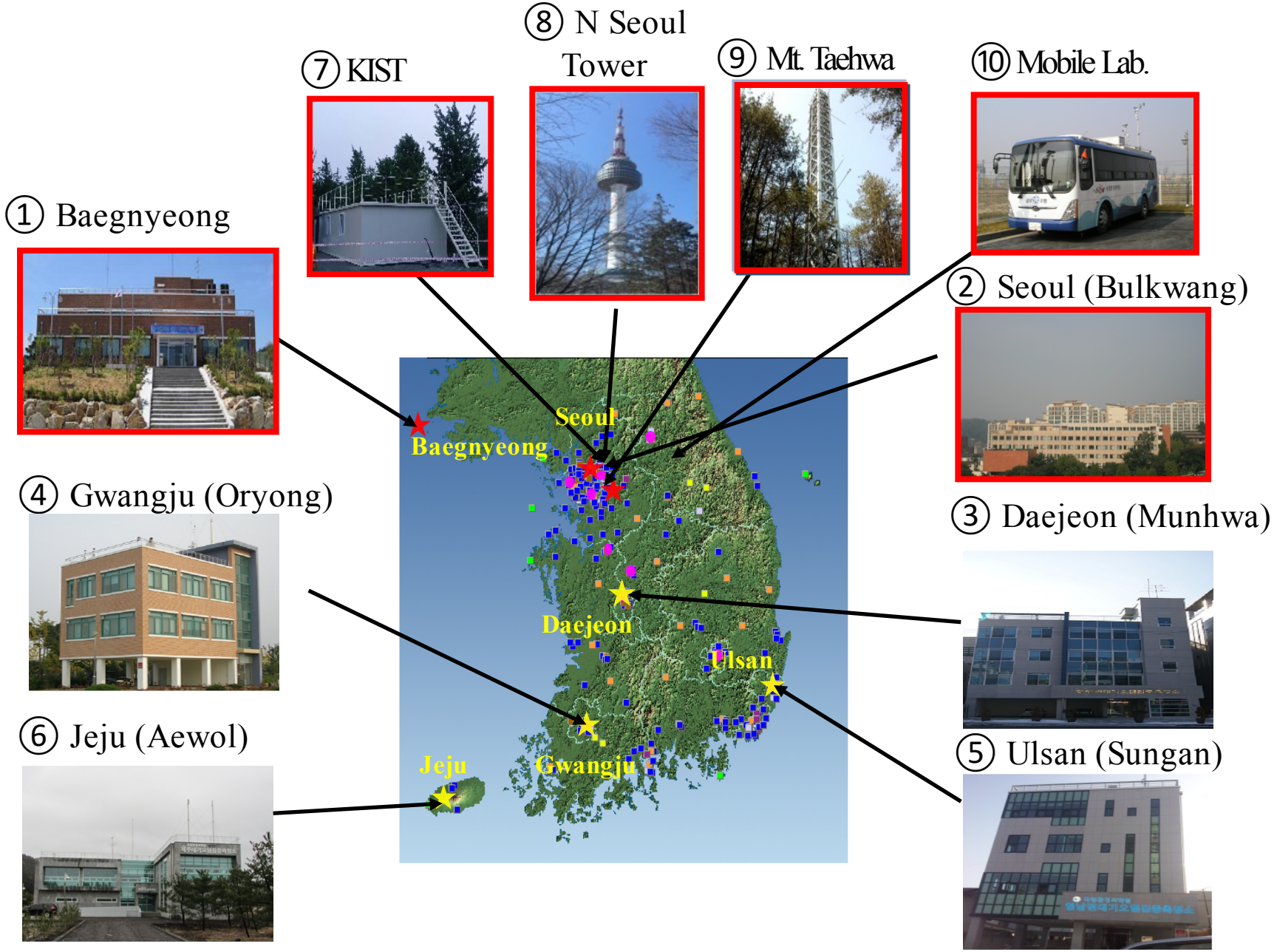
Current ground observation sites.



Current ground observation sites.

