OAU-MetLink: An online resource for teaching of physical meteorology

Adewale I. Ajao
Atmospheric Physics Research Group
Department of Physics & Engineering Physics,
Obafemi Awolowo University,
Ile-Ife, NIGERIA.

http://meteorology.oauife.edu.ng

WACREN Annual Conference. Dakar, Senegal. March 18, 2016.

Credits

- Atmospheric Physics Research Group (APRG)
  - Dr. O. E. Abiye
  - Mr. T. I. Oniosun
  - Dr. M. A. Ayoola
  - Dr. L. A. Sunmonu
  - Prof. O. O. Jegede

Atmospheric Physics Research Group @ OAU

Personnel: Prof. Jegede, Drs. Ayoola, Sunmonu & Abiye, Messers Ajao & Akinola. Technologists/Technicians.

Guiding Philosophy: High-quality research through deployment of research-grade instrumentation.

Collaboration/Funding

UPPSALA
UNIVERSITET

The Abdus Salam
International Centre
for Theoretical Physics

On-going Research Projects

- Nigeria Micrometeorological Experiments (NIMEX) – 2004 to date.
- Dynamics of Aerosol Chemistry Clouds Interactions in West Africa (DACCIWA). EU-funded (2013-2018).
- Surface Energy Balance (SEB) studies.
- Turbulence characteristics in the SL.
- Nocturnal Low-level Jets in the Boundary Layer.
- Measurements of Aerosol Optical Depth
- Modelling of Dispersion of Air Pollutants.

Postgraduate Students: M.Sc (15), Ph.D (8)

Topics (Physical Meteorology)

1. Solar & Atmospheric Radiation
2. Air Pollution
3. Cloud Microphysics
4. Atmospheric Turbidity & Aerosols
5. Atmospheric Thermodynamics

These are designed on issues essentially covering description of the processes detailing physical phenomena describing the state of the atmosphere.

