

High Technology with Customers

구름 자동 관측 시스템 개발 현황 (2018년)



<http://www.andkr.co.kr>

(주)에이앤디시스템

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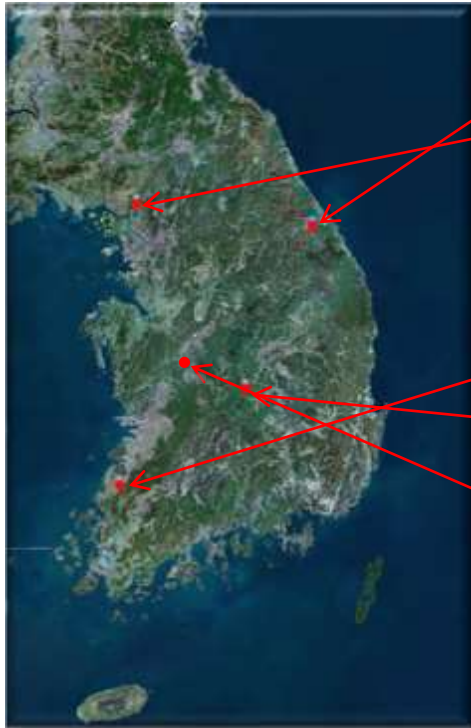
3D Image Solutions Total Service



A&D System

구름자동관측시스템 설치 현황

설치 장소



• 대관령 : 구름물리선도센터
(Ver 1.0 2009년 설치)

• 파주 : 파주기상대
(Ver 2.0 2010년 설치)

• 고창 : 고창기상대
(Ver 2.0 2011년 설치)

• 추풍령 : 추풍령기상대
(Ver 2.0 2012년 설치)

• 대전 : 대전지방기상청
(Ver 3.0 2017년 4월 설치)

구름자동관측시스템 변화

대관령



ACOS V1.0
950Kg
2009년

파주, 고창, 추풍령



ACOS V2.0
350Kg
2010~2012년

대전



ACOS V3.0
47Kg
2017년 4월



ACOS V4.0
6.5Kg
2018년 2월



ACOS V3.5
6.7Kg
2017년 11월

구름자동관측시스템 구성

Ver V1.0 / Ver V2.0 (기본형)

The interface displays the following information:

- Header:** Date: 2016-07-31, Time: 14:23:52. Status: 운영 (44.80%), 운고: 690.70 m, WMO: 5.
- Navigation:** Buttons for Home, Back, Forward, Search, Refresh, and various system controls.
- Camera Views:** Two circular fisheye camera feeds showing a night sky with a bright star and wind turbines.
- Temperature Data:**
 - Left View: 내부온도 35°C, 외부온도 33°C
 - Right View: 내부온도 32°C, 외부온도 33°C
- Sensor Confirmation (Left):**
 - 내부온도(중): 35°C, 내부온도(상): 47°C
 - 외부온도: 33°C, 당료온도: 36°C
 - 수위변세: 하
- Sensor Confirmation (Right):**
 - 내부온도(중): 32°C, 내부온도(상): 43°C
 - 외부온도: 32°C, 당료온도: 34°C
 - 수위변세: 중

구름자동관측시스템 구성

Ver V1.0 / Ver V2.0 (개선형)

The interface displays the following information:

- Header:**
 - Logo: A cartoon character with a red umbrella.
 - Date/Time: 2015-12-15 19:02:27
 - Alerts:
 - 장비 작동 주기: 1시간
 - 장비 세척 주기: 1회
 - 장비 세척 시간: 15초
 - 장비 건조 시간: 7분
 - Weather: 운량 72%, WMO 6, 구름 높이 (추정 평균/추정 최저) 1270m/1050m
 - Buttons: 자동, 수동, 설정, 정보, 종료
- Control Panels:**
 - Left Panel:
 - 알림: 알림
 - 알개축: 화
 - 카메라축: 세척버튼
 - 세척: 대기중
 - 건조: 대기중
 - 내부온도: 33
 - 외부온도: 33
 - Right Panel:
 - 알림: 알림
 - 알개축: 화
 - 카메라축: 세척버튼
 - 세척: 대기중
 - 건조: 대기중
 - 내부온도: 32
 - 외부온도: 32
- Camera Feeds:**
 - Two circular fisheye camera views showing the sky and surrounding environment.
 - Buttons for each camera: 카메라 이동, 알개축, 카메라 촬영, 온도 표시.
- Bottom Section:**
 - View Times: 현재 시간: 2015년 12월 15일 18시 1분, 다음 관측 시간: 2015년 12월 15일 19시 1분
 - Temperature Sensors:
 - 내부온도(중): 35°C
 - 내부온도(상): 35°C
 - 외부온도: 35°C
 - 알개온도: 35°C
 - Control Buttons: 영상회복, 영상회복-1, 영상회복-2, 영상회복-3, 영상회복-4, 영상회복-5, 영상회복-6, 영상회복-7, 영상회복-8, 영상회복-9, 영상회복-10, 영상회복-11, 영상회복-12, 영상회복-13, 영상회복-14, 영상회복-15, 영상회복-16, 영상회복-17, 영상회복-18, 영상회복-19, 영상회복-20, 영상회복-21, 영상회복-22, 영상회복-23, 영상회복-24, 영상회복-25, 영상회복-26, 영상회복-27, 영상회복-28, 영상회복-29, 영상회복-30, 영상회복-31, 영상회복-32, 영상회복-33, 영상회복-34, 영상회복-35, 영상회복-36, 영상회복-37, 영상회복-38, 영상회복-39, 영상회복-40, 영상회복-41, 영상회복-42, 영상회복-43, 영상회복-44, 영상회복-45, 영상회복-46, 영상회복-47, 영상회복-48, 영상회복-49, 영상회복-50, 영상회복-51, 영상회복-52, 영상회복-53, 영상회복-54, 영상회복-55, 영상회복-56, 영상회복-57, 영상회복-58, 영상회복-59, 영상회복-60, 영상회복-61, 영상회복-62, 영상회복-63, 영상회복-64, 영상회복-65, 영상회복-66, 영상회복-67, 영상회복-68, 영상회복-69, 영상회복-70, 영상회복-71, 영상회복-72, 영상회복-73, 영상회복-74, 영상회복-75, 영상회복-76, 영상회복-77, 영상회복-78, 영상회복-79, 영상회복-80, 영상회복-81, 영상회복-82, 영상회복-83, 영상회복-84, 영상회복-85, 영상회복-86, 영상회복-87, 영상회복-88, 영상회복-89, 영상회복-90, 영상회복-91, 영상회복-92, 영상회복-93, 영상회복-94, 영상회복-95, 영상회복-96, 영상회복-97, 영상회복-98, 영상회복-99, 영상회복-100.

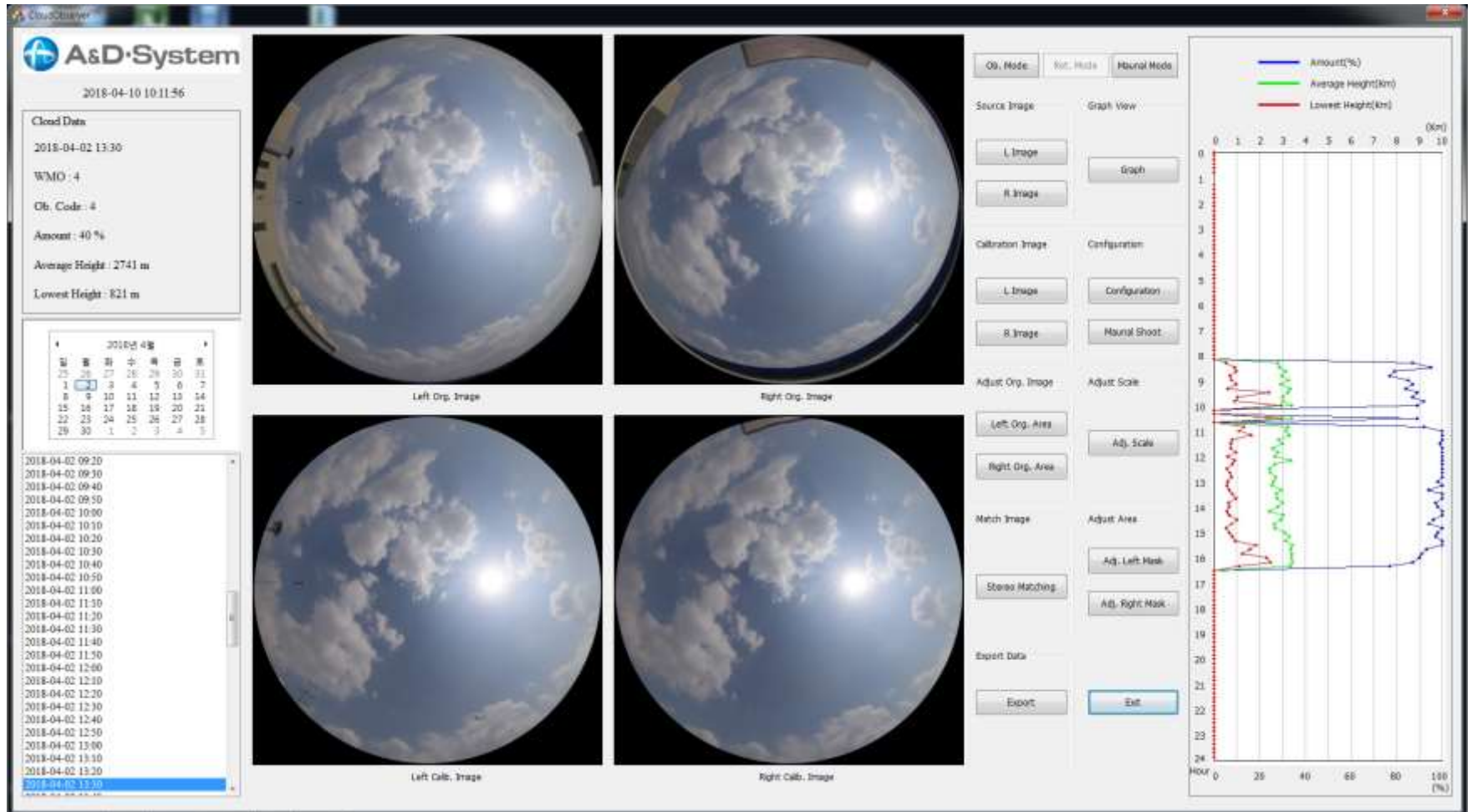
구름자동관측시스템 구성

Ver V3.0 (2017년 3월)

The screenshot displays the cloud observation system interface. At the top left, there is a logo for 'nims 국립기상연구소' and a date/time display showing '2018-04-08 09:35:36'. To the right of the date is the 'A&D-3D' logo. Further right, there are several data fields: 'WMO' with a value of '7', '주위 평균' (5897 m), and '주위 최저' (4881 m). Below these are control buttons for '자동' (Automatic), '수동' (Manual), '설정' (Settings), '정보' (Info), and '종료' (End). The main area contains two side-by-side camera feeds showing a wide-angle view of a cloudy sky. Below each feed are three green buttons labeled '일회 촬영' (One-time shot), '카메라 촬영' (Camera shot), and '종료 영상' (End video). At the bottom, there are four time stamps: '촬영 시간: 2018년 4월 8일 9시', '다음 촬영 시간: 2018년 4월 8일 10시', '촬영 시간: 2018년 4월 8일 9시', and '다음 촬영 시간: 2018년 4월 8일 10시'.