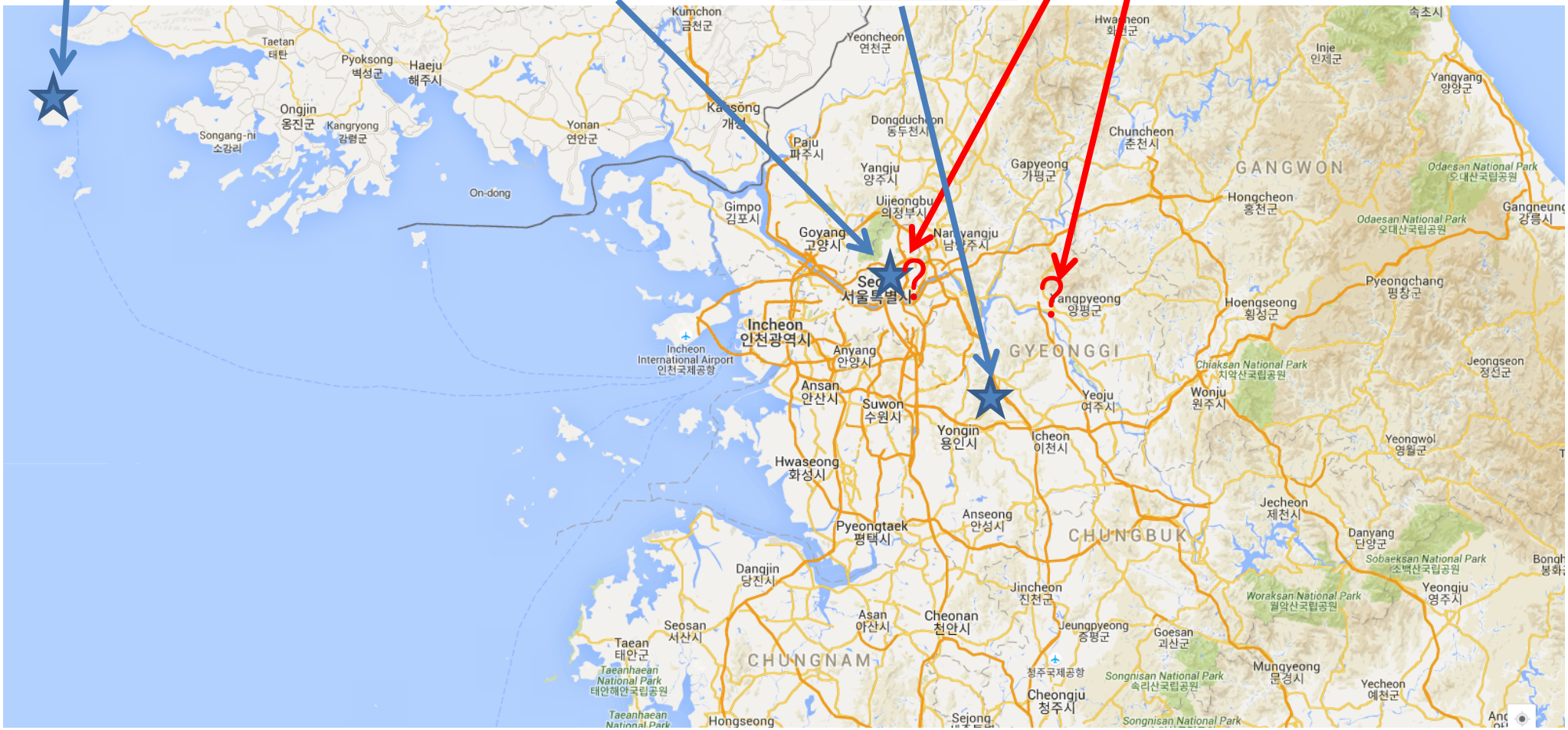
Upwind site
(Baegnyeong)

NIER super site
(Bulkwang)

Mt. Taehwa

Downtown site
(TBD)

Downwind site
(TBD)



	Species	BNI	Seould	N Tower	Hanseo King-Air	Technique
Precusors Oxidants	NO, NO_2, NO_X	◎	◎	◎		Chemiluminescence
	OH radical		◎			CIMS
	NO_3, N_2O_5		●			CRDS
	Cl and $ClNO_2$					CIMS
	VOCs speciation	◎	◎	◎		On-line GC-FID, TD-MS
	HR VOCs		◎	◎		PTR-MS
Oxydized products	HCHO and aldehyde	◎	◎			DNPH/HPLC
	Oxidized hydrocarbons					CEAS
	PAN		◎			CIMS
	H_2O_2 , Peroxides	◎	●			HPLC, TILDAS
	Organic Aerosol speciation	◎	◎			High-vol filter & GC-MS
Products Pollutants	O_3	◎	◎	◎		UV absorption, CRDS
	CO, SO_2	◎	◎	◎	◎	NDIR, Fluorescence
	HNO_3, NH_3	◎	●			AIM
	EC/OC	◎	◎			Sunset
	High resolution aerosol speciation	◎	◎		◎	AMS
	Water soluble organic aerosol		●			PILS-TOC
	Aerosol profil	◎	●			Lidar, Sun photometer
	Aerosol number and size	◎	◎		◎	APS, SMPS, UHSAS
	Aerosol scattering & Absorption	◎	◎			Nephelometer
	Aerosol trace metals	◎	◎			Realtime XRF
	$PM_{2.5}$ mass & chem. compositions	◎	◎			Filter Pack
	refractory Black Carbon	◎	◎			SP2
	Black carbon	◎	◎			AE31