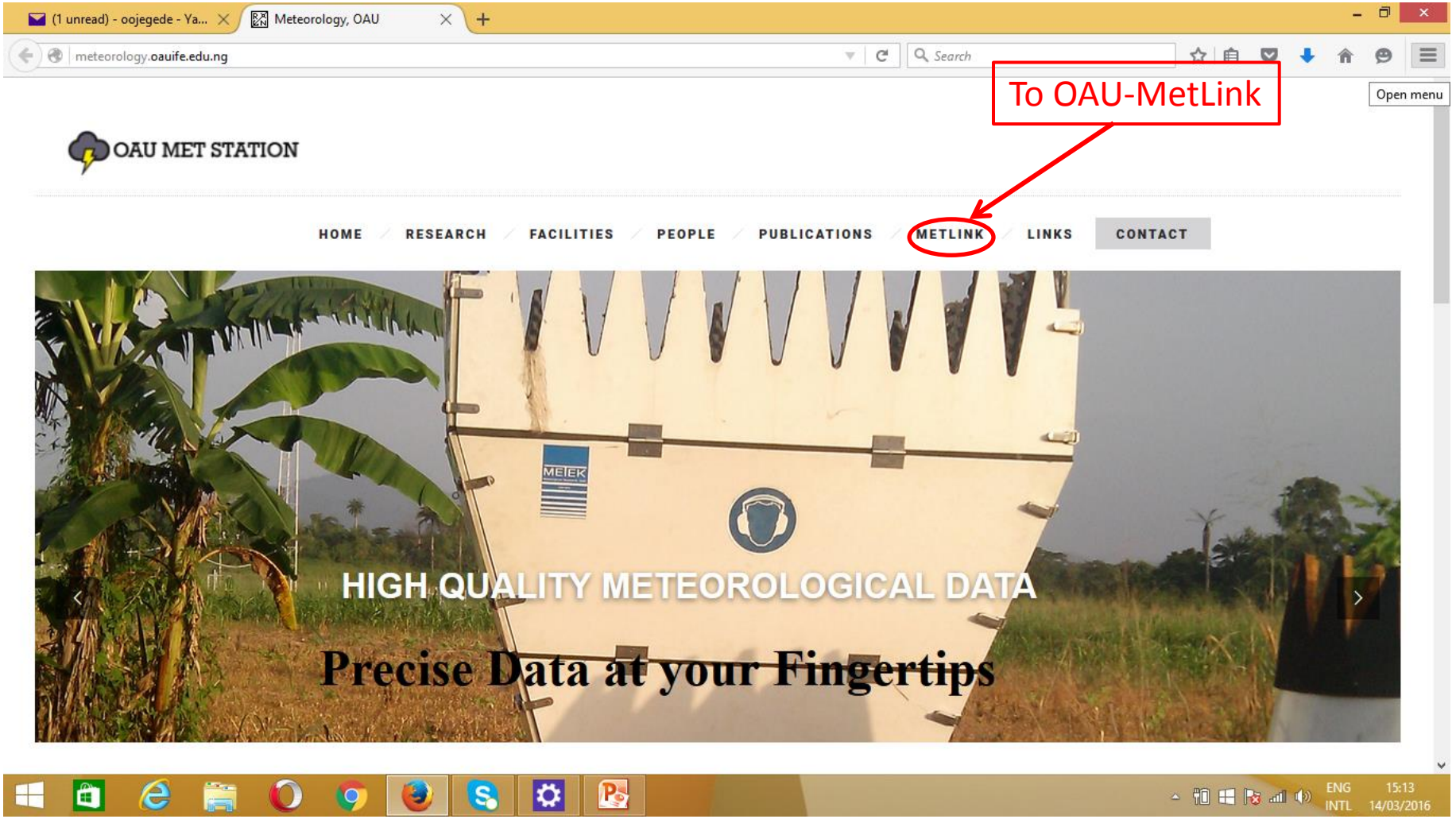
Conceptualization: OAU-MetLink

- Lack of relevant meteorological data to accompany the coursework.
- Self-teaching tool & resource for students
- Independent/remote platform (unlike face-to-face)
- Demonstration of the basic concepts (practice-based)
