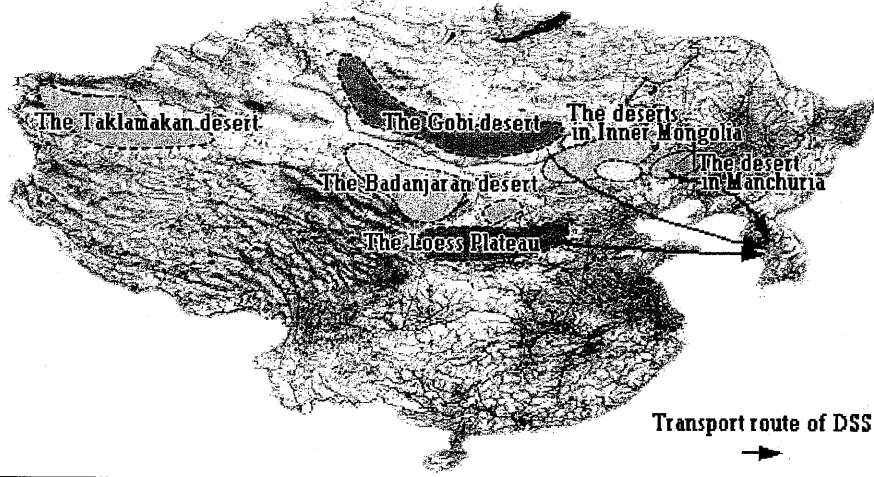


1. Status & Forecast of DSS



○ The deserts in Inner Mongolia(37%), the Gobi Desert(24%), the Loess Plateau (19%) have been the main source of DSS since the desert in Manchuria and Taklamakan represent

1. Status & Forecast of DSS

○ DSS have increased in terms of frequency and intensity in Korea

-Annual Frequency (Seoul) : '80s(3.9 days) → '90s(7.7 days) → 'after 2000(12.4 days)

<Status of Annual Frequency & Intensity of DSS in Seoul

Year	'01	'02	'03	'04	'05	'06
Frequency (days)	7(27)	7(16)	2(3)	4(6)	9(12)	7(11)
Intensity (Seoul, $\mu\text{g}/\text{m}^3$ )	980	3311	356	639	753	2941

\* Annual intensity of fine particles in Seoul in '05:  $58\mu\text{g}/\text{m}^3$

### 1. Status & Forecast of DSS

- 1~3 °C warmer & drier weather in source areas such as China and Mongolia
- The KMA expected more frequent DSS outbreaks than the average of 3.6 days in 2007. Especially, it will be much severe in April. ('07.2.1. Korea Meteorological Administration(KMA))

### 2. Damage of DSS

- Due to severe DSS, 4,373 schools were closed and 164 flights were cancelled, respiratory diseases were surged, and high-tech manufactures were closed in 2002.
- No report on school closure or flight cancellation in 2006.
- DSS contain normal range of harmful heavy metals in lead, cadmium and dioxin.
- However, the level of iron and manganese is 2 ~ 10 times higher than usual because of the soil composition of DSS in source areas. ('01 ~ '05, the National Institute of Environmental Research (NIER))

### 3. Implementation Structure

- Response System is well systemized.
  - Relevant Ministers have established & carried out detailed plans to cope with DSS issues since the severe DSS outbreaks in 2002.
  - Making its efforts to prevent the damage of DSS on domestic level
  - Pursuing international cooperation including the "Afforestation Project" in source areas

### 4. Response Measures

- DSS early warning and monitoring system (KMA,MOE)
  - Strengthening DSS early warning standards
    - ▷ Change the standards of DSS Advisory level (500→400 $\mu\text{g}/\text{m}^3$ ).  
Warning level(1,000→800 $\mu\text{g}/\text{m}^3$ )
  - Improving DSS monitoring system including adding monitoring stations
    - ▷ Adding DSS monitoring stations in Korea (21sites→27sites)
    - ▷ Adding DSS monitoring stations along the oversea transport routes of DSS (5sites→15sites)
    - ▷ adding meteorological towers to monitor DSS in Manchuria and Mongolia (3sites→5sites)
    - ▷ Pursuing establishment of DSS monitoring equipment in North Korea (using inter-Korean Cooperation Fund) : Kaesong Industrial Complex, Geumgang Mountain

