A Multi-disciplinary Research Proposal for Monitoring of Air Environment Change at Mt. Changbai

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Education	1972 SungKyunKwan University (B.S./Chemistry) 1975 Seoul National University (M.P.H./Biostatistics) 1978 University of Tokyo, Tokyo (Dr.H.Sc./Human Ecology) 1985 University of Texas, SPH, Houston (Ph.D./Environmental Sciences)
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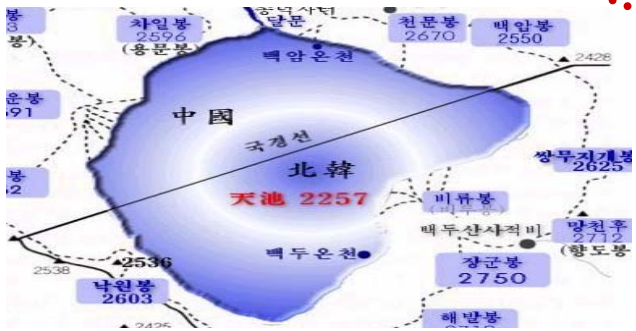
Contents

- Backgrounds
- Why it is proposed?
- First observation at Mt. Changbai
- Significance
- Summary

Backgrounds

- Height : 2,750m–the highest mountain in Korea
- Koreans believed it as a holy mountain from the earlier times

A study of atmospheric quality at Mt. Changbai was not undertaken to date.

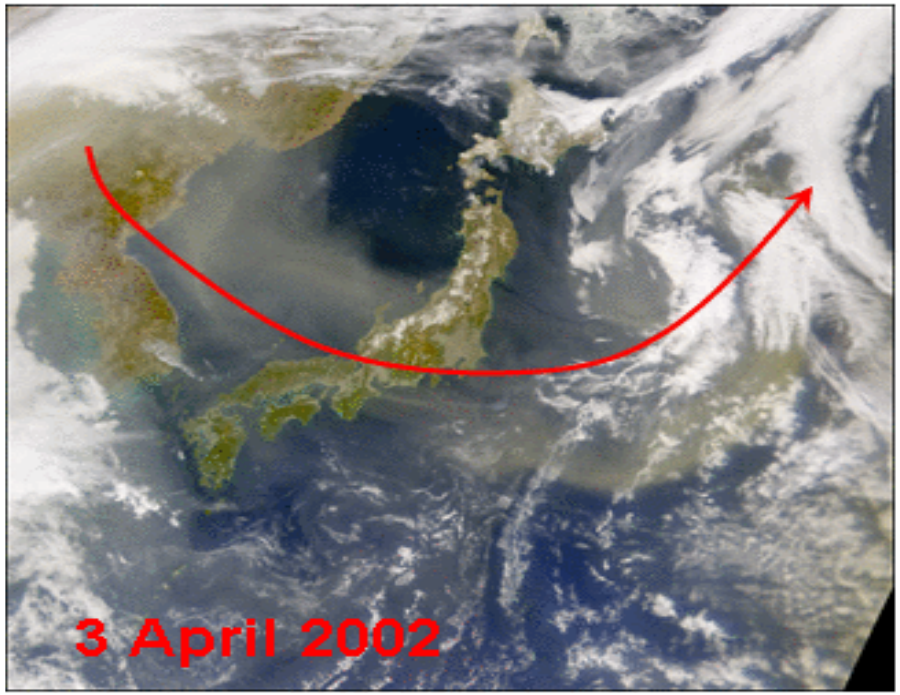


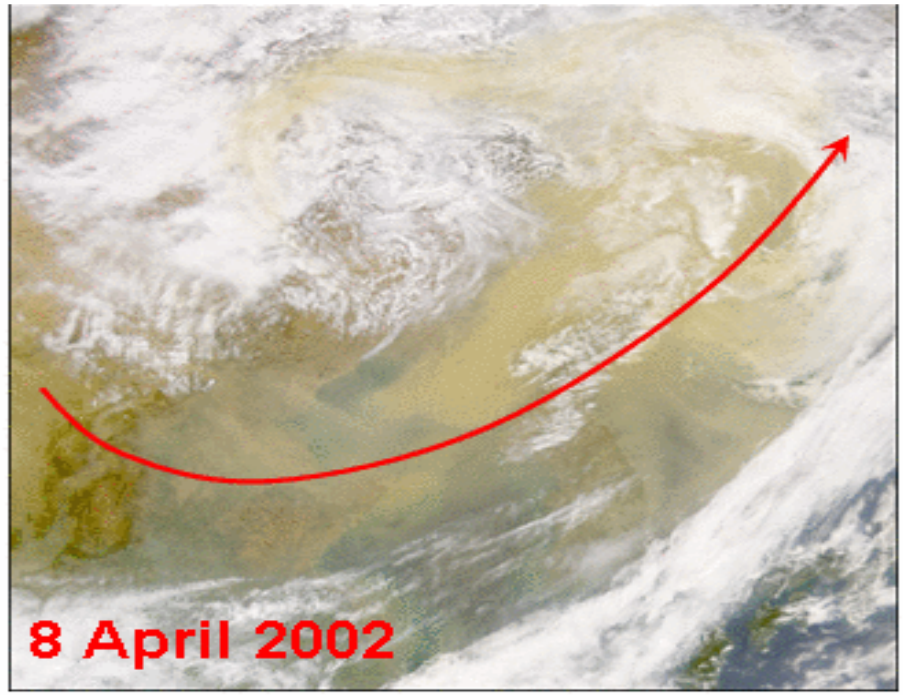
- **Located the boundary between Korea and China.**
- **To be a comparative study of atmospheric quality with the Mt. Halla(Kosan) in Jeju Island (ACE-Asia).**

Source regions of Asian Dust In China, Korea, and Japan

Route of the March 2002 Asian Dust clouds over China, Northeast Korea, and Japan

Episode of Asian Dust





Sea WiFs Images (NASA)

Asian dust (brownish yellow pumes) being blown from the Gobi desert over the Sea of Japan in early April 2002. Because of typical air flow patterns(arrow on plots) dust can be transported across the Pacific Ocean to North America, in five to seven days. Satellite images have even shown images of dust on the west coast of Alaska(CMDI, 2003).