- Online (web-based) and mobile (android) platforms
- Similar resources exist, but MetLink is geared specifically for the tropical West Africa scenarios (lat. Bands 4^{o} – 15^{o}N)

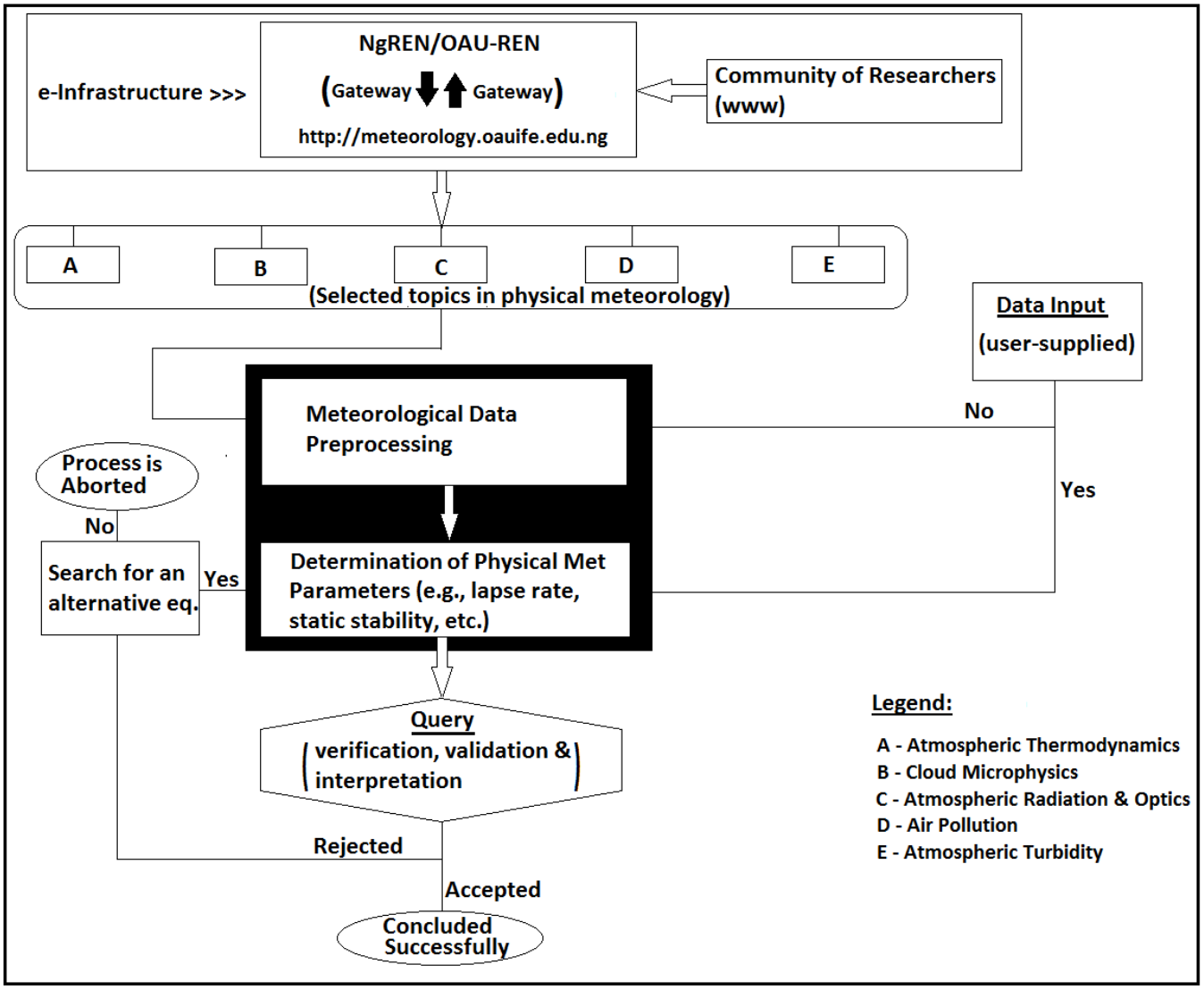
Value-added Services (OAU-MetLink)

