

# HYVIS

## HYdrometeor VideoSonde



### Outline

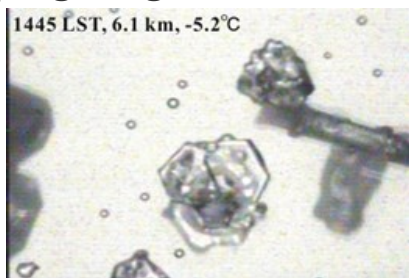
Balloon borne HYVIS is in-situ measuring instrument to capture upper-air cloud and/or ice crystal particles. HYVIS, connected with a GPS radiosonde, takes in ambient particles with sizes ranging from a few dozen  $\mu\text{m}$  to hundreds  $\mu\text{m}$  during ascension. Collected particles are attached to transparent film and then particle images are captured using two different cameras (microscope and close-up) alternately.

The captured video signals (images) are transmitted to ground HYVIS receiver system using 1680 MHz<sup>\*1</sup> radio telemetry. Antennas of the receiver system are controlled by GPS positioning information obtained from GPS radiosonde and hence automatically chase the flying HYVIS, which facilitates easy flight operation and minimizes tracking failure. The video images captured provide cloud property (shape, size, and number concentration) of sampling particles with vertical profile.

HYVIS has been using for in-situ cloud observations (microphysical properties in cloud), validation for classification of cloud particles by polarimetric radar, and numerical model simulation.

\*1) Applicable Radio Laws/Regulations should be complied with.

### Sampling Image



Cloud/ice particles captured by microscopic camera: by Nagoya Univ.

### Observation example



HYVIS system installed on JAMSTEC Vessel MIRAI, 2014

### Features

- Vertical distributions of upper clouds are directly measured capturing particles' images of minimum 10~  $\mu\text{m}$  in diameter
- Particles' characteristics such as quantity, shape, size, and number concentration versus altitude calculated by using the dedicated software (optional)
- Two different video images (close-up and microscope) are transmitted with sufficient resolution to the ground receiver
- Applicable for scientific researches like, in-situ observation of cumulonimbus and typhoon, validation to identify precipitation type by polarimetric radar, and numerical model simulation, etc.

## Specifications

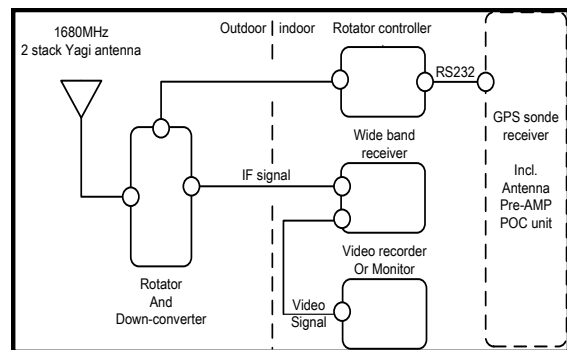
Transmitter			Receiver		
Image	Close-up Microscope	5.25 × 7 mm	Antenna	Type	Stacking two Yagi antennas
	Close-up Microscope	0.9 × 1.2 mm		Gain	> 14 dBi
Signal	Blank	2 sec.	Down Converter	Directivity	H-side: 12 deg.
	Method	7 sec.		Distance	E-side: 29 deg.
Transmitter	Frequency	1 sec.	Stand	Frequency	100 km
	Modulation	Film-capture-type		Input range	1,660 MHz to 1,700 MHz
Time		75 min.	Receiver	Output frequency	— 100dBm to — 20 dB
Size Weight	Dimensions (W/D/H)	134 × 275 × 381 mm		Antenna Controller	Movable range
	Weight	1,600 g	Tracking speed		AZ: 0 to 440 deg. EL: 0 to 180 deg. AZ: 5 deg./sec. EL: 2 deg./sec.
Model	Standard	Close-up & Microscope	Receiver	Center frequency	30 MHz
	Forced suction	Standard model with fan		Band width	3.0 MHz
Accessories	Balloon	Please contact us.	Antenna Controller	Sensitivity (max)	— 80 dBm (S/N: 20dB)
	Parachute			Output signal	1 Vp-p 75Ω Video signal
	Unwinder	Hex wrench (1.5 mm, 2.5 mm) Mister Syringe	Antenna Controller	Method	GPS slave driving
	Start-up kit			Update time	1 sec.
			Communication	RS-232C	

## Main components

- HYVIS Transmitter
- HYVIS Controller and Receiver
- HYVIS Antenna
- GPS Sonde Sounding System RD-08AC
- Start-up kit (optional)



## Block diagram



## ⚠ Cautions

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The specifications this catalog are current as of September 2018.

No. MSPA4-036 M1809

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