#### 4. Response Measures

- Establishing a center to monitor long-range trans boundary air pollution including DSS on the BackLyung island.
- ▷ Monitoring long-range trans-boundary air pollutant such as DSS and harmful air-polluting substances originated from China
- Expanding an air pollution monitoring network (PM10 – 250 stations) & continuing monitoring heavy metal in DSS
- Real-time analysis of harmful heavy metal in DSS by establishing a real-time monitoring station in metropolitan areas

#### 4. Response Measures

- Promoting International Cooperation (MOFAT, MOE, Korea Forest Service)
  - Developing cooperation measures to tackle DSS issues in Northeast Asia among Korea, China, and Japan
  - ▷ Joint efforts to reduce damage of DSS through TEMM
  - ▷ Supporting strengthening a monitoring network between Korea and China (using KOICA fund)
  - Supporting an afforestation project to prevent desertification in China & Mongolia & to reduce damage of DSS on the private level
  - Continuing support for an eco-restoration project in desertification areas in China & Mongolia
  - ▷ Promoting the "Greenbelt" program to prevent desertification in Mongolia ('07 ~ '16)
  - ▷ Supporting the pilot project of eco-restoration in Northwest China

#### 4. Response Measures

- Preparing the Guidelines & Recommendations about DSS & building dissemination system (Government Information Agency, National Emergency Management Agency)
  - Disseminating Guidelines & Recommendations about DSS & sending SMS on DSS when DSS warning is issued
- ▷ Spreading DSS warning by using break news, one-line DSS-related text news on TV, & roadside billboard (114)
- ▷ Spreading DSS warning to elderly homes and nursing homes through local offices

#### 4. Response Measures

- Preparing Institutional grounds of comprehensive measures to prevent damage of DSS
  - DSS prevention measures in each sector and 『DSS Response Committee』 can be established by revising the Clean Air Conservation Act. (MOE)
  - ※ The DSS Response Committee will consist of 14 Vice Ministers from relevant Ministries and private specialists, chaired by the Minister of Environment
  - Putting DSS into the 『National Disaster and Safety management Basic System』 to manage DSS on the disaster level (NEMA)

#### 4. Response Measures

- Implementing measures to reduce damage of DSS
  - Student and school protection measures (Ministry of Education & Human Resources Development)
    - ▷ Fast spreading the situation of DSS through emergency networks among schools and offices of education
    - ▷ Implementing countermeasures according to early warning levels such as recommending cut-class and going home early, avoiding outdoor activity, & emergency school closure
    - ▷ Broadcasting school closure with help of media
  - Prevention measures in industrial sectors (Ministry of Commerce, Industry and Energy)
    - ▷ Establishing and operating prevention measures by industrial sectors such as Automaker, Shipbuilding where outdoor jobs (i.e. painting) are needed

#### 4. Response Measures

- Undertaking preparation measures to take care of agricultural product & livestock such as 「Guidelines & Recommendations for Agricultural Product & Livestock Cares」 (Rural Development Administration)
- Preparing food safety measures such as 「Guidelines & Recommendations for Food Safety against DSS」
- Pushing flight safety measures according to DSS warning levels including establishment and operation of countermeasures against DSS (Civil Aviation Safety Authority)
- Implementing Public Health Measures (Korea Center for Disease Control & Prevention)
  - ▷ Sample monitoring of eye-infection through nationwide eye clinics & national campaign with the mass media
  - ▷ Campaign against DSS (including distribution of a mask)