- Responsive and query-based web design
- Online processing for students specific tasks
- Periodic push notifications (SMS alerts)
- User registration for students
- Tutors can easily monitor students' performances (assessments)
- Regular updates of the curriculum.

http://meteorology.oauife.edu.ng



OAU-MetLink Architecture

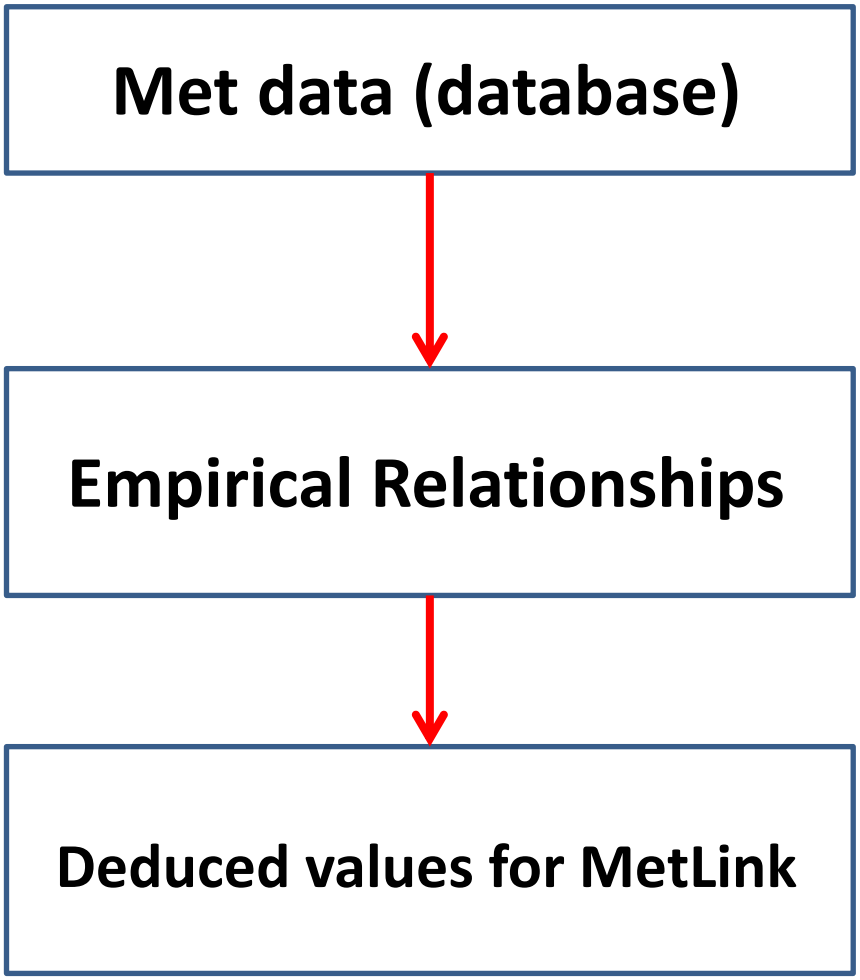


An Example: Plume Rise

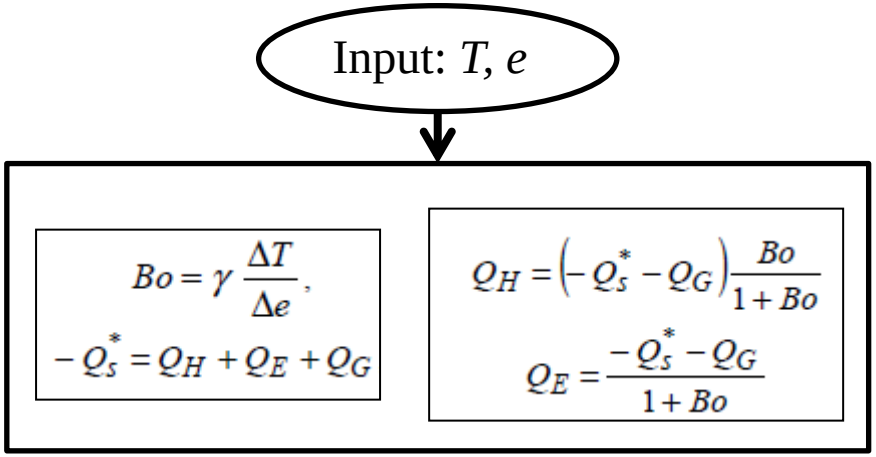
Data required:

1) **Stack height, hs**
2) **Exit temp, To**
3) **Exit velocity, vo**
4) **Ambient windspeed, U**
5) **Ambient temp, Ta**
6) **Sensible heat flux, QH**

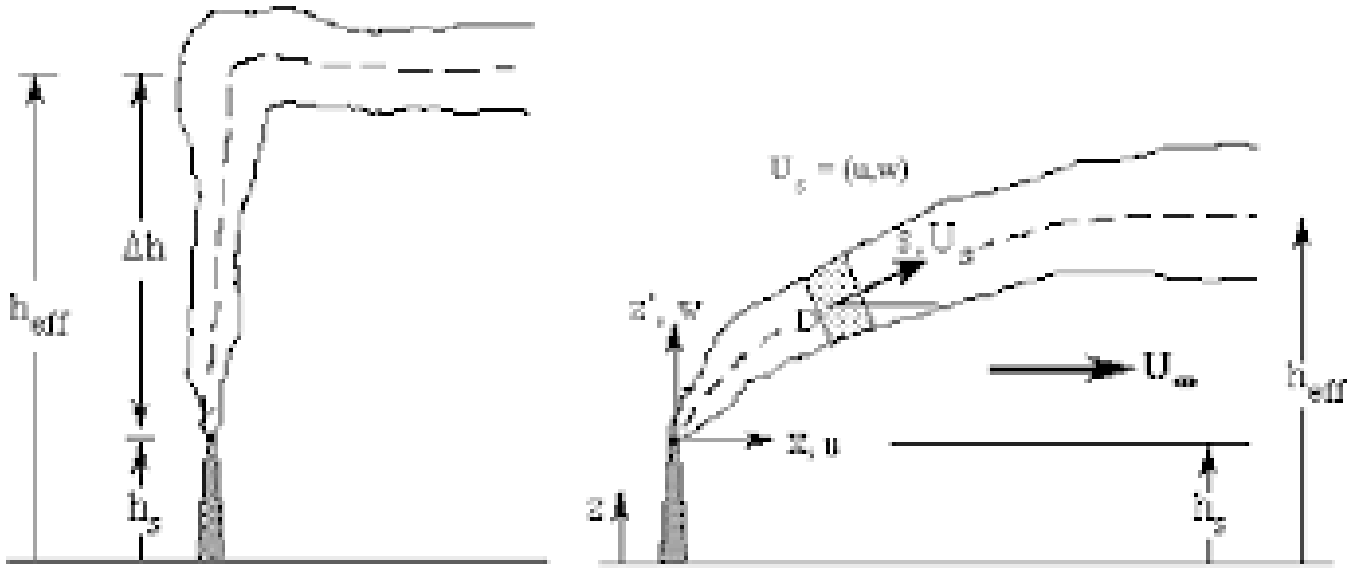
Part I: Meteorological Pre-processor (METPRO)



Example: Bowen ratio (Bo) & sensible heat flux (Q_H)



Part II: Plume rise calculations



(a) Top Hat Configuration (weak winds)

(b) Bent-over Configuration (moderate or strong winds)

$$\Delta h = \frac{V_s D}{u}\left(1.5 + 2.68\times10^{-3} PD\frac{\left(T_s - T_a\right)}{T_s}\right)$$

OAU-MetLink App is coming on the Mobile Platform (still under test!)

Google Play

- App is linked to the website and regular updates
- Push messages to mobile phones
- Can function without internet connectivity

Thank you for your attention