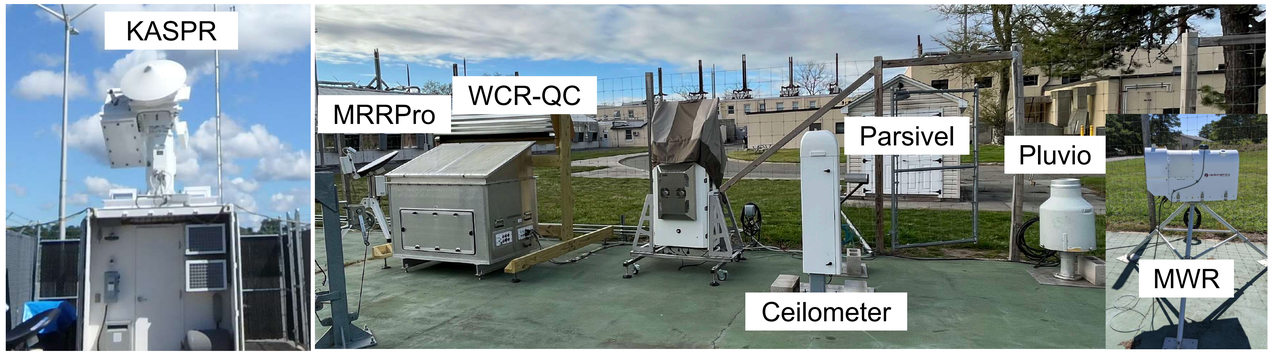
CIF: Millimeter-wavelength Radar Facility for Cloud and Precipitation Research
Stony Brook University

PI: Pavlos Kollias (pavlos.kollias@stonybrook.edu)
Co-I: Mariko Oue (mariko.oue@stonybrook.edu)

http://radarscience.weebly.com/



Multi-Frequency Radars

Instruments	Measurement	VAP
Ka-band Scanning Polarimetric Radar (KASPR, 35 GHz)	Reflectivity, Doppler velocity, Doppler spectrum width, Doppler spectra, full polarimetric observables (co- and cross- polarization)	Vertical and horizontal wind Cloud particle properties Precipitation particle properties supercooled liquid droplets, rime fraction, IWC, LWC, particle multiplication
W-band profiling radar (WCR-QPC, 94 GHz)	Reflectivity, Doppler velocity, Doppler spectrum width, Doppler spectra	Vertical velocity, particle size and fall speed, snow particle multiplication
Micro Rain Radar (MRRPro, 24 GHz)	Reflectivity, Doppler velocity, Doppler spectrum width, Doppler spectra	Precipitation particle fall speed, snow particle multiplication

Ancillary Instruments

Instruments	Measurement	VAP
Ceilometer	Lidar backscatter	Cloud base height Boundary layer height
Microwave radiometer (MWR)	Atmospheric absorption	Liquid water path, T, RH, water vapor profile
Parsivel	Snow particle size distribution, particle fall speed	Water content, precipitation particle bulk density, rime fraction
Pluvio Weighing gauge	Precipitation amount	

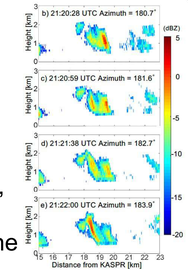
Related links

- Facility request: http://radarscience.weebly.com/observatories.html
- Realtime images: https://you.stonybrook.edu/radar/
- Instrument specifications: http://radarscience.weebly.com/observatories.html
- Multisensor Agile Adaptive Sampling: http://radarscience.weebly.com/maas1.html

Science

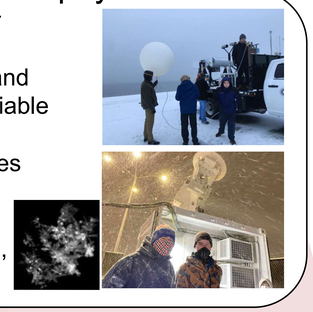
Atmospheric feature tracking

KASPR is fully integrated with the Multisensor Agile Adaptive Sampling (MAAS, Kollias et al., 2020; Lamer et al., 2023) which allows it to track atmospheric features and cloud entities of interest such as convective cells, shallow cumuli, and fall streaks. KASPR can sample using RHI the same feature every 20 to 30 sec.



Snow microphysics

Multi-frequency radar measurements in conjunction with lidar and radiometer enables reliable estimations of detailed microphysical processes and snow particle properties (e.g., size, number density, shape, rime degree).

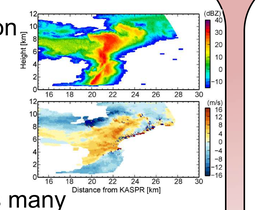


Severe weather

High-spatiotemporal resolution observations of dynamics and microphysics are available for:

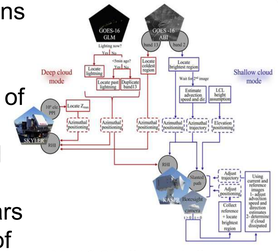
- Waterspout
- Hurricane
- Thunderstorm

KASPR polarimetry captures many microphysical and dynamical features (e.g., electrification, vorticity, riming).



Automated agile adaptive scan

Multi-sensor observations are used in real time to optimize the spatiotemporal sampling of atmospheric processes. The tailored pointing and increase in sensitivity enables the steered radars to sample a diverse set of atmospheric phenomena.



MAAS (Mutlisensor Agile Adaptive Sampling) framework

Outreach

Collaboration with local schools

Students from local community collages are given a tour of the facility and lectures of basics of radar science.

The facility and data are used for summer research (International Science and Engineering Fairs 2022–2023) by a high school student.

Virtual facility tour

https://you.stonybrook.edu/somas/2019/11/15/radar-observatory/

Summer school

The first Summer School in MM-Wavelength Radar Observations of Clouds and Precipitation was held from June 4 to June 9, 2023, in Stony Brook University. Students were given a total of ten lectures about radar basics, instrumentation, and atmospheric physics and a tour of the facility. They also worked on group researches using the datasets.