Sampling sites for the ACE-Asia project

Gosan site, Jeju island

- Aerosol chemistry data to investigate the long range transport from the Asian continent since 1990
- Super site during ACE-Asia in 2001

Table 1. Statistics of aerosol composition at 1100 site in Mt. Halla over the period of August 1996 to December 1999.

	Concentration(ug/m^3)							
	NH_4^+	Na^+	K^+	Ca^{2+}	Mg^{2+}	SO_4^{2-}	NO_3^-	Cl^-
Mean	1.11	0.29	0.25	0.36	0.09	4.48	0.68	0.16
Max	5.81	2.11	1.63	6.15	1.57	18.44	9.03	2.47
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.D	0.94	0.30	0.28	0.70	0.12	3.50	1.16	0.24

C.H Kang(2003)

Background air pollutant concentration at Kosan and other stations [K.Y.Park, 1994]

Station	Components	NO (ppbv)	Noy (ppbv)	SO2 (ppbv)	O3 (ppbv)	Period	Remarks
Domestic	Kosan (Jeju)	0.31	4.91	1.42	47.99	Feb-Dec, 1992	This study
	Jamsil (Seoul)			44.0	9.0	Avg. 1991	Yoon (1992)
Abroad	South Pole				27	Mar. 1982	Mizoguchi (1985)
	Bermuda			0.06	22	26-28 Jul. 1982	Sievering (1991)
	Hirosima (Japan)	0.05		2.1	26.9	1-16 Jul. 1982	Mizoguchi (1985)
	Oki island (Japan)		0.25-2.40	0.15	59 (30-62)	29 Sep.-7 Oct. 1991	1991 IGAC/APARE/PEACAMOT and PEM-West Campaign
	Tsushima (Japan)			0.92	40 (10-50)	4-11 Oct. 1991	
	Linan (China)		2.0-12.0*		(20-68)	20 Aug. -6 Nov. 1991	

Why this is proposed?

- Air measurements at the Mt. Halla were undertaken as a background data use of several international joint studies such as ACE(Aerosol Characterization Experiments) Asia, whereas there was nothing of study for them at Mt. Changbai.
- Needs to investigate a long-range transformation of aerosol to Mt. Changbai and North Korea area from China.
- Needs an importance of international cooperation and role because of geographical issue.

Objectives

- To identify atmospheric quality (physical and chemical properties of the aerosol) at Mt. Changbai.
- To compare air quality and its effects of Mt. Changbai with Mt. Halla.
- To identify of transferred route for Asian Dust to Northern China and Mt. Changbai.
- To establish a cooperative research program of global environment among China, Korea, and Japan.

Proposed Activities

It is proposed that the International joint research (A Multi-disciplinary Research Proposal for Monitoring of Air Environment Change at Mt. Changbai) holds a Task Team meeting on July 2005 in Yanbian, China, which could be :

- Discuss and identify the scientific issues related to the Mt. Changbai and the Asian dust.
- Dissuss the possibility of Establishing the Task Team
- Discuss the task approaches and future activities

Cooperative Institutes (Example)

Korea

- Hanyang University
- KIST , KJIST
- Seoul National University
- NIES
- Korea National Univ. of Education

