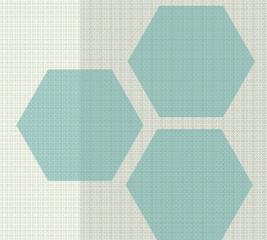
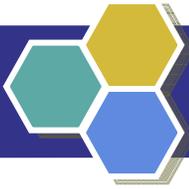


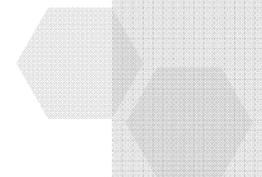
Airport Heated Pavement with Carbon Fiber Cable

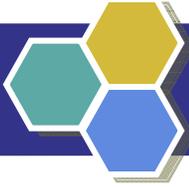
China Airport Construction Group Corporation of CAAC





1. Project Background





2. Project Overview

The project started because of snow and ice on airport pavement that can easily result in many security incidents.

The technology can be applied in the heavy snow and freezing weather.



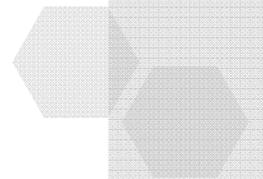
Quickly automatic melt snow and ice on airport pavement

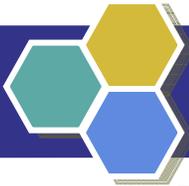


Maintain the pavement without snow and ice



The airport can operate normally





3. In Situ test

1. Full scale test (Identical airport pavement construction)



Soil Base Construction



CTB construction



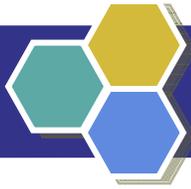
Carbon fiber cable



Pavement construction (40cm)



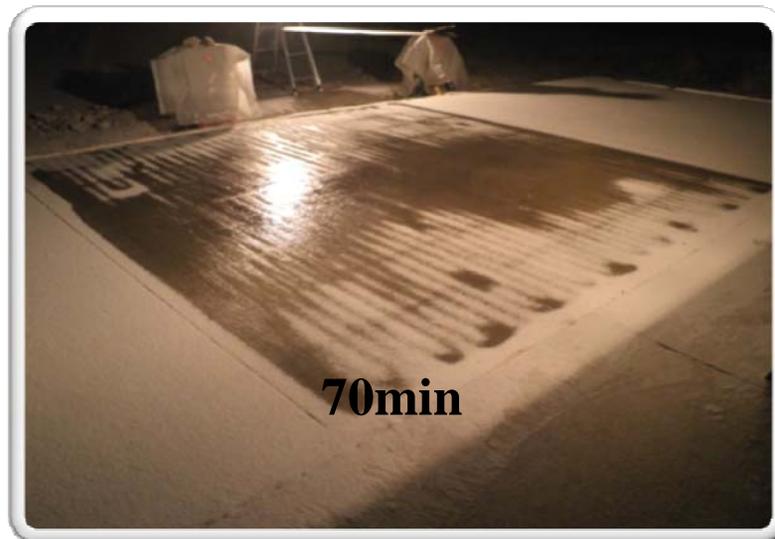
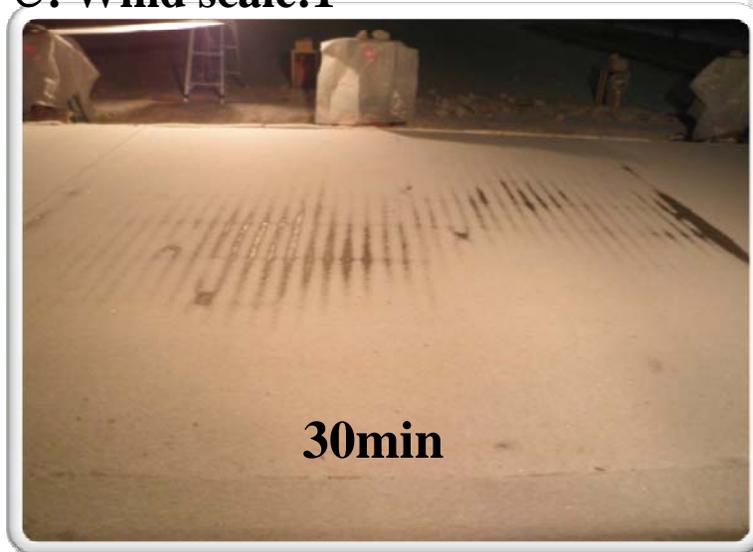
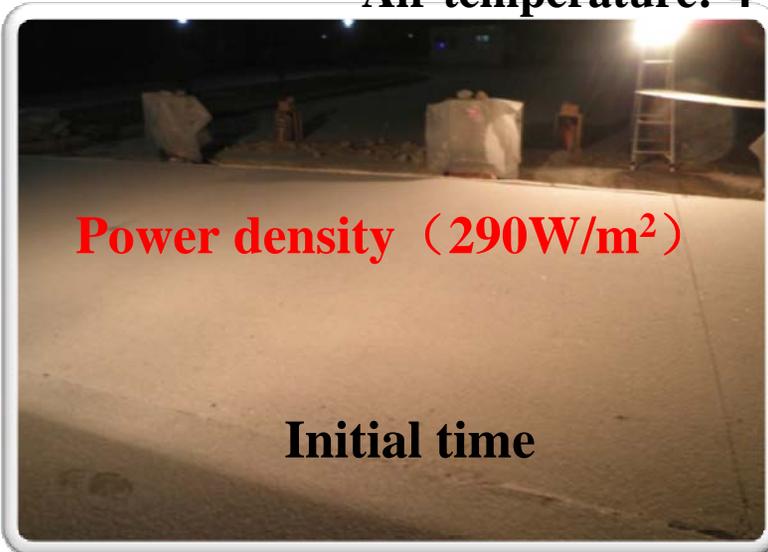
Completion of the pavement

