

# WRad: a long-term radiometric field campaign for characterizing W-band attenuation of precipitating clouds

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## RATIONALE

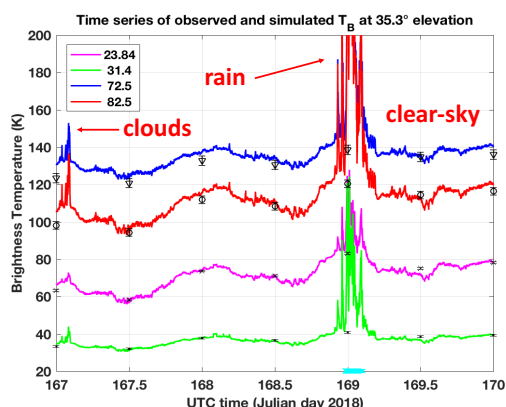
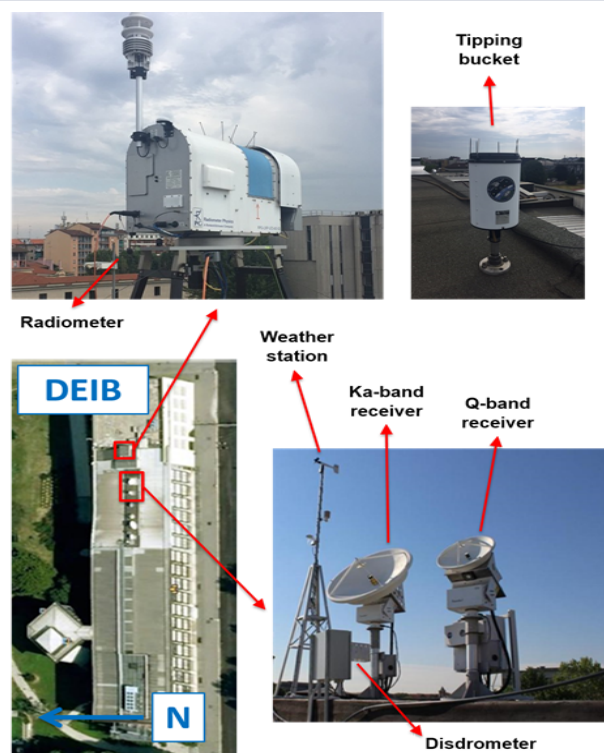
- Satellite telecommunications (**SatCom**) require accurate estimations of the **atmospheric attenuation** to minimize the link outage probability
- Particularly important at W band (75–110 GHz), the natural evolution of SatCom systems, due to high atmospheric losses by atmospheric **gases, clouds, and rain**
- Planning of future W band SatCom systems requires experimental data to characterize all-sky atmospheric attenuation for the **W-band radio channel**

## FUTURE WORK

- The 2-year WRad dataset will be exploited to characterize the attenuation of precipitating clouds at W band
- The generated distribution and diurnal/monthly statistics of atmospheric attenuation at W band will serve as reference to **radio-regulatory bodies**
- WRad will start in January 2019, funded by the European Space Agency (**ESA**) under contract # TBA
- **References:**
  - Marzano et al., 2016 doi:10.1109/TAP.2016.2606568
  - Mattioli et al., 2017 doi:10.1109/JSTARS.2016.2633439

## APPROACH

- A **two-year field campaign** is planned, exploiting:
  - ground-based microwave radiometers (**MWR**)
  - satellite beacon receivers
  - weather radars
  - terrestrial radio links
  - disdrometers
  - raing gauges
- WRad will exploit **Sun-Tracking (ST)** ground-based microwave radiometry, a technique recently demonstrated for deriving atmospheric attenuation in all weather conditions (Marzano et al., 2016; Mattioli et al., 2017).
- The WRad field campaign is proposed at two sites:
  - Milano “supersite” (PoliMI & Spino d’Adda)
  - Potenza (CNR-IMAA)



- The PoliMI (Politecnico di Milano) main campus is the core facility. Here a **MWR with ST capability** is operated at four receiving channels: 23.8 (K), 31.4 (Ka), 72.5 (V) and 82.5 (W) GHz
- In addition, the following ancillary instruments are available:
  - W- and D-band terrestrial links (73 and 83 GHz, 148 and 156 GHz)
  - Ka- and Q-band beacon receivers (Alphasat satellite).