Aircraft observation

- Gas & aerosol physical and chemical properties

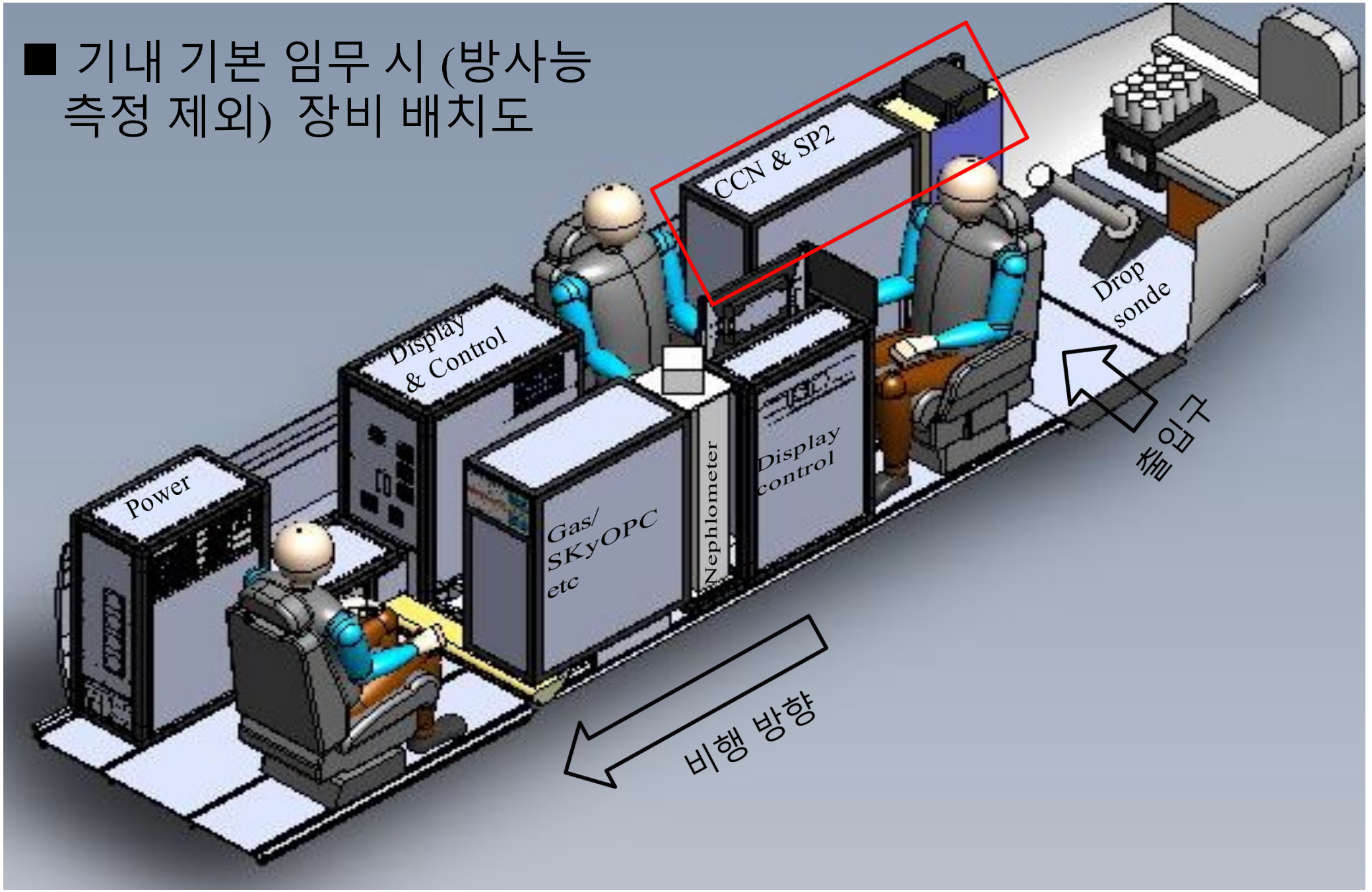
기상장비 배치도

■ 기체 외부

✓ 항공기 외부에 기상장비 장착에 따른 항공기 항력 증가로 항공기 기본성능 저하 예상
✓ 최종 납품 비행 메뉴얼은 수정 개정판 필요(제안서 제시 체공시간 감소 예상)

기상장비 배치도

■ 기내 기본 임무 시 (방사능 측정 제외) 장비 배치도



Research Vessle (R/V)

Kisang I (KMA)
~500 t

Onnuri (KIOST)

~1400 t
25 researchers

One more possibility (???)
Araon (KOPRI)
~7000 t

해양기상관측선 기상1호

주요제원

총톤수	498톤
총길이	64.32M
넓이	9.40M
깊이	4.30M
속력	16.5노트, 최대 18.0노트
주기관	2.332PS X 2대
추진기	FPP X 2축
선수추진기	CPP1축
발전기	주발전기 X 2, 정박발전기 X 1
항해거리	4,000 MILE 이상
연속항해	25일 이상
항해구역	근해(국제포함)
승선인원	32명
선급	KST
취항식	2011년 5월 30일
건조조선소	(주)고려조선소