Japan

- Nagoya University
- Kanazawa University
- University of Tokyo
- NIES

China

- Peking University
- China Academy of Science
- Yan Bian University

Multidisciplinary Approach

PI (CO-PI) — Advisor Group

Working Group

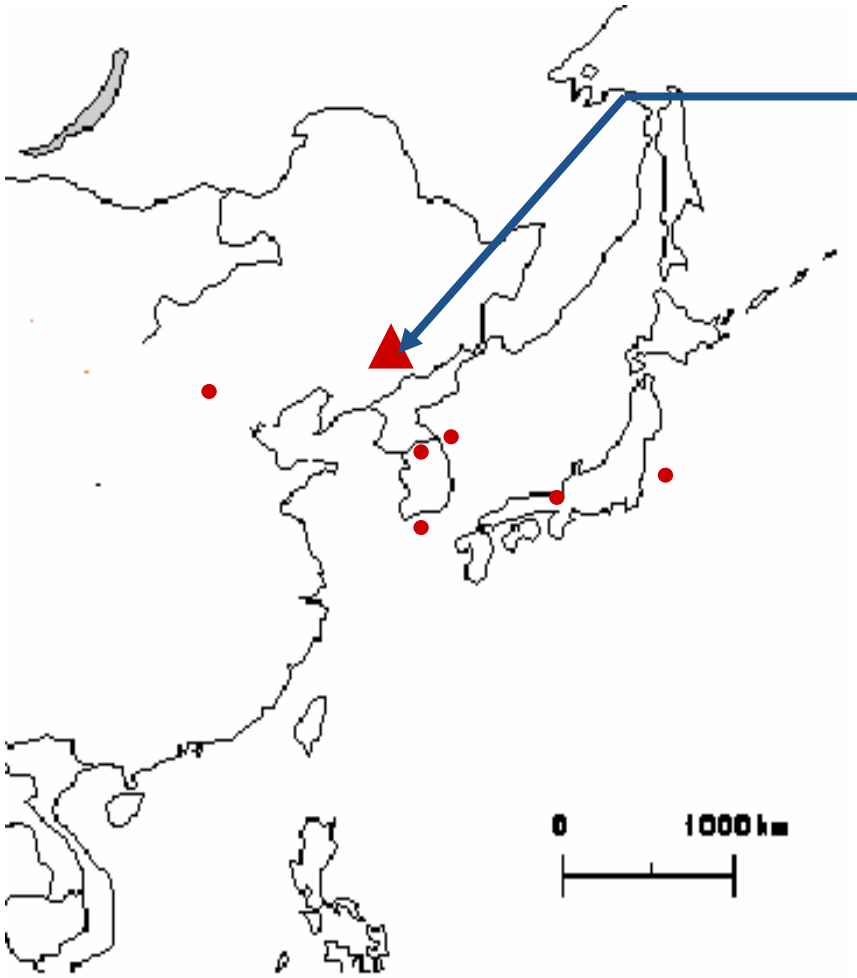
- Measurement team
- Effects (Epi. Study)

Task Force Group

(Coordinator)

- Chemical and Physical element analysis
- Environmental engineering
- Nuclear Engineering

Sampling sites



Sampling site

Mt. Changbai

Existing Observatory

Korea

Seoul, Donghae
Jeju

Japan

Tokyo, Nagoya

China

Beijing

Sampling Pollutants, Period, and Equipments

Pollutant

- **PM-10, PM-2.5**
- **Radon and other pollutants**

Period

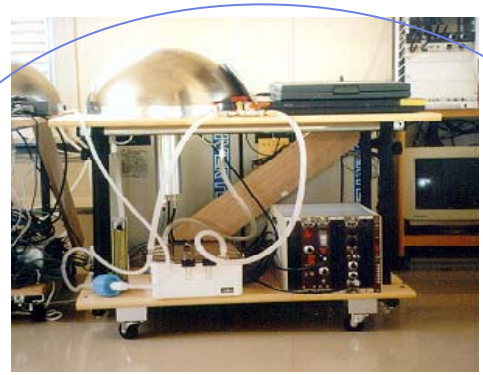
- **March 2007 ~ February 2009(2 years)**

Sampling equipment

Pollutants	Equipment
PM-10	FH-95, TEOM
PM-2.5	Mini Vol. sampler
Radon	Electronic radon monitor
Aerosol	Micro pulse LIDAR

Sampling Equipments

LIDAR measurement



Radon measurement

PM measurement

Additional Scientific Activity [1]

- Seasonal scientific meeting in China, Korea and Japan.

- Additional survey

  → Satellite observations & LIDAR measurements

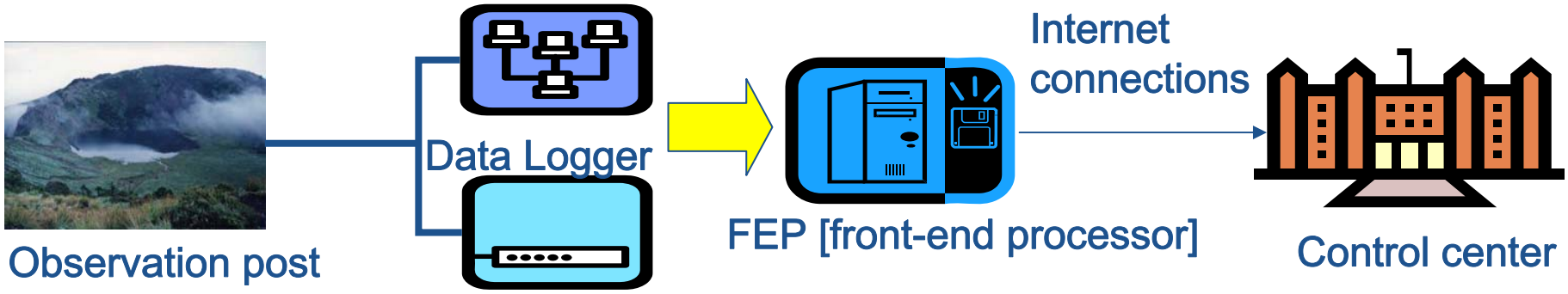
  : to quantify the temporally and spatially varying aerosol distributions.

- Formation of Active Measurement Group/ Task-Force Group.

