

# Beam blockage analysis for Montenegro weather radar site

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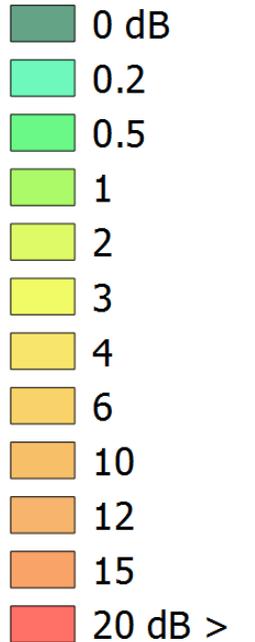
- This document presents a beam blockage analysis for a **potential weather radar site in Montenegro**. The beam blockage analysis is based on a physical model that simulates the propagation of radar beam in the atmosphere. The model estimates the beam altitude with respect to Earth's surface, and it takes in to account Earth curvature, digital terrain elevation model, and physical properties of propagating electromagnetic waves under standard atmospheric conditions. In the case the beam encounters an obstacle (e.g. a hill or mountain), the model estimates the amount of blockage.
- It is important to note that the analysis considers **only blockage due to terrain**. For example, it does not take into account nearby high-rising buildings, radio masts, trees, or other possible obstacles

# Beam blockage analysis for Montenegro weather radar sites

- The analysis was calculated using radar elevation angles of **0.5, 0.7, 1.0 and 1.5** degrees. *With higher elevations the altitude of the beam increases quickly with distance, decreasing the overall quality and utility of radar observations.*
- Tower height of **15 m** was used in the analysis

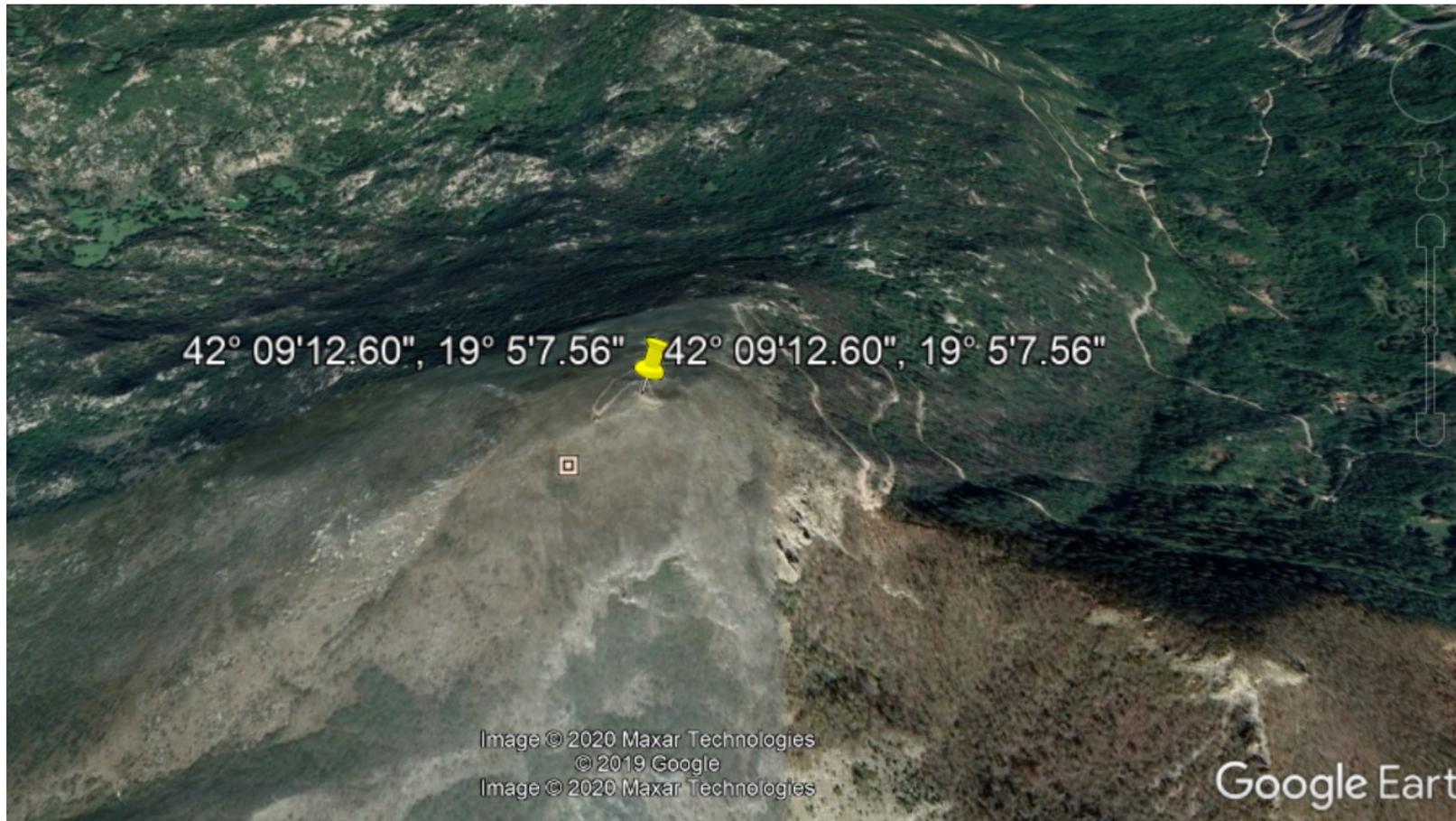
- The amount of beam blockage in the images is indicated with color coding
  - Shows the amount of power loss of radar signal in dB
  - Please see the attached legend
- Interpretation of the colors as follows:
  - Red color: Complete loss of the radar signal (complete blockage),
  - Yellow: Partial loss (radar can still observe, but with very limited capacity)
  - Green moderate loss

