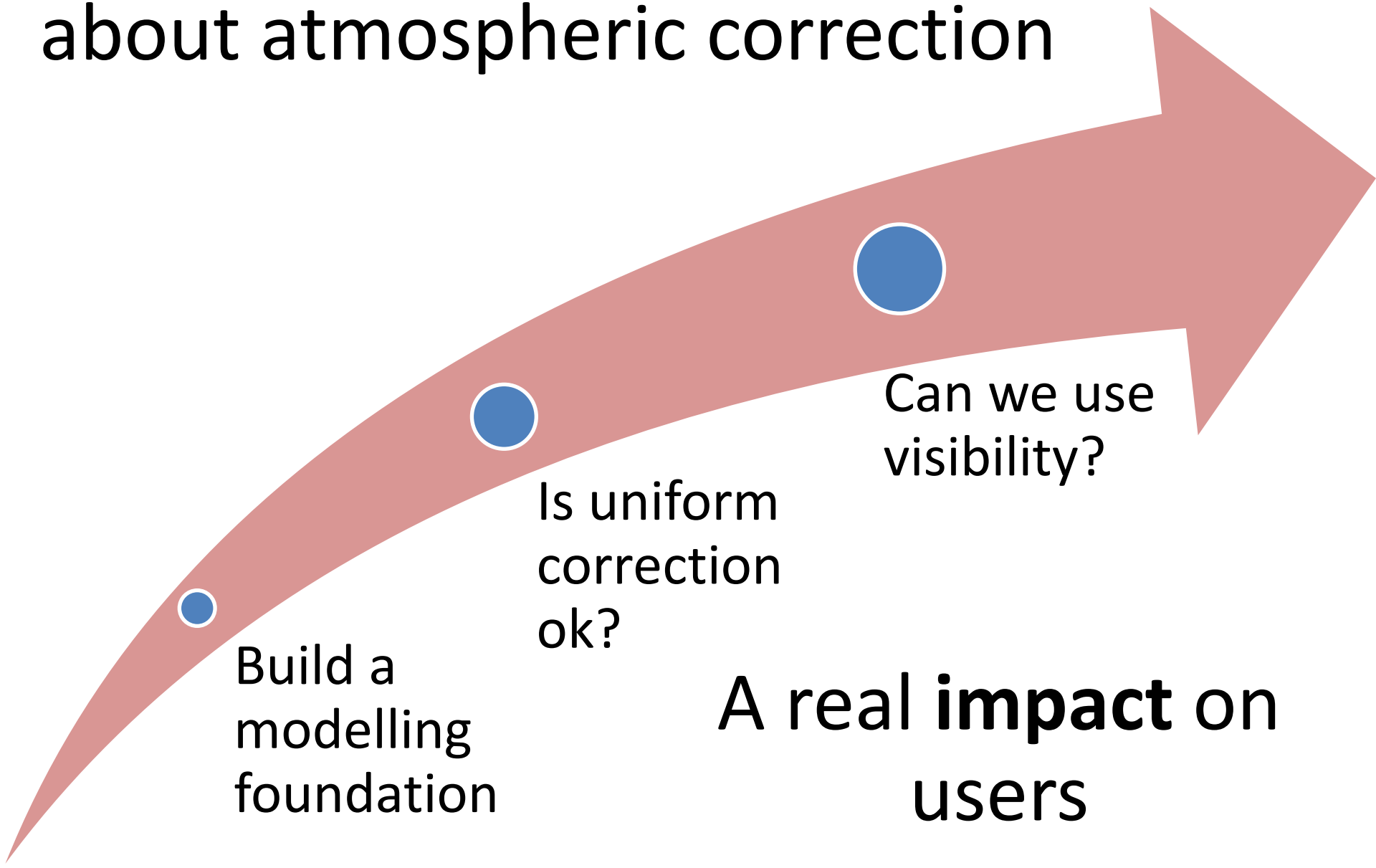
Answering **practical** questions about atmospheric correction



Answering **practical** questions about atmospheric correction



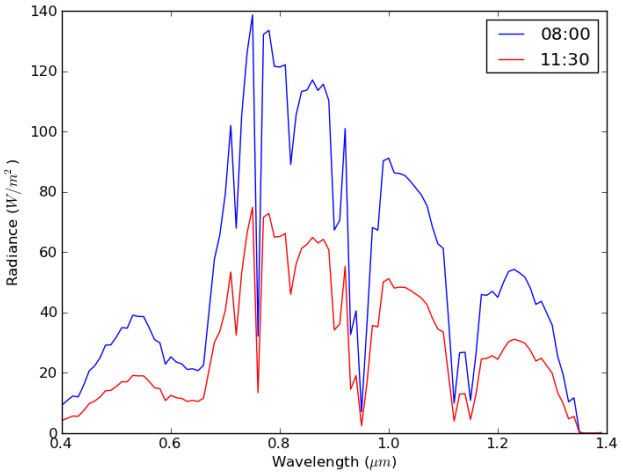
Answering **practical** questions about atmospheric correction

