PRECIP: NCAR S-Pol radar time series data, Version 1.0

Overview

This dataset contains radar time series data in IWRF format, collected by the S-Pol radar during the Prediction of Rainfall Extremes Campaign In the Pacific (PRECIP). During PRECIP, S-Pol was located at the west coast of Taiwan and collected data from May 25 to August 11, 2022. For more information on PRECIP see https://www.eol.ucar.edu/field_projects/precip.

The site details for S-Pol at Nanliao are as follows:

Closest town	**Nanliao**
Latitude	24.8191 deg N
Longitude	120.9075 deg E
Antenna altitude	10 m MSL

Instrument description

NCAR/EOL's S-Pol radar is an advanced, transportable, ground-based, dual-polarized, Doppler weather radar. S-Pol transmits at 10 cm wavelength. The dual-polarimetric capabilities of S-Pol lead to improved precipitation estimates and real-time identification of hydrometeor types. An innovative system design eliminates the need for a radome and allows for S-Pol to be packed into seven standard 20 ft shipping containers that provide a base when the radar is unpacked and set up. The radar needs only minimal surface site preparation and its relative ease of transport makes S-Pol a valuable tool for studying precipitation and cloud processes at remote sites around the world. S-Pol has been deployed on four continents. For more information on S-Pol see www.eol.ucar.edu/instrumentation/remote-sensing/s-pol.

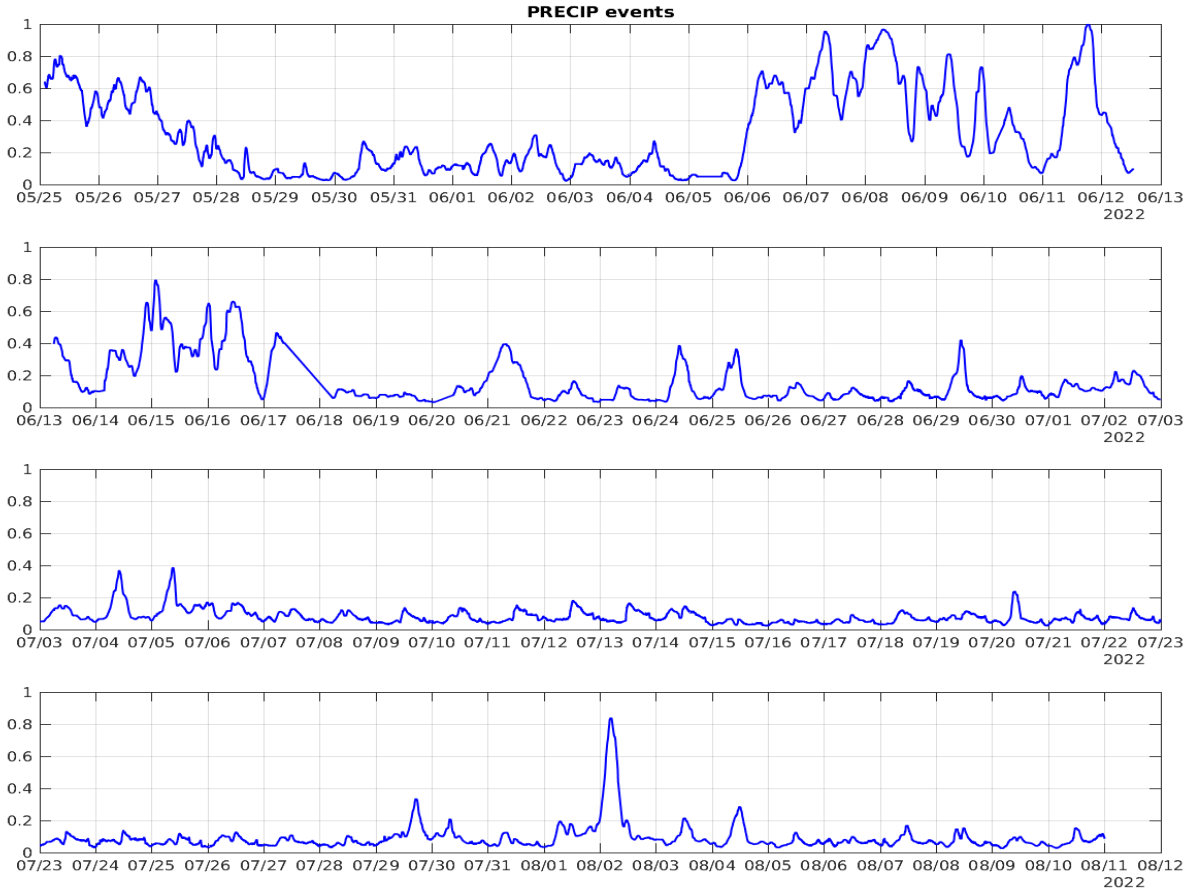
Radar characteristic	**Value**
Transmitter frequency	2.8415 GHz
Wavelength	10.557 cm
Pulse width	1.0 and 1.5 μsec
Staggered PRT 2/3 ratio	0.0016 / 0.0024 s
Peak power	630 kW
Receivers (2)	H & V
Noise power	114.5 dBm
Minimum detectable dBZ	-42.4 dBZ at 1 km -0.24 dBZ at 100km
Polarization	H-V simultaneous
Antenna	Parabolic, center feed
Gain	~45 dB including waveguide loss
Diameter	8.5 m (28 ft.)
Beamwidth	0.92 degrees

