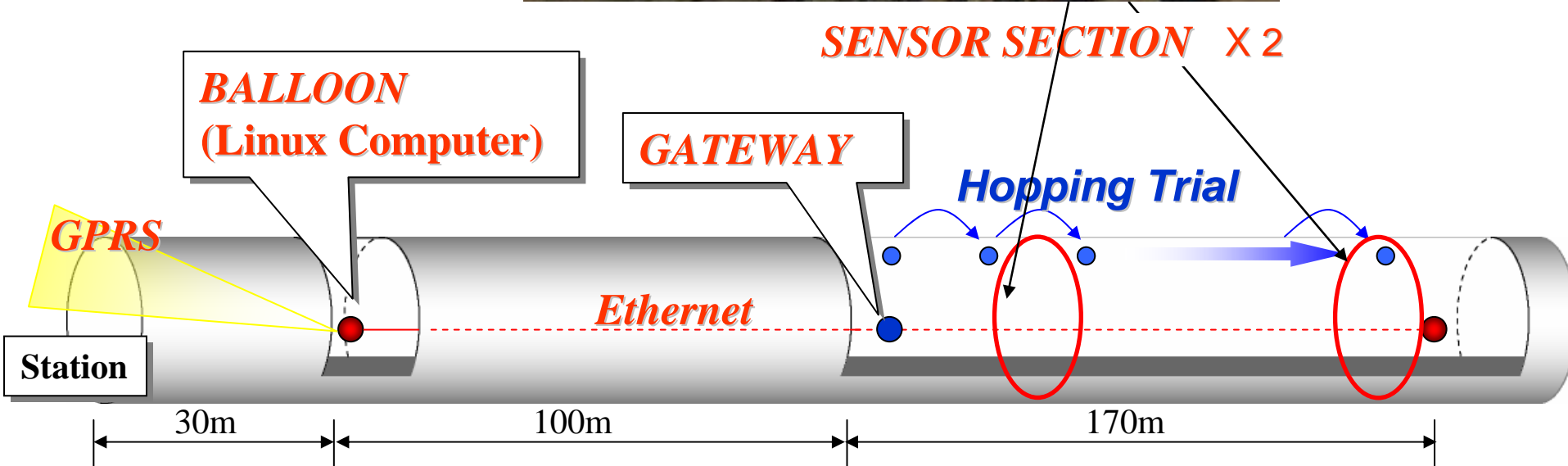
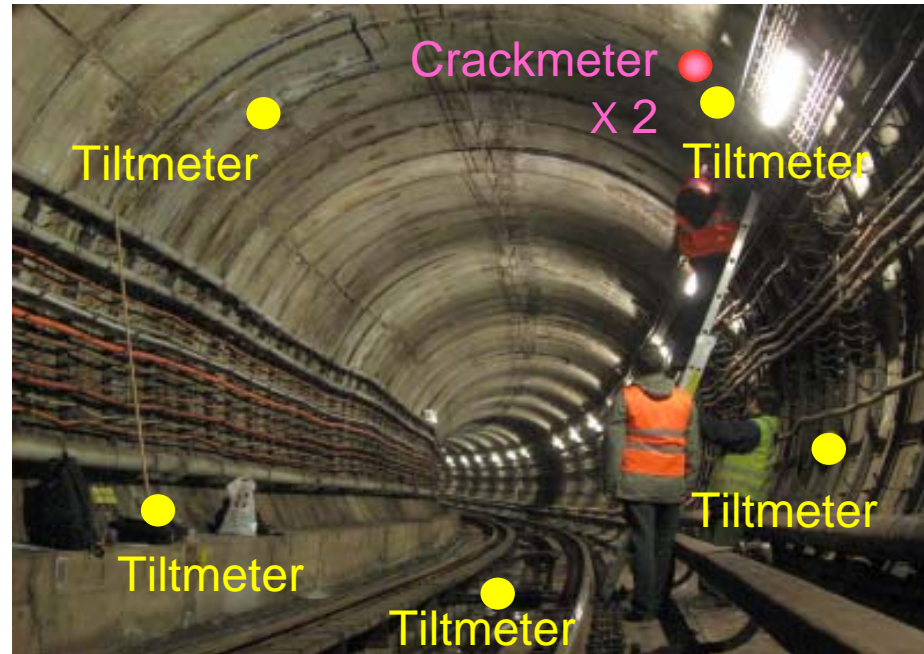


Installations – Prague and London



Prague Metro WSN



London Underground

- Background
 - Spalling in deep tunnel
 - Fresh and historical



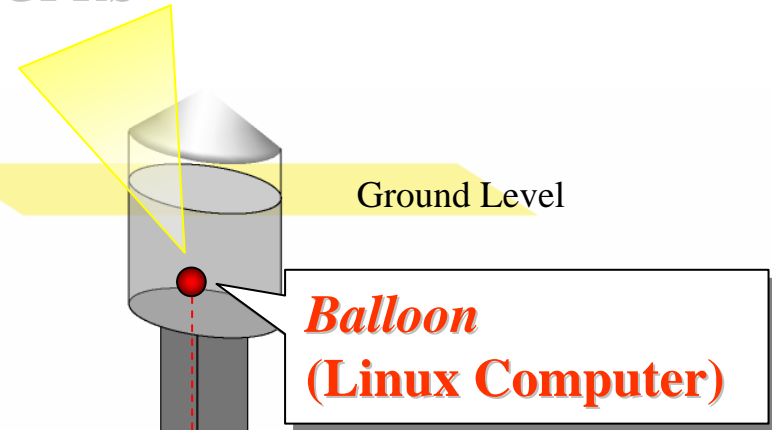
Strain gauges installed points

Ring Number	Sections							
	BC	CD	DE	EF	FG	GH	HJ	JK
1496								
1497								
1510								
1528								
1596								
1604								
1605								
1606								
1607								
1619								
1660								
1662								
1669								
1689								