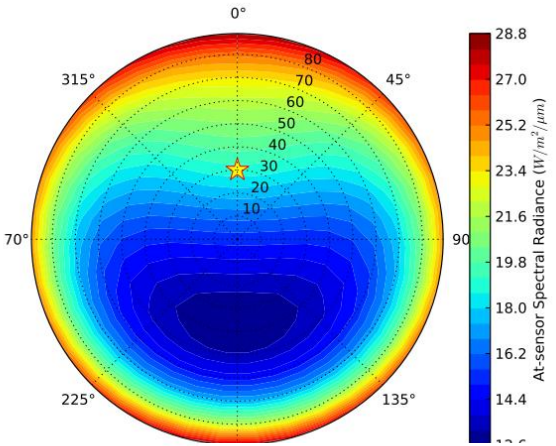


Py6S

Python interface to the 6S Radiative Transfer Model

```
# Input file
0
40.0 100.0 45.0 50.0 7 23
3.6 0.9
```





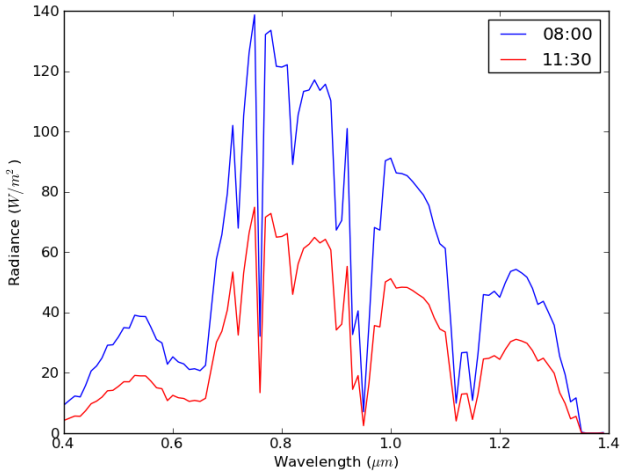
Wilson (2012), Computers & Geosciences 51

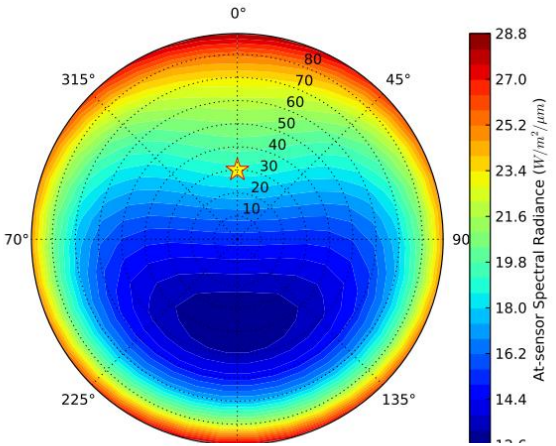
Py6S

Python interface to the 6S Radiative Transfer Model

```
# Input file
0
40.0 100.0 45.0 50.0 7 23
3.6 0.9

# Py6S code
from Py6S import *
s = SixS()
s.atmosprofile = AtmosProfile.UserWaterAndOzone(3.6, 0.9)
s.run()
```