구름자동관측시스템 구성

Ver V4.0 (2017년 11월)



장비 개발의 기본 구성 요소

- **고 정밀 관측 자료의 획득**

고 분해능을 가진 고해상 카메라 사용 (2,432X2,432), 최대(3,648X3,648)

야간 촬영 가능 카메라 채택 (세계 유일)

관측 오차가 적은 영상 Image 사용 (촬영 각 180도 / 사용범위 140도)

- **관측 자료의 정확성 분석**

시야 각에 따른 오차보정 방법 설정 (왜곡영상 평활보정)

운고 : 평균운고 및 최저운고 산출

운량 : 백분율, 관측code, WMO code

관측오차 유발요소 최소화 기능 및 알고리즘 채택

장비 개발의 기본 구성 요소

- **측정 장비의 HW 신뢰성**

정밀측정을 위한 최소한의 동작기능 보유

➔ 상시 송풍장치 채택 / Heater 자율제어 (영상 2°C가동)

장비상태의 원격확인 시스템

- **통신 시스템**

Cloud Server를 활용한 자동 원격 Data 관리 시스템

자동 및 수동 Data 집계와 Retrieve 시스템

원격 Monitoring 및 Maintenance 시스템

ACOS-1800 개발 내용

- **제원 (구름영상 획득장치 HW)**

본체 무게 : 6.5Kg (기존 ACOS장비 무게 950Kg, 350Kg, 47Kg)

본체 크기 : 264(W) X 264(D) X 247(H)mm

통신 규격 : Ethernet 단일 통신 (통신 가능 거리 120m씩 연장 가능)

제어 Data, 영상 Data 단일 Ethernet 송수신

동작 전압 : 220V AC

카 메 라 : Canon EOS 6D

해상도 : 2,432 X 2,432 (최대해상도 : 3,648X3,648)

촬영 화각 : 180도

ISO : 25,600 (야간 촬영 및 관측)

ACOS-1800 개발 내용

- **관측오차 유발 요소 최소화 기능 채택 :**
 - 태양광 제거 알고리즘 적용 (태양광 / 햇무리)
 - 야간 주변광 제거 알고리즘 적용
 - 미세먼지 인식 알고리즘 적용
 - 일출 / 일몰 시 촬영영상의 청색화 방지 프로그램 적용
 - Pre-Shot 기능 적용으로 광량에 무관한 안정된 영상획득
 - 촬영영상의 빗방울 제거 알고리즘 적용
 - 상시 송풍장치를 이용한 먼지 및 강수입자 제거장치
 - 자동 온도감지 열선 채택으로 적설방지
 - 어안렌즈에 의한 왜곡영상 평활 알고리즘 적용
 - ISO 25,400 적용으로 야간촬영 및 측정자료 정밀화 실현적용
 - 10분 간격 관측으로 매시간 평균 측정치와 순간 측정치 산출

외국장비와 비교 (제원)

항 목	ACOS-1800	ASI-16	SRF-02
카메라 종류	DSLR	USB	USB
해상도	2,432 X 2,432	1,920 X 1,920	1,200 X 1,200
촬영 최저 밝기	ISO 25,600 (야간촬영 가능)	0.03Lux (야간촬영 불가)	0.1Lux (야간촬영 불가)
관측시간	주야간 24 시간	주간(하절기 05:00~17:30)	주간
관측 주기	10분 단위 (6회/1시간)	15분 단위 (4회/1시간)	
먼지, 강수 제거장치	먼지 제거 송풍장치 항시 가동	없음	없음
왜곡영상 평활 보정	적용 (원거리 오차제거)	적용 안함 (원거리 오차발생)	적용 안함 (원거리 오차발생)
적설방지	자동온도조절 열선 채택	없음	없음
원격 Monitoring	동작상태 및 고장상태 확인	확인 불가	확인 불가
전원	AC 220V	AC 220V / DC 48V	AC 220V
제조사/국가	에이앤디시스템 / 한국	Schreder GmbH / Austria	EKO Instrument / Japan
비고	1대 3,000만원 / 2대5,000만원	1대 3,500~3,700만원	단종 / 후속model 개발 중
외관			

외국장비와 비교 (디자인)



ACOS-1800
에이앤디시스템
Korea

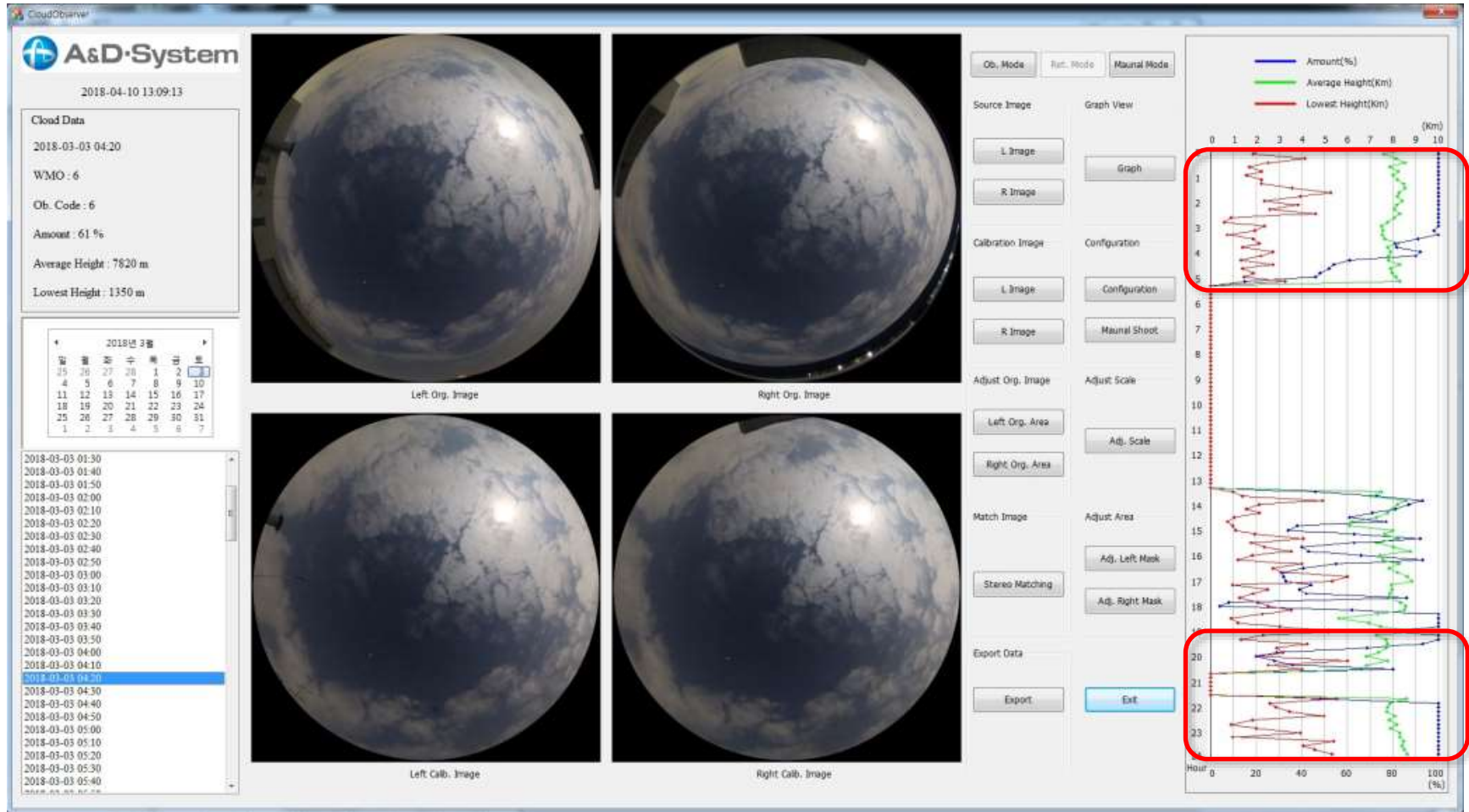


ASI-16
Schreder GmbH
Austria



SRF-02
EKO Instrument
Japan

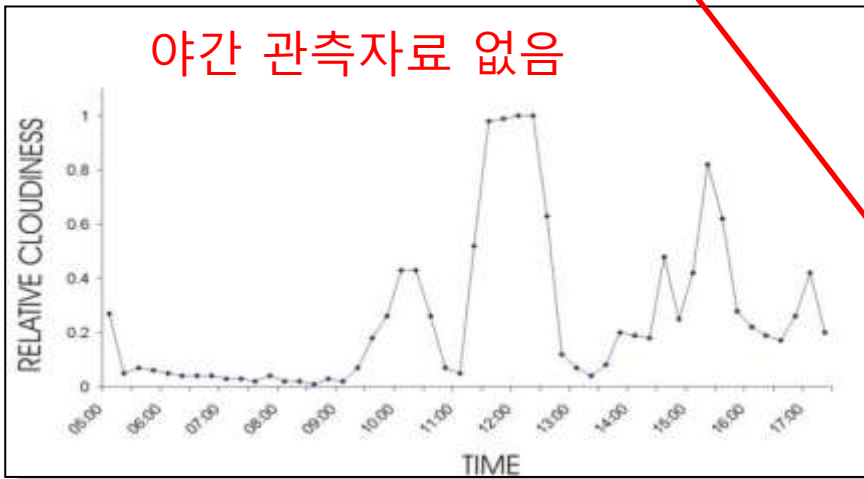
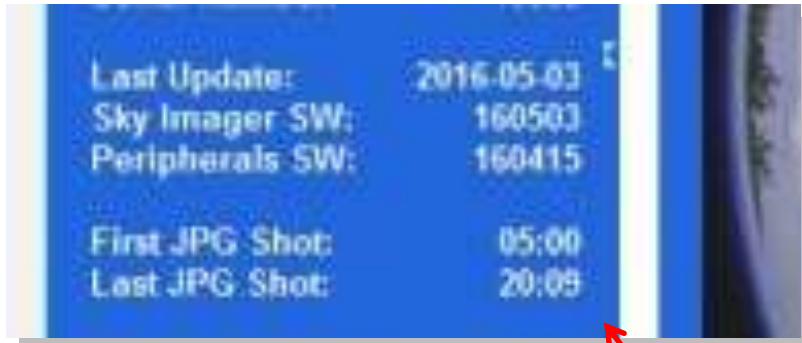
특성 비교 (ACOS-1800)



야간 관측자료

관측시간 : 00:00~23:50 / 관측주기 : 매 10분 / 180도 촬영영상과 평활영상

특성 비교 (ASI-16)



그래프 시간 : 05:00~17:30
 사양서 시간 : 05:00~20:09

CMS Schreder - Styria #1 (/2)
 Office, Lamberg 34, A-8411 Hengsberg, G. Lerneiss
 LAT: 46.87283333 N - LON: 15.45416667 E - ELE: 382m

View Control
 Auto
 100%
 50%

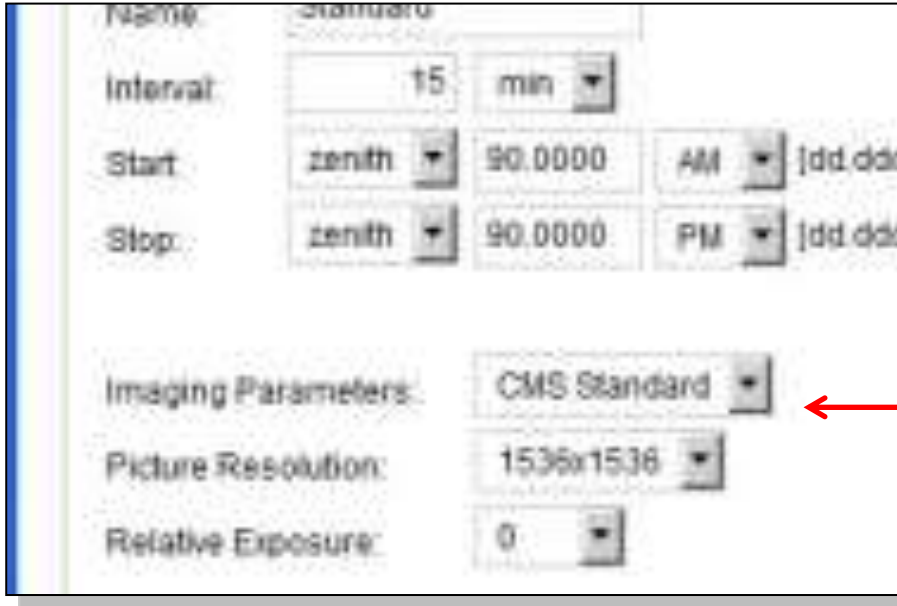
Local Capture

All Sky Imager
 Serial Number: 16009
 Last Update: 2016-05-03
 Sky Imager SW: 160503
 Peripherals SW: 160415
 First JPG Shot: 05:00
 Last JPG Shot: 20:09

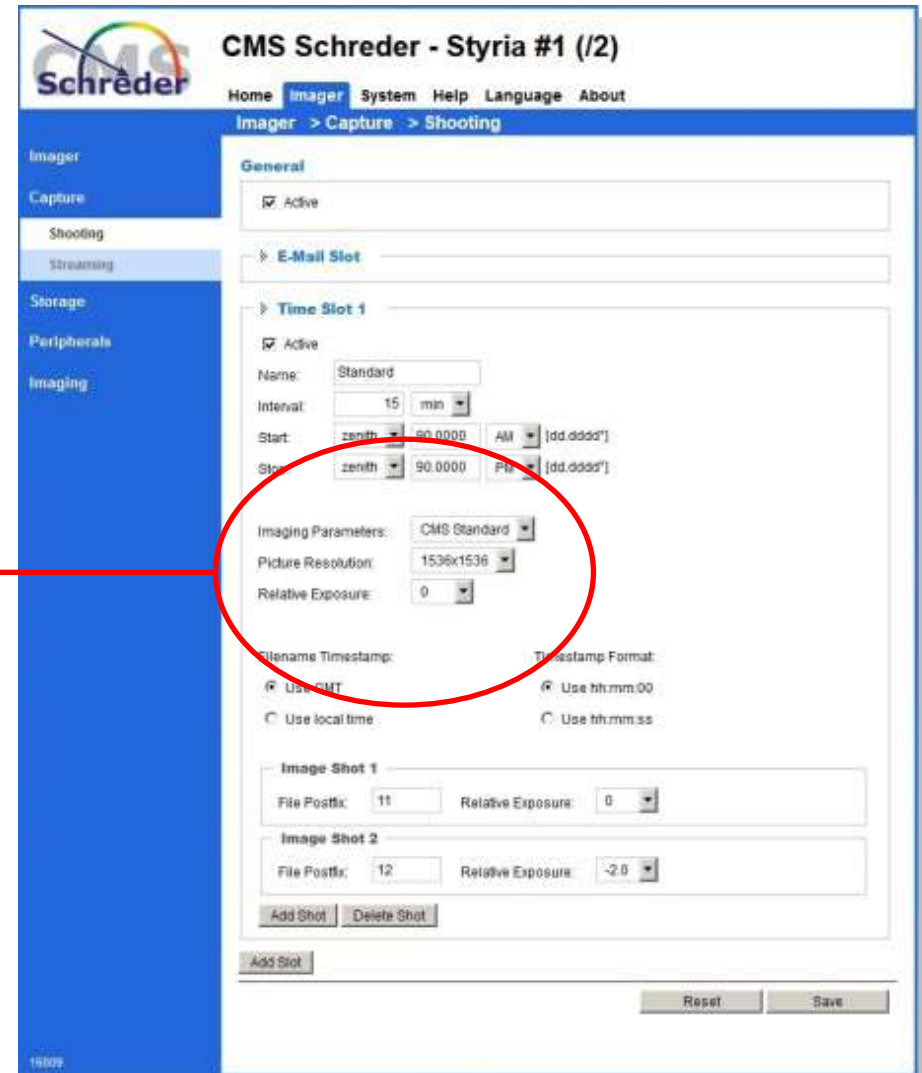
Peripherals
 Temperature: 21 °C
 Rel. Humidity: 41 %
 Dew Point: 8 °C
 Fan Status: ON
 Heater Status: OFF
 Sensor Status: ON