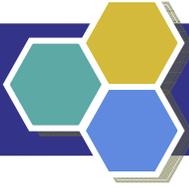


Moderate snow in Beijing (2013.1.20)

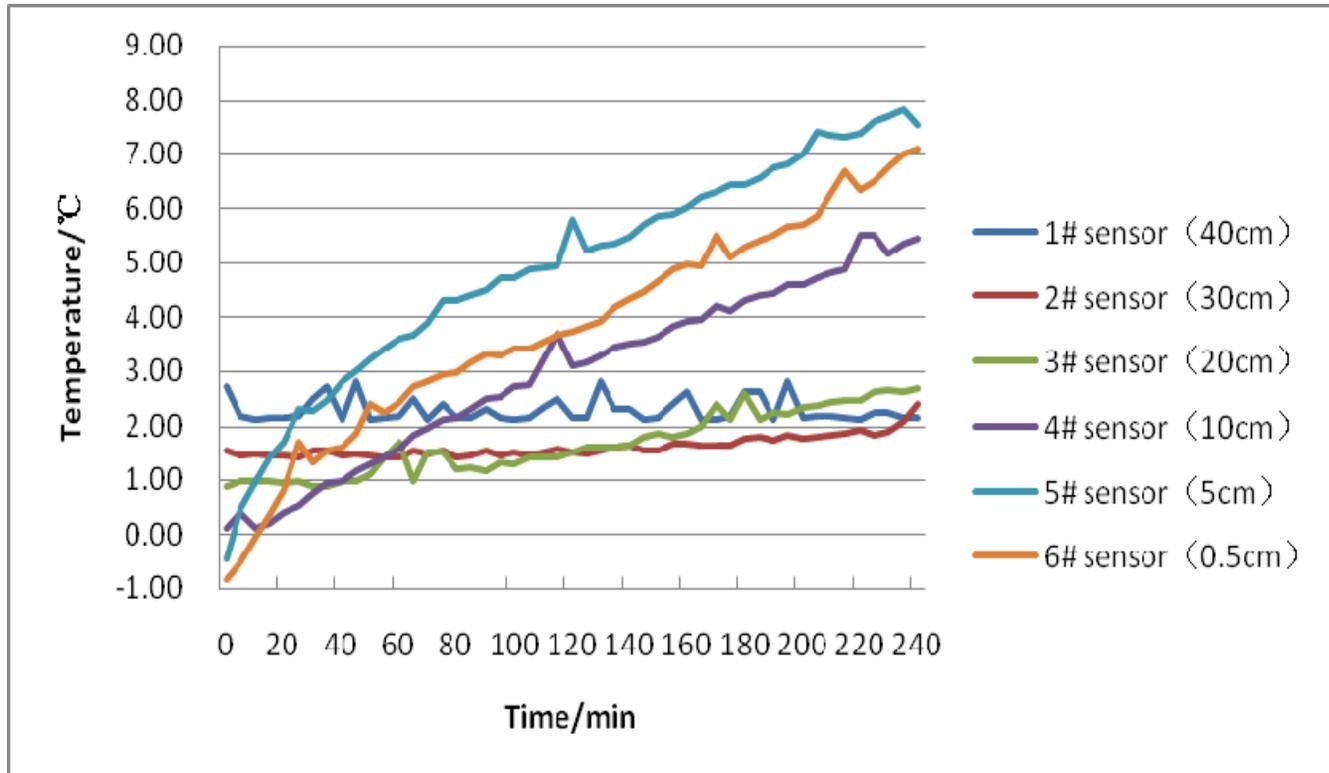
2. Precipitation in 7 hours:2.5mm. Snow depth:3cm.

Air temperature:-4~-2°C. Wind scale:1

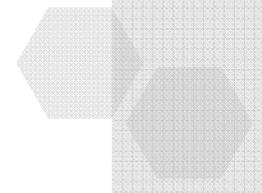


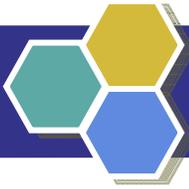


Moderate snow in Beijing (2013.1.20)