Baker Street ->

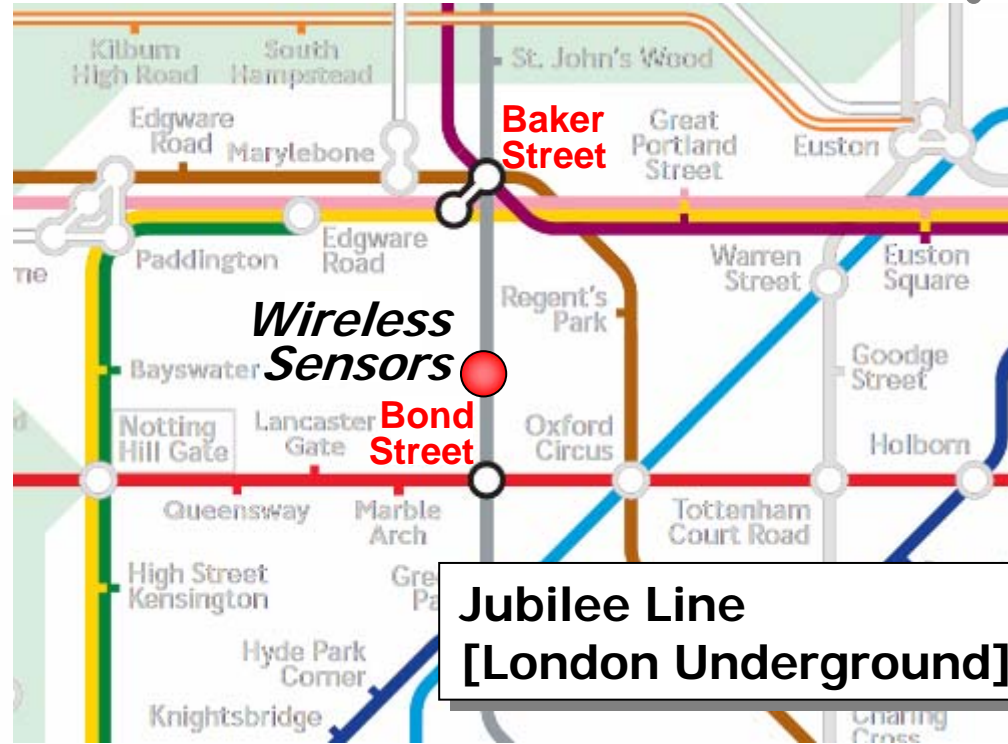
London Underground WSN

GPRS



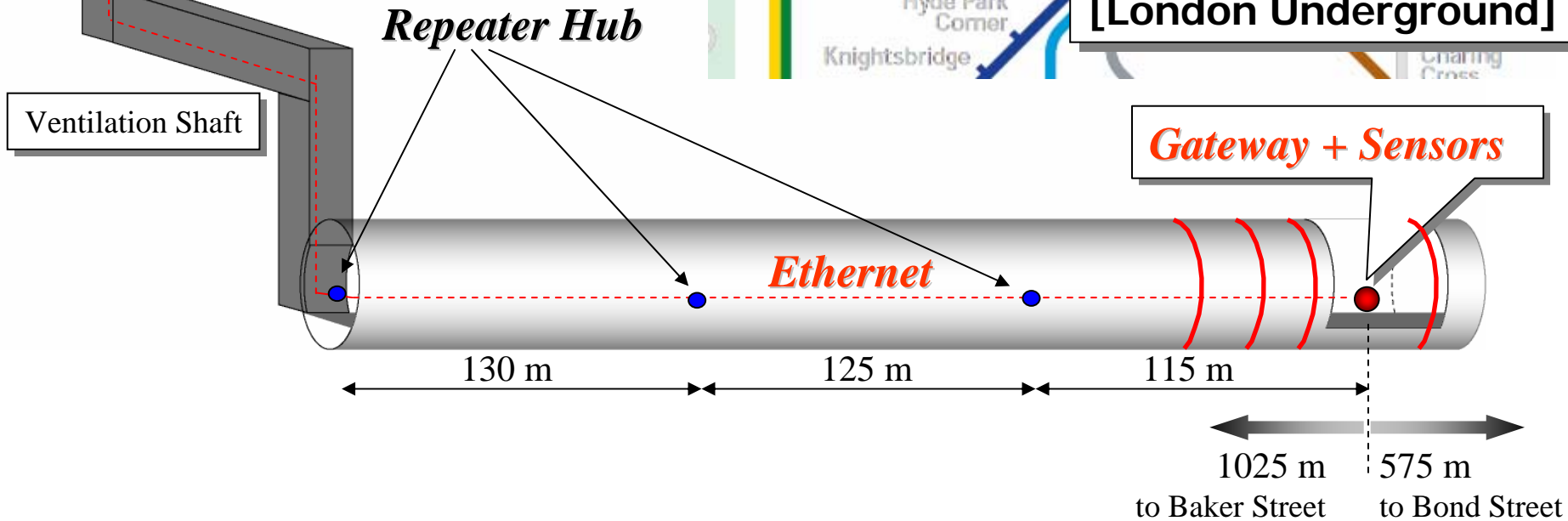
Ground Level

**Balloon
(Linux Computer)**



**Wireless
Sensors**

**Jubilee Line
[London Underground]**



Repeater Hub

Ventilation Shaft

Ethernet

Gateway + Sensors

130 m

125 m

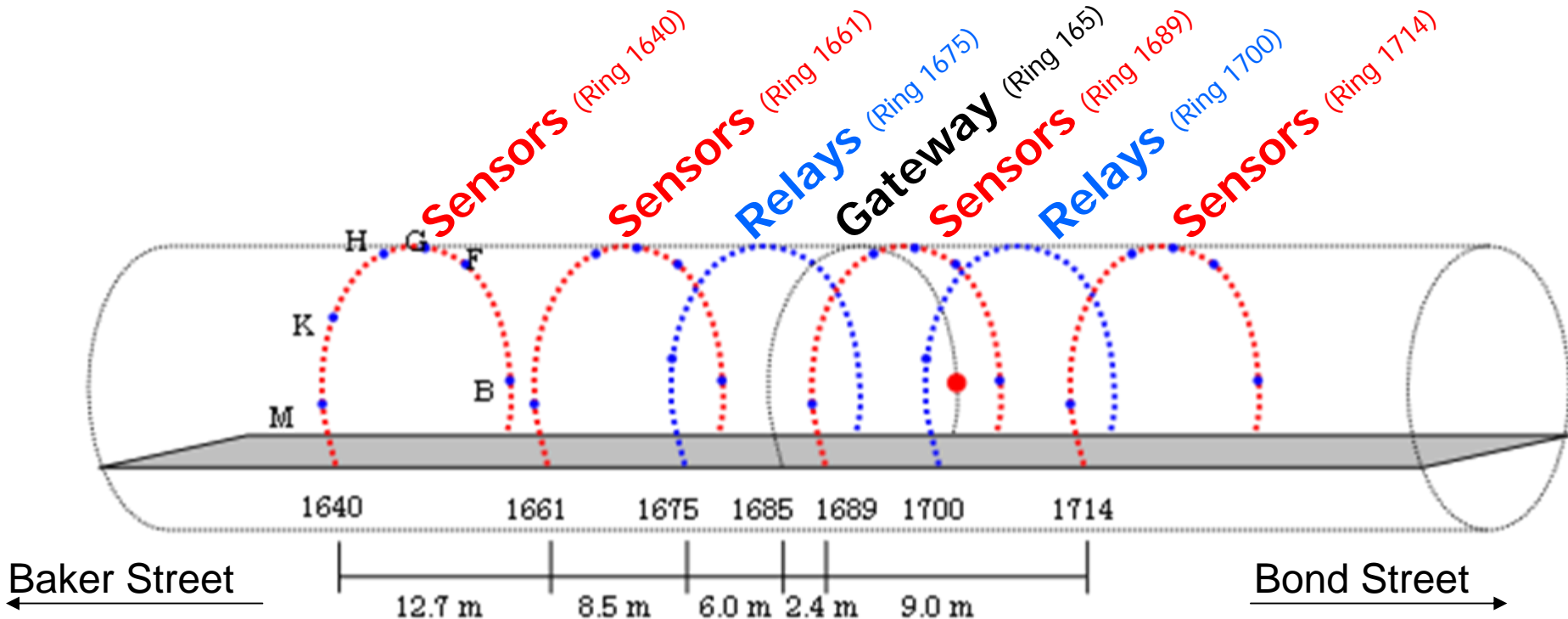
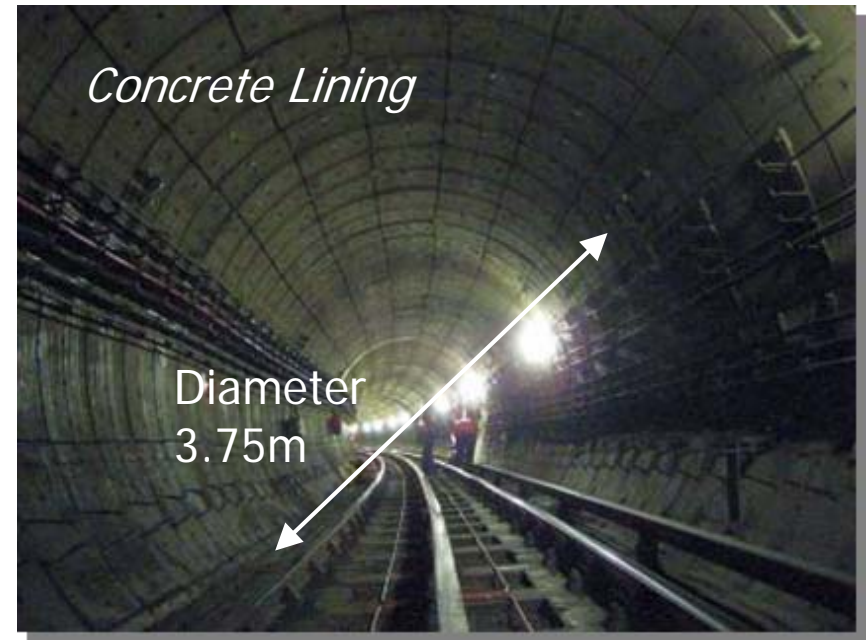
115 m