### 5. Research Projects

- Analyzing dioxin level during DSS events in comparison with non-DSS periods (MOE)
  - Comparing the level of dioxin between the days hit by DSS and normal days
- Developing next-generation acid deposition model to predict long-range trans boundary air pollution (MOE)
  - Developing a physical & chemical process model on air polluting substances & developing an aerosol model considering environment of Northeast Asia
- Research vertical distribution of DSS aerosols (MOE)
  - Analyzing aerosol distribution by hours during DSS events

### 5. Research Projects

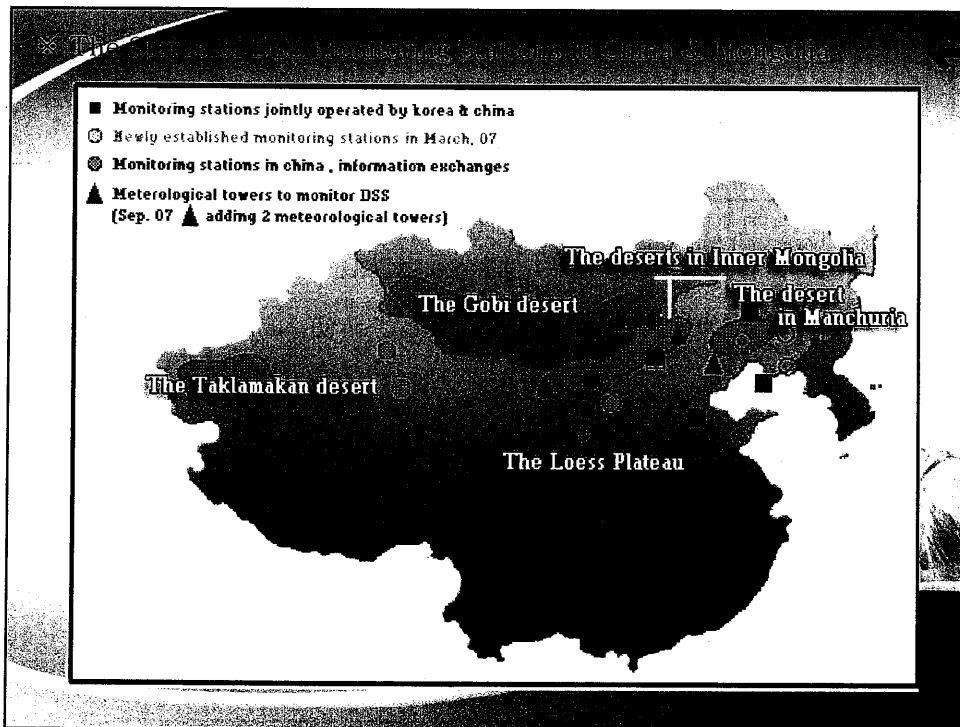
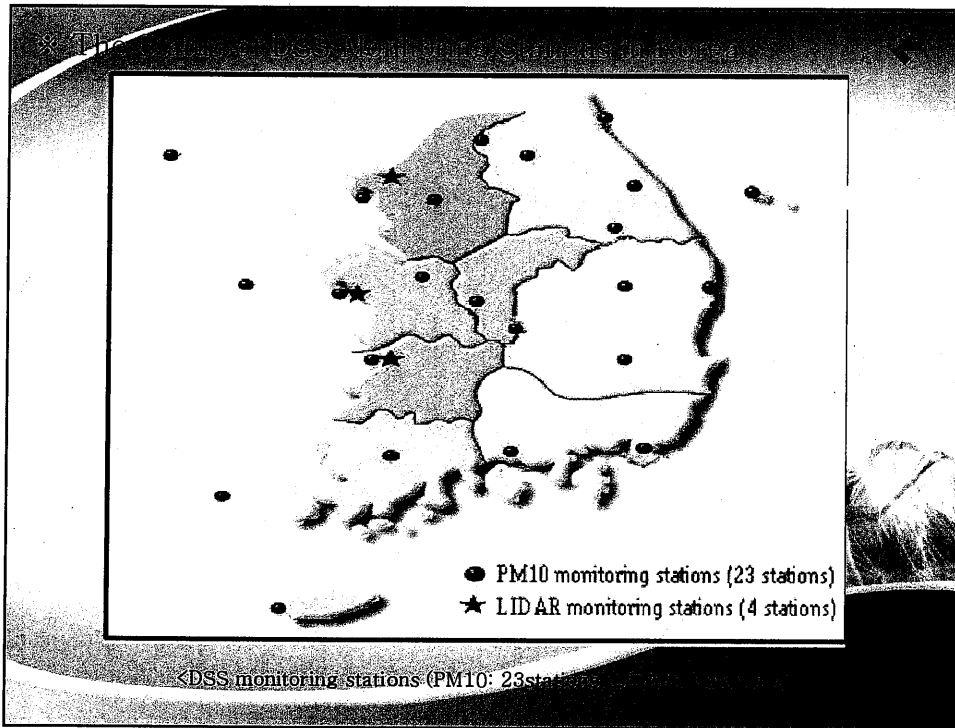
- Identifying characteristics of soil in DSS (Rural Development Administration)
  - Analyzing DSS impact on soil and agricultural environment through identifying arsenic acid level & composition & particle content by traveling miles
- Developing damage assessment method & countermeasure technology (National Emergency Management Agency)
- Monitoring the status of forestation areas in western China (Korea Forest Service)
  - Continuous monitoring & research on growth status and change of vegetation of forestation areas in western China, finished project in 2005 starting from 2001.