Home | Imager | System | Help | Language | About
 ASI 16009 2016/05/05 16:16:50

특성 비교 (ASI-16)

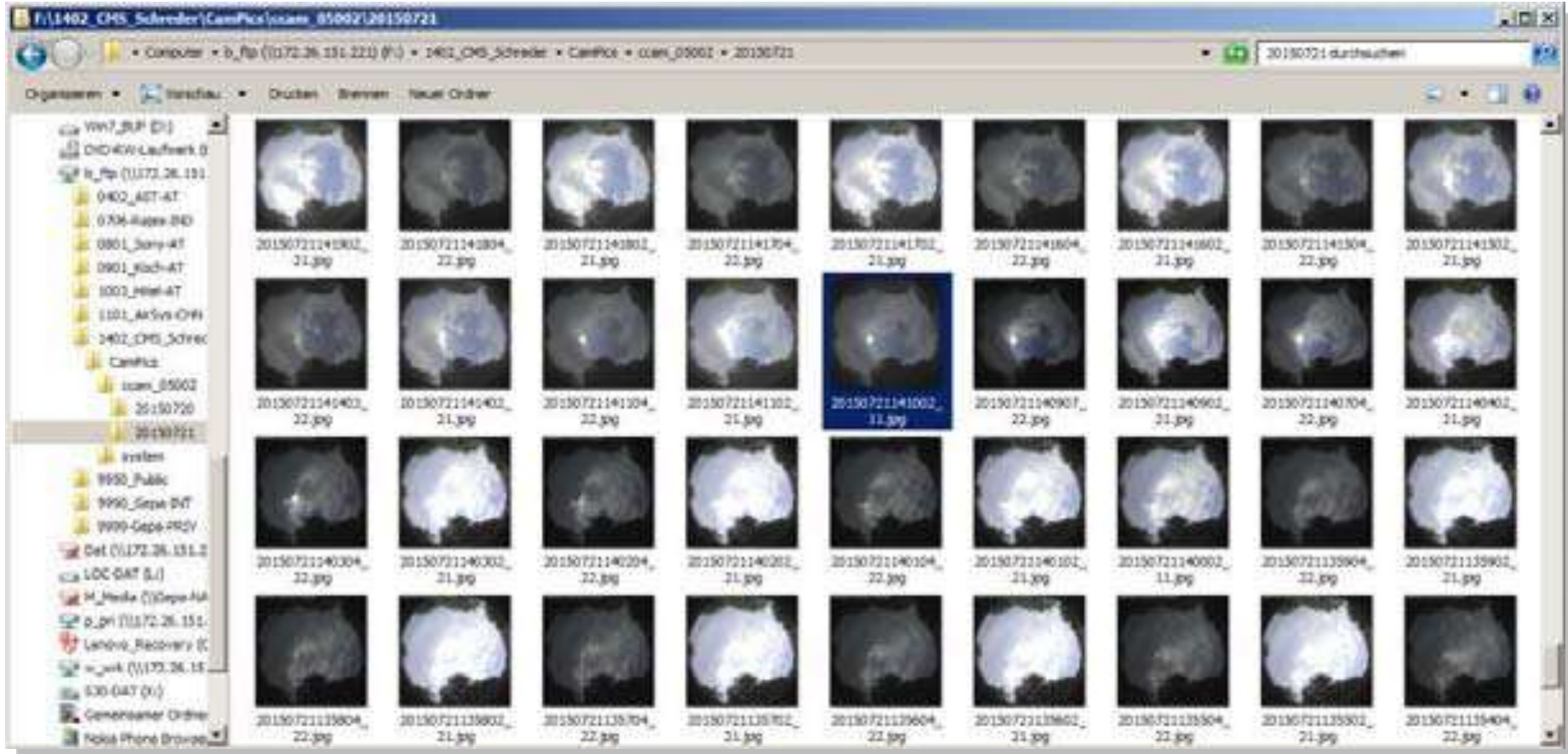


동작 해상도 : 1,536X1,536
사양서 해상도 : 1,920X1,920



특성 비교 (ASI-16)

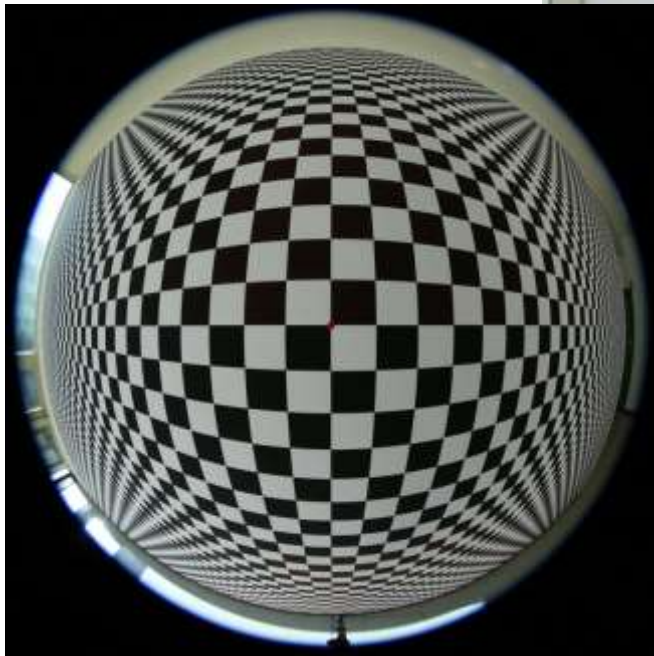
Auto-created server directory (.../Camera/Day/)
Ready for all CMS cloud analysis software.



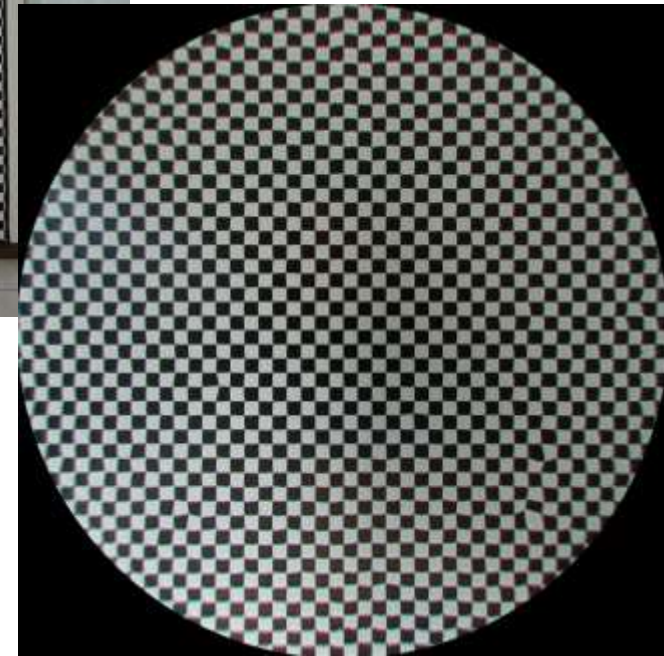
일자 별 검색이 안되고 Windows 검색창의 일자 별 Fauld 에서 자료 추출

왜곡영상 평활 보정 (Pattern)

촬영원본 왜곡영상



평활 보정 영상



촬영원본 영상

왜곡영상 평활 보정 (실제영상)

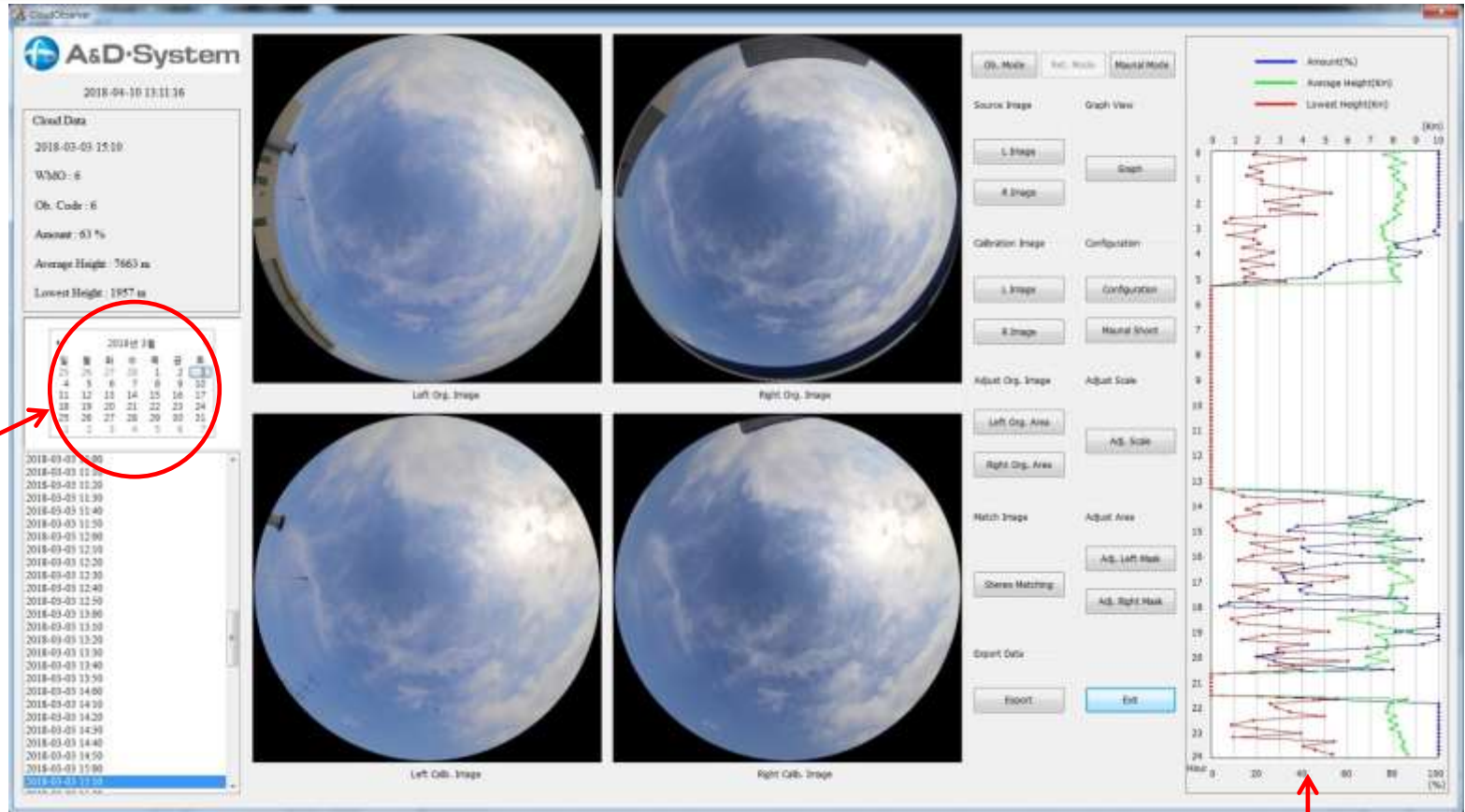


촬영원본 왜곡영상 (운량25%)



평활 보정 영상 (운량40%)