1025 m
to Baker Street

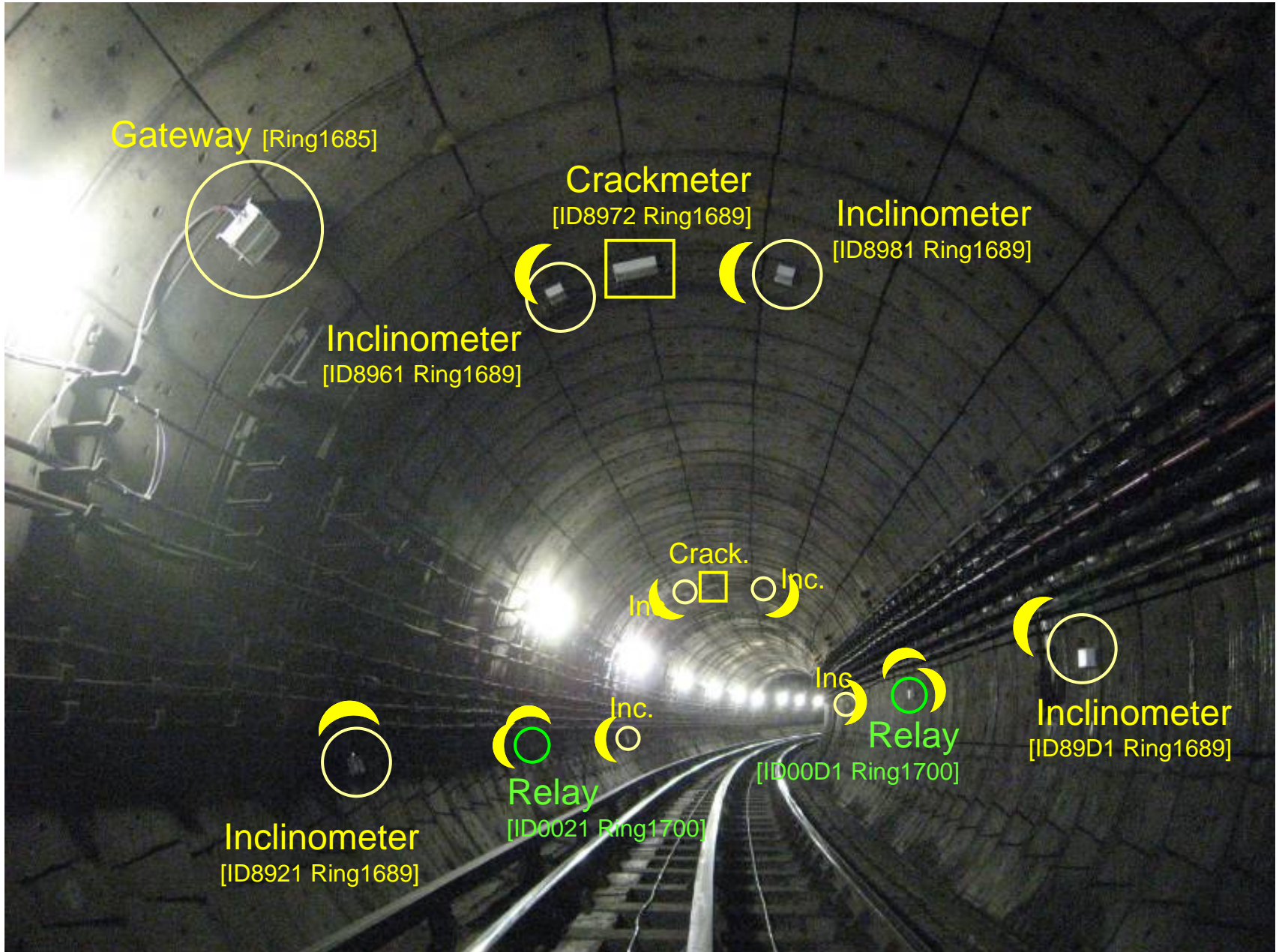
575 m
to Bond Street

Sensor Locations

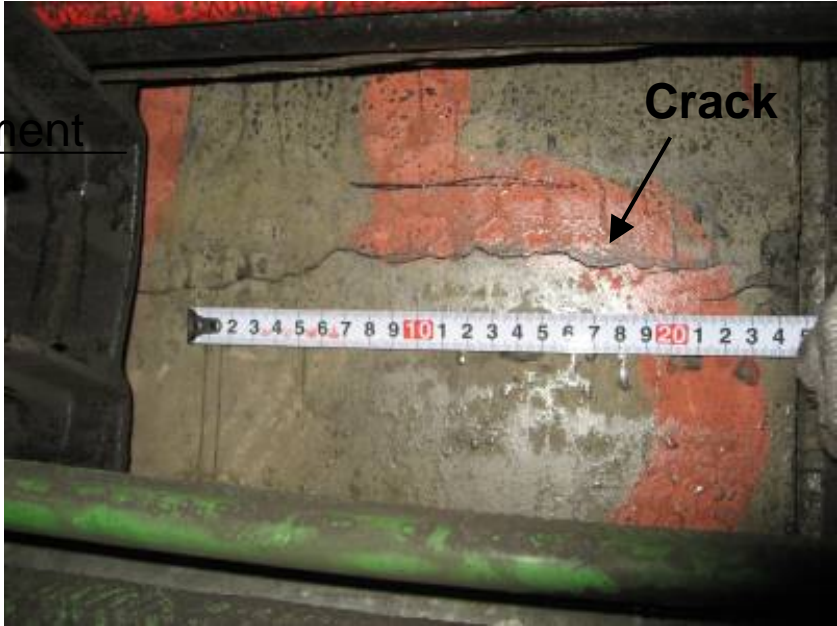
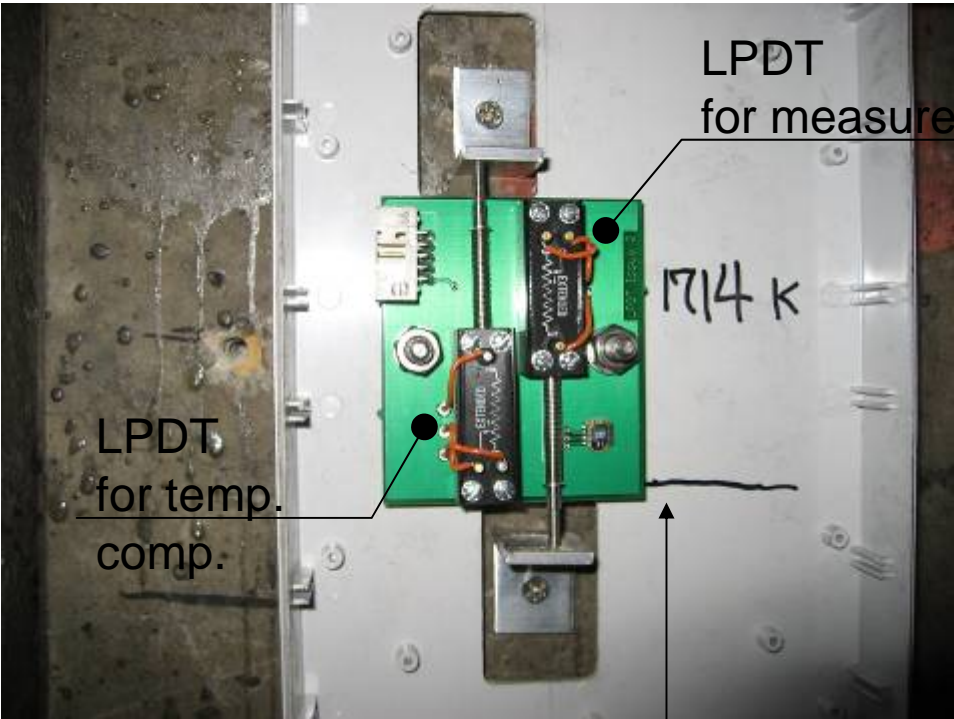
- ▶ Sensor Nodes
 - Inclinometer: 16
 - Crackmeter : 5
- ▶ Relay Nodes 4
- ▶ Gateway



Sensor Locations



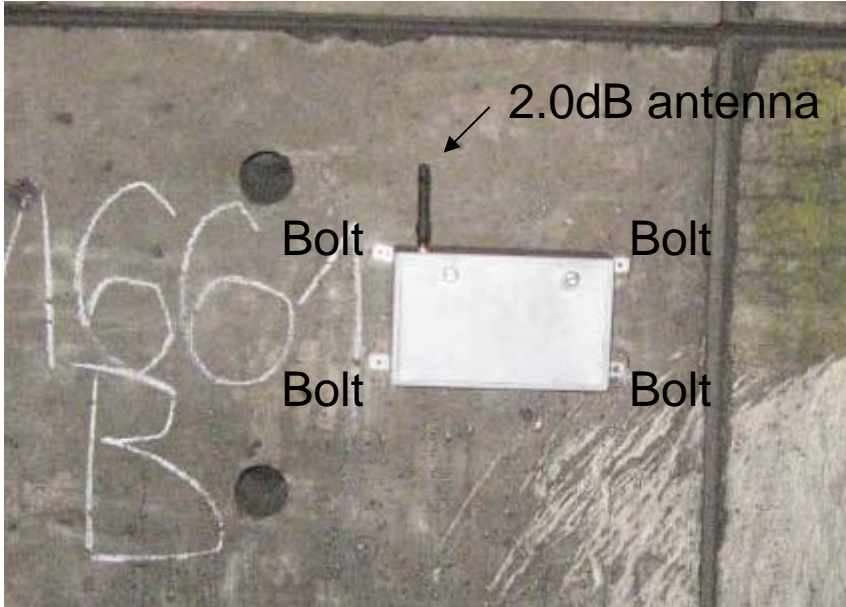
Crackmeter (LPDT)