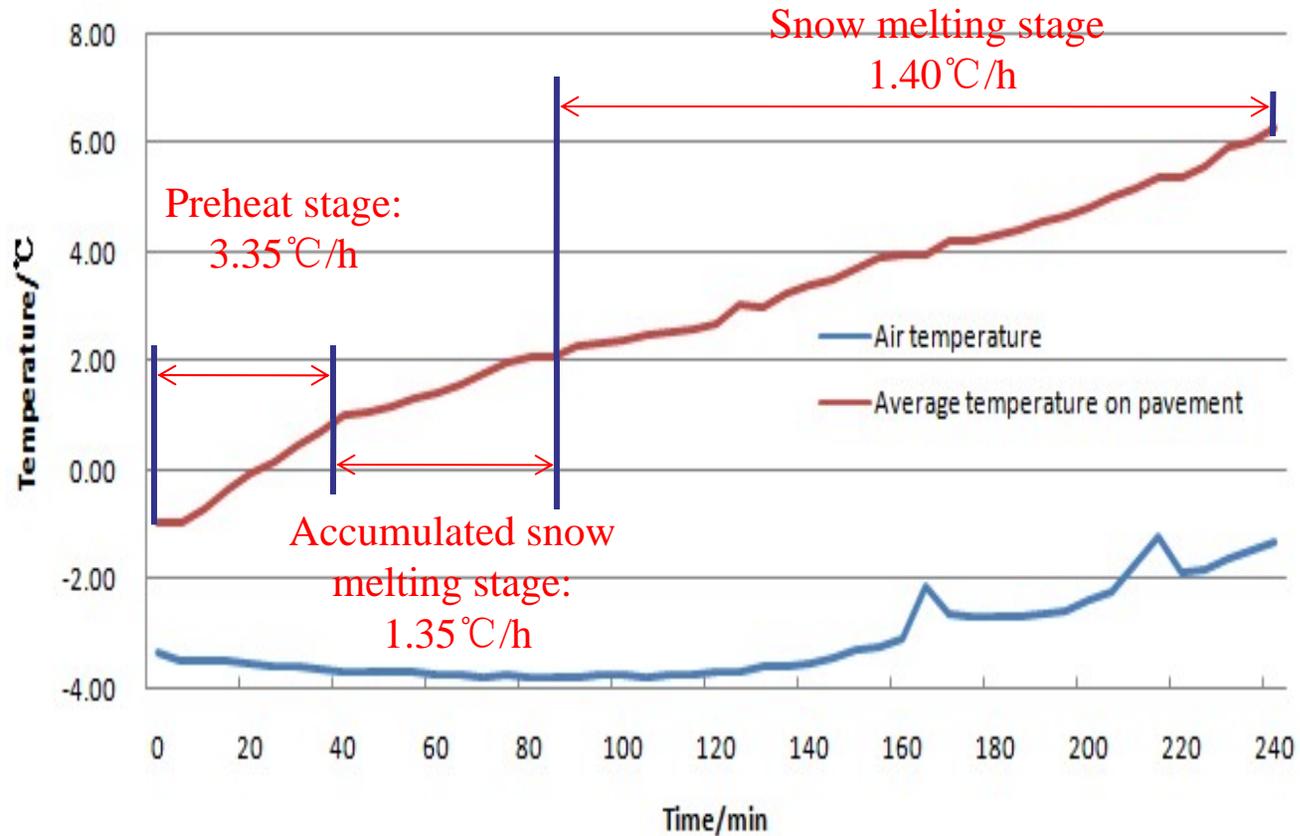


The relationship between temperature and time in different depths

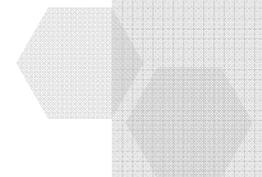


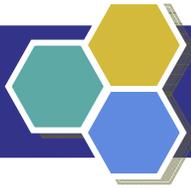


Moderate snow in Beijing (2013.1.20)



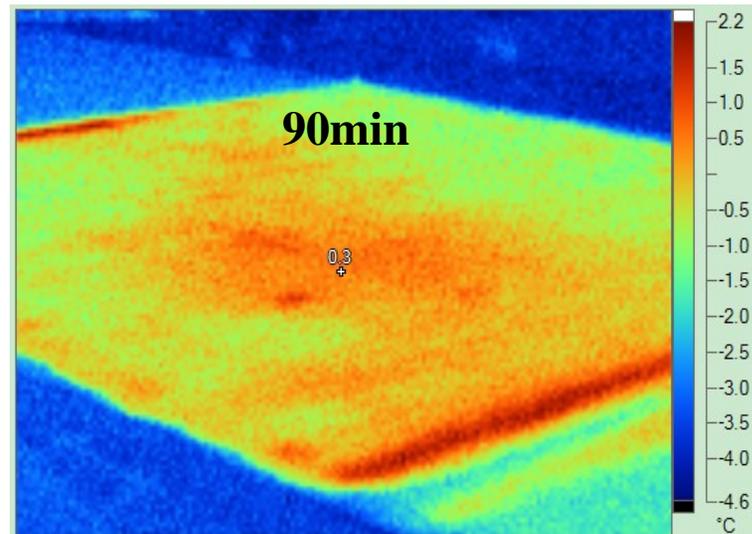
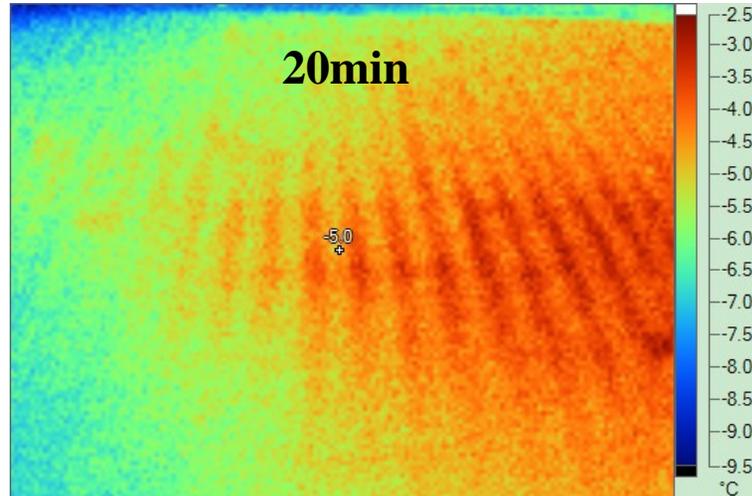
The relationship between average pavement temperature and time