Additional Scientific Activity [2]

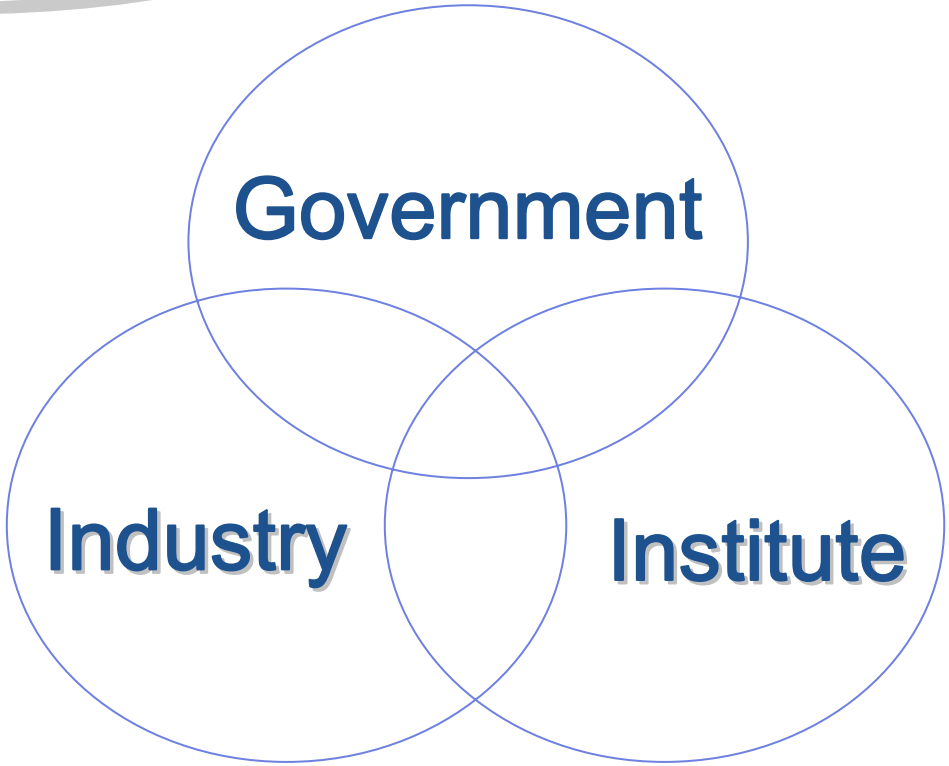
- Operation of Homepage (www.changbaistudy.re.kr)

- Construction of Transportation Management System(TMS)



Financial Support

Korea, Japan, China



Estimated Budget (2yr)

Budget Category		Sum of Money($)	Percentage (%)
Personnel expenses		170,000	34
Direct Costs	Equipment	90,000	18
	Supplies	40,000	8
	Travel	120,000	24
	Other Expenses	35,000	7
Indirect Costs		22,500	9
Total Costs for Research		500,000	100.0

First observation [July 17 – 19, 2005]

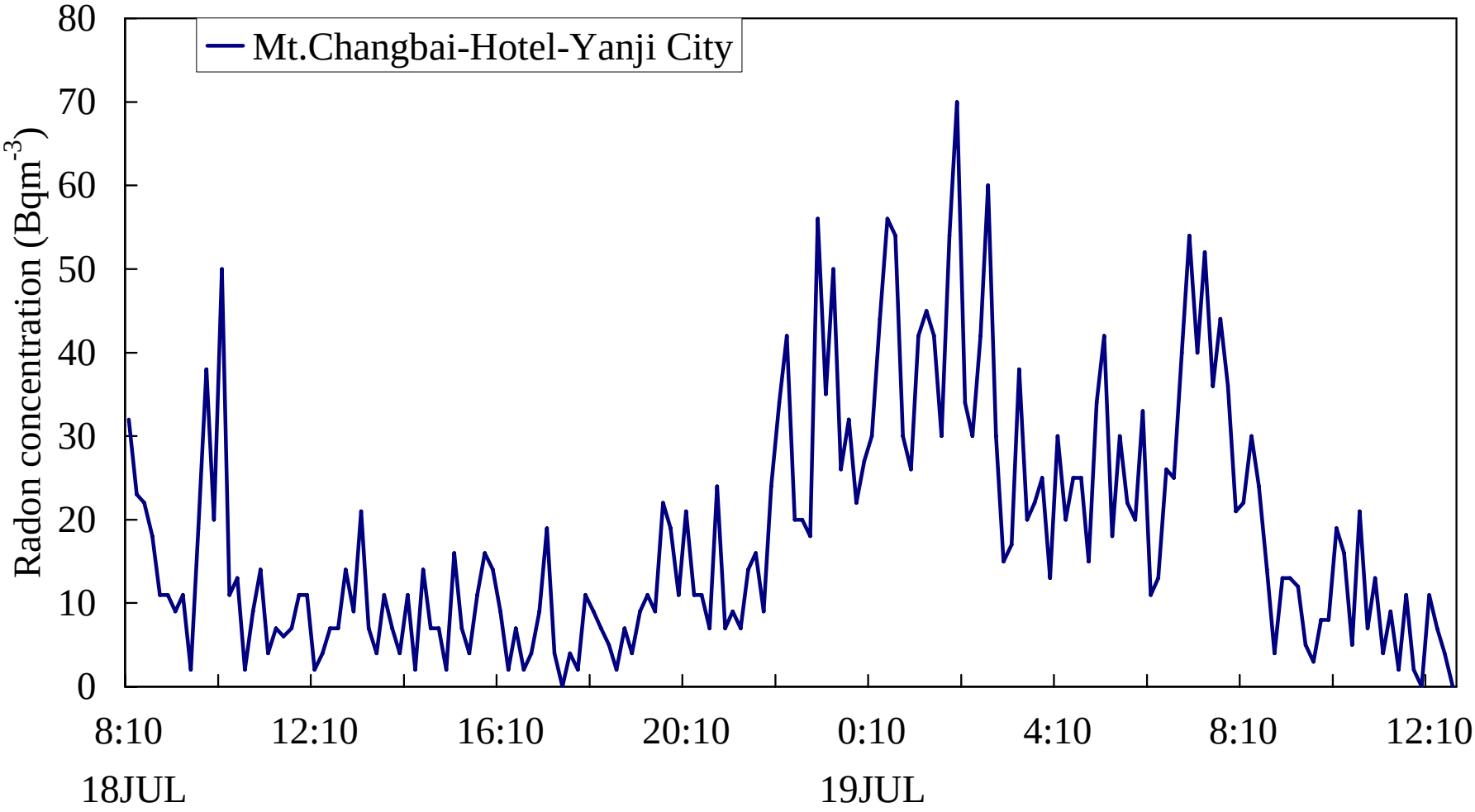
Measurements of air pollutants concentration at Mt. Changbai