Crack Location

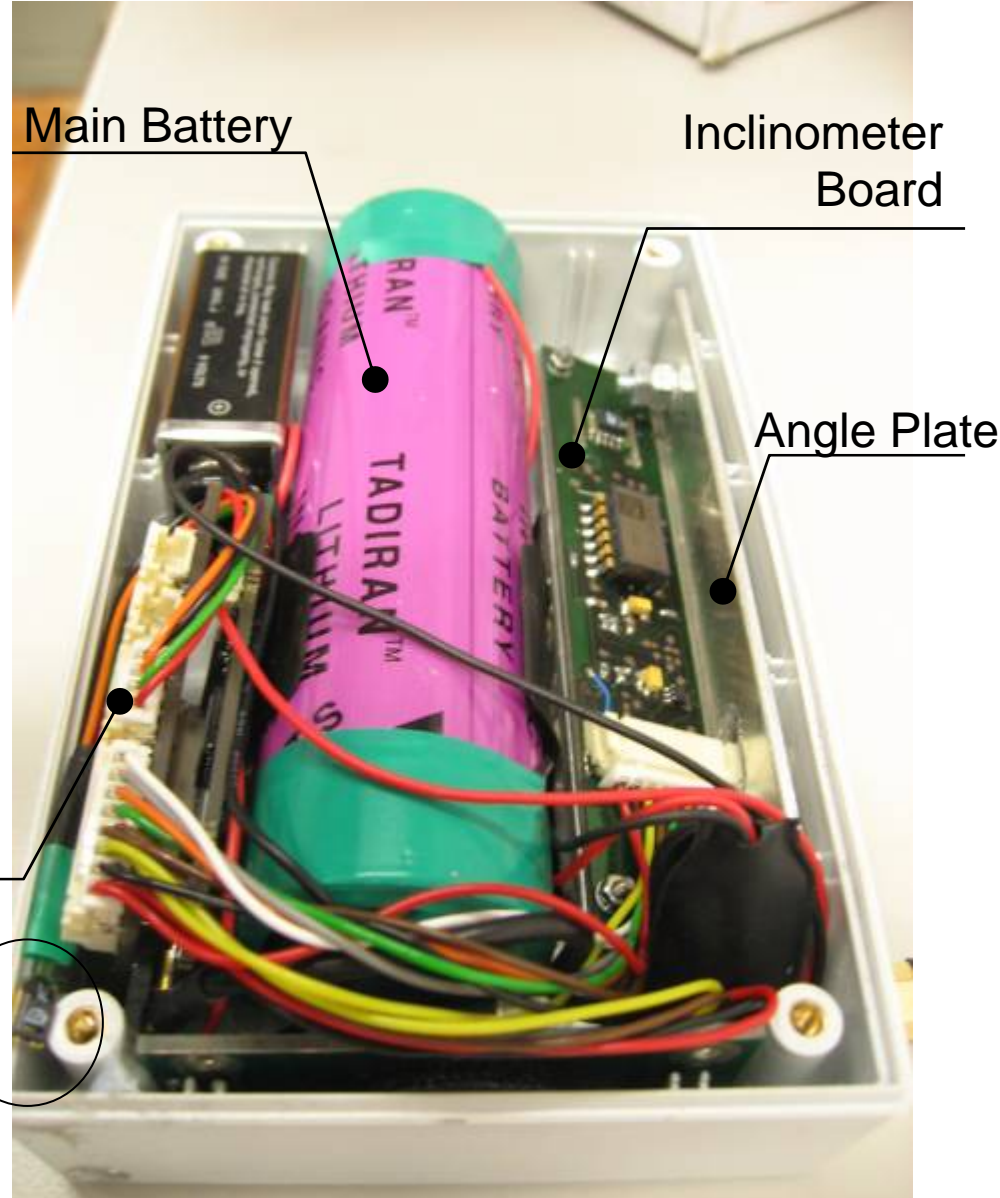
Range 12.5mm
MicaZ 10 bit ADC
Resolution ~12 μ m