Wilson (2012), Computers & Geosciences 51

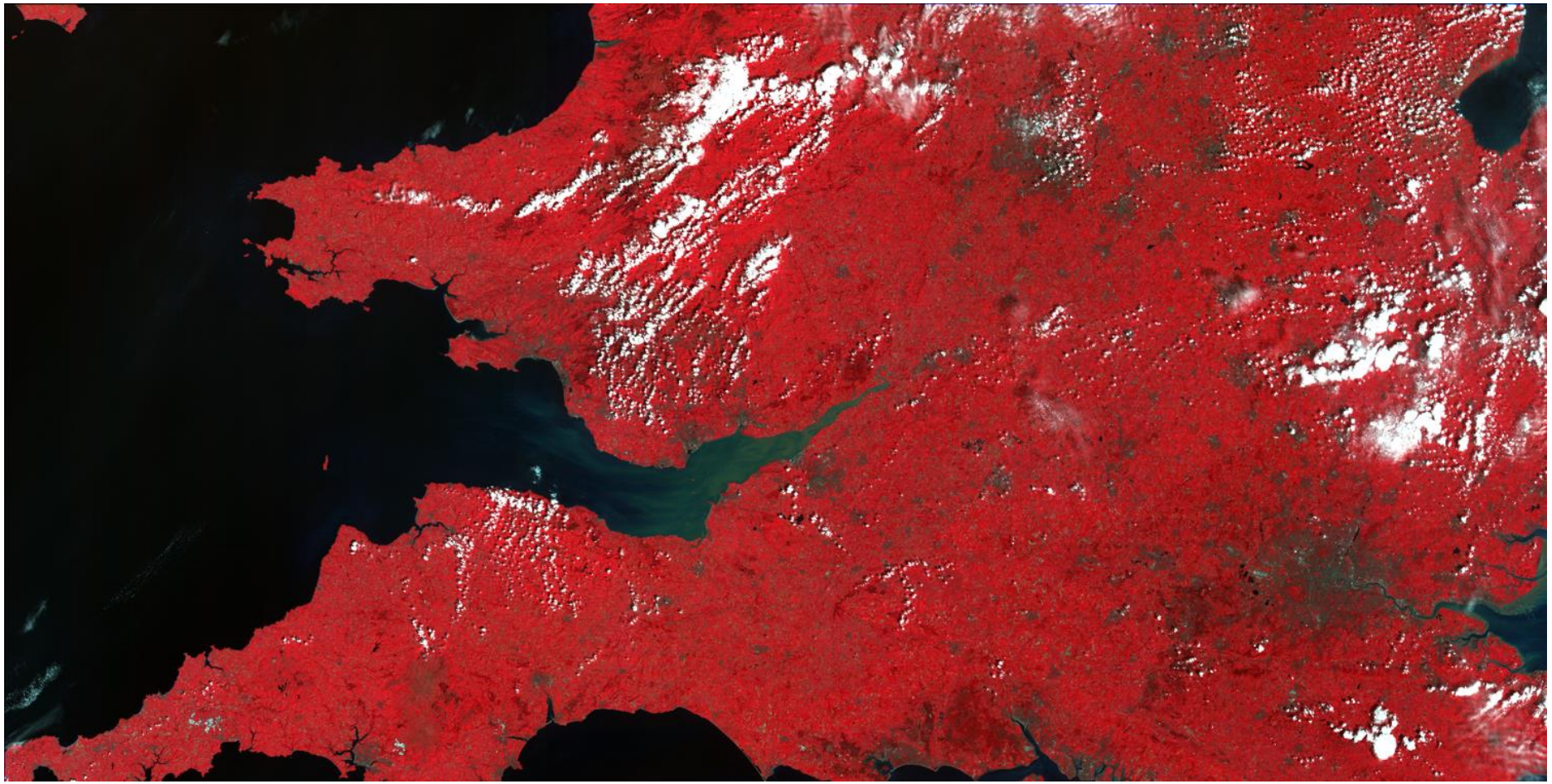
Py6S users

MULLARD SPACE
SCIENCE LABORATORY

British
Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Norsk Romsenter
NORWEGIAN SPACE CENTRE

Spatial variability & atmospheric correction



Wilson, Milton & Nield (2014) *International Journal of Remote Sensing* 35 (13)

- **How much** do atmospheric properties vary across southern England?
- **What errors would result** from ignoring this variability?

Wilson, Milton & Nield (2014) *International Journal of Remote Sensing* 35 (13)

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- **What errors would result** from ignoring this variability?

Aerosol Optical Thickness: **0.1–0.5**

Precipitable Water Content: **1.5–3.0cm**

Wilson, Milton & Nield (2014) *International Journal of Remote Sensing* 35 (13)

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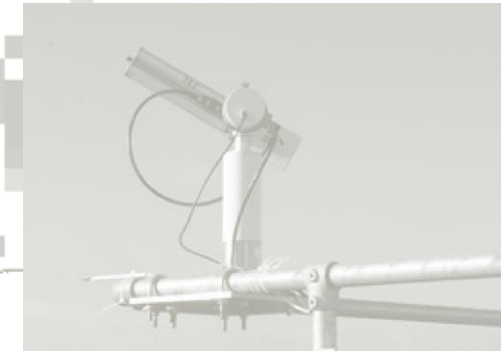