CO_2 and CO analysis

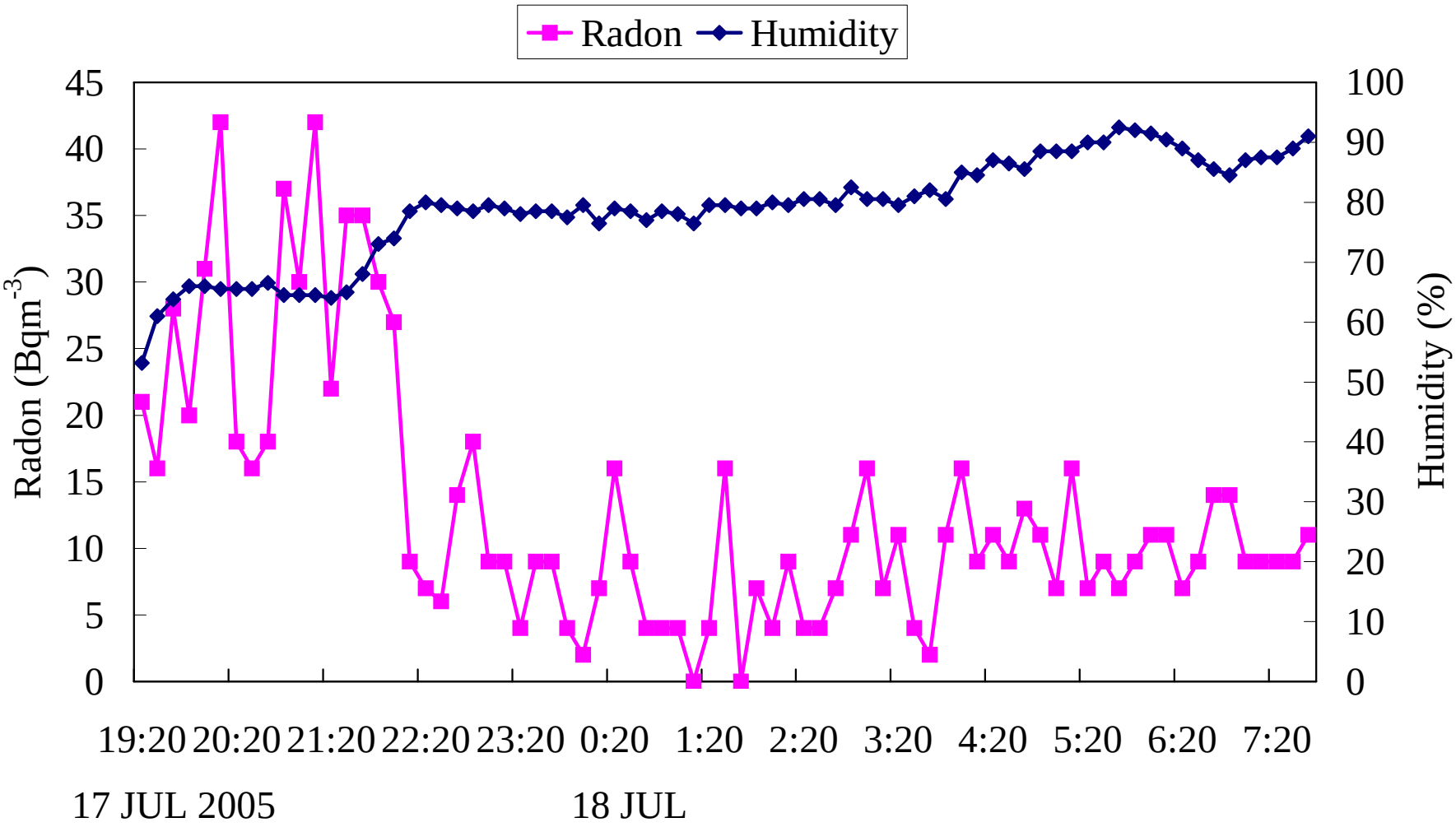
Weather observation

Particle matter

Continuous measurement of radon concentration with Alpha Guard



Time variation of Radon concentration at Hotel outside of Mt. Changbai



Radon concentration and Gamma radiation intensity at Yanji city and Mt. Changbai with Alpha guard and a Dose ratemeter

• 17 JUL 2005 6:40~8:20	37~82 Bqm^{-3}
• At Yanben Univ.	58~66 $Ngyh^{-1}$
• Measuring from Yanbian to Mt. Changbai in bus	21~51 $nGyh^{-1}$
• Out of the bus	46.7, 51.8, 51.1 $nGyh^{-1}$
• Top of the Changbai	67.9 $nGyh^{-1}$
• Around the hotel of entrance Mt. Changbai	84.7, 116.8, 87.6, 114.6, 95.6, 97.8, 99.2 $nGyh^{-1}$