Blockage [dBZ]



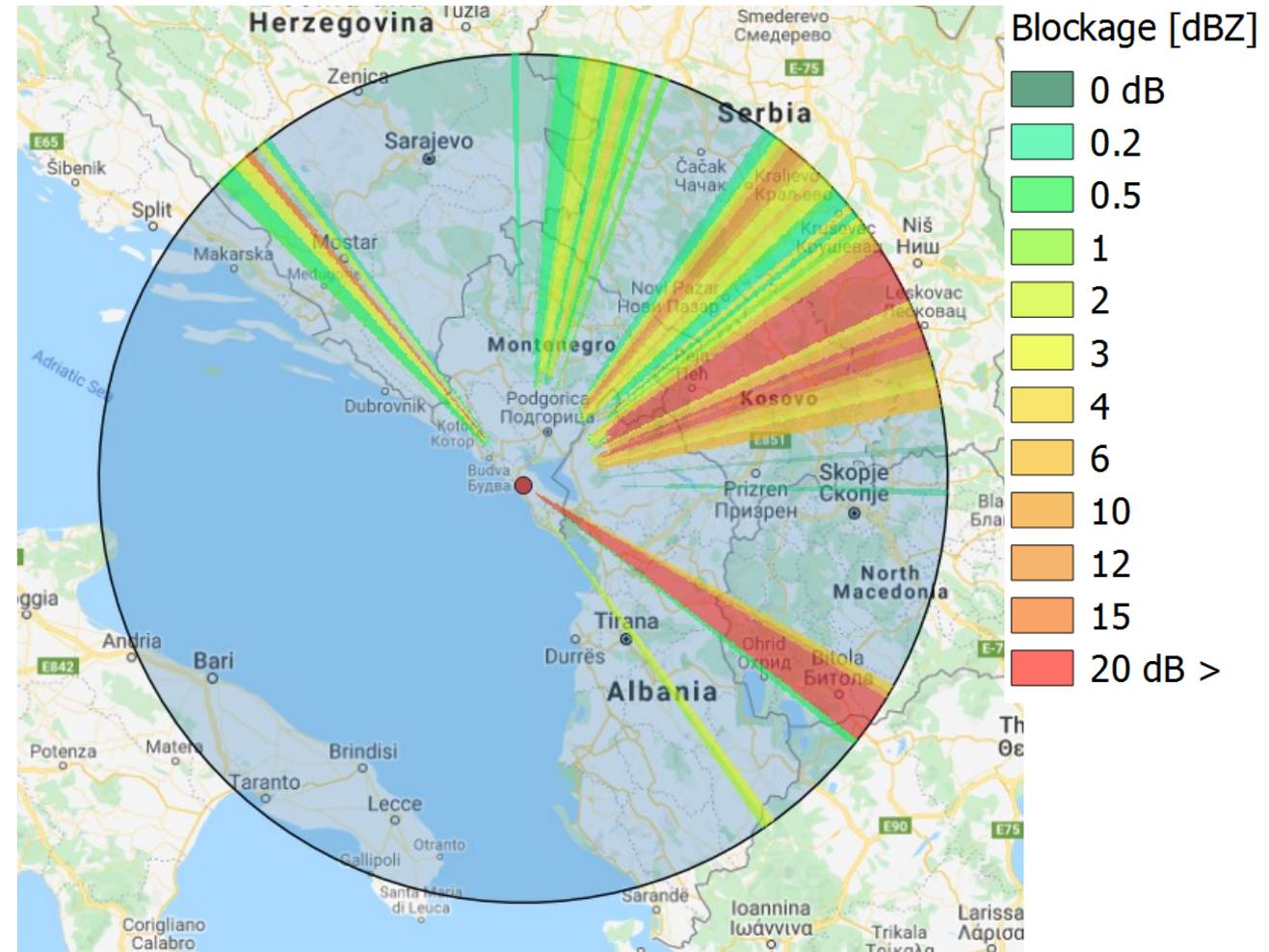
# Evaluated site

- Lat 42° 09'12.60"N , Lon 19° 5'7.56"E, Alt 1166 m



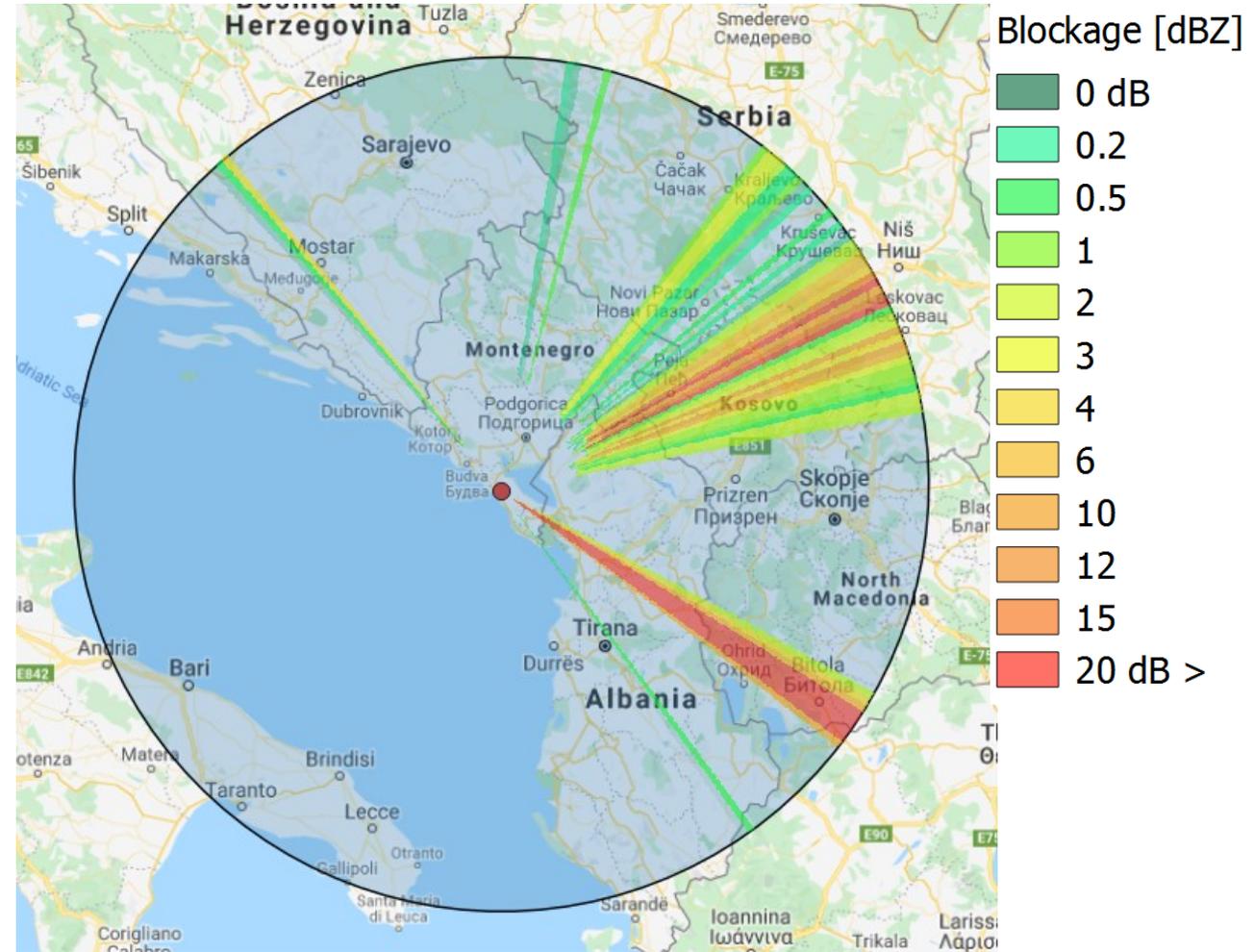
# Site: Lat 42° 09'12.60"N , Lon 19° 5'7.56"E, Alt 1166 m

- Beam blockage analysis with antenna elevation of 0.5 degrees up to 250 km in range
- Sectors of beam blockage in several directions