Error

NDVI: Up to 5%

Net Primary Productivity: Up to 12.3Mt C

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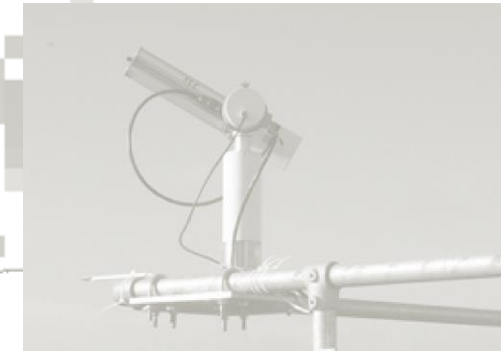


Error

NDVI: Up to 5%

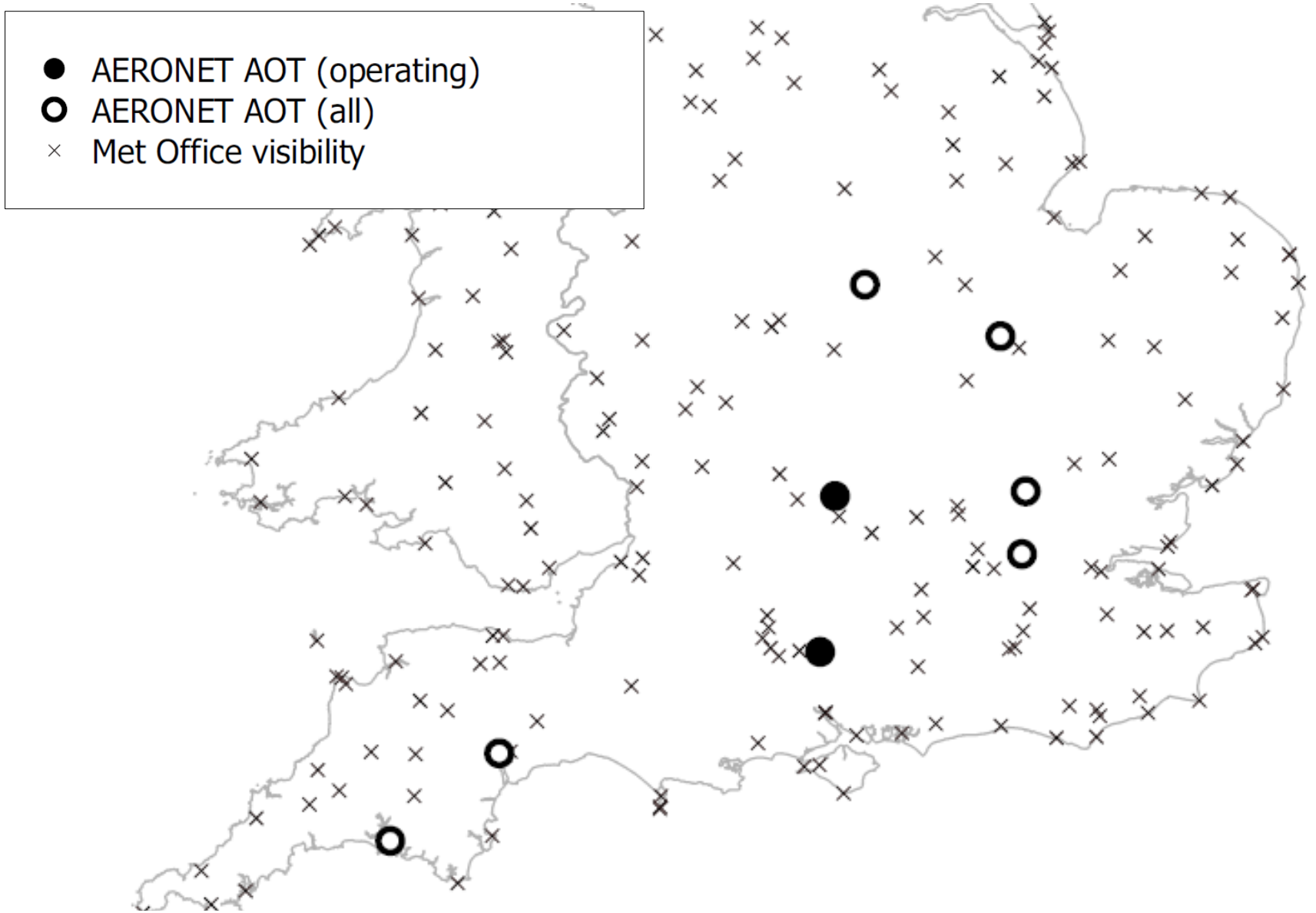
Net Primary Productivity: Up to 12.3Mt C

Significant error

Don't use uniform correction!