Inclinometer

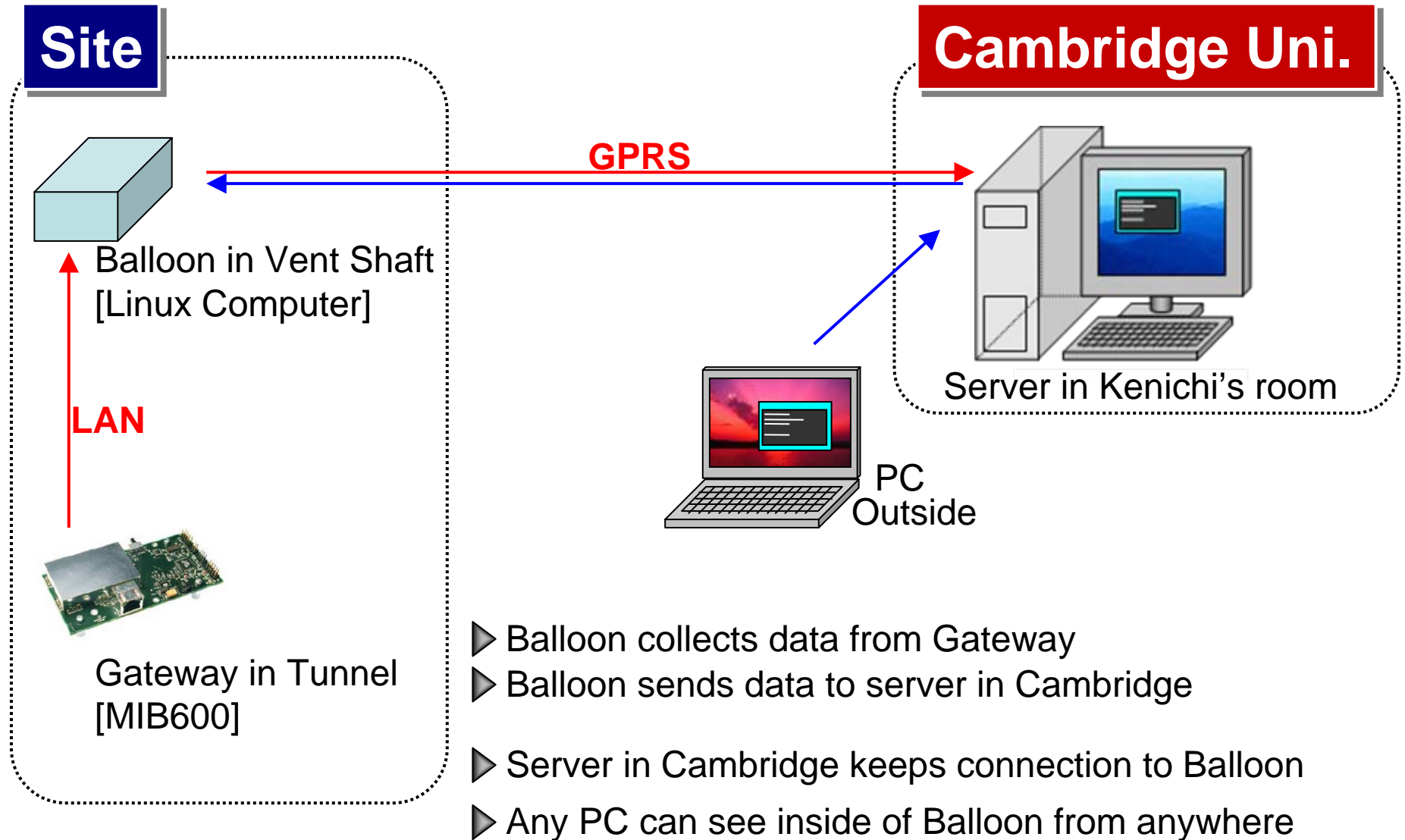


Resolution 0.001°
Range $\pm 15^\circ$
External 16 bit ADC

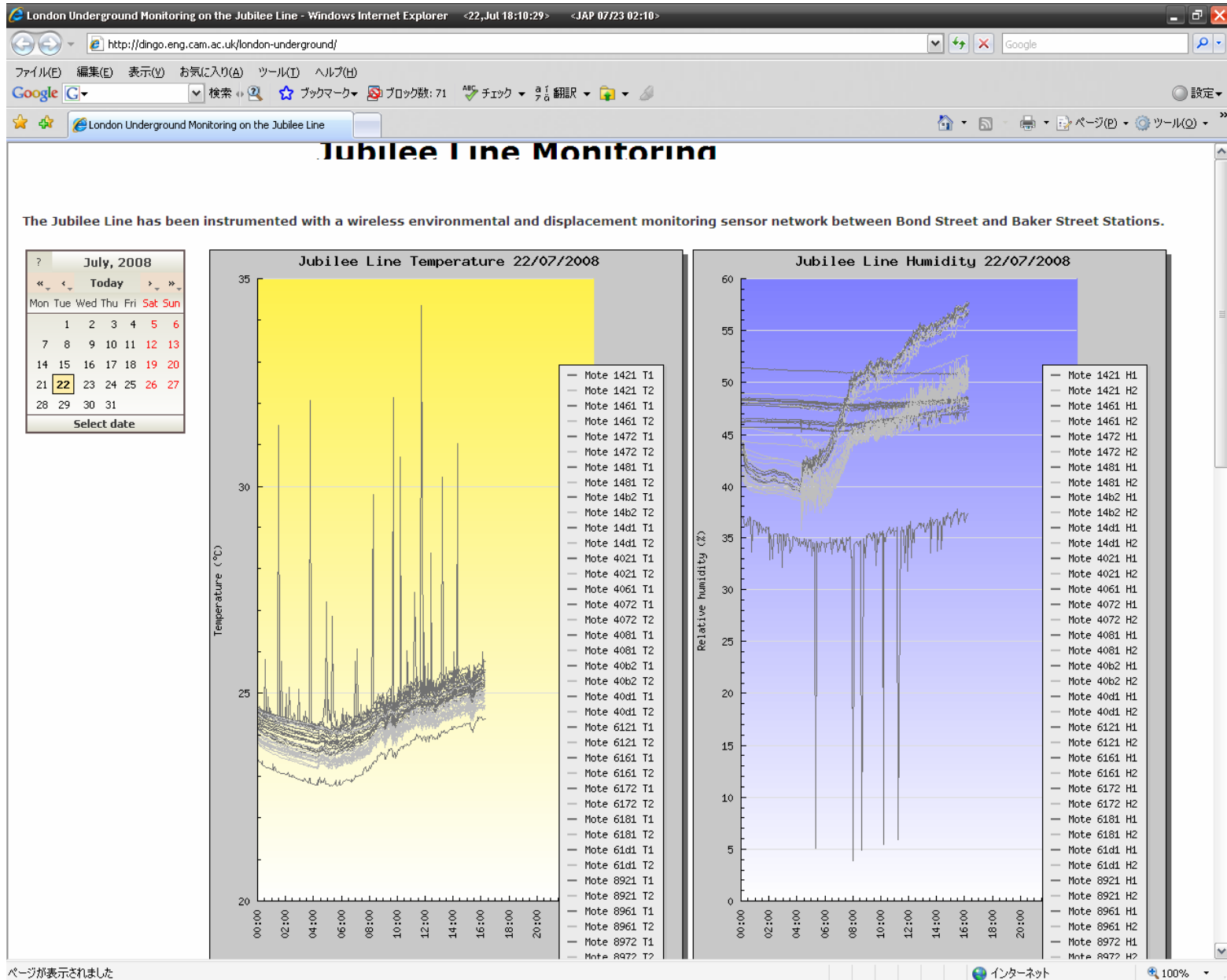