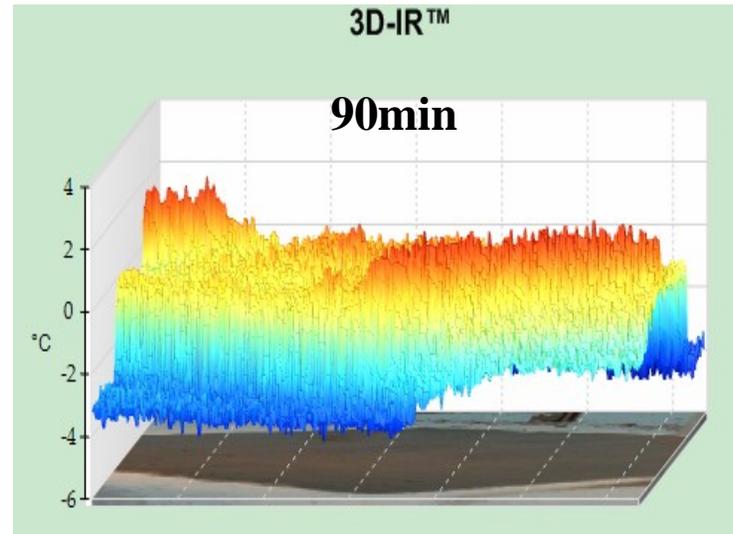
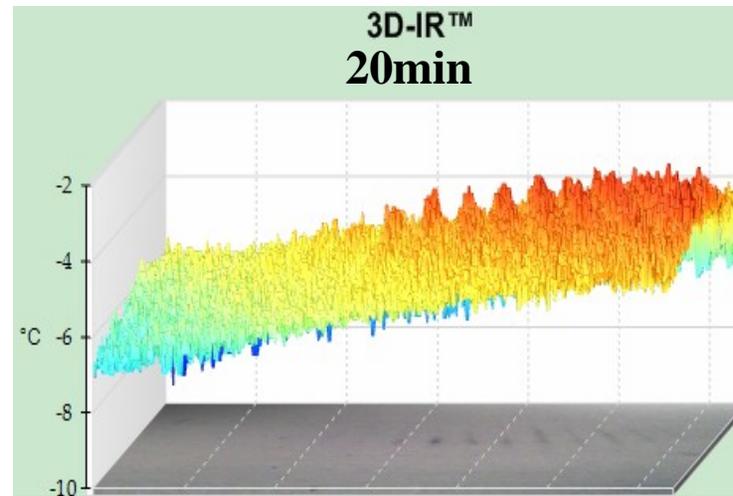


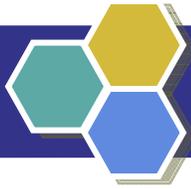
Moderate snow in Beijing (2013.1.20)

Infrared thermal images



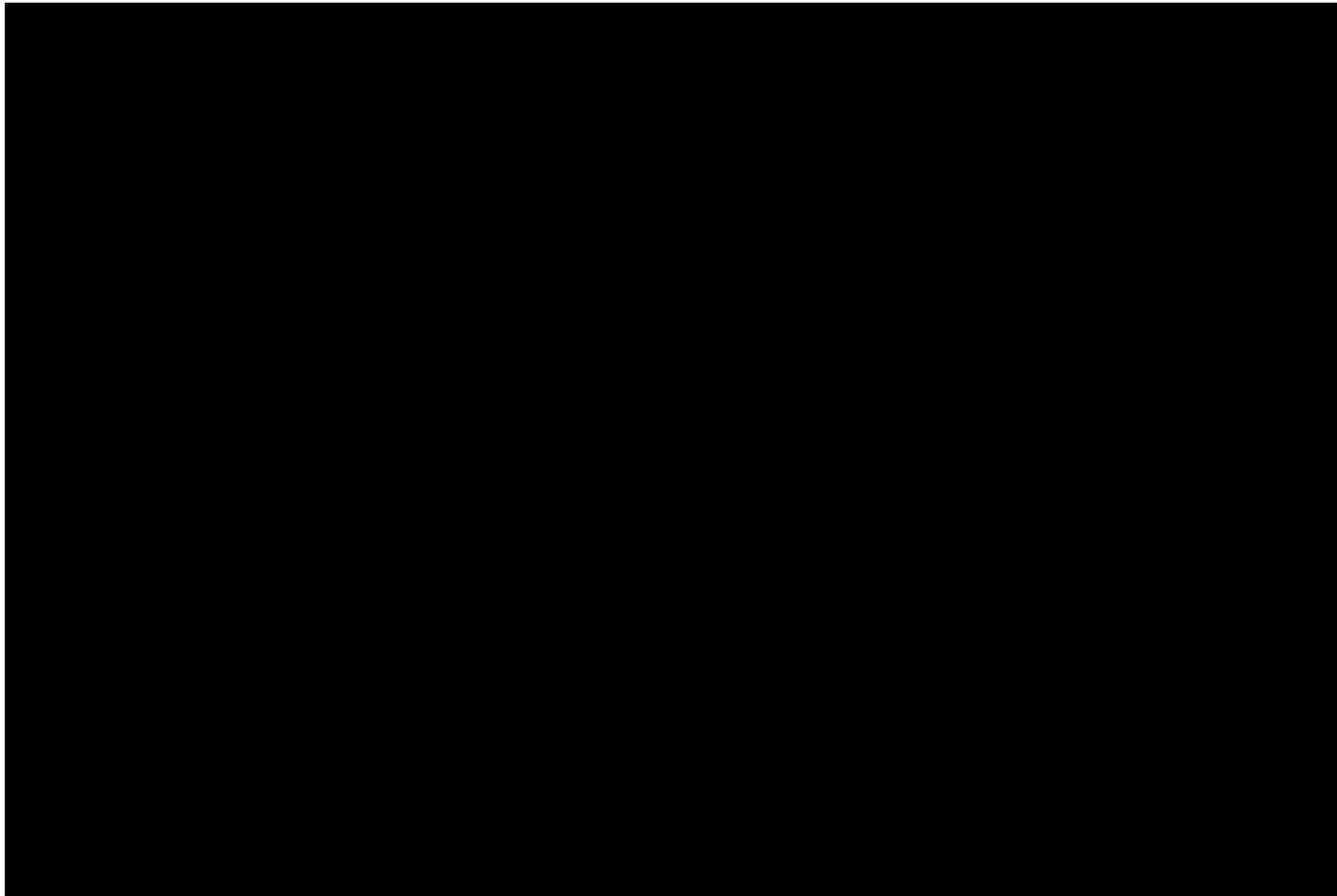
3D-IR



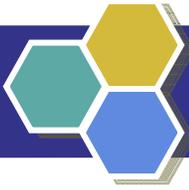


The video of snow melting

On January 20, the Beijing Capital Airport canceled a total of 118 flights because of heavy snow , and nearly 100 flights were delayed.