Scan rate	10.5°/s for PPIs; 6 deg/s for RHIs
Wind limit	operations: 30 m/s survivability: 54 m/s
Number of range gates	2000
Gate spacing	150 m
Max range	300 km
Number of samples	Typically 50 per dwell
Clutter filter	Adaptive using CMD
Times series (I/Q) recording	Yes

Data description

Time series data is available at https://data.eol.ucar.edu/dataset/621.003. It contains the raw in-phase (I) and quadrature (Q) information archived as IWRF time series. Documentation on the IWRF time series format is available at: https://github.com/NCAR/lrose-core/blob/master/codebase/libs/radar/doc/iwrf/IWRF_ts_format.pdf

If you do not know what radar time series data is, you are probably better served with the processed CfRadial moments data available at https://data.eol.ucar.edu/dataset/621.001.



Data processing and quality control

Time series data is the raw collected field data. It will always remain unchanged.

Known problems

- The transmit power was unstable between 2022/06/11 and 2022/06/21, with drops of up to 2 dB. This means that the v0.1 reflectivity values were low by up to 2.0 dB during this period.
- The H channel receiver gain decreased after 2022/07/15, by up to 0.5 dB. As a result both Z and ZDR field values were biased negative starting 2022/07/15. After 2022/08/07 the gain decreased by a further 1.0 dB. at 00:00 UTC, until 2022/08/08 at 09:00 UTC.

Operations log

The SPOL staff maintained an operations log throughout the project, to document issues that came up.

Data time-gaps

The following table lists data gaps of more than 30 minutes.

Gap start time	Gap end time	Gap secs	Gap hours	Reason
2022-05-29T00:59:38Z	2022-05-29T02:49:15Z	6577	1.827	Pedestal maintenance.
2022-05-30T04:59:32Z	2022-05-30T06:08:01Z	4109	1.141	Not logged.
2022-06-01T01:59:31Z	2022-06-01T04:00:57Z	7285	2.024	Calibration, pedestal maintenance.
2022-06-03T01:59:32Z	2022-06-03T04:03:41Z	7450	2.069	Pedestal maintenance.
2022-06-05T01:35:34Z	2022-06-05T02:25:02Z	2968	0.824	Pedestal maintenance.
2022-06-05T03:47:31Z	2022-06-05T13:38:47Z	35476	9.854	High winds at site.
2022-06-10T04:54:50Z	2022-06-10T08:07:02Z	11531	3.203	Pedestal maintenance.
2022-06-10T08:42:49Z	2022-06-10T10:07:26Z	5076	1.410	Breaker tripped.
2022-06-12T02:06:52Z	2022-06-12T04:00:50Z	6838	1.899	Install internet fiber.
2022-06-12T12:54:52Z	2022-06-13T05:55:38Z	61246	17.013	Pre-emptive shutdown because of transmitter problems, end of IOP.
2022-06-14T02:42:48Z	2022-06-14T04:01:17Z	4709	1.308	Pedestal maintenance.
2022-06-17T01:18:52Z	2022-06-17T03:13:13Z	6861	1.906	Maintenance - transmitter pulse shaper.
2022-06-17T06:42:51Z	2022-06-17T07:12:50Z	1799	0.500	Arc faults.
2022-06-17T08:54:52Z	2022-06-18T05:08:41Z	72829	20.230	Pre-emptive transmitter shutdown because of arc faults. This turned out to be a monitoring problem rather than real arcing.