ACOS-1800 User Interface

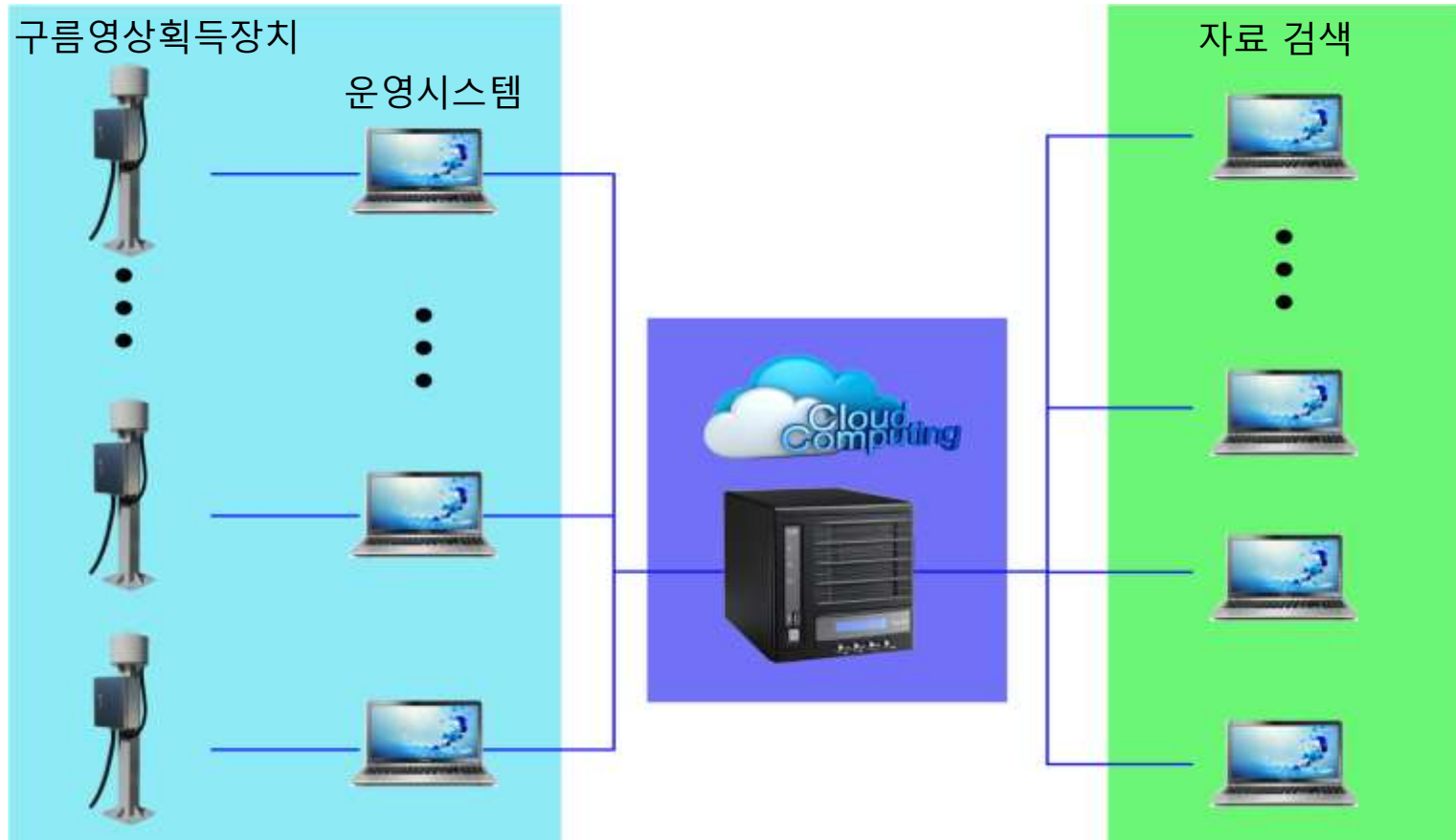


운영시스템 기본 화면

◆ 평할 보정 영상 출력 : 촬영영상과 평할 보정 영상을 동시에 관찰

운량, 운고 시간 별 그래프
(0:00~24:00 / 10분 단위)

ACOS-1800 네트워크



클라우드 시스템을 통하여 원하는 장소 어느 곳에서도
실시간으로 구름 영상정보의 검색이 가능함.

시스템 사양

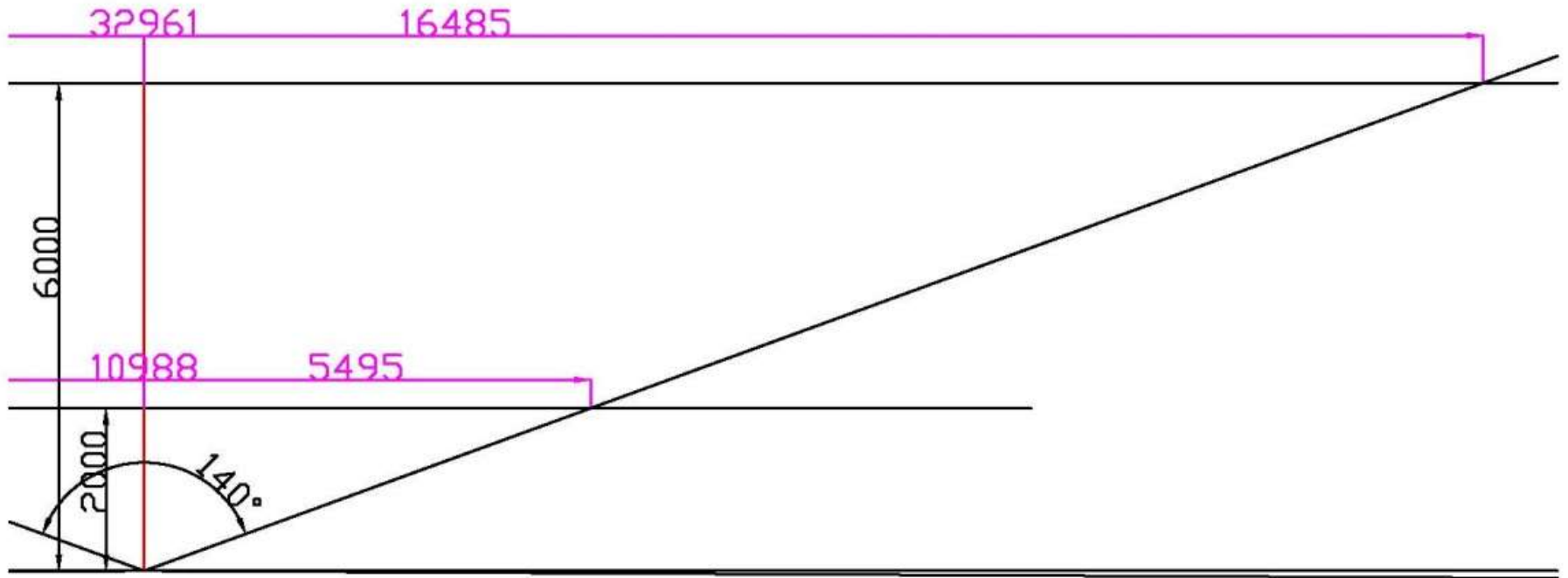
◆ 운영시스템 기본사항 및 자료 검색

- 컴퓨터 HW와 운영프로그램 분리 관리
- 운영체제 : Windows 7 32Bit 또는 그 이상
- 측정자료 : 운량(% , 관측 code, WMO code) / 운고(추정 최저운고, 추정 평균운고)
- 중앙 Cloud Server와 Network System 체재 구축
- 목적 자료 입력 기능

◆ 영상획득장치 기본 사양

- 획득 영상 해상도 : 2,432X2,432 (최대해상도 : 3,648X3,648)
- 야간 촬영 및 관측 기능 : ISO 25,600 (세계 유일)
- 동작 전압 : 220V AC
- 시스템 통신 : 이더넷 통신
- 크기 : 264(W) X 264(D) X 247(H)
- 무게 : 6.5Kg

촬영 화각 140도 참고자료



- ◆ 렌즈 화각 140도의 경우 관찰되는 지역 범위
 - 2,000m 상공의 구름 : 직경 11Km 지역
 - 6,000m 상공의 구름 : 직경 33Km 지역

촬영 화각 140도 참고자료



ACOS-1700 설치사진 (대전기상청)

설치일자 : 2017년 4월 24일

장비 이격 간격 : 36m

장비명 : ACOS-1700 V3.0



ACOS-1800 설치사진 (천안 강설 시)

설치일자 : 2017년 11월 15일

장비 이격 간격 : 38m

장비명 : ACOS-1800 V3.5



표출시스템 사무실에 위치



ACOS-1800 설치사진 (천안)

설치일자 : 2018년 2월 10일

장비 이격 간격 : 38m

장비명 : ACOS-1800 V4.0



표출시스템 사무실에 위치



감사합니다

A&D-System

2018-04-10 11:21:25

Cloud Data

2018-03-03 00:00

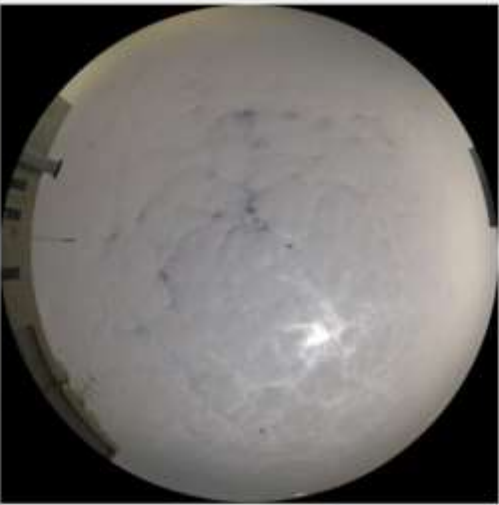
WMO : 8

Ob. Code : 10

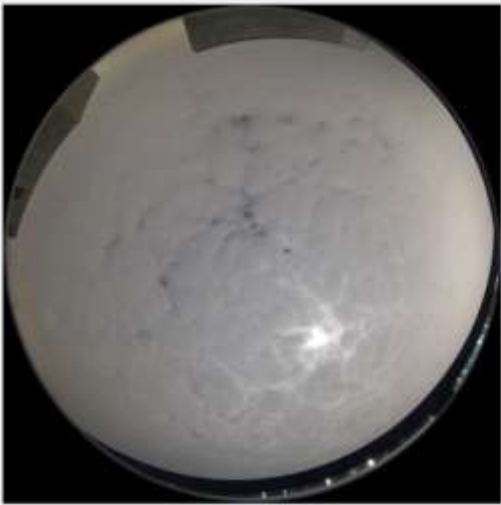
Amount : 100 %

Average Height : 8326 m

Lowest Height : 2017 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

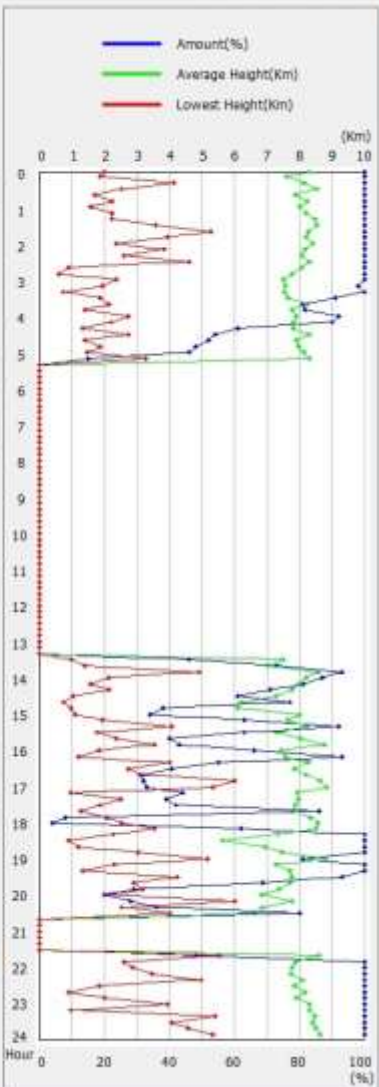
Graph View

Graph

Amount(%)

Average Height(Km)

Lowest Height(Km)



2018년 3월						
일	월	화	수	목	금	토
25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-03 00:00