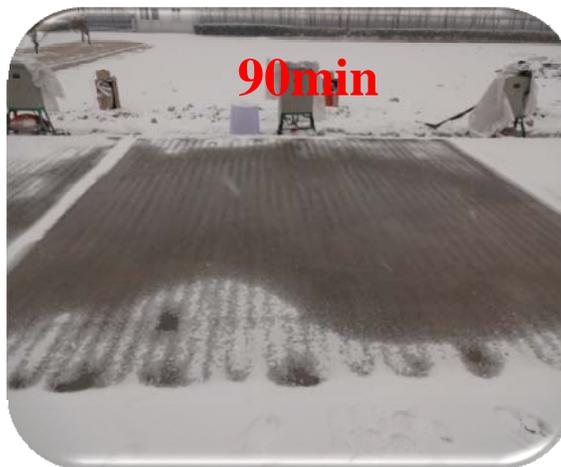
Conclusions: The technology can melt moderate to heavy snow.

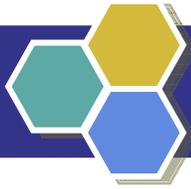


Heavy snow in Beijing (2013.2.3)

3. Precipitation in 9 hours:4.7mm. Snow depth:4cm.

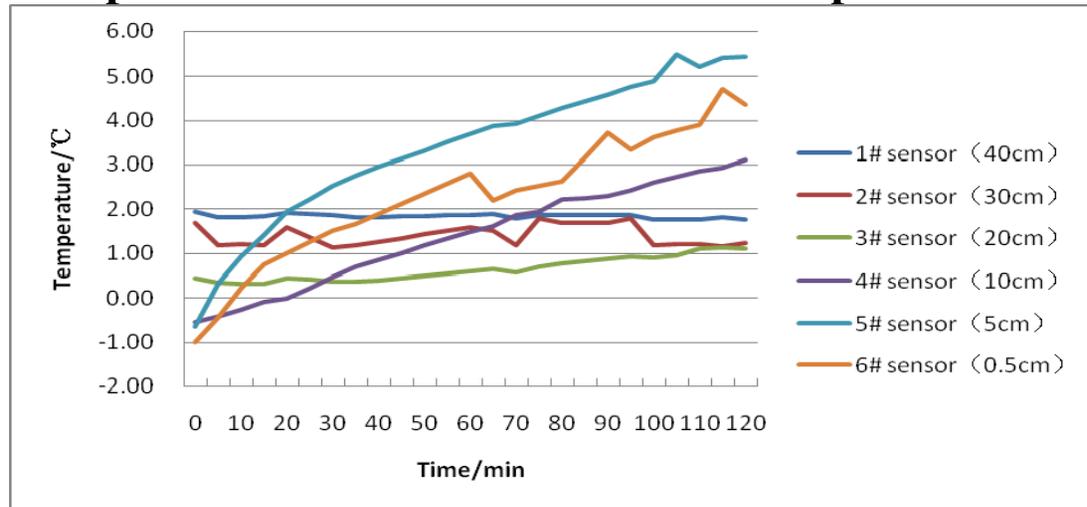
Air temperature:-2°C. Wind scale:2



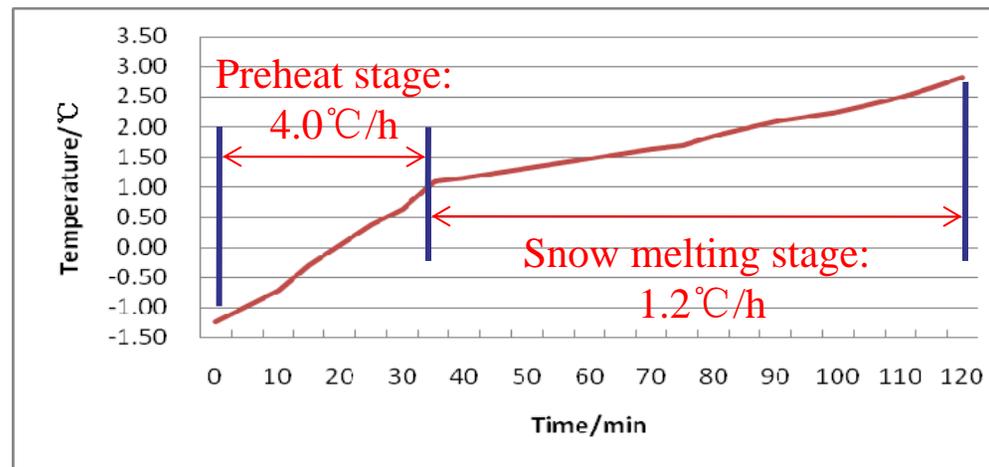


Heavy snow in Beijing (2013.2.3)

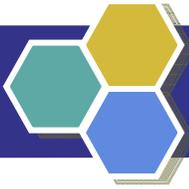
3. Precipitation in 9 hours:4.7mm. Snow depth:4cm.