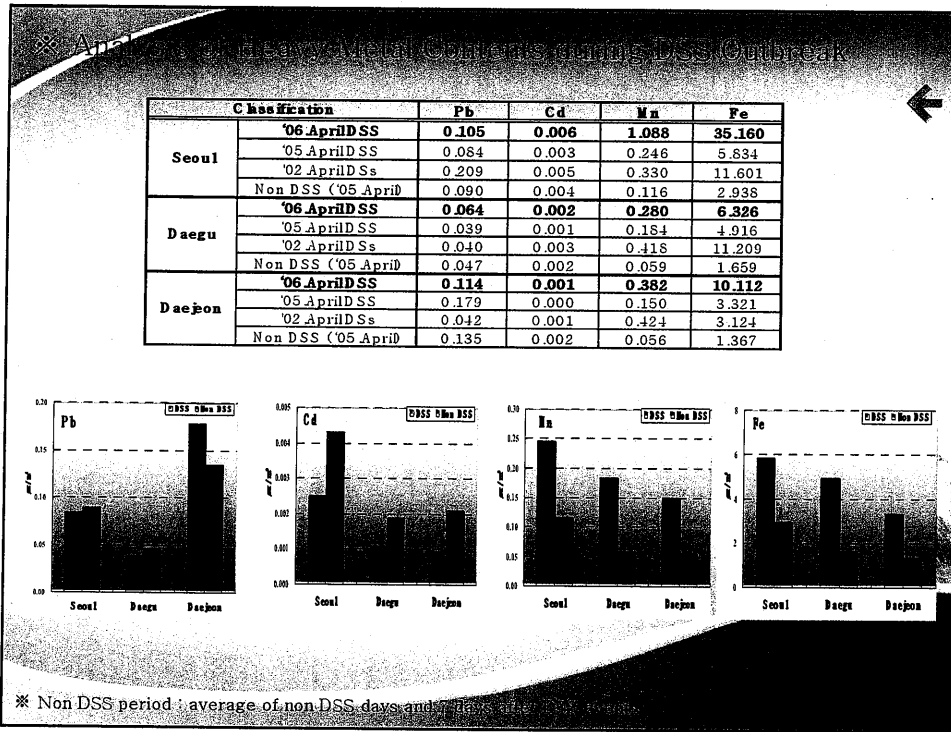


# Thank you

Guidelines & Recommendations in line with DSS early warning level

Classification	Standards	Guidelines & Recommendations
Advisory	When an hourly averaged dust concentration (PM10) expects to exceed 400 $\mu\text{g}/\text{m}^3$ for over two hours	<ul style="list-style-type: none"> <li>① The elderly, children, anyone with respiratory disease are advised to avoid outdoor activities</li> <li>② Preschool &amp; elementary school students are advised to avoid outdoor activities including outdoor exercise &amp; field trip</li> <li>③ People including middle &amp; high school students are advised to avoid extreme outdoor sports and stay indoors</li> </ul>
Warning	When an hourly averaged dust concentration (PM10) expects to exceed 800 $\mu\text{g}/\text{m}^3$ for over two hours	<ul style="list-style-type: none"> <li>① The elderly, children, anyone with respiratory disease are advised to stay indoors</li> <li>② preschool &amp; elementary school students are advised to avoid outdoor activities including outdoor exercise &amp; field trip &amp; to take protective measures such as cutting classes &amp; closing windows</li> <li>③ people including middle &amp; high school students are advised to avoid extreme outdoor sports and stay indoors</li> </ul>





Classification of Air Quality Index (AQI) and DSS (Dust Storm Season) Outbreak

Level	Guidelines & Recommendations	
Before DSS outbreak	Home & food handling areas	<ul style="list-style-type: none"> <li>- The elderly, children, anyone with respiratory disease are advised to stay indoors</li> <li>- Close windows</li> <li>- Wear glasses, mask, long sleeve cloth</li> <li>- Avoid putting vegetable &amp; fruit outdoors without covering</li> </ul>
	Educational institutions including schools	<ul style="list-style-type: none"> <li>- Listen to DSS forecasting, review close schools or cut classes</li> <li>- Check emergency networks</li> <li>- Prepare plans for children who need care</li> <li>- Disseminate guidelines of DSS</li> </ul>