2018-03-03 00:10

2018-03-03 00:20

2018-03-03 00:30

2018-03-03 00:40

2018-03-03 00:50

2018-03-03 01:00

2018-03-03 01:10

2018-03-03 01:20

2018-03-03 01:30

2018-03-03 01:40

2018-03-03 01:50

2018-03-03 02:00

2018-03-03 02:10

2018-03-03 02:20

2018-03-03 02:30

2018-03-03 02:40

2018-03-03 02:50

2018-03-03 03:00

2018-03-03 03:10

2018-03-03 03:20

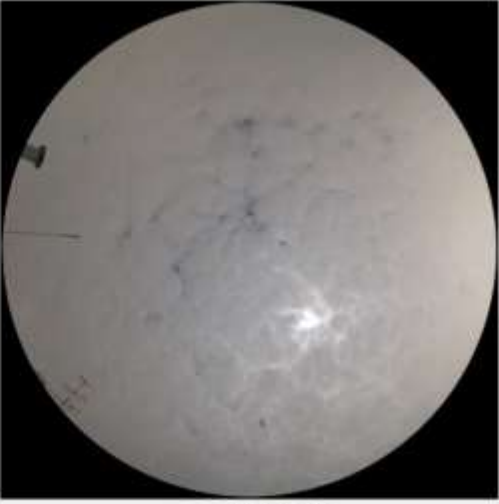
2018-03-03 03:30

2018-03-03 03:40

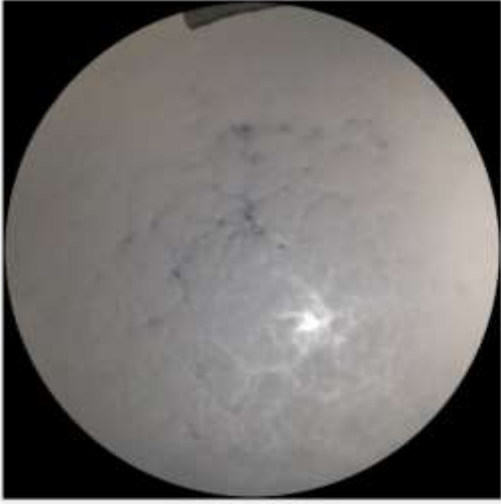
2018-03-03 03:50

2018-03-03 04:00

2018-03-03 04:10



Left Calb. Image



Right Calb. Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Configuration

Configuration

Manual Shoot

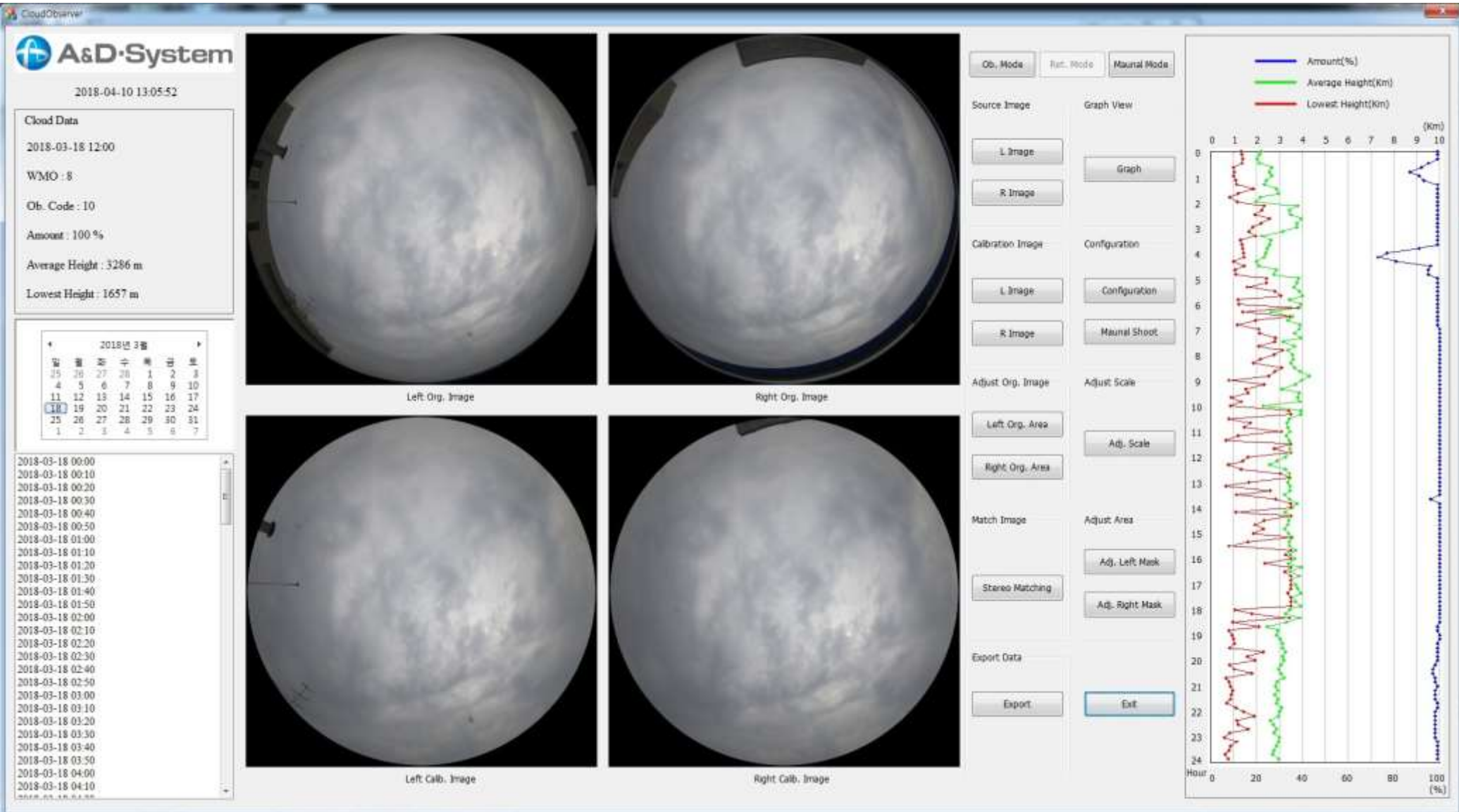
Adjust Scale

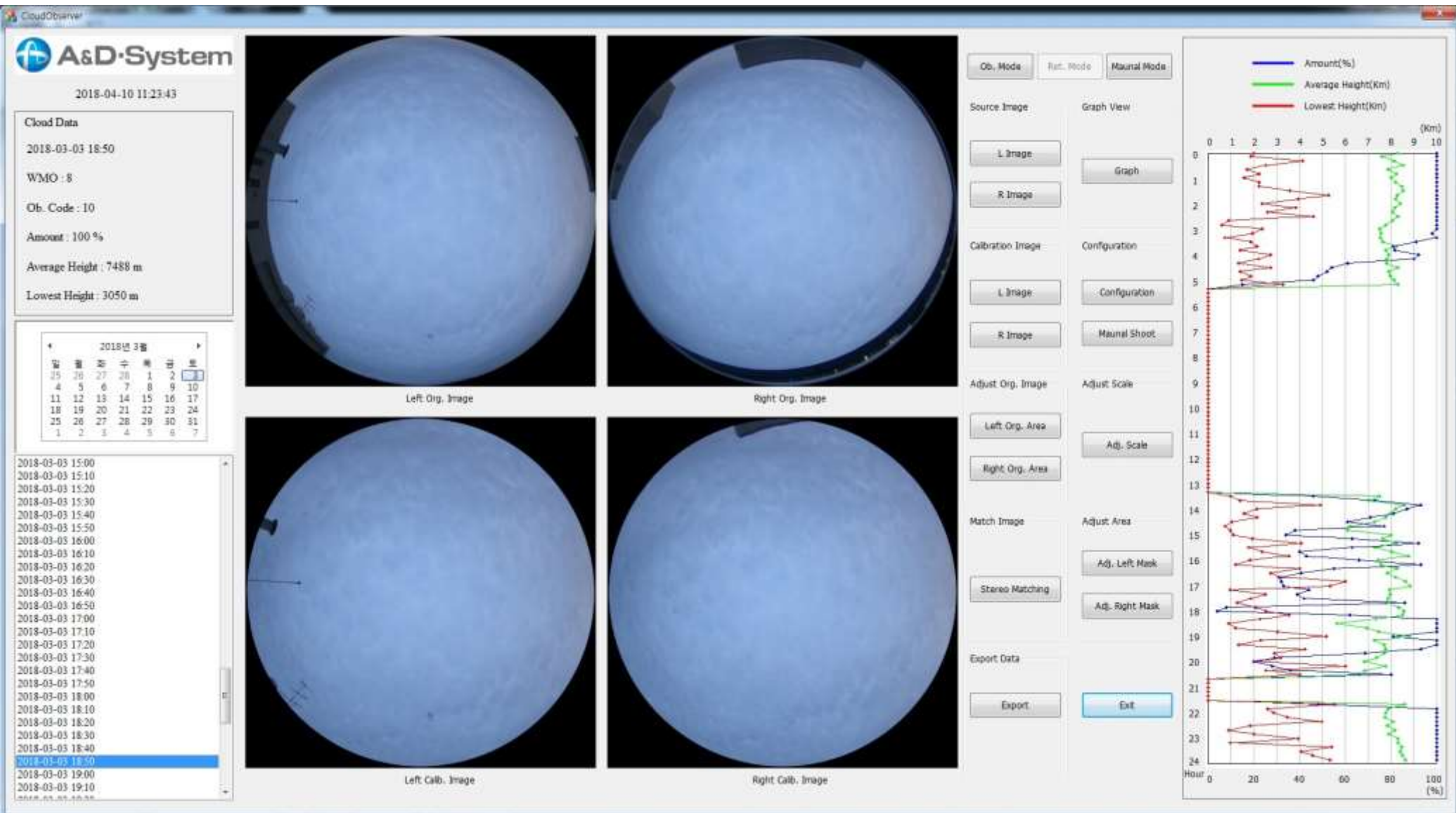
Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit





A&D-System

2018-04-10 11:20:15

Cloud Data

2018-03-02 21:00


WMO : 0

Ob. Code : 0

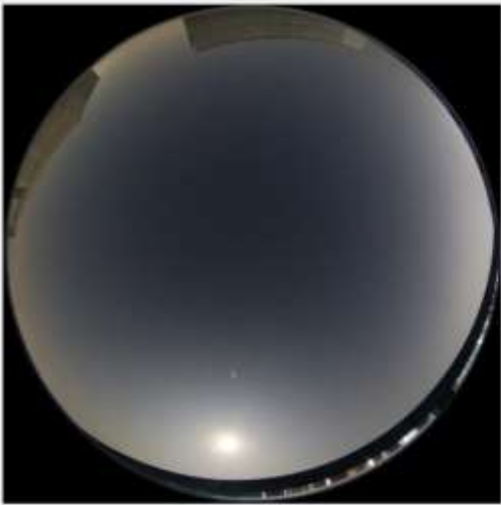
Amount : 0%

Average Height : 0 m

Lowest Height : 0 m



Left Org. Image



Right Org. Image

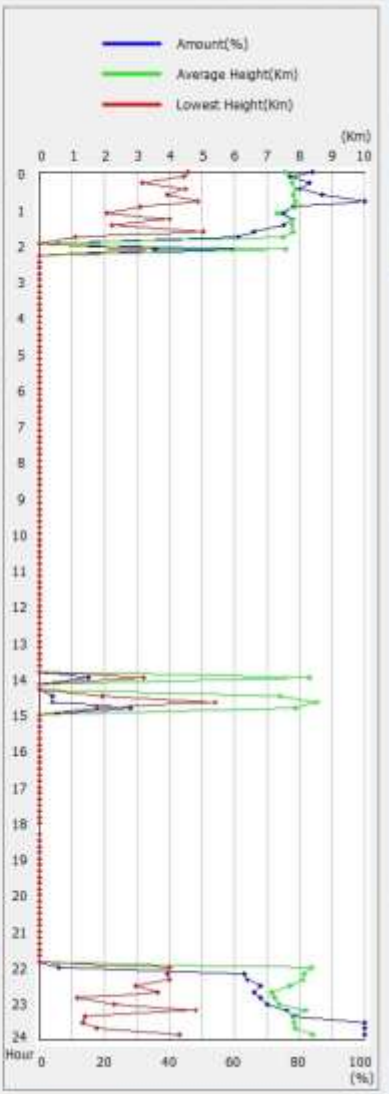
Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Graph View

Graph



Amount(%)
Average Height(Km)
Lowest Height(Km)

Hour 0 1 2 3 4 5 6 7 8 9 10 (Km)

2018년 3월						
일	월	화	수	목	금	토
25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-02 19:40

