New Developments in Greenhouse Gas Measurements and Earth Observation for Climate

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29 October 2015
What do we cover?

**Greenhouse gas measurements**
Support tax, trade and regulatory instruments for carbon pricing, reporting and management

**Climate data**
Provide confidence and reduce uncertainties in climate data used for monitoring and modelling

**Low carbon technologies**
Accelerate development and assess performance of low carbon technologies
Greenhouse gas measurements
New facility #1: New DIAL

- Greater detection sensitivities that offer more accurate results
- Flexible system that enables operators to switch between the types of pollutants being measured
- More efficient data manipulation and usage e.g. improved software
Increase in focus on fugitive emissions internationally

- Health and safety
- Avoid economic loss e.g. in the case of natural gas
- Global warming potential of some gases much larger than that of carbon dioxide

**Reporting:**
- Companies reporting under permit/licence
- National inventories
- GHG reduction targets under UNFCCC
- Concerns in particular sectors e.g. shale gas
Wind vector
Example DIAL results
New facility #2: Area source facility
What are area source emissions?
Why are we interested?

- Evidence-based determination of emission factors
- Reduce uncertainties and increase confidence in reported emission values
- Develop improved remote sensing techniques and monitoring protocols
- Test new sensors
The facility allows the gas control system to be up to 60m from the point of release, and the operator to be up to a further 50m away.
Area Source Emissions Facility

- A novel facility for the performance testing and calibration of current remote monitoring systems, and validation of new technologies, measuring GHGs (primarily CO$_2$, CH$_4$, C$_3$H$_8$).
- The system is capable of producing both uniform and a variety of non-uniform emission type plume characteristics as found at landfill sites, CCS plants, in industry or agriculture.
- Have a top emission rate capability on order of 50 kg.hr$^{-1}$, comparable to the emission rates of small-medium industrial fugitive releases.
- Incorporate some capability to introduce cross interfering species to the emitted gas matrix.
- The facility is transportable.
Earth Observation for Climate
Vicarious Post-Launch Calibration

- **RADCALNET**
- Ensure radiometric integrity of space-borne instruments
- Spatially uniform, bright, large targets (pixels from 10 to 100s m)
- Flat, “No Atmosphere” i.e. low cloud levels
- Standardised procedures to aid characterisation
- Comparisons of field instruments & techniques to ensure consistency and traceability
Even easy test sites have challenges

- Extremes of temperature
- Representative-ness over large areas in short time scales
- Atmospheric effects
- Animals…

Gonio-Radiometric Absolute Spectrometer System (GRASS)
NPL Training Course

Uncertainty for Earth Observation Training Course

Textbook, presentations and future course information can be found here:

http://www.meteoc.org/training.html
Thank you for listening.
Any questions?

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