	Farming including livestock and gardening	<ul style="list-style-type: none"> <li>- Prepare animal escape</li> <li>- Cover haycock</li> <li>- Check &amp; repair instruments used to wash DSS</li> <li>- Check doors &amp; windows in greenhouses</li> </ul>
During DSS outbreak	Home & food handling areas	<ul style="list-style-type: none"> <li>- The elderly, children, anyone with respiratory disease are advised to stay indoors</li> <li>- Close windows and avoid outdoor activity. When you are out, wear glasses, mask, long sleeve cloth</li> <li>- After returning home, wash hands and feet in particular wash eyes and brush teeth</li> <li>- Eat vegetable &amp; fruit after thorough cleaning</li> <li>- Prevent 2nd contamination through thoroughly wash hands &amp; food tools when touch food materials</li> </ul>
	Educational institutions including schools	<ul style="list-style-type: none"> <li>- Preschool &amp; elementary school students are advised to avoid outdoor activities including outdoor exercise &amp; field trip to take protective measures such as cutting classes &amp; closing schools</li> </ul>
	Farming including livestock and gardening	<ul style="list-style-type: none"> <li>- Prevent exposure to DSS</li> <li>- Close doors &amp; windows of barns</li> <li>- Cover haycock to prevent exposure from DSS</li> </ul>
After DSS outbreak	Home & food handling areas	<ul style="list-style-type: none"> <li>- Air circulation and clean materials which were exposed to DSS</li> </ul>
	Educational institutions including schools	<ul style="list-style-type: none"> <li>- Clean &amp; disinfect schools &amp; early going home for students who have been exposed to DSS</li> </ul>
	Farming including livestock and gardening	<ul style="list-style-type: none"> <li>- Clean &amp; disinfect barns and instruments</li> <li>- Closely observe animals whether they have disease or not</li> <li>- Clean residues of DSS on greenhouse</li> </ul>