2018-03-02 19:50

2018-03-02 20:00

2018-03-02 20:10

2018-03-02 20:20

2018-03-02 20:30

2018-03-02 20:40

2018-03-02 20:50

2018-03-02 21:00

2018-03-02 21:10

2018-03-02 21:20

2018-03-02 21:30

2018-03-02 21:40

2018-03-02 21:50

2018-03-02 22:00

2018-03-02 22:10

2018-03-02 22:20

2018-03-02 22:30

2018-03-02 22:40

2018-03-02 22:50

2018-03-02 23:00


2018-03-02 23:10

2018-03-02 23:20


2018-03-02 23:30

2018-03-02 23:40

2018-03-02 23:50



Left Calb. Image



Right Calb. Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Configuration

Configuration

Manual Shoot

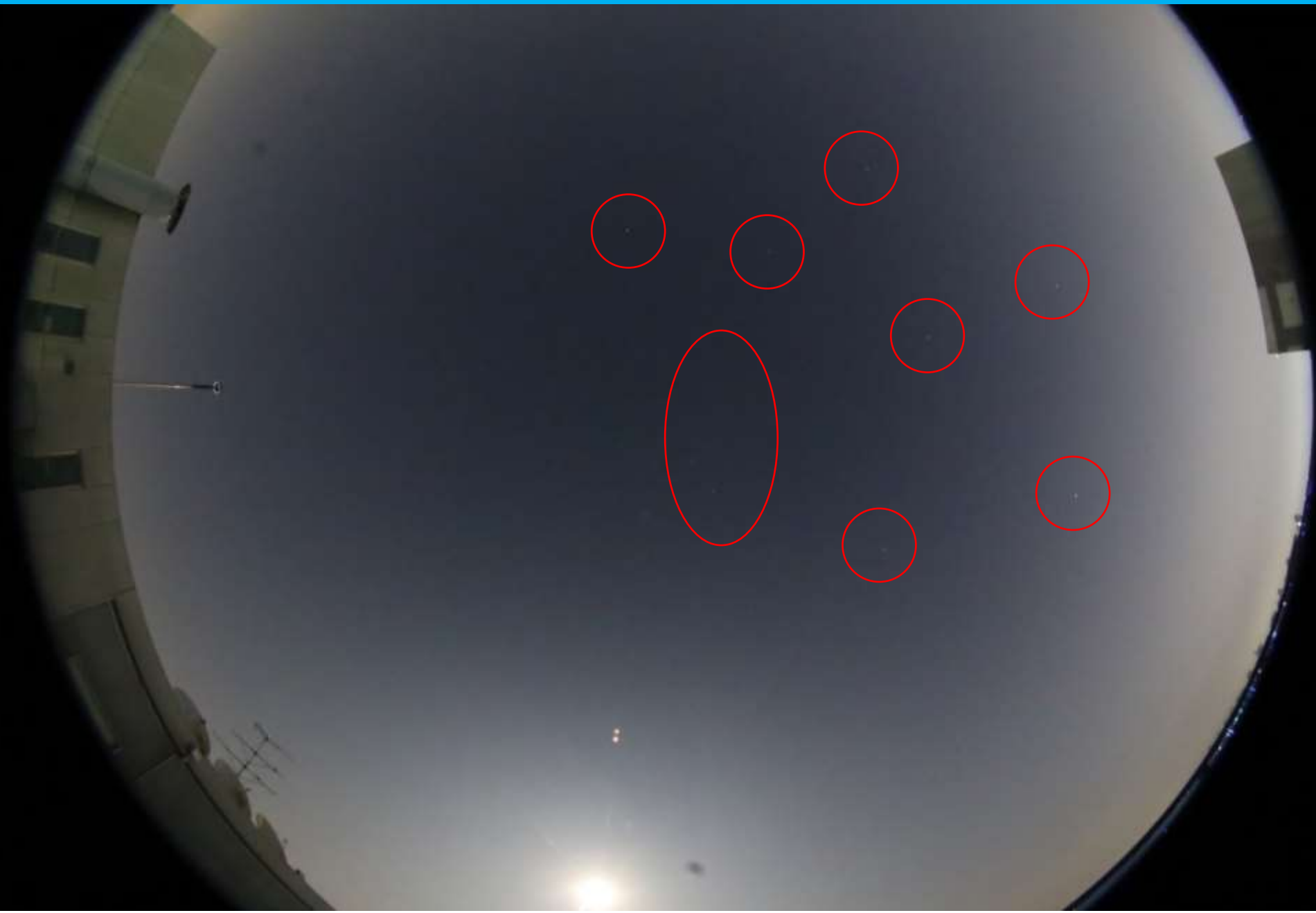
Adjust Scale


Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit





2018-04-10 11:14:01

Cloud Data

2018-03-02 08:30

WMO : 0

Ob. Code : 0


Amount : 0%

Average Height : 0 m


Lowest Height : 0 m

2018년 3월						
일	월	화	수	목	금	토
25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

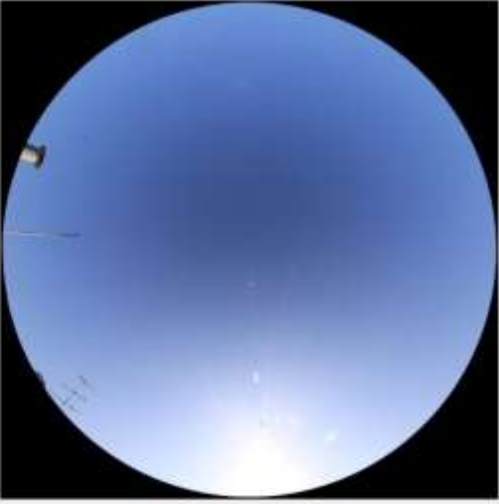
- 2018-03-02 05:30
- 2018-03-02 05:40
- 2018-03-02 05:50
- 2018-03-02 06:00
- 2018-03-02 06:10
- 2018-03-02 06:20
- 2018-03-02 06:30
- 2018-03-02 06:40
- 2018-03-02 06:50
- 2018-03-02 07:00
- 2018-03-02 07:10
- 2018-03-02 07:20
- 2018-03-02 07:30
- 2018-03-02 07:40
- 2018-03-02 07:50
- 2018-03-02 08:00
- 2018-03-02 08:10
- 2018-03-02 08:20
- 2018-03-02 08:30
- 2018-03-02 08:40
- 2018-03-02 08:50
- 2018-03-02 09:00
- 2018-03-02 09:10
- 2018-03-02 09:20
- 2018-03-02 09:30
- 2018-03-02 09:40




Left Org. Image



Right Org. Image



Left Calb. Image



Right Calb. Image

Ob. Mode
Ret. Mode
Manual Mode

Source Image

L Image

R Image

Graph View

Graph

Calibration Image

L Image

R Image

Configuration

Configuration

Manual Shoot

Adjust Org. Image

Left Org. Area

Right Org. Area

Adjust Scale

Adj. Scale

Match Image

Stereo Matching

Adjust Area

Adj. Left Mask

Adj. Right Mask

Export Data

Export

Exit

Legend:

- Amount(%)
- Average Height(Km)
- Lowest Height(Km)

A&D-System

2018-04-10 11:15:53

Cloud Data

2018-03-02 12:00


WMO : 0

Ob. Code : 0


Amount : 0%

Average Height : 0 m


Lowest Height : 0 m




Left Org. Image



Right Org. Image



Left Calib. Image



Right Calib. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

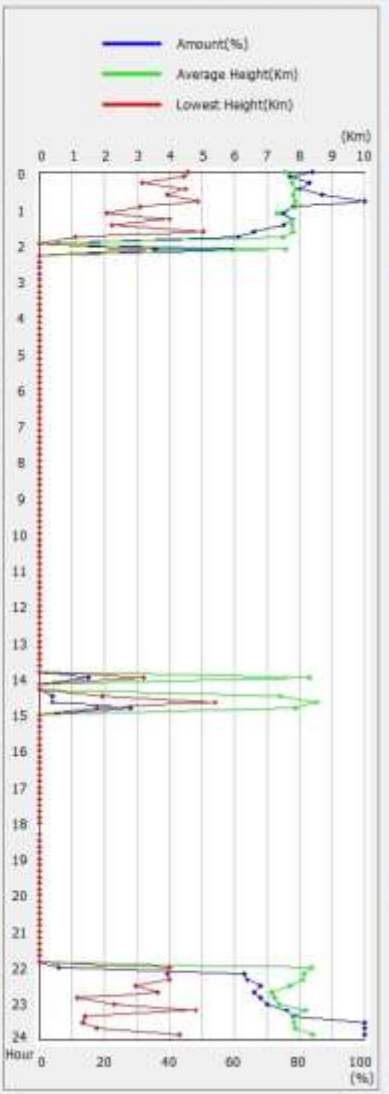
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%) Average Height(Km) Lowest Height(Km)

Hour (%)

A&D-System

2018-04-10 11:17:27

Cloud Data

2018-03-02 19:00


WMO : 0

Ob. Code : 0


Amount : 0%

Average Height : 0 m


Lowest Height : 0 m




Left Orig. Image



Right Orig. Image



Left Calib. Image



Right Calib. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Orig. Image

Left Orig. Area Right Orig. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

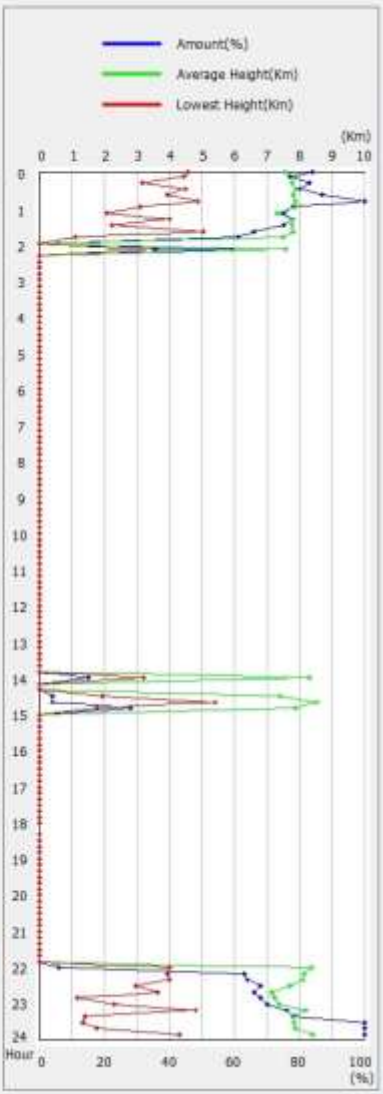
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%) Average Height(Km) Lowest Height(Km)

Hour (%)

A&D-System

2018-04-10 13:09:13

Cloud Data

2018-03-03 04:20

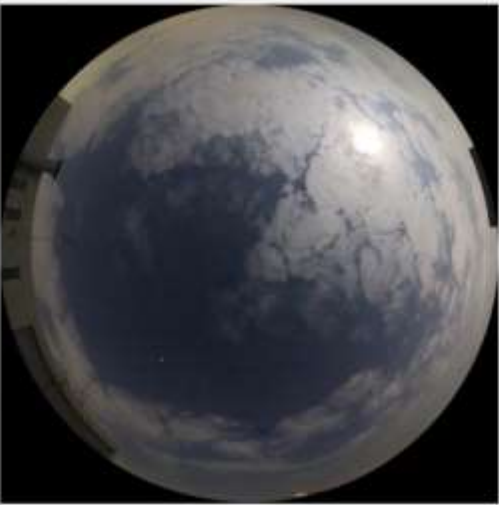
WMO : 6

Ob. Code : 6

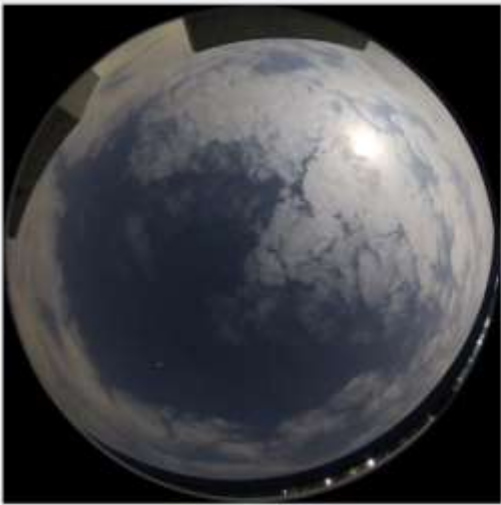
Amount : 61 %

Average Height : 7820 m

Lowest Height : 1350 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

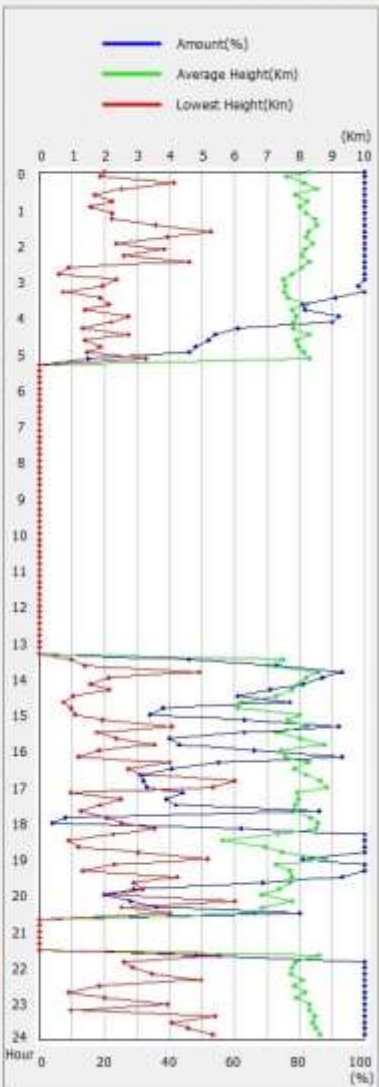
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%) Average Height(Km) Lowest Height(Km)

Hour 0 1 2 3 4 5 6 7 8 9 10

(Km)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

0 20 40 60 80 100 (%)

2018년 3월

일	월	화	수	목	금	토	일
25	26	27	28	1	2		
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
18	19	20	21	22	23	24	
25	26	27	28	29	30	31	
1	2	3	4	5	6	7	

2018-03-03 01:30

2018-03-03 01:40

2018-03-03 01:50

2018-03-03 02:00

2018-03-03 02:10

2018-03-03 02:20

2018-03-03 02:30

2018-03-03 02:40

2018-03-03 02:50

2018-03-03 03:00

2018-03-03 03:10

2018-03-03 03:20

2018-03-03 03:30

2018-03-03 03:40

2018-03-03 03:50

2018-03-03 04:00

2018-03-03 04:10

2018-03-03 04:20

2018-03-03 04:30

2018-03-03 04:40

2018-03-03 04:50


2018-03-03 05:00

2018-03-03 05:10

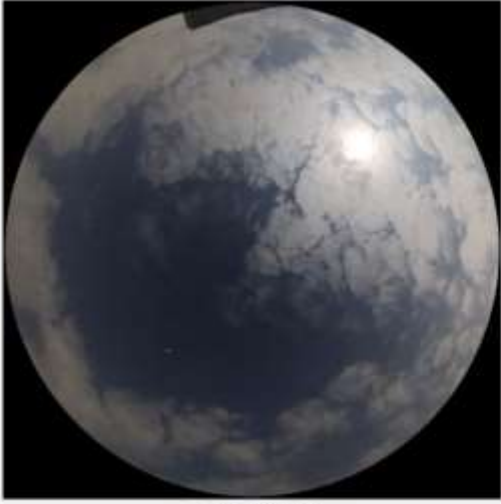
2018-03-03 05:20

2018-03-03 05:30

2018-03-03 05:40



Left Calb. Image



Right Calb. Image

A&D-System

2018-04-10 13:27:58

Cloud Data

2018-02-14 08:10


WMO : 6

Ob. Code : 6


Amount : 65 %

Average Height : 7686 m


Lowest Height : 1107 m




Left Org. Image



Right Org. Image



Left Calb. Image



Right Calb. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit

Amount(%) Average Height(Km) Lowest Height(Km)

