



Earth Observation Technology Cluster

Kick-off meeting 5th May

Field-based Fourier Transform InfraRed (FTIR) Spectroscopy

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Environmental applications of FTIR spectroscopy

The utility of field-based FTIR spectroscopy (specifically the 8 to 14 micron waverange) to a wide range of environmental applications has been demonstrated by a number of academic studies over recent years.

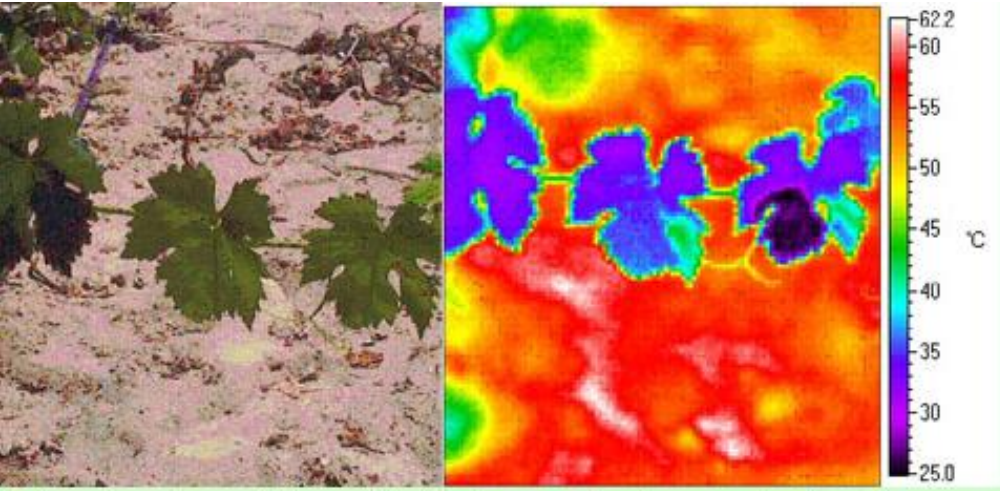
FTIR spectroscopy has the capability of providing information on the composition of a rock, sediment, soil, vegetation or atmosphere that reflectance spectroscopy cannot.

Field-based FTIR techniques have the potential to significantly advance the application of remote sensing to a wide range of environmental processes and problems

Environmental applications of FTIR spectroscopy



Field FTIR can resolve concentration of gases over fixed distances

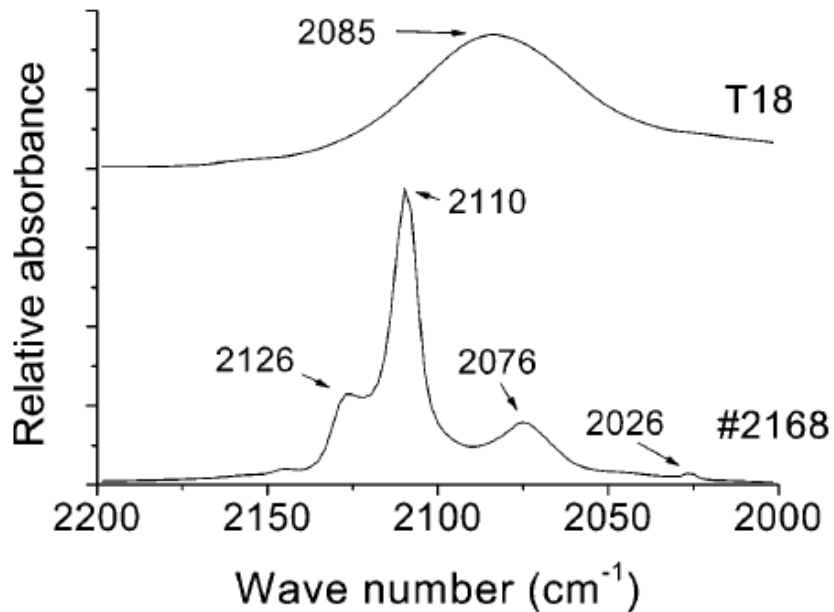


False colour thermal image (right) of grape-vine leaves, showing the temperature difference between non-transpiring (42 oC light blue-green) and wet (25 oC blue-black) areas of the leaves.