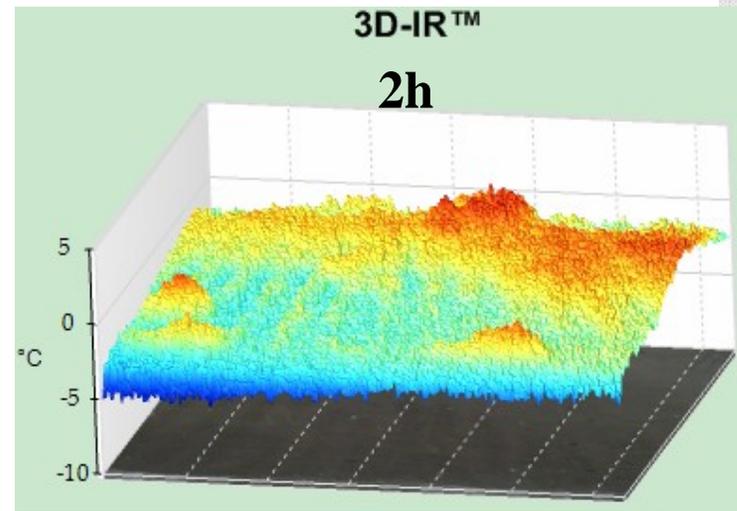
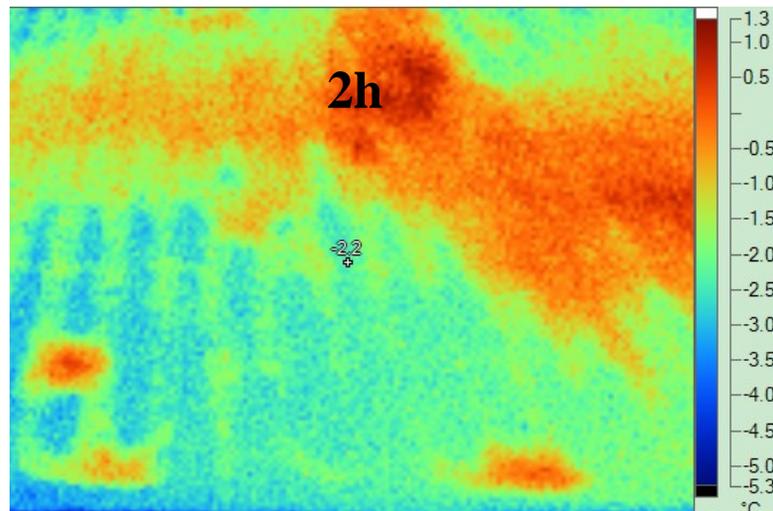
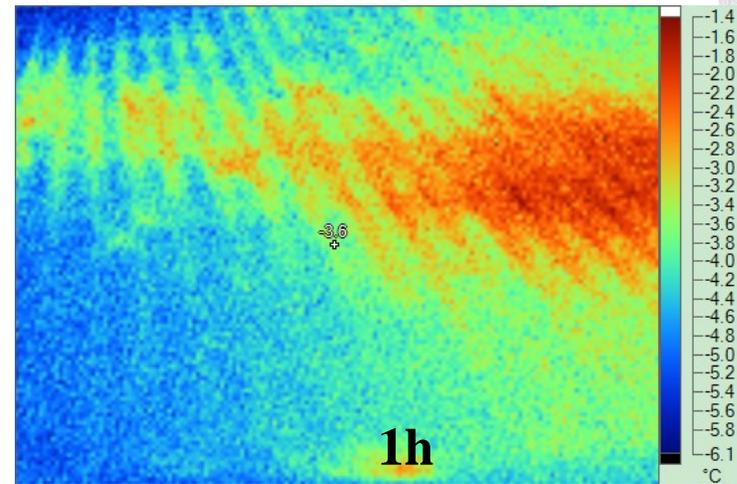
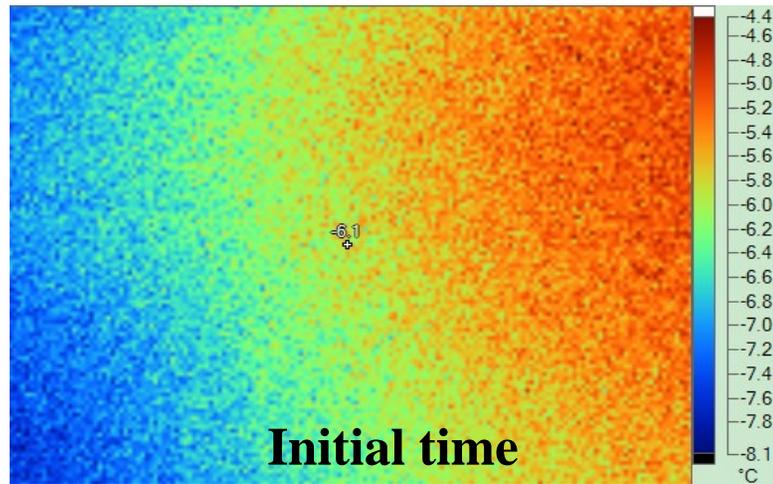
The relationship between temperature and time in different depths



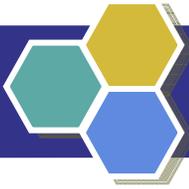
The relationship between average pavement temperature and time



Heavy snow in Beijing (2013.2.3)