Hour 0 1 2 3 4 5 6 7 8 9 10 (km)

0 1 2 3 4 5 6 7 8 9 10

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

0 20 40 60 80 100 (%)

High Technology with Customers

A&D-System

2018-04-10 13:11:16

Cloud Data

2018-03-03 15:10


WMO : 6

Ob. Code : 6


Amount : 63 %

Average Height : 7663 m

Lowest Height : 1957 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

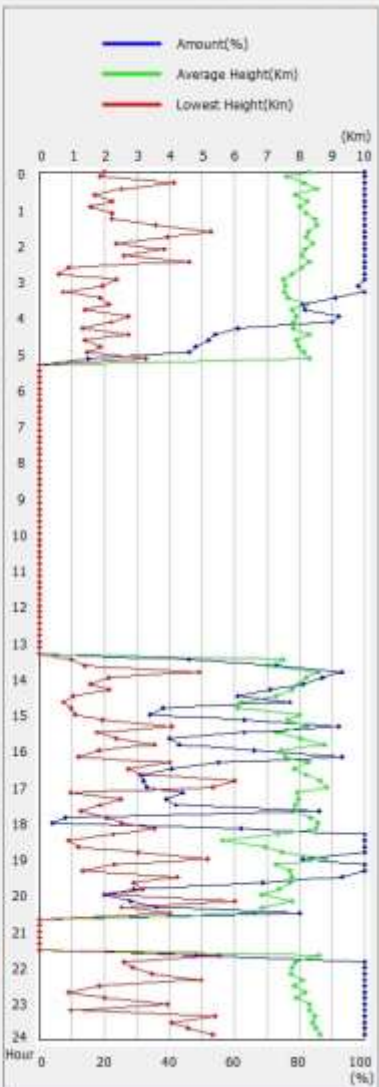
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%) Average Height(Km) Lowest Height(Km)

Hour 0 1 2 3 4 5 6 7 8 9 10

(Km)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

0 20 40 60 80 100 (%)

2018년 3월

일	월	화	수	목	금	토	일
25	26	27	28	1	2	3	4
4	5	6	7	8	9	10	11
11	12	13	14	15	16	17	18
18	19	20	21	22	23	24	25
25	26	27	28	29	30	31	1
2	3	4	5	6	7	8	9

2018-03-03 11:00

2018-03-03 11:10

2018-03-03 11:20

2018-03-03 11:30

2018-03-03 11:40

2018-03-03 11:50

2018-03-03 12:00

2018-03-03 12:10

2018-03-03 12:20

2018-03-03 12:30

2018-03-03 12:40

2018-03-03 12:50

2018-03-03 13:00

2018-03-03 13:10

2018-03-03 13:20

2018-03-03 13:30

2018-03-03 13:40

2018-03-03 13:50

2018-03-03 14:00

2018-03-03 14:10

2018-03-03 14:20


2018-03-03 14:30

2018-03-03 14:40


2018-03-03 14:50

2018-03-03 15:00

2018-03-03 15:10



Left Calb. Image



Right Calb. Image

A&D System

2018-04-10 11:29:50

Cloud Data

2018-03-05 00:40


WMO : 8

Ob. Code : 10

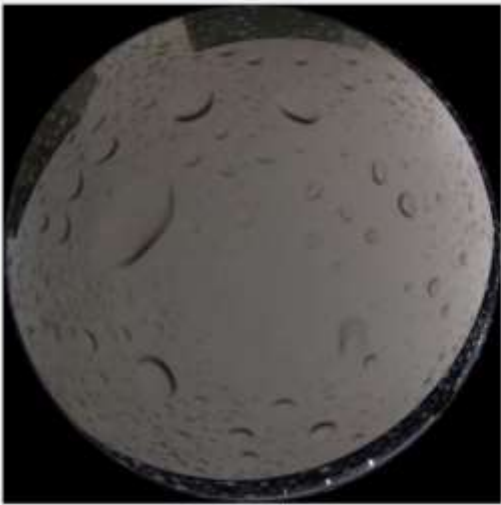
Amount : 100 %

Average Height : 7577 m

Lowest Height : 1353 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit

2018년 3월

25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-05 00:00

2018-03-05 00:10

2018-03-05 00:20

2018-03-05 00:30

2018-03-05 00:40

2018-03-05 00:50

2018-03-05 01:00

2018-03-05 01:10

2018-03-05 01:20

2018-03-05 01:30

2018-03-05 01:40

2018-03-05 01:50

2018-03-05 02:00

2018-03-05 02:10

2018-03-05 02:20

2018-03-05 02:30

2018-03-05 02:40

2018-03-05 02:50

2018-03-05 03:00

2018-03-05 03:10

2018-03-05 03:20


2018-03-05 03:30

2018-03-05 03:40


2018-03-05 03:50

2018-03-05 04:00

2018-03-05 04:10



Left Calb. Image



Right Calb. Image

A&D-System

2018-04-10 11:28:29

Cloud Data

2018-03-05 06:50


WMO : 8

Ob. Code : 10


Amount : 100 %

Average Height : 3975 m


Lowest Height : 1187 m




Left Org. Image



Right Org. Image



Left Calb. Image



Right Calb. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit

Amount(%) Average Height(Km) Lowest Height(Km)

Hour 0 20 40 60 80 100 (%)

2018년 3월						
일	월	화	수	목	금	토
25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

- 2018-03-05 03:20
- 2018-03-05 03:30
- 2018-03-05 03:40
- 2018-03-05 03:50
- 2018-03-05 04:00
- 2018-03-05 04:10
- 2018-03-05 04:20
- 2018-03-05 04:30
- 2018-03-05 04:40
- 2018-03-05 04:50
- 2018-03-05 05:00
- 2018-03-05 05:10
- 2018-03-05 05:20
- 2018-03-05 05:30
- 2018-03-05 05:40
- 2018-03-05 05:50
- 2018-03-05 06:00
- 2018-03-05 06:50
- 2018-03-05 07:00
- 2018-03-05 07:10
- 2018-03-05 07:20
- 2018-03-05 07:30

A&D System

2018-04-10 11:32:29

Cloud Data

2018-03-08 12:00


WMO : 8

Ob. Code : 10

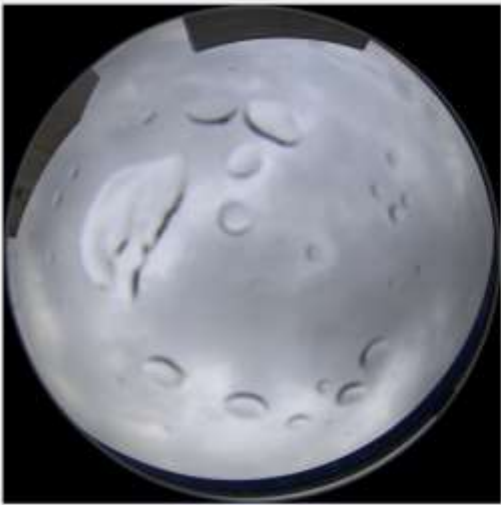
Amount : 99 %

Average Height : 3819 m

Lowest Height : 927 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit

2018년 3월

25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-08 09:30

2018-03-08 09:40

2018-03-08 09:50

2018-03-08 10:00

2018-03-08 10:10

2018-03-08 10:20

2018-03-08 10:30

2018-03-08 10:40

2018-03-08 10:50

2018-03-08 11:00

2018-03-08 11:10

2018-03-08 11:20

2018-03-08 11:30

2018-03-08 11:40

2018-03-08 11:50

2018-03-08 12:00

2018-03-08 12:10

2018-03-08 12:20

2018-03-08 12:30

2018-03-08 12:40

2018-03-08 12:50


2018-03-08 13:00

2018-03-08 13:10


2018-03-08 13:20

2018-03-08 13:30

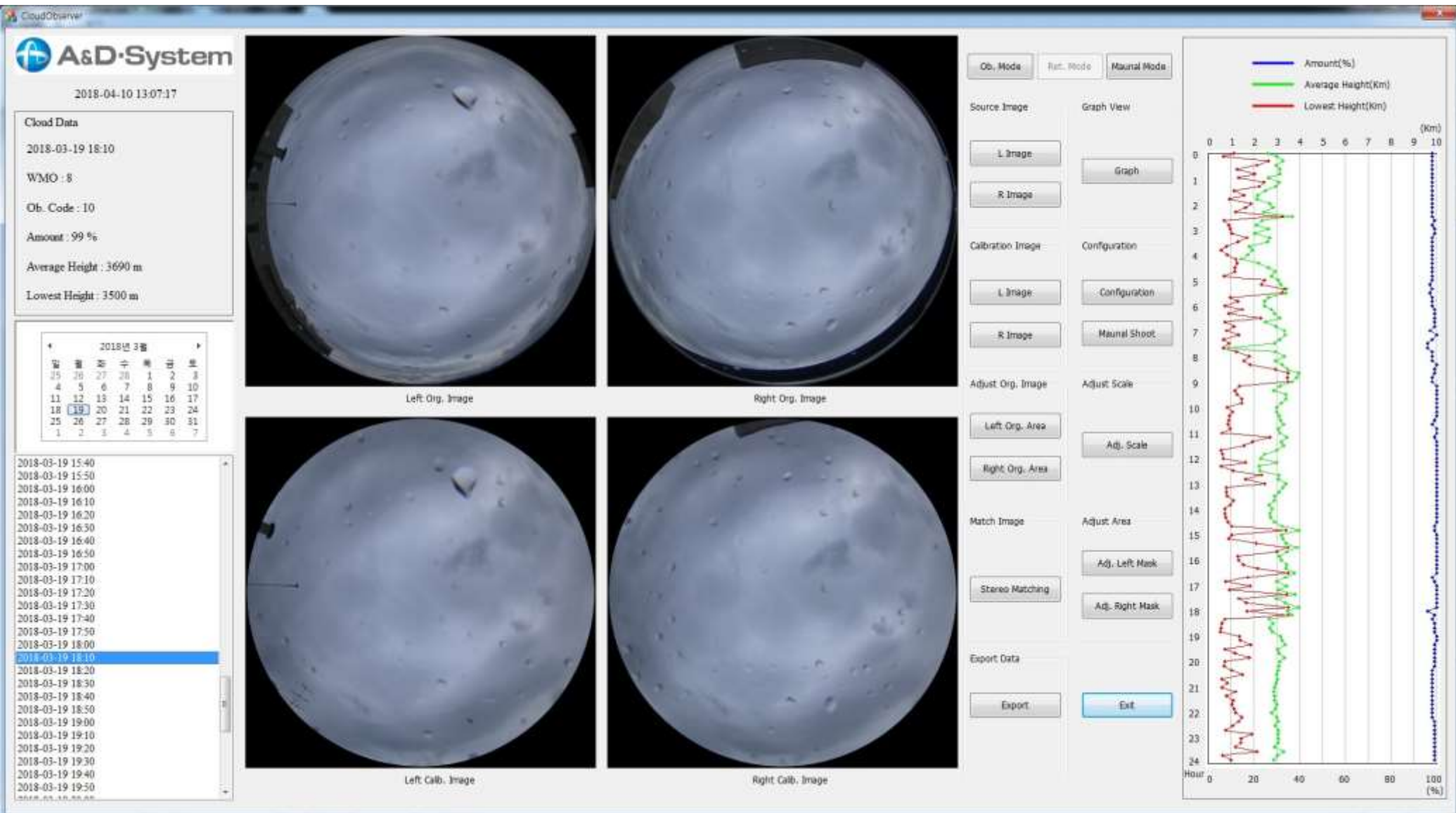
2018-03-08 13:40



Left Calb. Image



Right Calb. Image



A&D-System

2018-04-10 13:13:59

Cloud Data

2018-03-31 06:40


WMO : 0

Ob. Code : 0

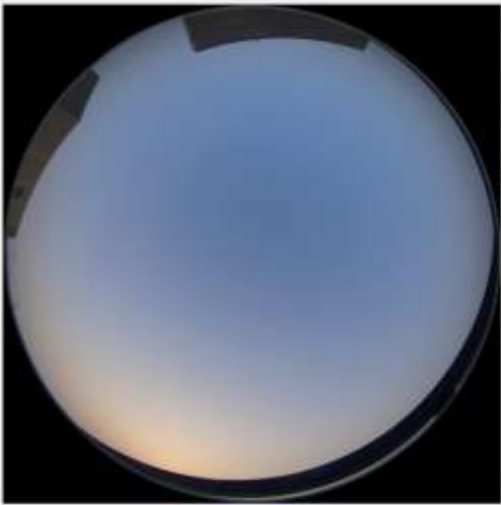
Amount : 0 %

Average Height : 0 m

Lowest Height : 0 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

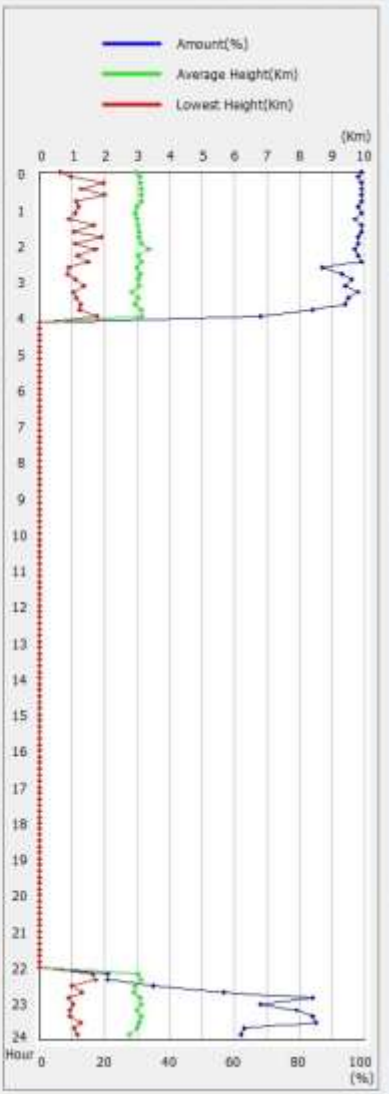
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%) Average Height(Km) Lowest Height(Km)