Wilson, Milton & Nield (2014) *International Journal of Remote Sensing* 35 (13)

Is visibility-derived AOT ok to use?



Wilson, Milton & Nield (2015) *International Journal of Remote Sensing 36 (6)*

Is visibility-derived AOT ok to use?

AOT errors of up to 70%

Errors far higher than other AOT estimation methods

Wilson, Milton & Nield (2015) *International Journal of Remote Sensing 36 (6)*

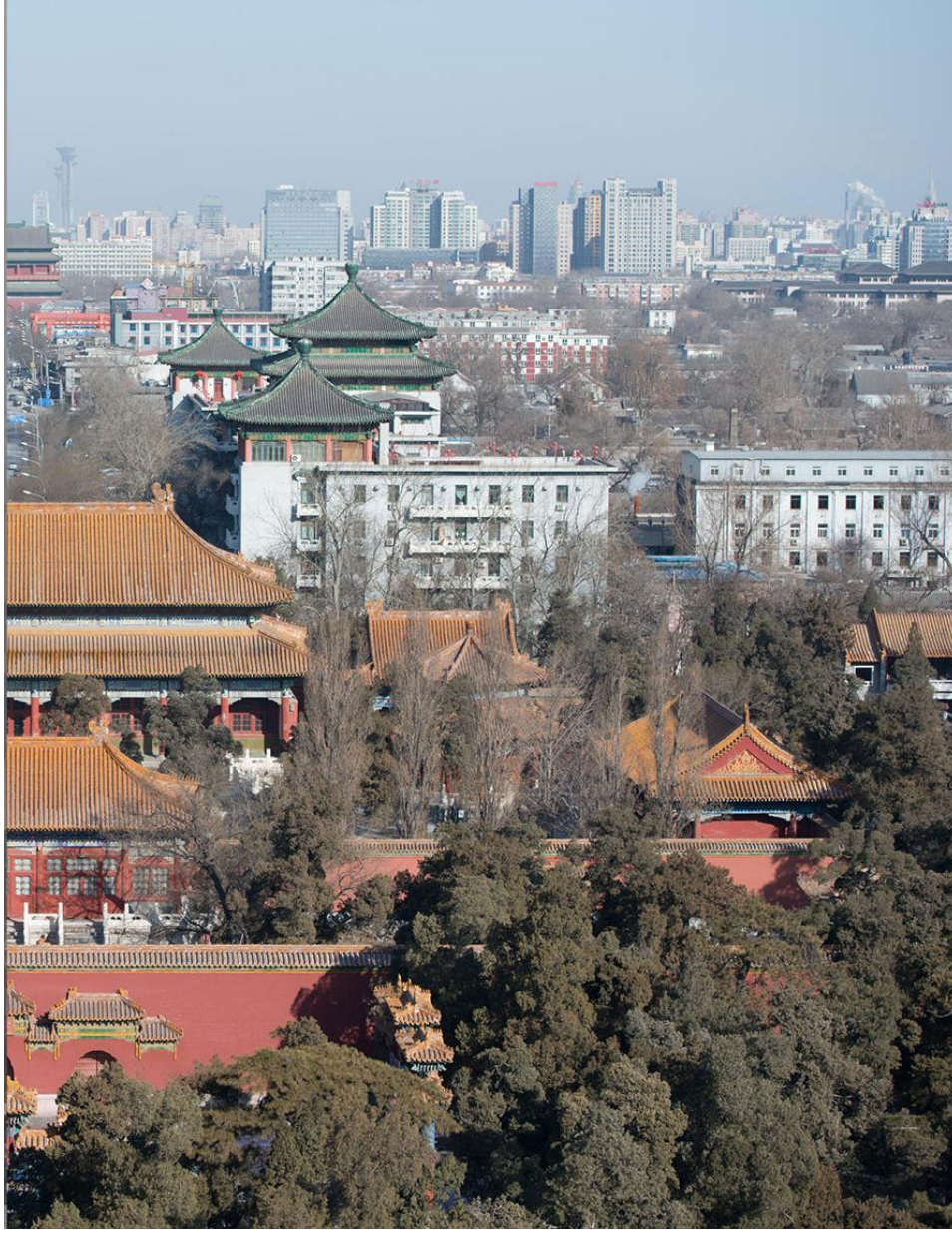
Is visibility-derived AOT ok to use?