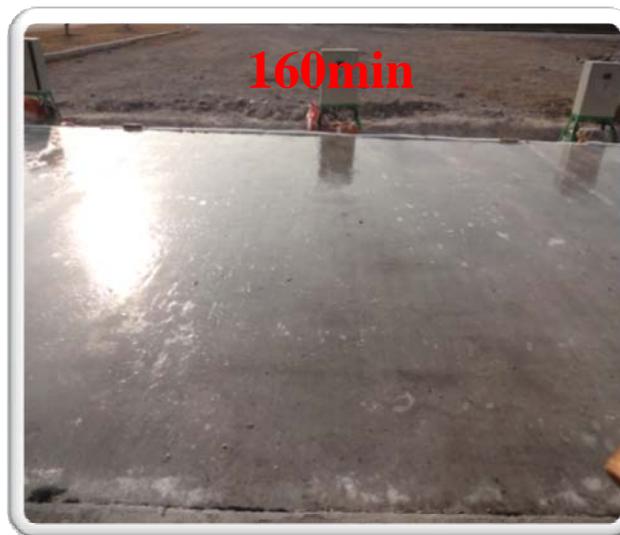
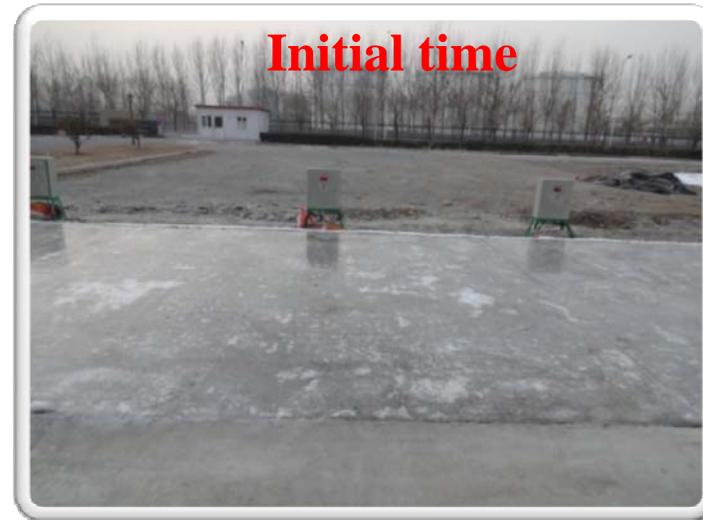


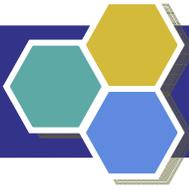
Infrared thermal imagers



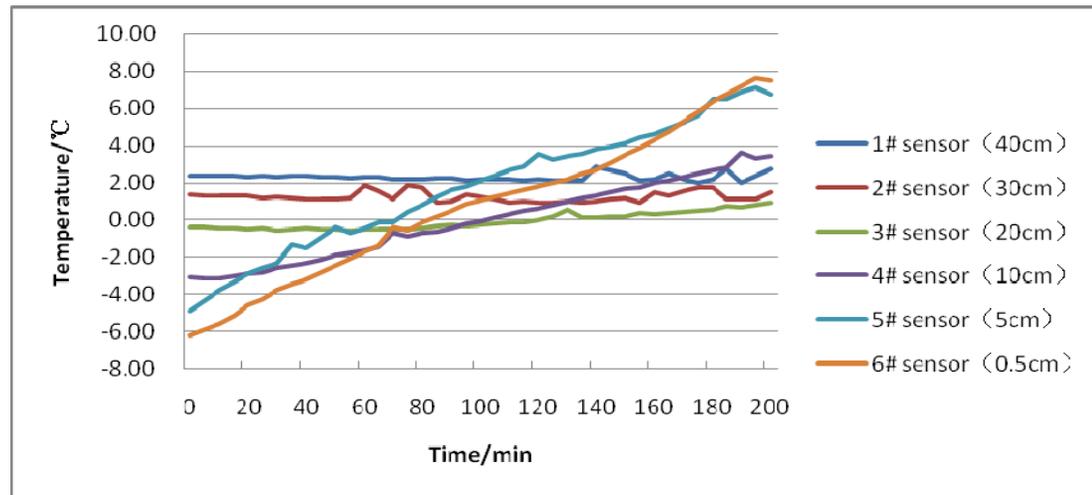
Deicing in Beijing (2013.01.18)

- Power density : 315W/m^2
- Precipitation : 3mm
- Air temperature : $-10\sim-5\text{ }^\circ\text{C}$
- Wind scale:1~2

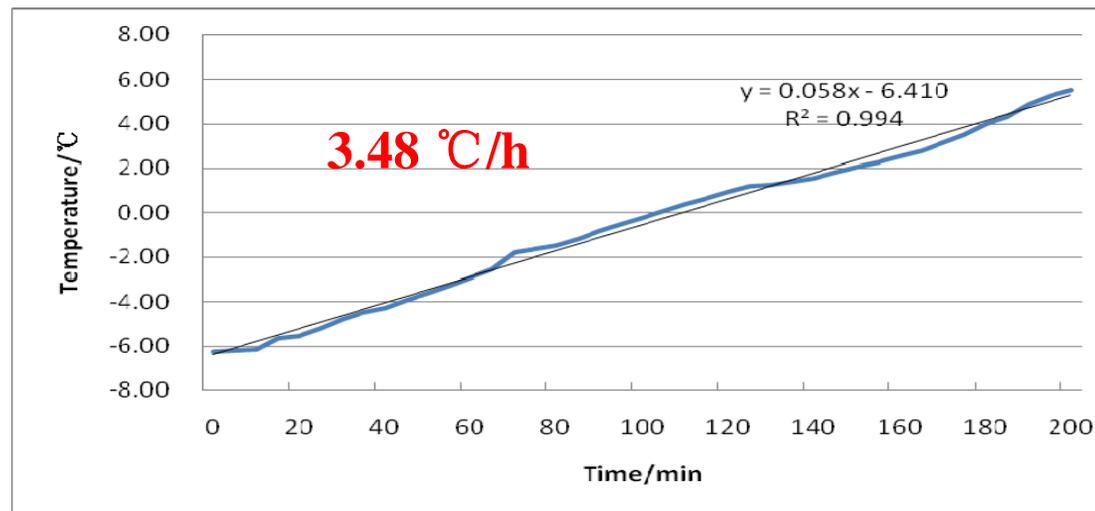




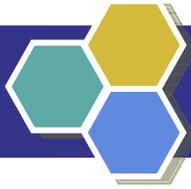
Deicing in Beijing (2013.01.18)