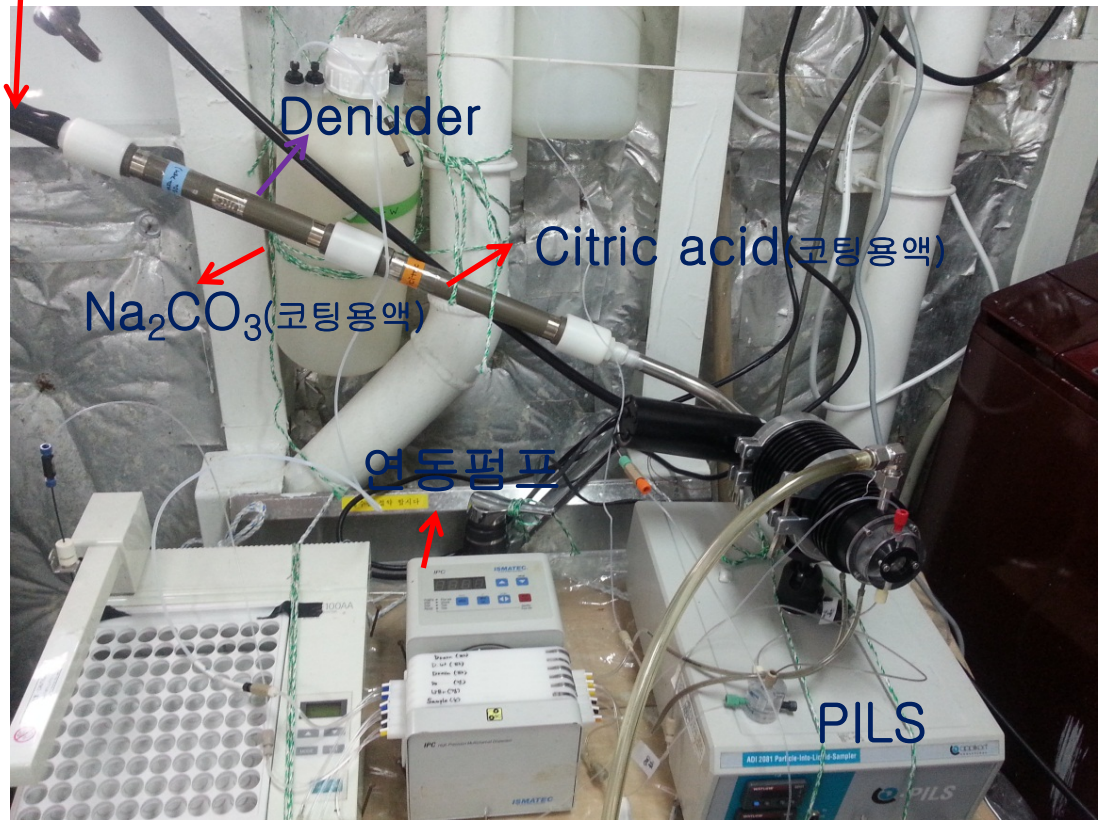
기상1호를 활용한 황사·연무 관측 예비실험

- **측정장비(국립기상과학원)**

광산란입자계수기(OPC)

Inlet

PILS

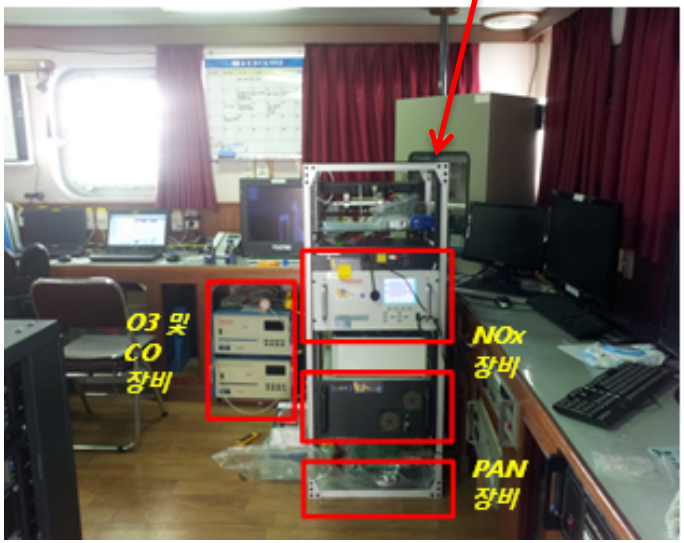


에어로졸필터오염
관측중단
(11.17.~22.)