AOT errors of up to 70%

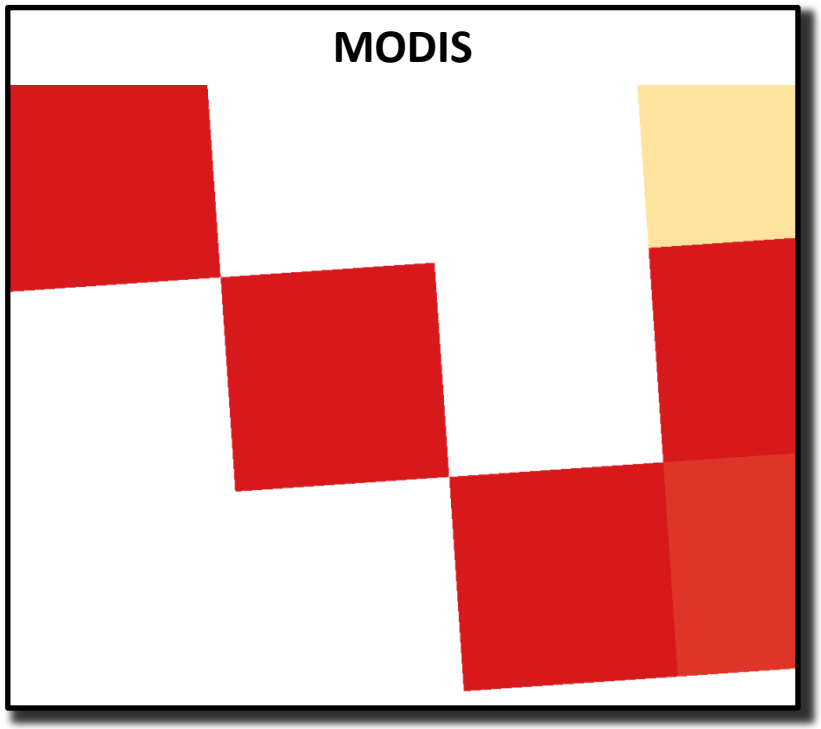
Errors far higher than other AOT estimation methods

Don't use unless you have no other options!

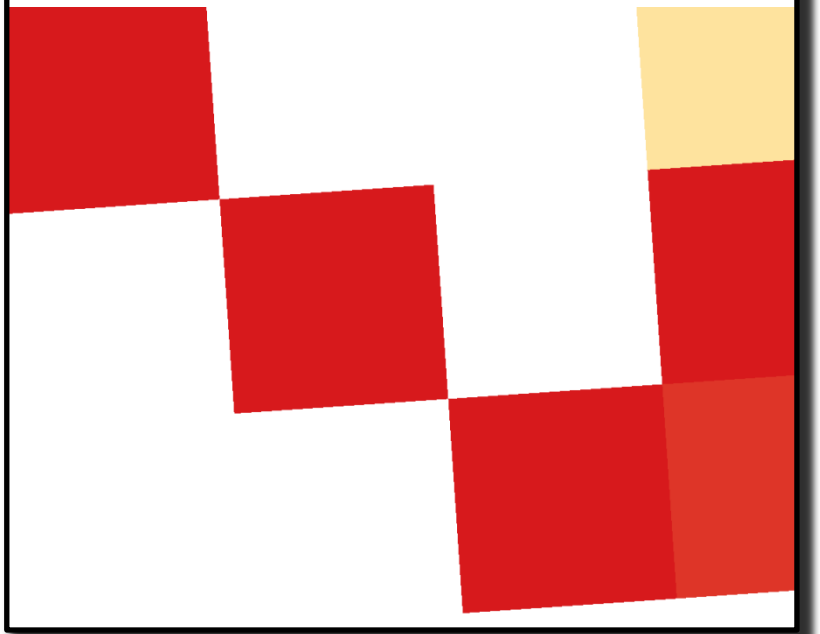
Wilson, Milton & Nield (2015) *International Journal of Remote Sensing 36 (6)*



