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Automating a near real-time satellite rainfall pipeline for digital pastoralist decision support app

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1 Why Does This Matter?

- **High rainfall variability affects pastoralist livelihoods in arid and semi-arid regions**
- **Timely rainfall information can support better decision-making**
- **Helps inform grazing mobility**
- **Supports water availability planning**
- **Improves livestock management**

2 Objective

Design and implement an automated, near real-time rainfall pipeline that transforms TAMSAT satellite precipitation into lightweight, API-ready information for the InfoRange decision-support application.

3 Method, Data & Study Area

01 **Study areas** → Marsabit County in Kenya and Omaheke and Kavango East regions in Namibia

02 **TAMSAT rainfall database** → Dekadal (every 10 days) rainfall estimates in NetCDF

03 **Python-based automation** → Near real-time automatic retrieval of data + server storage

04 **Geospatial format conversion** → Heavy-weight NetCDF to light-weigh GEOJSON

05 **Application Programming Interface (API)** → Delivery to the InfoRange application

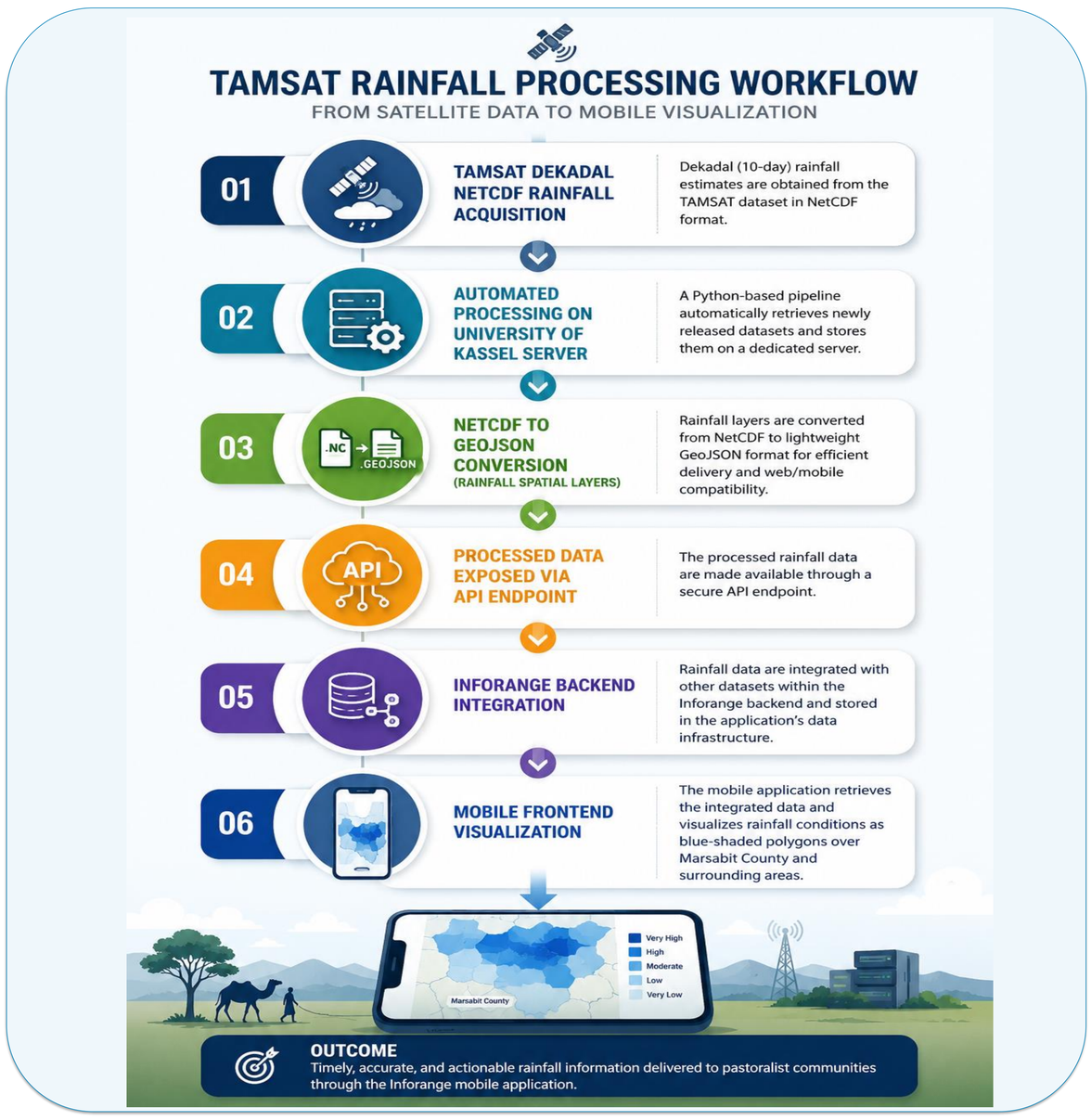
4 NetCDF → GeoJSON: Why It Matters?