Temperature &
Humidity sensor



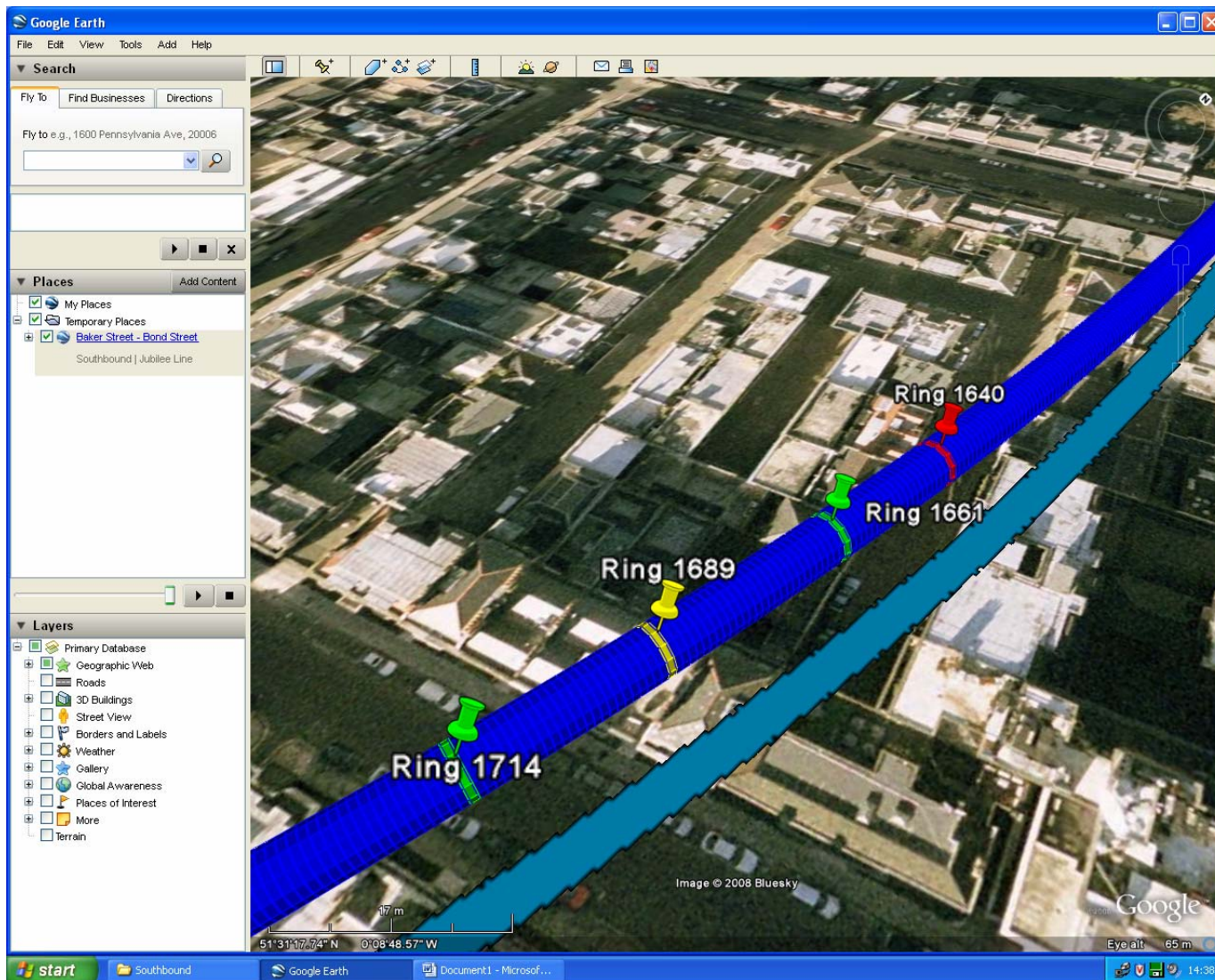
Network from Site to Cambridge



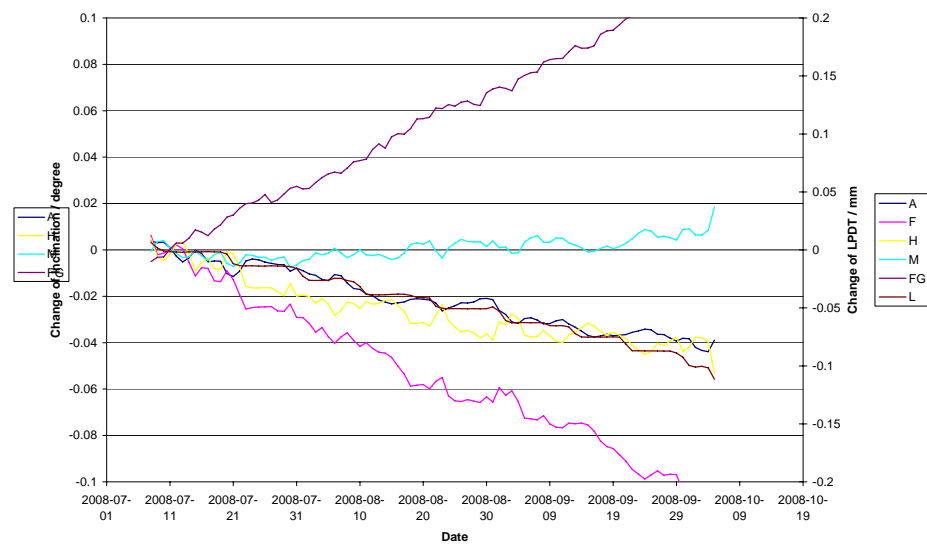