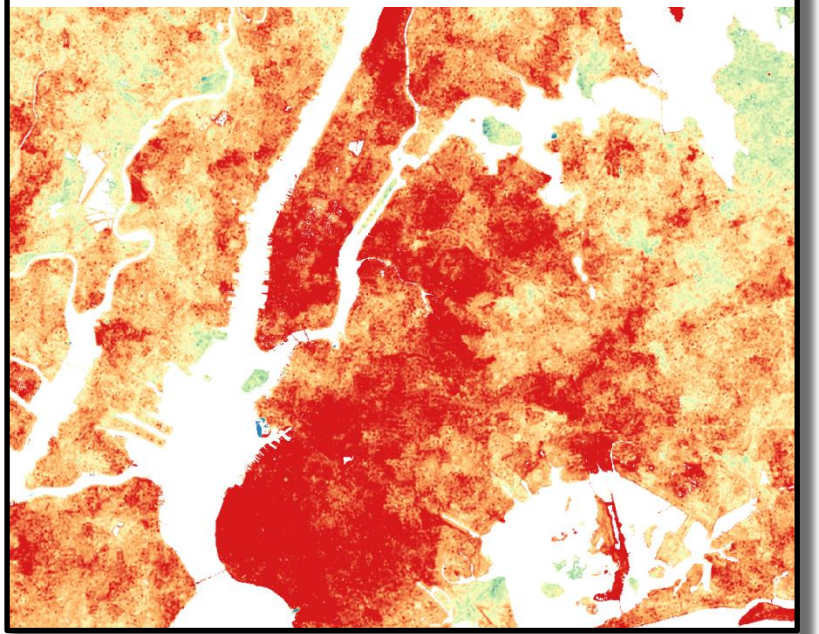
3.2m deaths per year

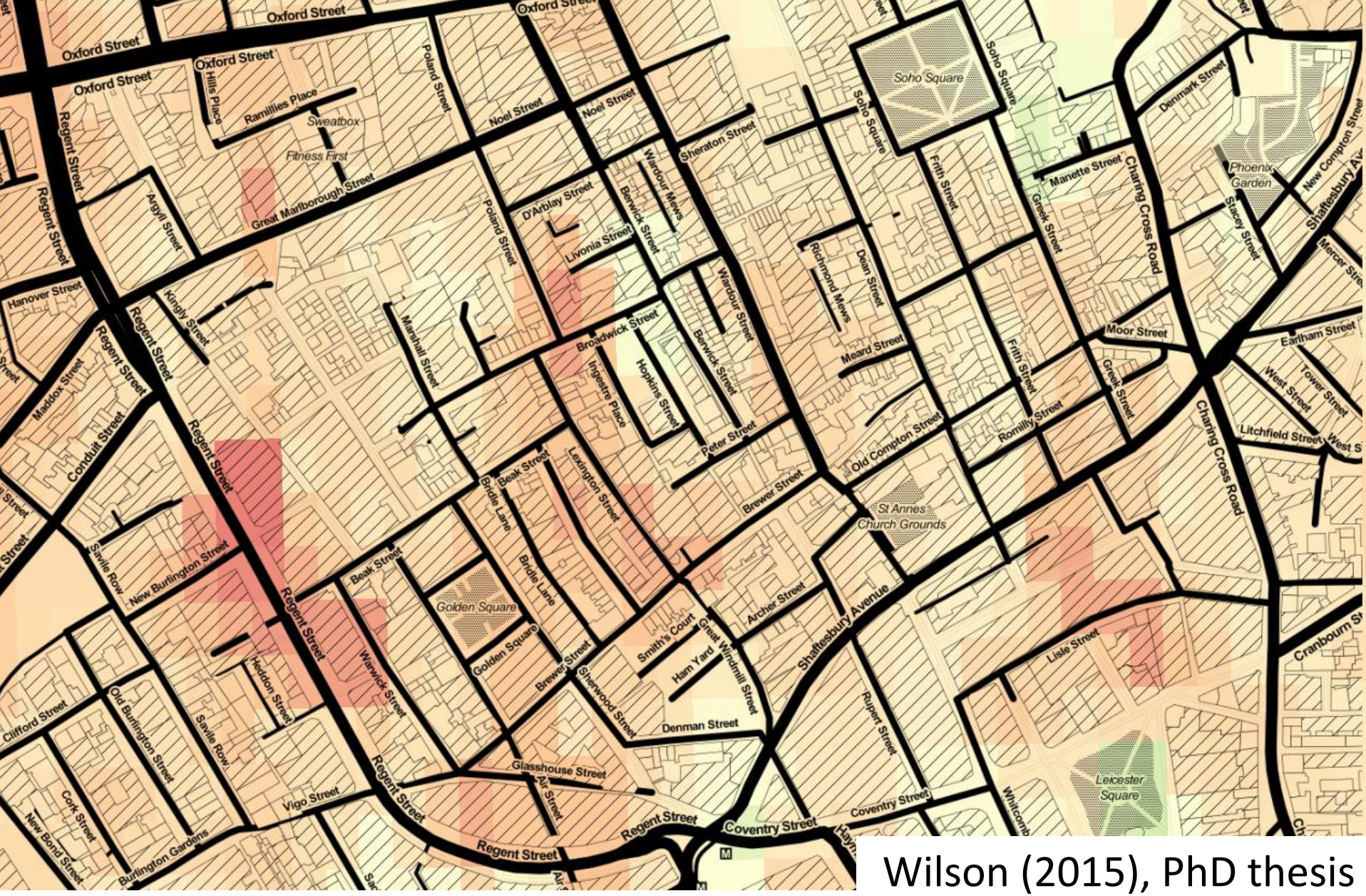

MODIS

MODIS



HOTBAR





Wilson (2015), PhD thesis

HOTBAR: 30m air quality

SkySci instrument

EPSRC

Wilson (2015), PhD thesis

Teaching

"Robin is already a confident and effective lecturer… an excellent session in every respect"

