Progress in Satellite Monitoring and Ash Dispersion Modeling
by
Caroline N. Ngwa

Progress in Satellite Monitoring and Ash Dispersion Modeling

Before the 1990s. During this period, there was manual Detection & Limited Modeling	Ground observers, often volcanologists, monitored volcanic activity for signs of eruptions and the resulting ash plumes. Pilots, equipped with a special volcanic activity report form, provided critical data on ash cloud location, timing, and nature
The 1990s: Introduction of automated volcanic ash detection using TIR satellite data	Introduction of automated volcanic ash detection using TIR satellite data. Development of the first operational ash dispersion models like VAFTAD (Volcanic Ash Forecast Transport and Dispersion)
2000s: Multi-sensor Integration & Improved Models	Launch of satellites with higher-resolution sensors Integration of satellite data into real-time ash dispersion models
2010s: Near-Real-Time Systems & Global Coverage	Near-Real-Time Systems & Global Coverage Systems like VAACs (Volcanic Ash Advisory Centers) began using real-time satellite data and ensemble modeling
2020s and Beyond: Machine Learning & Data Fusion	2020s Integration of artificial intelligence and machine learning techniques for automatic ash detection and cloud classification. Fusion of satellite, ground, radar, and LiDAR data for more robust modeling

Where is the Mt. Cameroon Volcano Observatory today?

- Monitoring was largely dependent on ground observations.
- Manual Detection & Limited Modeling
- Satellite imagery began to be used, but analysis is slow.
- Ash dispersion models are done using the past Volcanic Explosivity Index (VEI) and other parameters
- No real-time measurements

Thank You!