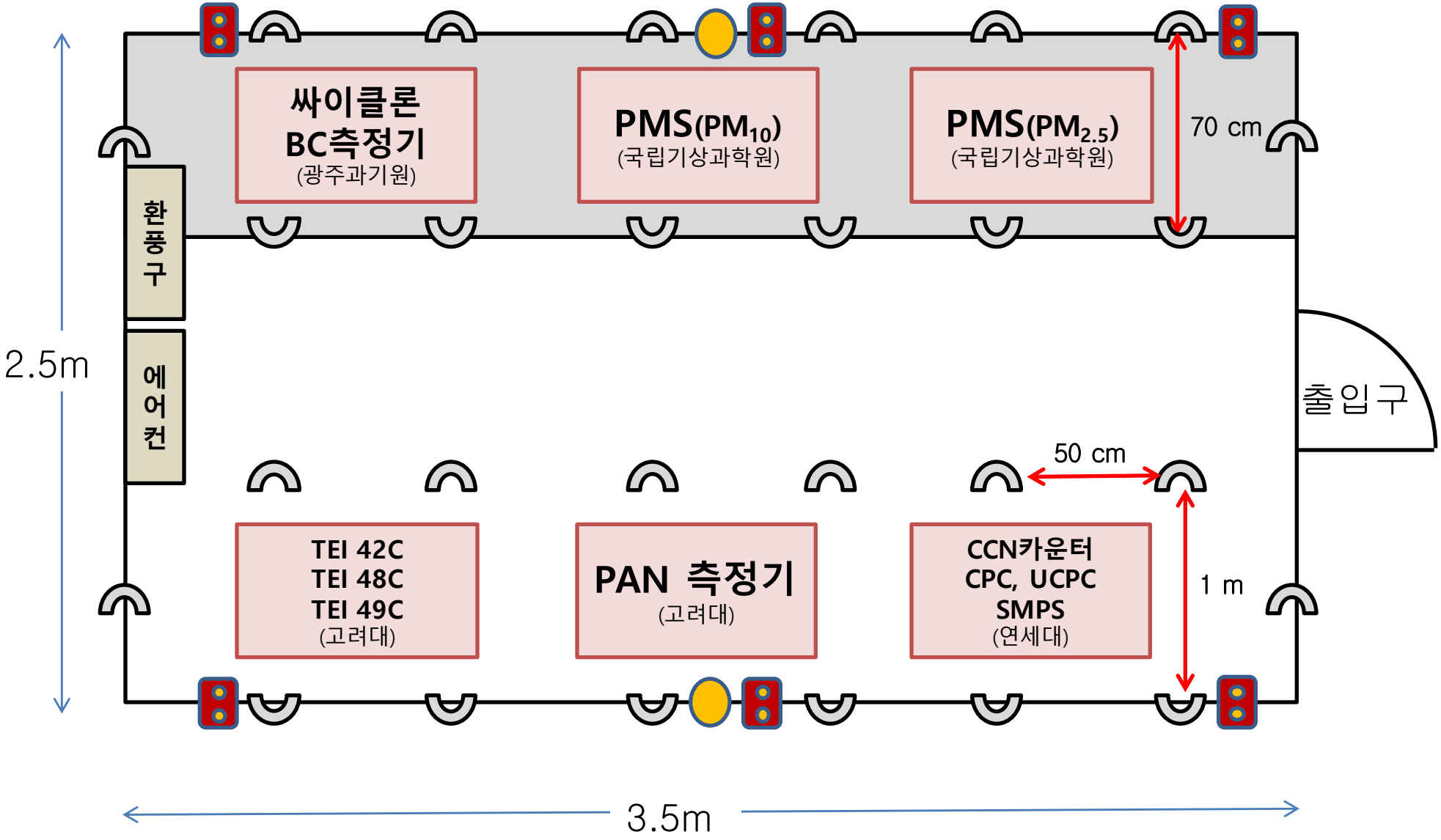
기상1호를 활용한 황사·연무 관측 예비실험

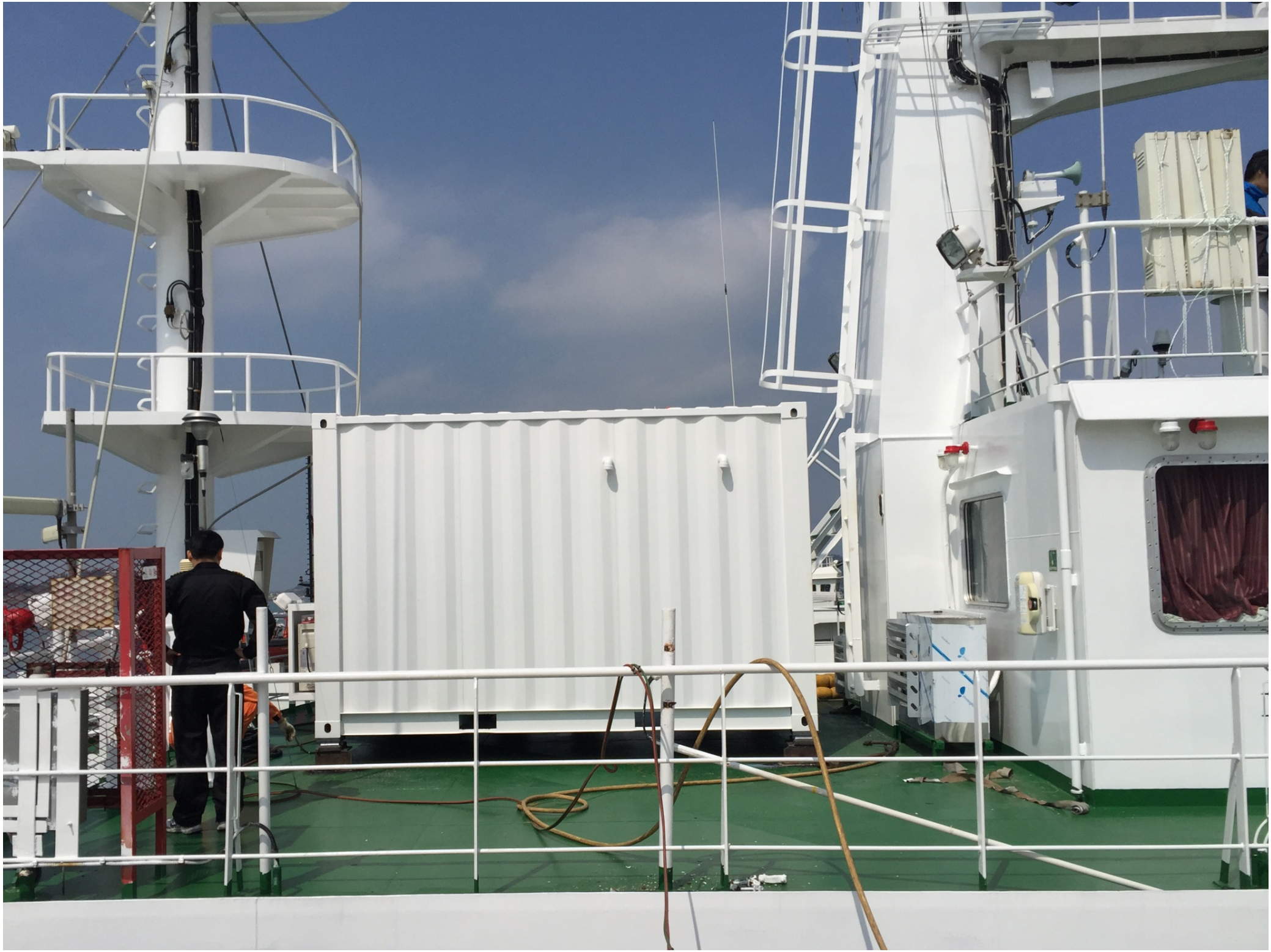
- **측정장비(연세대학교, 고려대학교)**

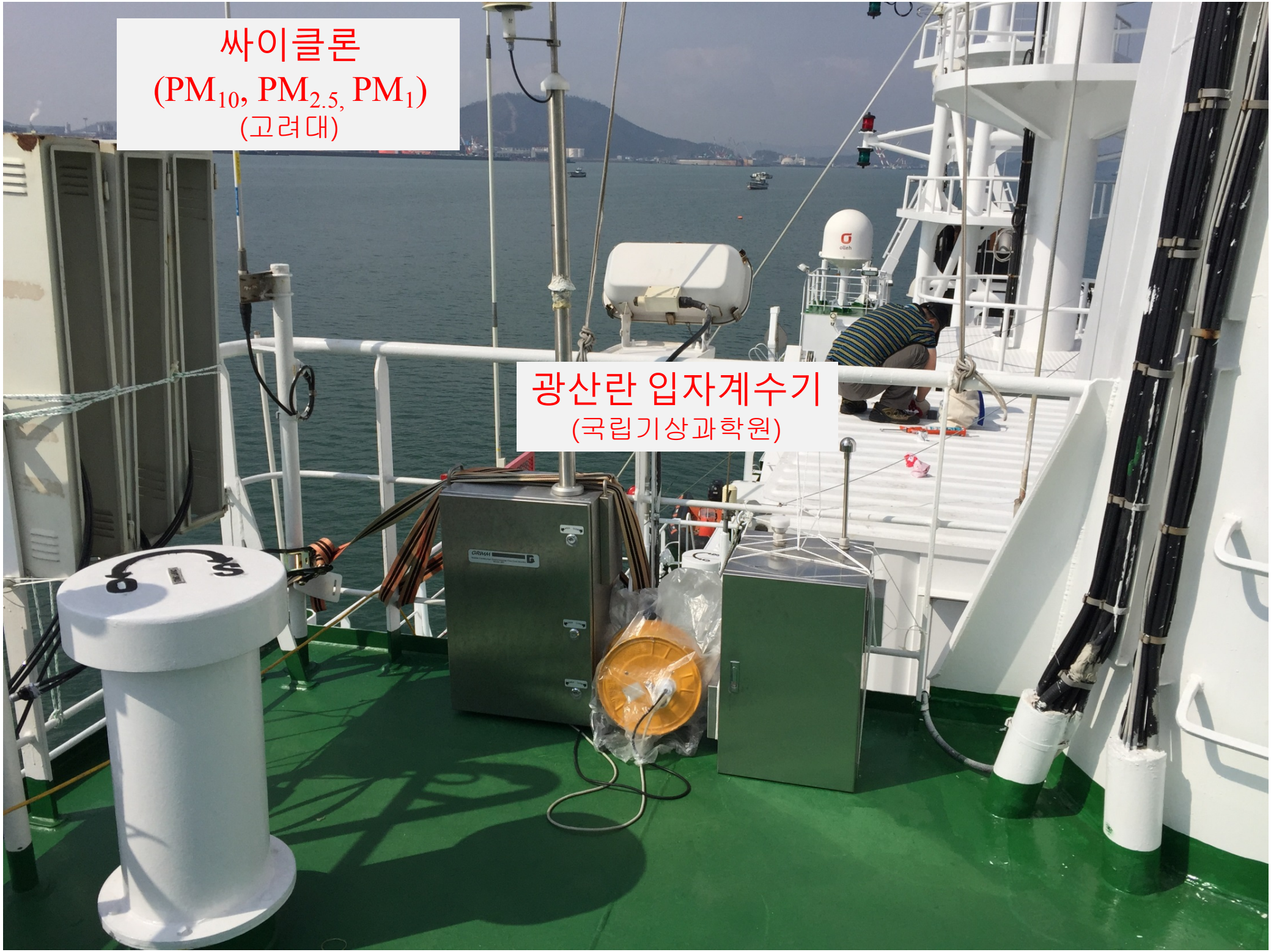
CPC, CCNC

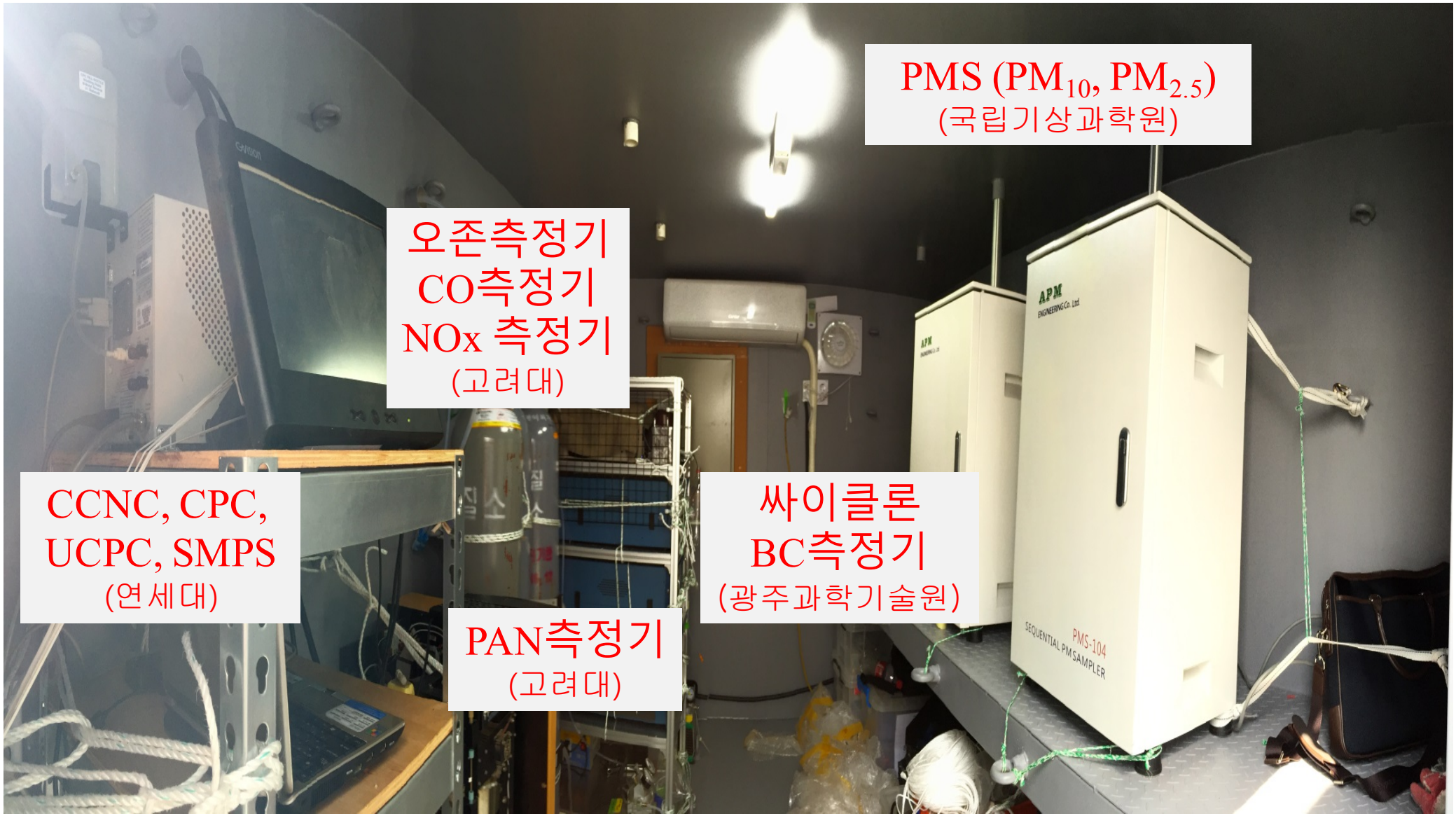


관측 컨테이너 설치(2015. 4. 8.)






싸이클론
(PM_{10}, $PM_{2.5}$, PM_1)
(고려대)
광산란 입자계수기
(국립기상과학원)



- 컨테이너 내부 여유 공간: PMS 대, rack 1개 추가 설치 가능/ 천장 천공 6개
- 외함 있는 장비는 갑판에 설치 가능

R/V Onnuri

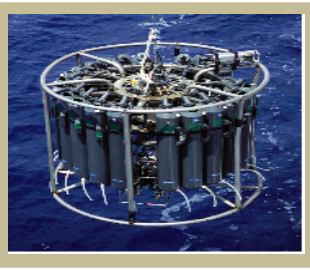
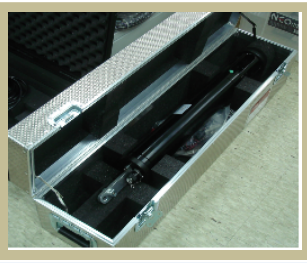
	Specification
Operator	Korea Institute of Ocean Science and Technology (KIOST)
Gross Tonnage	1,370 ton
Accommodation	25 scientists/ 15 crews
Length	63.8 m
Breadth	12.0 m
Moulded Depth	7.55 m
Cruising speed	13 knots
Date of Launch	15 JULY 1991
Cruise day/year	270 days