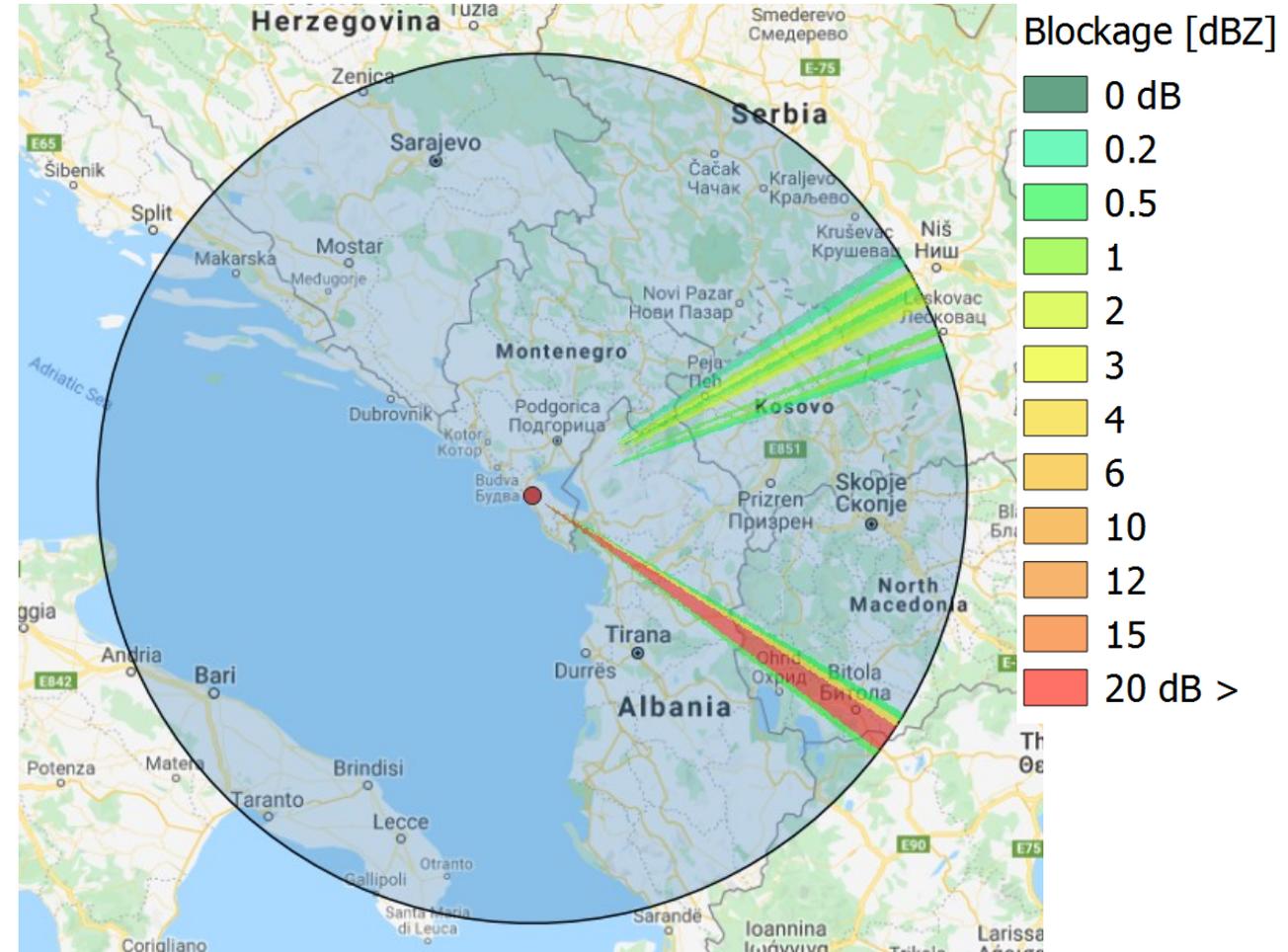
# Site: Lat 42° 09'12.60"N , Lon 19° 5'7.56"E, Alt 1166 m

- Beam blockage analysis with antenna elevation of 0.7 degrees up to 250 km in range
- Sectors of beam blockage in several directions



# Site: Lat 42° 09'12.60"N , Lon 19° 5'7.56"E, Alt 1166 m

- Beam blockage analysis with antenna elevation of 1.0 degrees up to 250 km in range
- The amount of blockage decreases significantly.



# Site: Lat 42° 09'12.60"N , Lon 19° 5'7.56"E, Alt 1166 m

- Beam blockage analysis with antenna elevation of 1.5 degrees up to 250 km in range
- The amount of blockage decreases nearly completely. However, sector of intense blockage in SE direction persists.
- Note that 1.5 degree elevation angle is quite high for operational weather radar activities.