Gap start time	Gap end time	Gap secs	Gap hours	Reason
2022-06-19T01:54:52Z	2022-06-19T03:58:14Z	7403	2.056	Pedestal maintenance.
2022-06-19T22:42:51Z	2022-06-20T00:12:51Z	5400	1.500	Installed CWB loaner pulse shaper.
2022-06-20T01:18:52Z	2022-06-20T09:12:57Z	28445	7.902	Tuned transmitter for CWB pulse shaper. Increased pulse width to 1.5 us. Calibration.
2022-06-21T01:42:58Z	2022-06-21T04:19:43Z	9404	2.612	Calibration. Pedestal maintenance.
2022-06-23T01:30:59Z	2022-06-23T04:40:23Z	11364	3.157	Calibration. Pedestal maintenance.
2022-06-24T01:30:59Z	2022-06-24T03:19:54Z	6535	1.815	Pedestal maintenance.
2022-06-26T01:54:52Z	2022-06-26T03:14:00Z	4749	1.319	Pedestal maintenance.
2022-06-27T09:18:52Z	2022-06-27T10:13:12Z	3260	0.906	Installed fan in pedestal for cooling.
2022-06-28T01:59:39Z	2022-06-28T03:14:08Z	4470	1.242	Oil system inspection.
2022-07-02T01:21:12Z	2022-07-02T01:54:11Z	1979	0.550	Not logged.
2022-07-04T01:18:52Z	2022-07-04T03:04:53Z	6362	1.767	Pedestal maintenance.
2022-07-05T02:11:50Z	2022-07-05T02:48:59Z	2229	0.619	Pedestal maintenance.
2022-07-08T03:11:39Z	2022-07-08T04:37:39Z	5161	1.434	Swapped CWB pulse shaper to replacement pulse shaper from the US.
2022-07-09T02:59:38Z	2022-07-09T03:40:42Z	2464	0.684	Receiver maintenance.
2022-07-10T02:23:38Z	2022-07-10T03:46:23Z	4965	1.379	Pedestal maintenance.
2022-07-11T21:59:39Z	2022-07-11T22:53:13Z	3214	0.893	Not logged.
2022-07-12T02:59:38Z	2022-07-12T04:00:56Z	3677	1.021	Solar scans.
2022-07-13T09:47:39Z	2022-07-13T10:57:48Z	4209	1.169	Solar scans, network problems.
2022-07-16T01:35:32Z	2022-07-16T03:34:16Z	7125	1.979	Calibration.
2022-07-18T01:23:34Z	2022-07-18T02:24:57Z	3683	1.023	Calibration.
2022-07-20T02:23:39Z	2022-07-20T02:45:03Z	1284	0.357	Pedestal inspection.
2022-07-20T05:42:52Z	2022-07-20T06:04:55Z	1323	0.368	Calibration.
2022-07-21T05:59:36Z	2022-07-21T06:21:54Z	1337	0.371	Pedestal maintenance.
2022-07-22T08:54:52Z	2022-07-22T09:30:35Z	2143	0.595	Not logged.
2022-07-23T02:59:39Z	2022-07-23T04:24:59Z	5120	1.422	Calibration.
2022-07-24T22:23:39Z	2022-07-24T22:57:13Z	2014	0.560	Operator error.
2022-07-25T01:59:39Z	2022-07-25T03:26:26Z	5207	1.446	Solar scans, clutter scans.
2022-07-26T23:30:52Z	2022-07-27T00:09:59Z	2347	0.652	Not logged.
2022-07-30T13:30:55Z	2022-07-30T14:53:41Z	4966	1.379	Pedestal maintenance.
2022-07-31T11:42:52Z	2022-07-31T12:25:36Z	2564	0.712	Unknown.
2022-08-02T07:42:52Z	2022-08-02T09:24:50Z	6119	1.700	Maintenance - fixed loose coax in receiver.
2022-08-02T23:54:52Z	2022-08-03T02:16:26Z	8494	2.359	AC repairs.

Gap start time	Gap end time	Gap secs	Gap hours	Reason
2022-08-06T02:11:39Z	2022-08-06T02:39:29Z	1670	0.464	Pedestal maintenance.
2022-08-08T08:30:52Z	2022-08-08T08:54:58Z	1447	0.402	Purge waveguides.
2022-08-08T22:30:52Z	2022-08-08T23:01:40Z	1849	0.514	Not logged.
2022-08-09T01:35:39Z	2022-08-09T02:00:59Z	1520	0.422	Solar scans, calibrations.
2022-08-09T03:18:52Z	2022-08-09T03:53:10Z	2059	0.572	Network problem.
2022-08-10T01:30:52Z	2022-08-10T02:57:07Z	5176	1.438	Solar scans, calibrations.
2022-08-10T09:30:51Z	2022-08-10T10:05:00Z	2048	0.569	Solar scans.
		TOTAL	116.5	hours, 6.2% total downtime.

Citation

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