Draft	6.5 m

Parameters to be measured

- AOP
- IOP
- Biogeochemical variables
- Atmosphere variables

	Measurement	Potential instruments used for data collection
Physical properties	Temperature and salinity	CTD sensor (Seabird)
Apparent Optical Properties	Water-leaving radiance; remote-sensing reflectance	HyperPro (Satlantic); ASD (ASD); C-OPS (Biospherical); HyperSAS (Satlantic)
	Diffuse attenuation	HyperPro, C-OPS
	Photosynthetic available radiation	HyperPro, PAR sensors, HyperSAS
Inherent Optical Properties	Total and dissolved beam attenuation and absorption	ac-s spectrophotometer (WETLabs)
	Backscattering	Eco BB3, Eco VSF3 or BB9 (WetLabs) HydroScat-6 (HOBILabs)
	CDOM absorption	ac-s – Filtered for CDOM Ultrapath (WPI)/Spectrophotometer WETStar fluorometers (WETLabs)
	Absorption of particulate and phytoplankton pigments	Spectrophotometer
Biogeochemical Properties	Concentration of phytoplankton pigments	HPLC
	TSM, particle size distribution	Gravitational; LISST
	Particulate (POC) and Dissolved Organic Carbon (DOC)	CEC 440HA Elemental Analyzer; MQ1001 carbon analyzer
	Nutrients (NO_3, NO_2, PO_4)	Spectrophotometer (Colorimetric analyses)
	pCO2, Dissolved Inorganic Carbon, pH and Total Alkalinity	Sunburst SAMI-CO_2, Turner C-sense
	Phytoplankton Taxonomy	Imaging flowcytometer (McLane, Inc.); FlowCAM (Fluid Imaging)
	Productivity	^{14}C or ^{13}C incubations; FRRF
Atmospheric Properties	Aerosol optical depth	Sunphotometer
	NO_2, O_3, trace gases	Pandora