２００５年７月１６日から１８日まで，
中国延辺朝鮮族自治州，延吉市、白頭山を訪問。

7月17日

Ｘｉａｎｇｙｕ　Ｈｏｔｅｌ内 08:00	ラドン　３７±１３　Ｂｑｍ－３ 空間ガンマ線線量率　７８ｎＧｙｈ－１
延辺大学構内	空間ガンマ線線量率　５８～６６ｎＧｙｈ－１
長白山へバスで移動している時の車内	空間ガンマ線線量率　２１～５１ｎＧｙｈ－１
バスの停車時に車外で測定（広場の裸地）	空間ガンマ線線量率　４６．７，　５１．８，５１．１（ｎＧｙｈ－１）
長白山のホテル到着 19:00　前庭で（４２．０３Ｎ，　１２８．０４Ｅ）	空間ガンマ線線量率　８３．９ｎＧｙｈ－１

ホテルは長白山のふもとの狭い谷にあり、温泉が出ている。火山研究所長の話では、基盤岩は玄武岩

7月18日

早朝に，大宇ホテルのある峡谷を測定　　８４．７，　１１６．８，　８７．６，　１１６．８，
１１４．６，９５．６，９７．８，　９９．２ｎＧｙｈ－１

長白山の山頂（２７４９ｍ），９：３８　　６７．９ｎＧｙｈ－1，２０℃，　７４２ｈＰａ，１１Ｂｑｍ－３
（４２．０３Ｎ，　１２８．０２Ｅ）

山頂の気象観測所は４年前（２００１年）から測定している。（Ｚ＝２６００ｍ）

友人観測は６～９月。　１９５４年から３０年間の平年値はすでに測定されている。

主風向　：冬期は北西，夏期は南
雲，視程，風，雪，雨，湿度，露点温度，気温，気圧，日射，着氷

高層観測は延吉市で測定している。

山頂はガスがかかって、視界不良。

天池の水深は３７３ｍ。

午後，天気が回復したので，再び山頂へ登った。　天池や北朝鮮側を確認することができた。

7月19日　6:00　晴れ　１１Ｂｑｍ－３

ラドン測定　７月１７日夜からホテルの窓の外へラドン計を置いて，連続測定を行なった。
７月１８日８：５６から、屋外で連続測定を行なった。　ホテル～自動車～ホテル～バス～延吉市

Discussion after the first observation

- Needs a pliot study after first observation.

- Determine type of air pollutants and sampling site at Mt. Changbai.

- Decide the research budget and financial support.

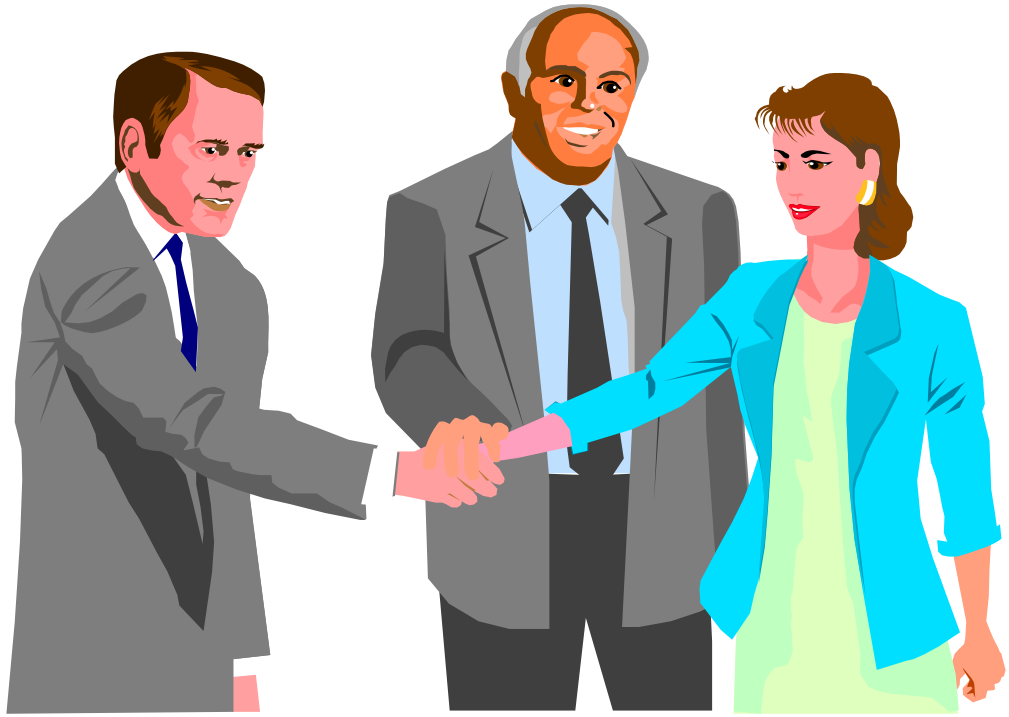
Significance

- Contribution to understand the sources and effects of atmospheric pollution in Northeastern Asia.
- Identification of transferred route for Asian Dust in Northeastern Asia (Mt. Changbai).
- Contribution and promotion to understand environmental situation in North Korea.
- Development of stronger partnership for international research in Northeastern Asia.
- Contribution to international cooperative research in global environment.

Summary

- International cooperative study of air monitoring at Mt. Changbai should be undertaken in the near future.

- Environmental scientists from China,Korea (South/North), and Japan would contribute to understanding of global environment based on this proposed study.



