IDRA, IRCTR Drizzle Radar: A High Resolution FMCW X-band Doppler Polarimetric Weather Radar

Jordi Figueras i Ventura
IDRA: IRCTR Drizzle Radar

- Objective: Observation of the detailed spatial and temporal distribution of rainfall and drizzle

**Drizzle:** Fairly uniform precipitation composed exclusively of fine drops of water of diameter less than 0.5 mm

- Shape: \(\approx\) sphere
- Formed in low altitude clouds: 0 to 1500 m
- Wind speed: 2 to 7 m/s (USA studies)
- Reflectivity (min.): **-15 dBZ**
# System Specifications

<table>
<thead>
<tr>
<th><strong>Radar Type</strong></th>
<th>Tower-based horizontal scanning Doppler polarimetric FM-CW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polarization</strong></td>
<td>Fully polarimetric (HH, VV, HV)</td>
</tr>
<tr>
<td><strong>Modulation</strong></td>
<td>Sawtooth/Arbitrary</td>
</tr>
<tr>
<td><strong>Transmitted Power [W]</strong></td>
<td>20 max. (selectable in 0.25 dB steps)</td>
</tr>
<tr>
<td><strong>Centre Frequency [GHz]</strong></td>
<td>9.475</td>
</tr>
<tr>
<td><strong>Max. Doppler Velocity [m/ s]</strong></td>
<td>User selectable 19 (mono-modal)/9.5 (polarimetric)</td>
</tr>
<tr>
<td><strong>Maximum Range [km]</strong></td>
<td>User selectable 15 (Normal Mode)/1.5 (High resolution mode)</td>
</tr>
<tr>
<td><strong>Azimuth Resolution [°]</strong></td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Range resolution [m]</strong></td>
<td>User selectable 30 (normal mode)/3 (High resolution mode)</td>
</tr>
<tr>
<td><strong>Sweep rate [Hz]</strong></td>
<td>9765.625, 4882.8125, 2441.40625 (Normal), 1220.703125, 610.3515625, 305.1757813</td>
</tr>
<tr>
<td><strong>Number of range cells</strong></td>
<td>128, 256, 512 (Normal), 1024, 2048, 4096</td>
</tr>
<tr>
<td><strong>Frequency sweep [MHz]</strong></td>
<td>5 to 50</td>
</tr>
<tr>
<td><strong>Zmin [dBZ]</strong></td>
<td>-15 at 15 km</td>
</tr>
<tr>
<td><strong>Data Flow [MBps/ ch]</strong></td>
<td>5 (4 channels)</td>
</tr>
</tbody>
</table>
Example: Rain

Δr=30 m

Δr=500 m
Example: Drizzle
Example: Drizzle
Example: Drizzle
Example: Drizzle
Example: Drizzle
Example: Clear air

\[ \Delta R = 3 \text{ m} \]

\[ V_{\text{wind (av)}} = 6.42 \text{ m/s} \]
\[ V_{\text{wind (max)}} = 7.94 \text{ m/s} \]
\[ D_{\text{wind}} = 103.5 \text{ Deg.} \]
Example: Clear air

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Data FREELY available on demand for scientific purposes!

www.atmos.irctr.tudelft.nl

jordi.figuera@meteo.fr