Hour (%)

2018년 3월

일	월	화	수	목	금	토
25	26	27	28	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-31 05:50

2018-03-31 06:00

2018-03-31 06:10

2018-03-31 06:20

2018-03-31 06:30

2018-03-31 06:40

2018-03-31 06:50

2018-03-31 07:00

2018-03-31 07:10

2018-03-31 07:20

2018-03-31 07:30

2018-03-31 07:40

2018-03-31 07:50

2018-03-31 08:00

2018-03-31 08:10

2018-03-31 08:20

2018-03-31 08:30

2018-03-31 08:40

2018-03-31 08:50

2018-03-31 09:00

2018-03-31 09:10

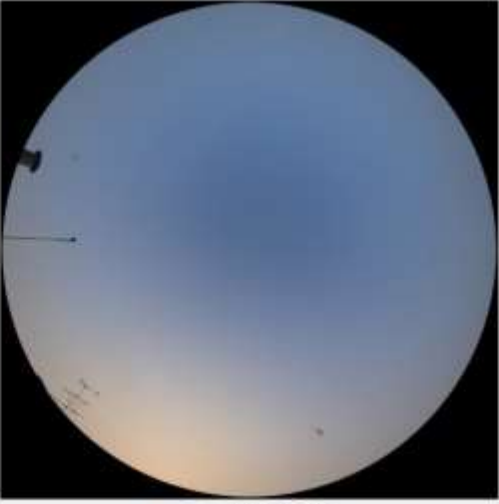
2018-03-31 09:20

2018-03-31 09:30


2018-03-31 09:40

2018-03-31 09:50

2018-03-31 10:00



Left Calb. Image



Right Calb. Image

A&D-System

2018-04-10 13:12:49

Cloud Data

2018-03-31 12:00


WMO : 0

Ob. Code : 0

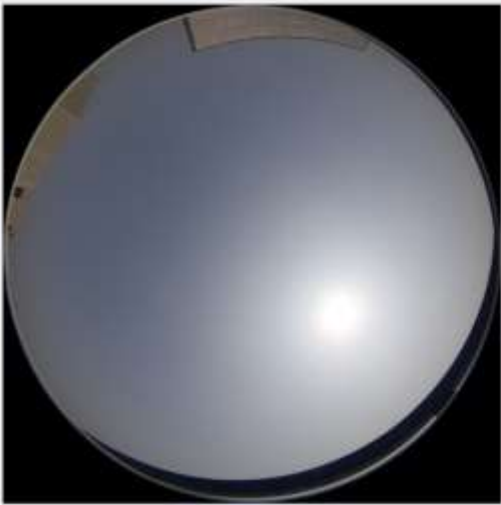
Amount : 0 %

Average Height : 0 m

Lowest Height : 0 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

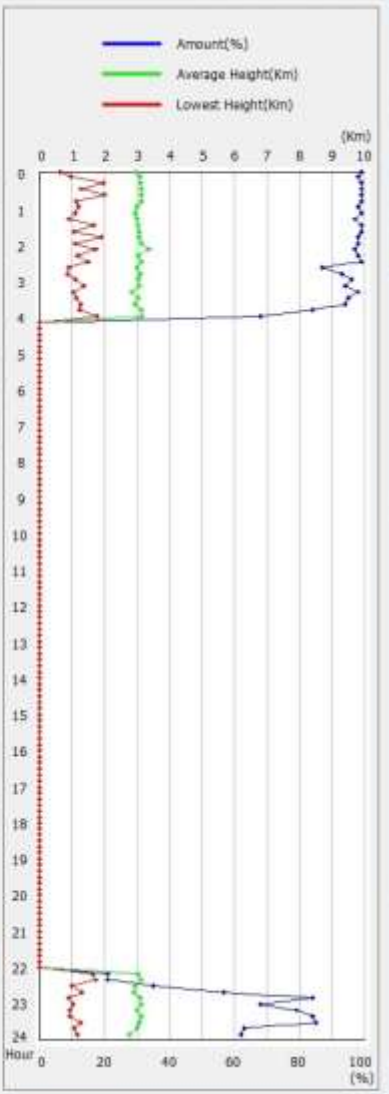
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit




Amount(%) Average Height(Km) Lowest Height(Km)


Hour (%)

2018년 3월						
일	월	화	수	목	금	토
25	26	27	28	1	2	3
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25	26	27	28	29	30	31
1	2	3	4	5	6	7

- 2018-03-31 09:00
- 2018-03-31 09:10
- 2018-03-31 09:20
- 2018-03-31 09:30
- 2018-03-31 09:40
- 2018-03-31 09:50
- 2018-03-31 10:00
- 2018-03-31 10:10
- 2018-03-31 10:20
- 2018-03-31 10:30
- 2018-03-31 10:40
- 2018-03-31 10:50
- 2018-03-31 11:00
- 2018-03-31 11:10
- 2018-03-31 11:20
- 2018-03-31 11:30
- 2018-03-31 11:40
- 2018-03-31 11:50
- 2018-03-31 12:00
- 2018-03-31 12:10
- 2018-03-31 12:20
- 2018-03-31 12:30
- 2018-03-31 12:40
- 2018-03-31 12:50
- 2018-03-31 13:00
- 2018-03-31 13:10



Left Calb. Image



Right Calb. Image

A&D-System

2018-04-10 13:15:05

Cloud Data

2018-03-31 18:40

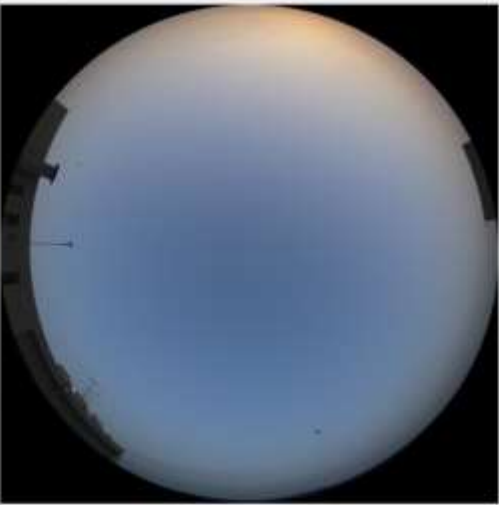
WMO : 0

Ob. Code : 0

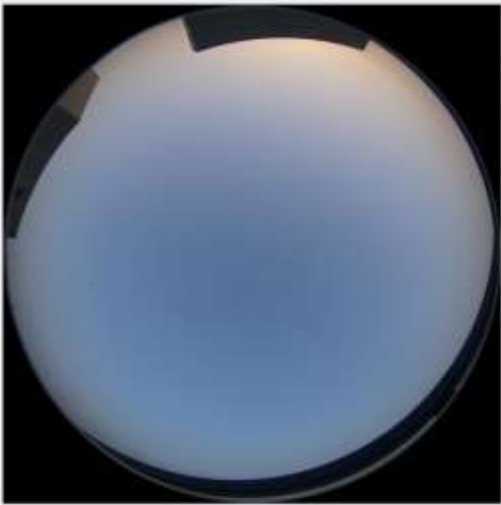
Amount : 0 %

Average Height : 0 m

Lowest Height : 0 m



Left Org. Image



Right Org. Image

Ob. Mode Ret. Mode Manual Mode

Source Image

L Image R Image

Calibration Image

L Image R Image

Adjust Org. Image

Left Org. Area Right Org. Area

Match Image

Stereo Matching

Export Data

Export

Graph View

Graph

Configuration

Configuration

Manual Shoot

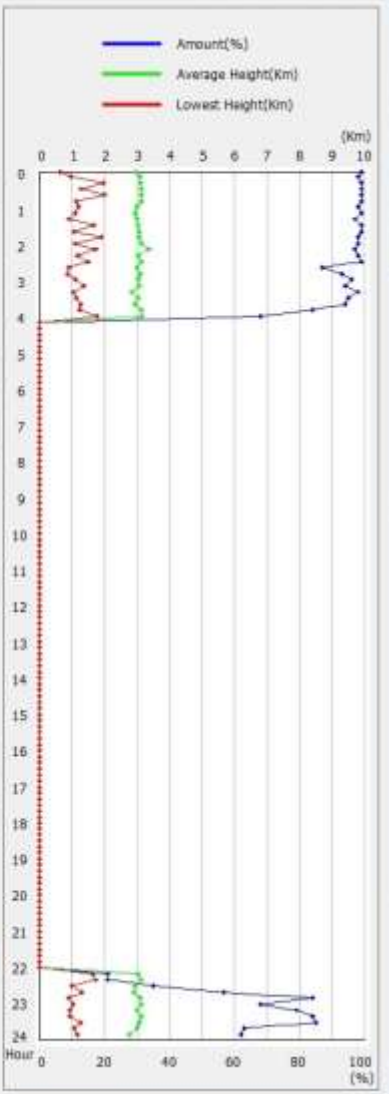
Adjust Scale

Adj. Scale

Adjust Area

Adj. Left Mask Adj. Right Mask

Exit



Amount(%)
Average Height(Km)
Lowest Height(Km)

Hour 0 1 2 3 4 5 6 7 8 9 10

(km)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

0 1 2 3 4 5 6 7 8 9 10

(%)

2018년 3월

일	월	화	수	목	금	토
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25	26	27	28	29	30	31
1	2	3	4	5	6	7

2018-03-31 16:00

2018-03-31 16:10

2018-03-31 16:20

2018-03-31 16:30

2018-03-31 16:40

2018-03-31 16:50

2018-03-31 17:00

2018-03-31 17:10

2018-03-31 17:20

2018-03-31 17:30

2018-03-31 17:40

2018-03-31 17:50

2018-03-31 18:00

2018-03-31 18:10

2018-03-31 18:20

2018-03-31 18:30

2018-03-31 18:40

2018-03-31 18:50

2018-03-31 19:00

2018-03-31 19:10

2018-03-31 19:20

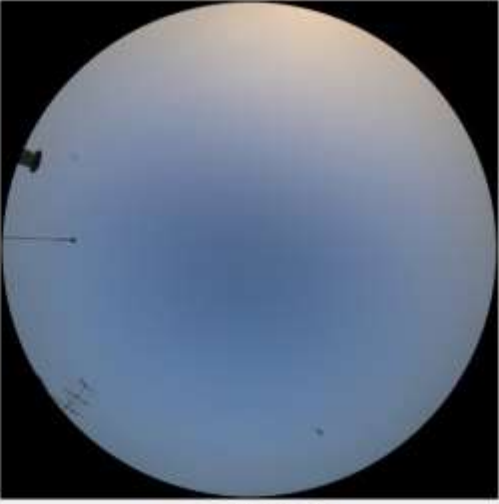
2018-03-31 19:30

2018-03-31 19:40

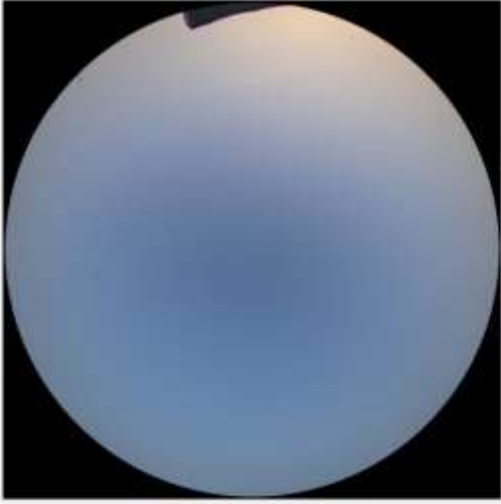
2018-03-31 19:50

2018-03-31 20:00

2018-03-31 20:10



Left Calb. Image



Right Calb. Image