Teaching observation, 2014

"Excellent one-to-one support in the practical class"

Teaching observation, 2013

I already have experience of:

- Lecturing
- Small group & seminar work
- Practical classes (lab & computer)
- Supervising students (undergraduate, MSc, Post-Doc)
- Fieldwork
- Individual tutoring

1st year through to PhD and beyond

In three years’ time I will be:

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- a Fellow of the Higher Education Academy (PGCAP-certified)

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- a Fellow of the Higher Education Academy (PGCAP-certified)
- supervising undergraduate, MSc and PhD students
- convening a new 3rd year/MSc module: *Atmospheric Remote Sensing* or *Programming for GIS/RS*

In three years’ time I will have:

In three years' time I will have:

- expanded remote-sensing in fieldtrip work

In three years' time I will have:

- expanded remote-sensing in fieldtrip work
- expanded basic programming & modelling in remote sensing courses

In three years' time I will have:

- expanded remote-sensing in fieldtrip work
- expanded basic programming & modelling in remote sensing courses
- **excited and engaged students in Remote Sensing at all levels**

Research

"I believe Robin is on the threshold of a career of national and international significance"

Neil Chu Hong, Director, Software Sustainability Institute

"Py6S, and Robin's support, enabled key research which would otherwise have been impossible"

Py6S user, via mailing list

In three years’ time I will have:

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- produced world-leading research in:
  - Atmospheric correction
  - Satellite estimation of air quality
  - Practical, applied remote sensing

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- published highly-cited papers $\rightarrow$ REF

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- produced world-leading research in:
  - Atmospheric correction
  - Satellite estimation of air quality
  - Practical, applied remote sensing
- published highly-cited papers → REF
- received funding from national/ international bodies

SkySci

Atmos Meas Tech 2015

SkySci

Atmos Meas Tech 2015

GPS Water Vapour

Atmos Meas Tech 2015

SkySci

Atmos Meas Tech 2015

GPS Water Vapour

Atmos Meas Tech 2015

Nighttime lights & 'urbanicity'

Int J of Health Geographics 2015

SkySci

Atmos Meas Tech 2015

GPS Water Vapour

Atmos Meas Tech 2015

GPS for Dengue Fever

PLoS ONE 2015

Nighttime lights & 'urbanicity'

Int J of Health Geographics 2015

Vision: Atmospheric correction for the modern era

- **What is the spatial scale of AOT?**
- **Can we link HOTBAR in to automated atmospheric correction?**
- **How accurately do we need to parameterise RTMs?**

Classification and Change Detection Using Landsat TM Data: When and How to Correct Atmospheric Effects?

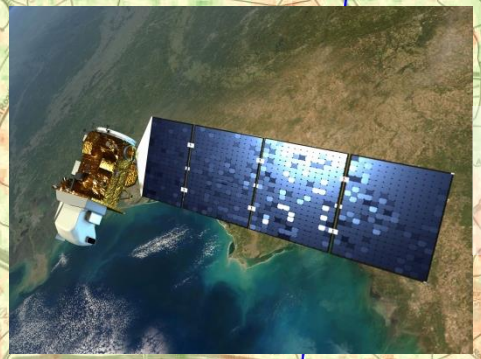
Conghe Song, Curtis E. Woodcock,* Karen C. Seto,† Mary Pax Lenney,* and Scott A. Macomber**

- **Is this right in the modern world?**

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

PRIFYSGOL
ABERYSTWYTH
UNIVERSITY

Vision: Accurate high spatial & temporal resolution air quality measurements



Combining satellites & models

Novel validation with SkySci, citizen science and models

Application in LMICs, and with TfL & King's ERG


European Environment Agency
Transport for London
+
KING'S College LONDON
ERG
MRC
Medical Research Council
ACTRIS
Aerosols, Clouds, and Trace gases Research Infrastructure Network
EuNetAir

NERC

SCIENCE OF THE ENVIRONMENT

Rio Tinto


KING'S College LONDON
?


Thank you to my
collaborators