Thank You

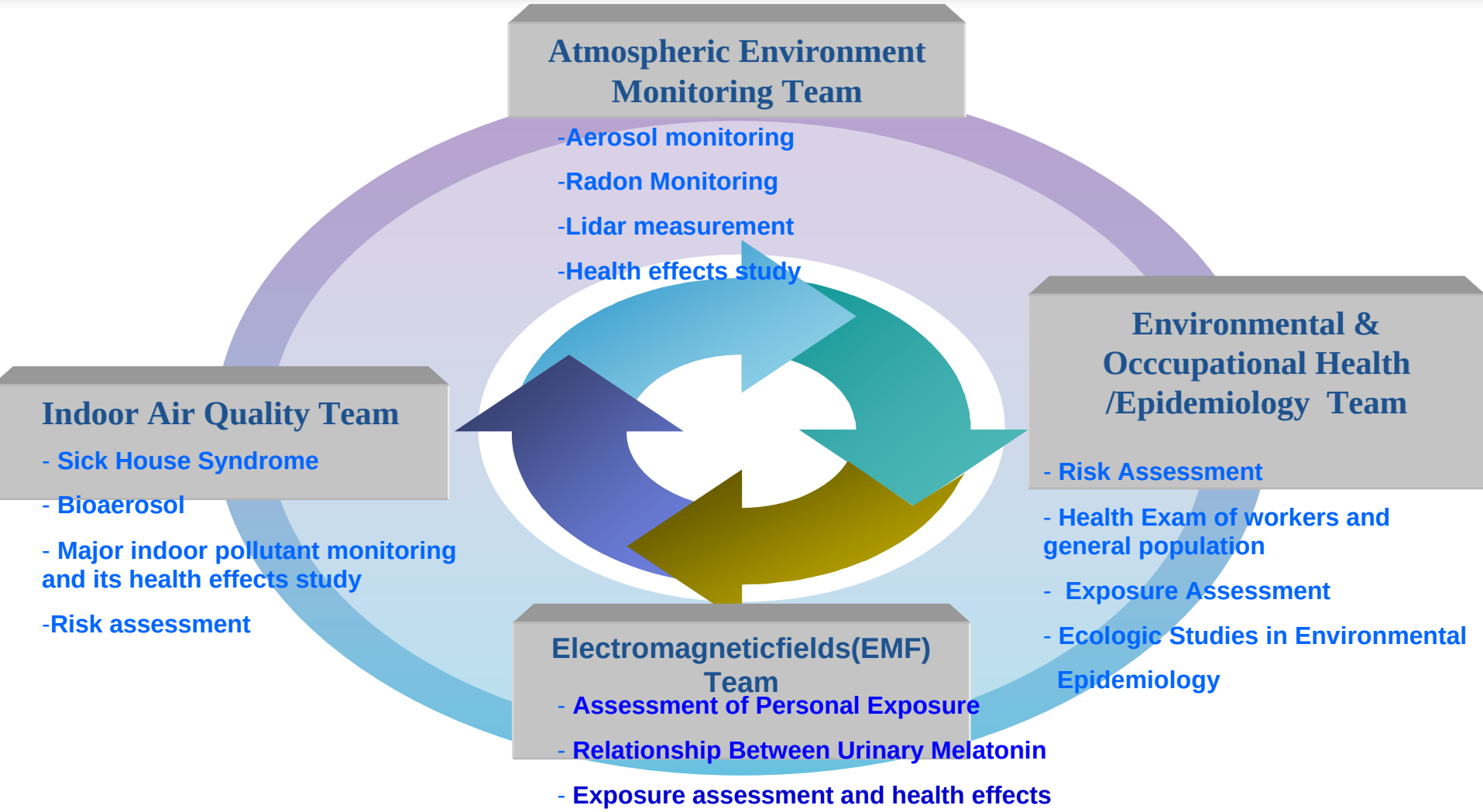
Institute of Environmental & Industrial Medicine, Hanyang.ac.kr

http://www.hanyang.ac.kr/~hyit/H5EABC/

Institute of Environmental & Industrial Medicine

Director	**Yoon Shin Kim**
Organization	**15 Researchers** **2 Research Centers**
Major Study Subjects	• **Atmospheric Environment Monitoring** • **Monitoring of Indoor Air Quality** • **Study of Environmental-Epidemiology** • **Investigation of EMF Biological Effects on Human**

Institute Environmental & Industrial Medicine(IEIM)
Major Research Areas

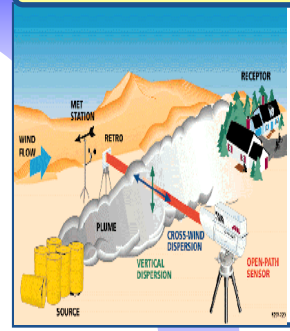


Atmospheric Environmental Monitoring team

In-situ Monitoring

- Tracer Gas Monitoring
- HAPs Monitoring
- Atmospheric Open Path Monitoring

Atmospheric Aerosol



- Development of Optical Monitoring Techniques
- System Integration
- Analysis Algorithms

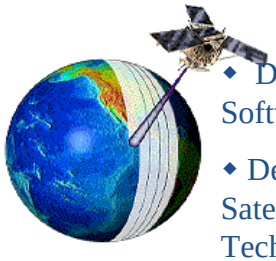
Infrastructure for Atmospheric Environmental Monitoring

Air

Radiometer Technology

- Infrastructure of Global Monitoring
- Development of Algorithms
- Atmospheric Monitoring System