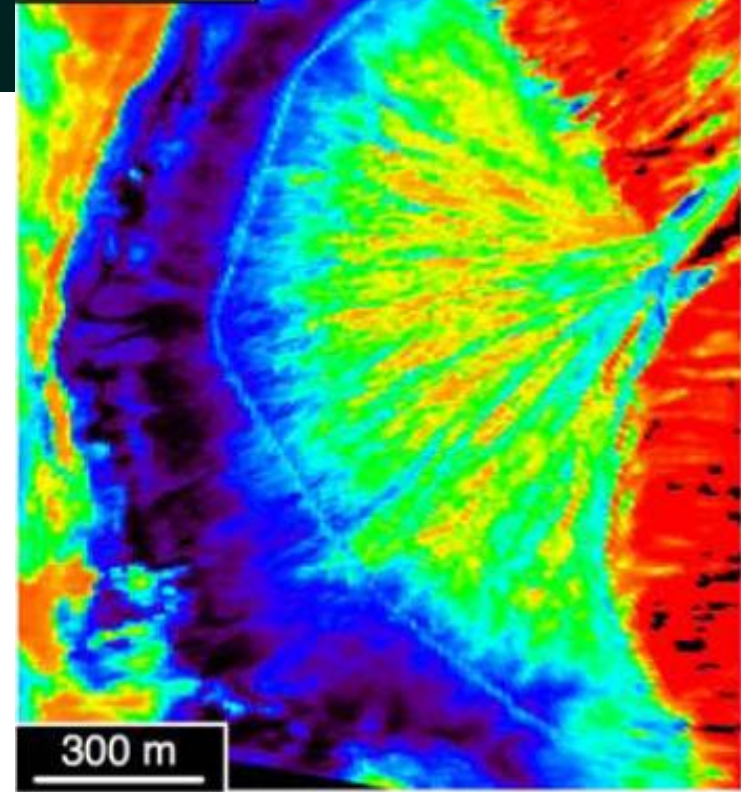
Vegetation



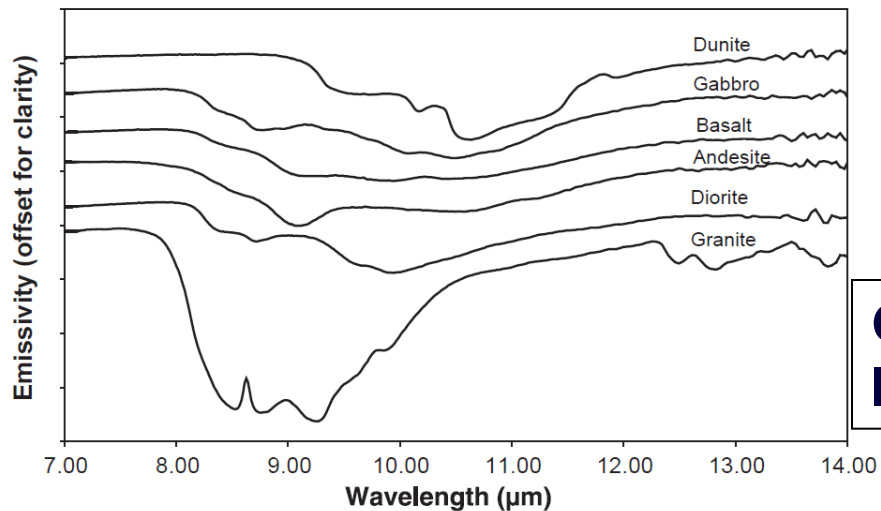
3D characterisation of gases from landfill