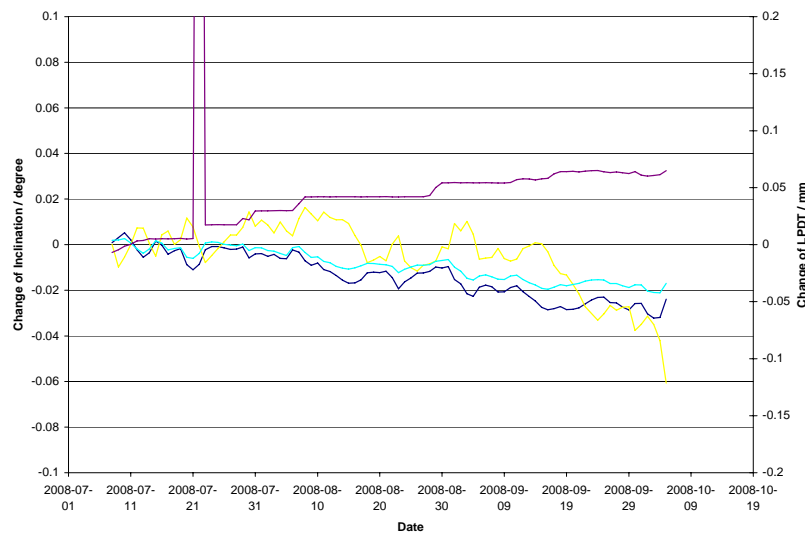
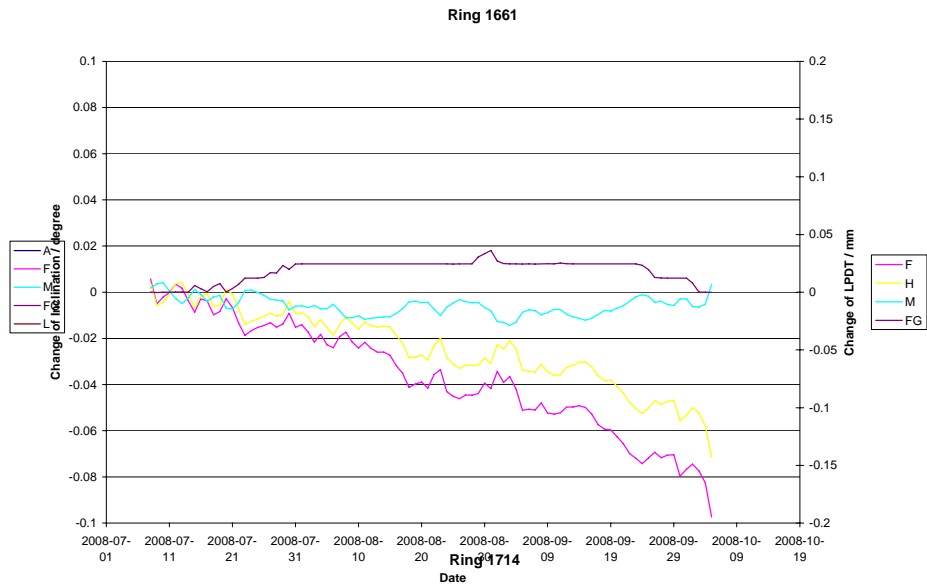
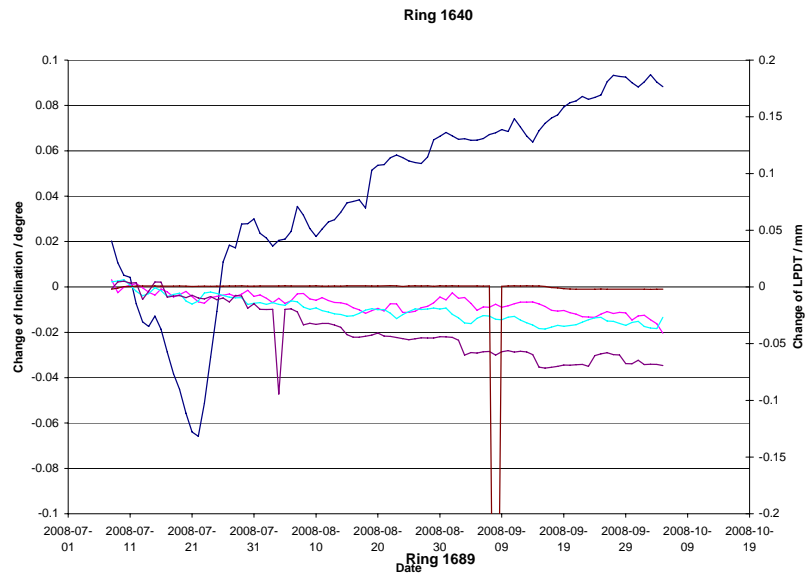
Real-time Monitoring on WEB