Global Change Monitoring



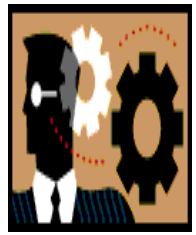
- Development of Software
- Development of Satellite-based Sensor Technologies

Indoor Air Quality Team

Measurement / Analysis

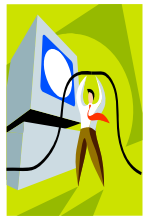
- Precise Measurement & Analysis
- Systematic Measuring Methods
- Measuring instruments

Health Impact Assessment



- Exposure Analysis
- Epidemiology
- Health Risk Assessment

Control / management



- Environmental Plant Development
- Filter & Sampler
- Heat Exchange
- Electromagnetic Waves

Healthy House

- Characteristics of Indoor Pollutants
- Optimal Ventilation Methods
- Building Materials
- Household Utensils

HCHO Humidity
Human Comfort

VOC **IEIM** HAPs

For Well-being Indoor Environment

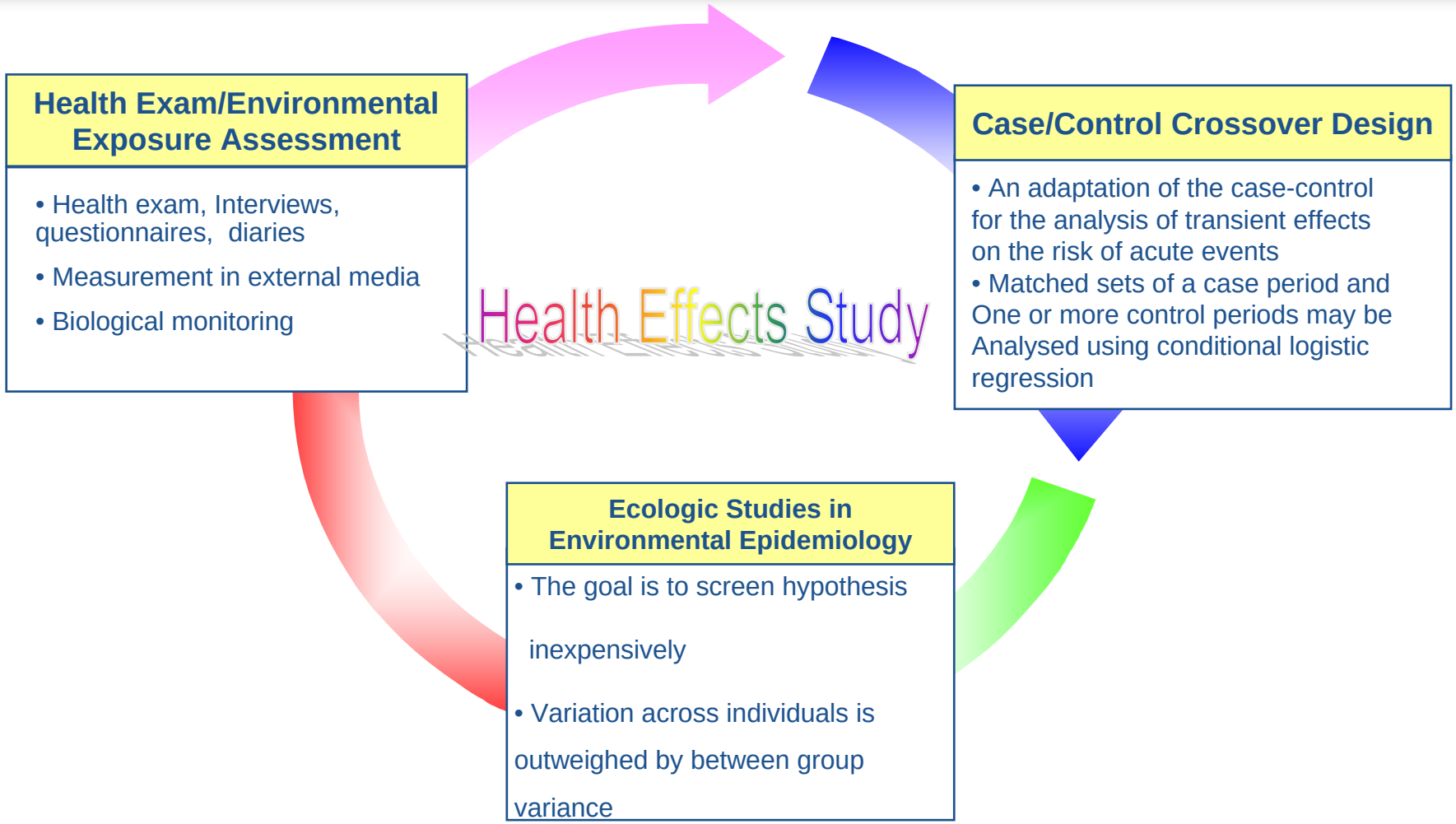
PAHs ETS

Sick Building Syndrome (SBS)
Building Related Illness (BRI)
Multiple Chemical Sensitivity

Electromagnetic Fields (EMFs)

Bioaerosol (Fungl, Bacteria)

Environmental & Occupational Health /Epidemiology Study Team



Electromagneticfields (EMF) Study Team

Health effects study

Assessment of Personal Exposure

• Primary school located near a 154 kV overhead transmission power line

Relationship Between Urinary Melatonin and EMF

• Relationship Between Urinary Melatonin Levels and Extremely Low Frequency Magnetic Fields

Exposure assessment and health effects

• Exposure assessment and health effects of 60Hz magnetic field Generated by electric blanket during the sleep period