Aspect	NetCDF	GeoJSON
Purpose	Scientific multidimensional data storage	Lightweight geospatial visualization
Structure	Raster/grid-based	JSON vector format
Use in this study	Raw TAMSAT rainfall storage	Mobile app rainfall display
File size	Large	Smaller
Processing	Requires scientific libraries	Web/mobile compatible
Frontend use	Limited direct rendering	Efficient frontend rendering
Data transfer	Higher bandwidth demand	Low-bandwidth friendly
Pipeline role	Backend processing	API and frontend delivery

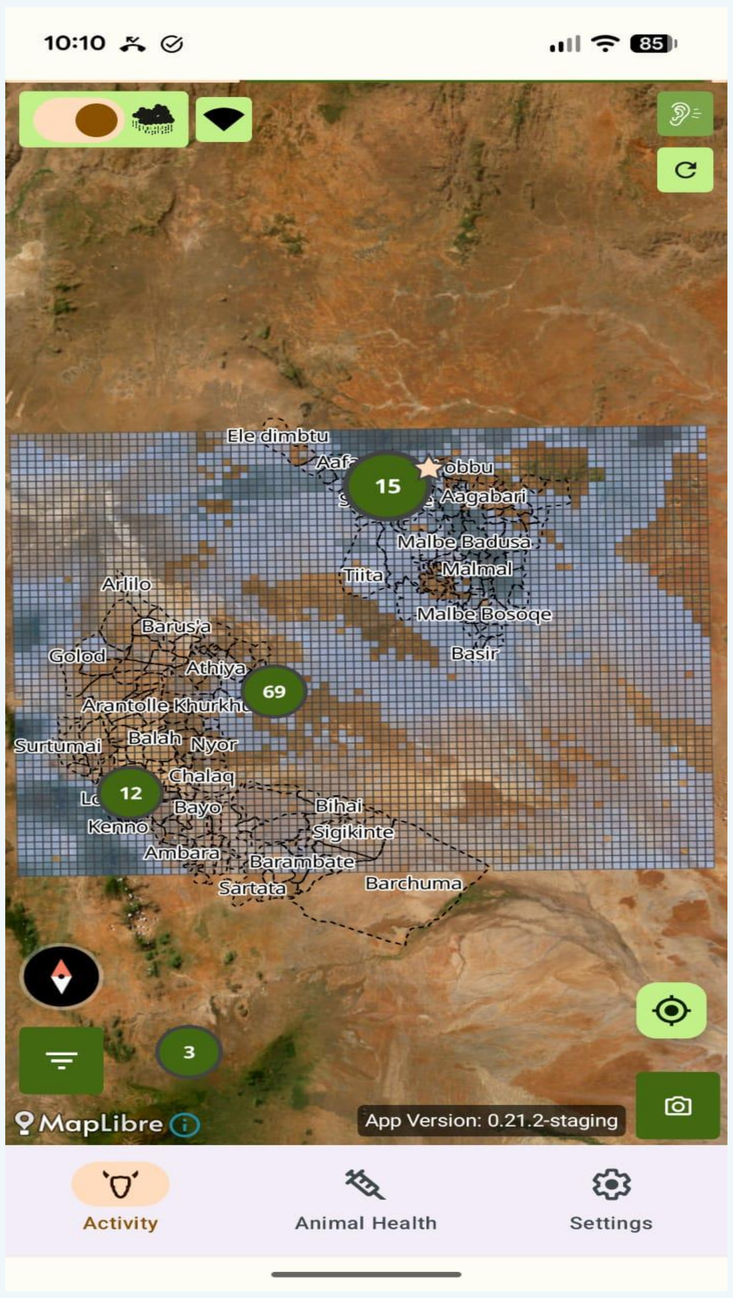
5 What Was Achieved?

- **Automated:** New TAMSAT data are retrieved, stored and processed with minimal manual intervention.
- **Reduced data size:** GeoJSON reduces transfer requirements and supports web/mobile compatibility.
- **Operational:** API delivery connects processed rainfall directly to the InfoRange app.
- **Scalable:** The framework can be adapted to other regions and environmental variables.

6 Pipeline Architecture



7 From Data to Decision



8 Key Takeaways

01 **Improved Climate Resilience e**nabling pastoralists to make better informed decisions.

02 **Digital innovation** combining satellite data, open formats and mobile technology

03 **Broader impact**, a practical framework for climate services in data-scarce regions and beyond

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