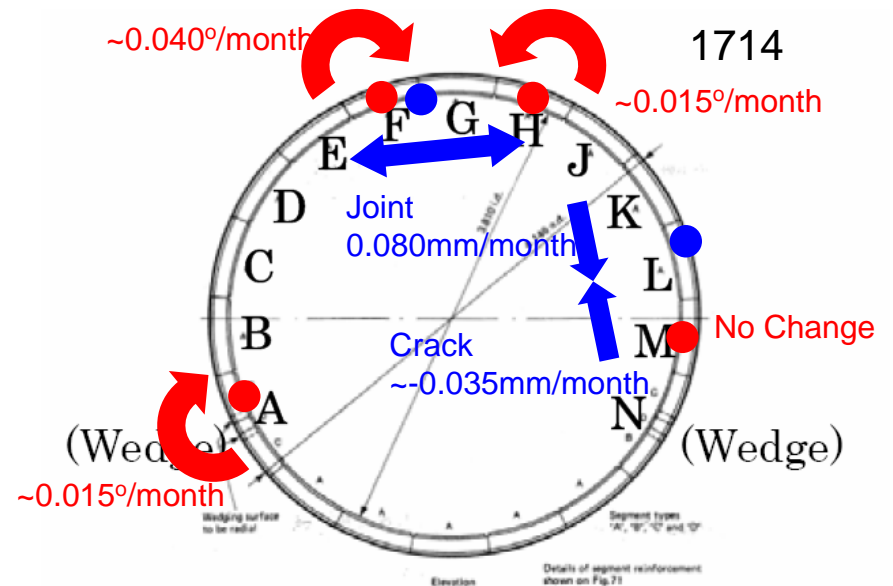
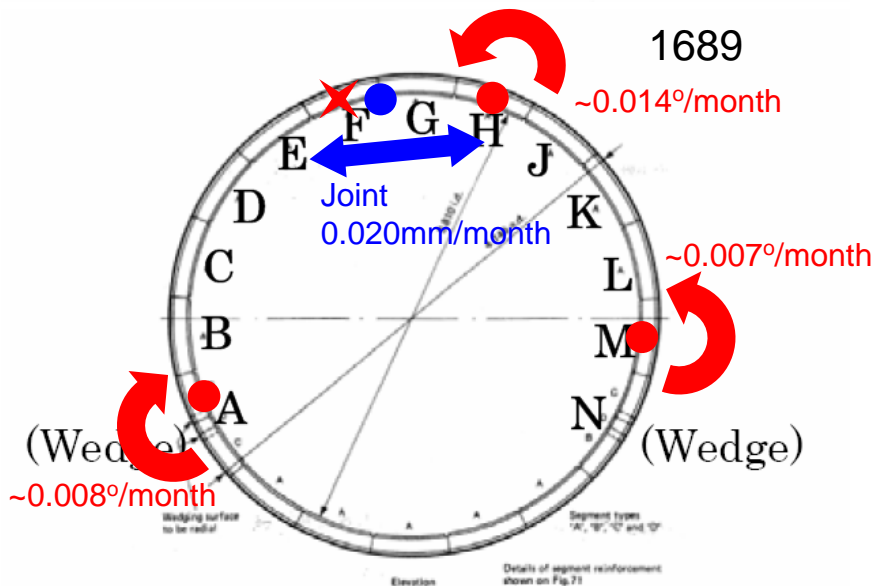
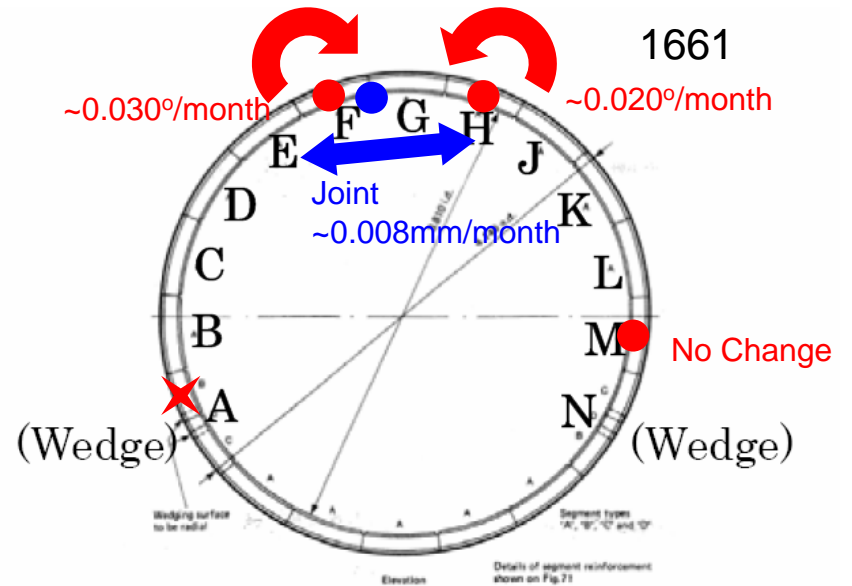
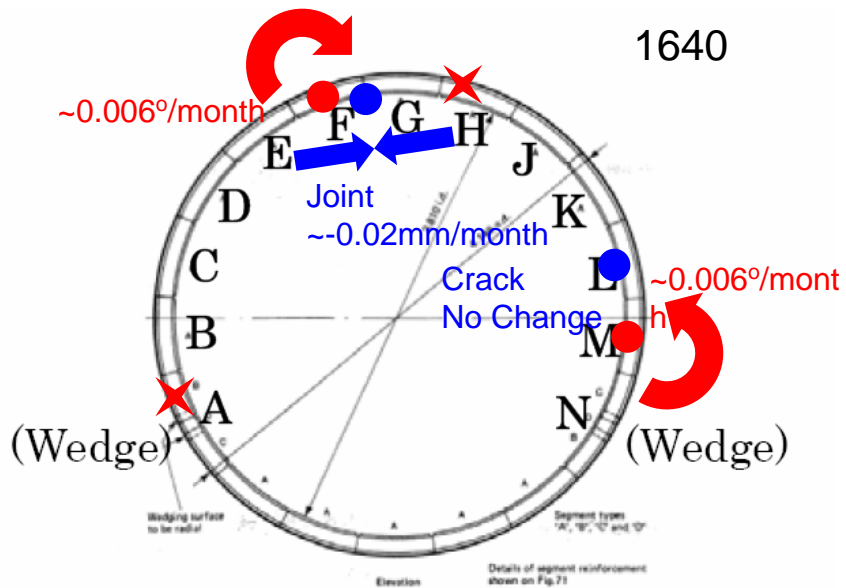
Google Earth Model



Monitoring Results LUL



Movement Overview



Network Statistics

- Network topology changes rapidly

avitest-0.wmv

Power Harvesting Potential

- Data Logger
- Accelerometer
- Anemometer