The relationship between temperature and time in different depths

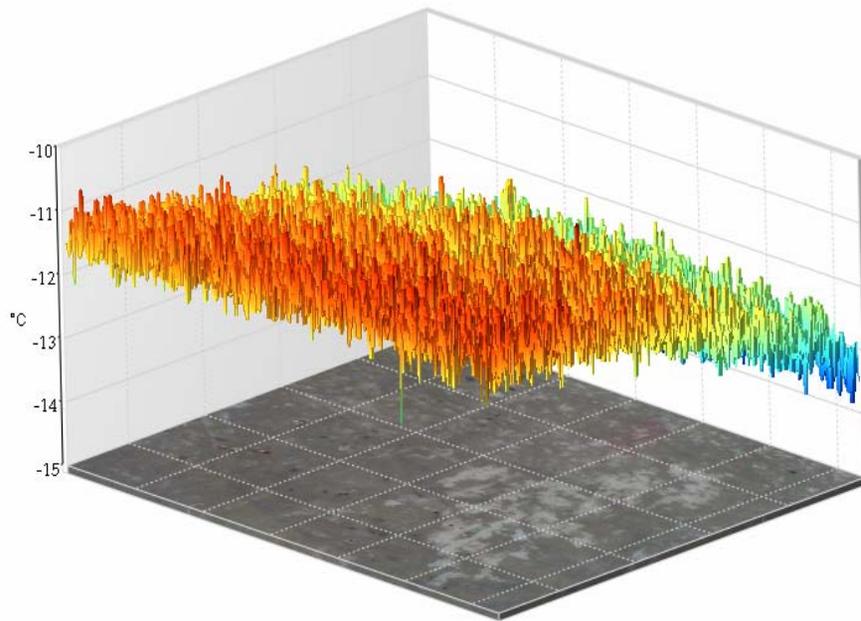


The relationship between average pavement temperature and time

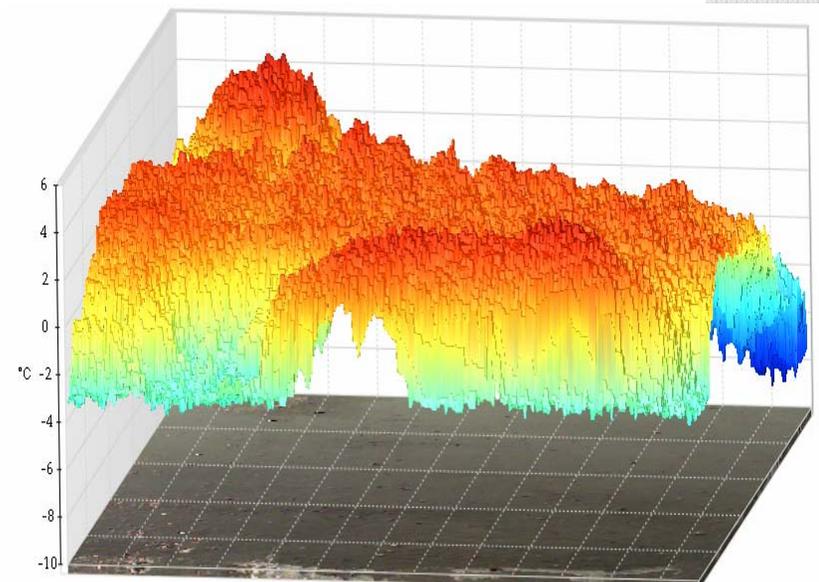


Deicing in Beijing (2013.01.18)

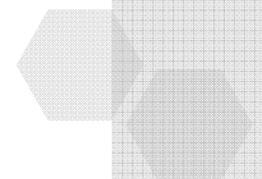
3D-IR infrared thermal imagers

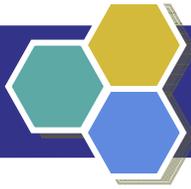


Initial time



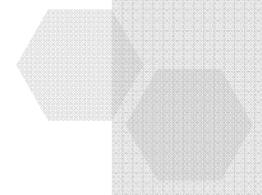
200 min





Snow melting in Beijing (2013 winter)

Power density (W/m ²)	Air temp. (°C)	Wind scale	Snow and ice depth (mm)	Snow melting and Deicing time (min)	Heating time (min)	Heating rate (°C/h)	Pavement		Others
							Initial temp. (°C)	Final temp. (°C)	
150	-8 ~ -4	1	0	---	330	0.15	-1.03	-0.20	
206	-4 ~ -3	1	0	---	100	2.10	-0.61	2.82	
260	-4 ~ -3	2~3	1	120	120	3.36	-4.00	2.89	Melt snow and ice
290	-4 ~ -2	1	4	60	60	3.70	-1.41	2.30	Melt snow
347	-2	1~2	30	110	120	Preheat stage: 4.0°C/h Snow melting stage: 1.2°C/h	-1.24	2.82	Melt snow





Thank you!