Soil contamination e.g. Cyanide



Geomorphology e.g. Particle Size



**Geology e.g. Characterising
Igneous Rocks**

Applied and Commercial applications of field-based FTIR Spectroscopy

Detection from Long Distances

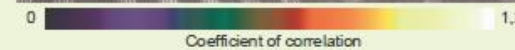
Release of Sulfur Hexafluoride



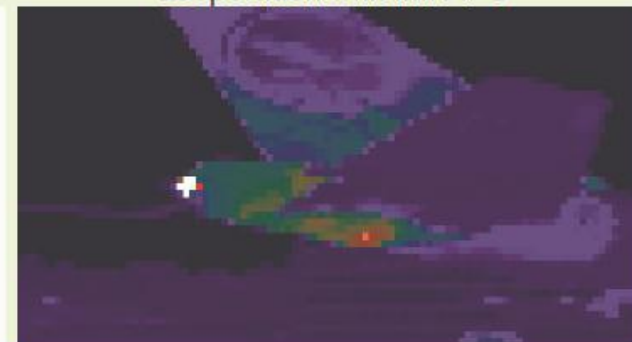
Airborne Pipeline Surveillance

Industrial Emissions

Ammonia



Measurement of Aircraft Exhaust Gas Cooperation with IMK-IFU

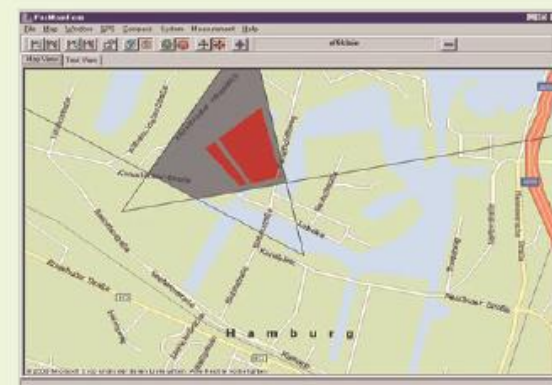


Remote Sensing of Volcanic Gases

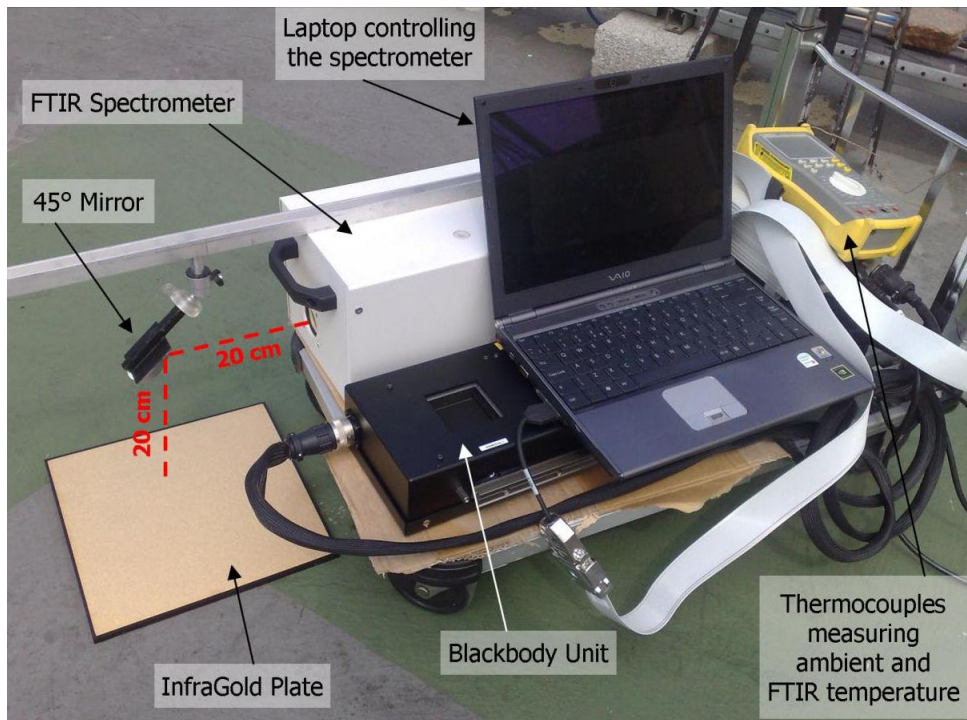
Cooperation with INGV



Tomographic Mapping



Utilisation of Field-based FTIR spectroscopy



Utilisation of field-based FTIR spectroscopy by EO specialists has been limited by a number of factors including :

- availability of field FTIR instruments has been very limited
- field FTIRs have been cumbersome, delicate and difficult to use
- complex procedure for processing and analysing field FTIR data

Development of Field-based FTIR Technologies

- Technological developments now producing much lighter, cheaper, simpler and more robust portable FTIRs

Enable this powerful analytical technique to become much more accessible to scientists in all sectors of the EO community





Aims of Project

- **Carry out comprehensive investigation of the capability of portable and handheld FTIRs**
- **Demonstrate the functionality of the new generation of portable and hand-held FTIR instruments at a range of conferences and workshops for EO scientists from all sectors of the EO community**
- **Inform the discussion on the specification of future airborne- and satellite-based FTIRs**

Programme of Knowledge Exchange Activities

Conference	Activity	Sectors of community attending	Date and Location
Geo-environmental Remote Sensing GRSG	Presentation and seminar to demonstrate environmental applications of FTIR techniques. (* as part of Thermal Spectroscopy SIG sessions *)	All sectors of UK and overseas EO community. Both academic and commercial	December 1-3, 2010, Geological Society, London
ET 2011 <i>(Environmental Technology) part of Sustainabilitylive! 2011</i>	Presentation and workshop to demonstrate environmental applications of FTIR techniques.	Environmental engineers and managers from both the academic and regulatory sectors	April 2011, Birmingham
31st EARSeL meeting	Presentation, seminar and workshop to demonstrate environmental applications of FTIR techniques. (* as part of Thermal Spectroscopy SIG sessions *)	All sectors of UK and overseas EO community	June 2011, University of Edinburgh
RSPSoc 2011	Presentation, seminar and workshop to demonstrate environmental applications of FTIR techniques.	All sectors of UK and overseas EO community	September 2011 UK