R/V Onnuri Devices

Conductivity Temperature Depth	Auto Weather Station	Air Sea Gravity Meter	Thermosalino Graph
			
Expendable Bathytermograph	**Sound Velocity Sensor**	**Sound Velocity Profiler**	***Multichannel Seismic System**
			
Acoustic Doppler Current Profiler	**Hydrographic Echo Sounder**	**Echo Sounder**	***Sub Bottom Profiling System**
MBX Beacon Receiver	**MRU Sensor**	**Trimble Beacon DGPS**	**Satellite DGPS Receiver**

AQ & OC Coordination

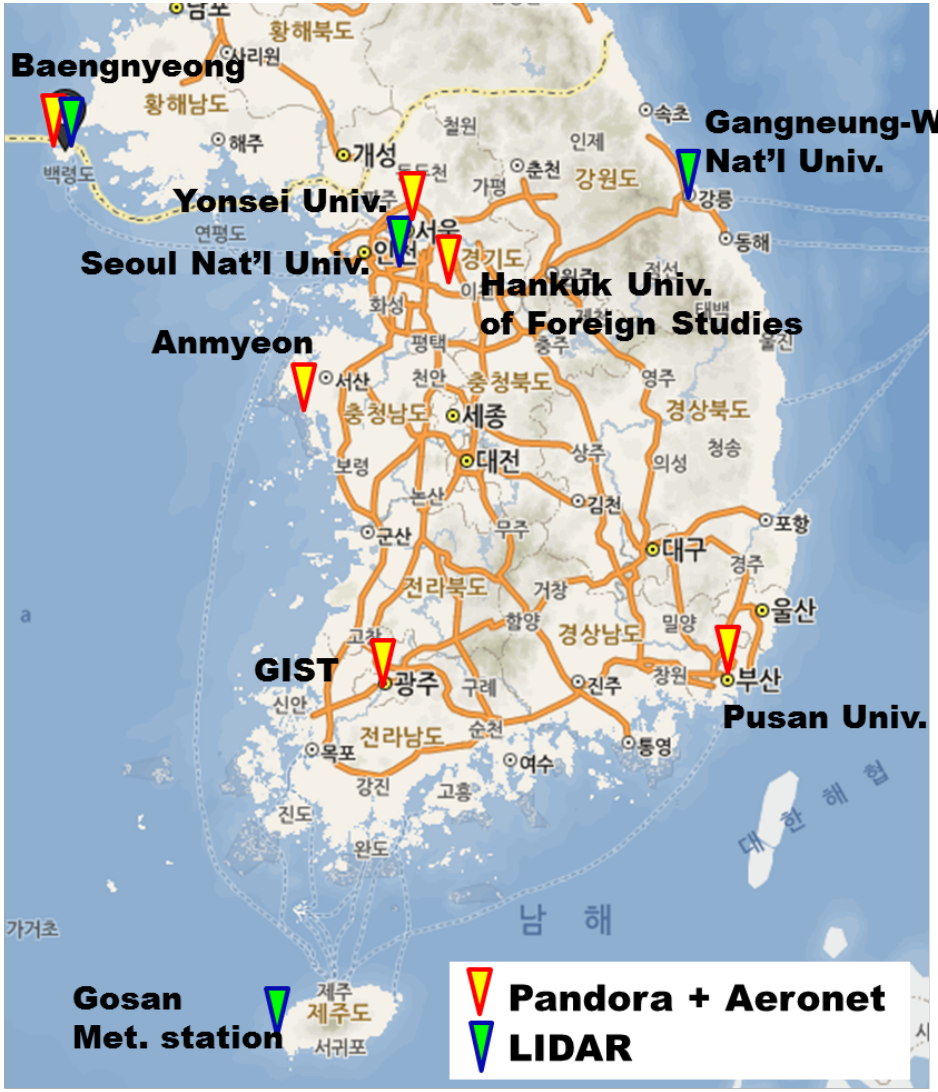
- Determining KORUS-OC field campaign period
  - Flight schedule of KORUS-AQ is critical to KORUS-OC scheduling
    - Flight paths and time
  - R/V scheduling for 2016 starts in Nov. 2015

- Atmospheric variables for ocean color retrieval
  - It is crucial to accurately correct for atmospheric contributions from **aerosols**, **NO_2**, **O_3**, and **water vapor** for ocean color retrieval
  - GOCI produces science data for aerosol
  - AERONET-OC site available at Ieodo Station

- Information on sea surface reflectance

Remote sensing

- Pandora ($\underline{O_3, NO_2}$, H_2O, SO_2, HCHO), AERONET(AOD)
- LIDAR : Vertical profile of aerosol.



Satellite data availabilty?