

STRENGTHENING HYDROMETEOROLOGICAL CAPACITY IN MOLDOVA

SMHI

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1 INTRODUCTION

The Strengthening Hydrometeorological Capacity in Moldova (SHC-Moldova) project (2024–2029) is a Swedish-funded collaboration between the Swedish Meteorological and Hydrological Institute (SMHI) and Moldova’s Meteorological and Environmental Monitoring Authority (AMM), formerly the State Hydrometeorological Service, to modernize the country’s meteorological, hydrological, and climate services.

The programme strengthens operational forecasting by increasing technical capacity in observation systems, data management, meteorological forecasting, hydrological modelling, and early warning services, while also emphasizing institutional sustainability. Its launch brought together Moldovan ministries and public institutions with international organizations, including the European Union, the United Nations Development Programme, and the World Bank.

For weather radar, SHC-Moldova supports the integration and operational use of radar observations to improve precipitation monitoring, nowcasting, and severe weather warnings, thereby enhancing the accuracy and timeliness of hydrometeorological services and contributing to disaster risk reduction.

2 COLLABORATION WITH OPERA

Close collaboration with the EUMETNET OPERA programme is essential to AMM’s hydrometeorological production chain.

As a first step, we are preparing to transfer ODIM-compliant data from radar Chișinău to OPERA’s data hub, CUMULUS, following the guidelines for introducing and implementing changes to OPERA services (Fig. 1a). The goal is to make Moldova’s radar data accessible through OPERA and incorporate it into OPERA composites by November 2026.

3 DATA QUALITY

Currently, radar data quality control relies solely on filters in the signal processor and the EDGE software. No post-processing of the radar data is applied.

For example, radio-frequency interference is frequently visible in the single-site radar products (Fig. 1b). AMM is collaborating closely with ARCOM (National Regulatory Agency for Communications) to identify and eliminate sources of electromagnetic interference. However, ARCOM currently lacks monitoring equipment capable of detecting emissions in the 5 GHz band.

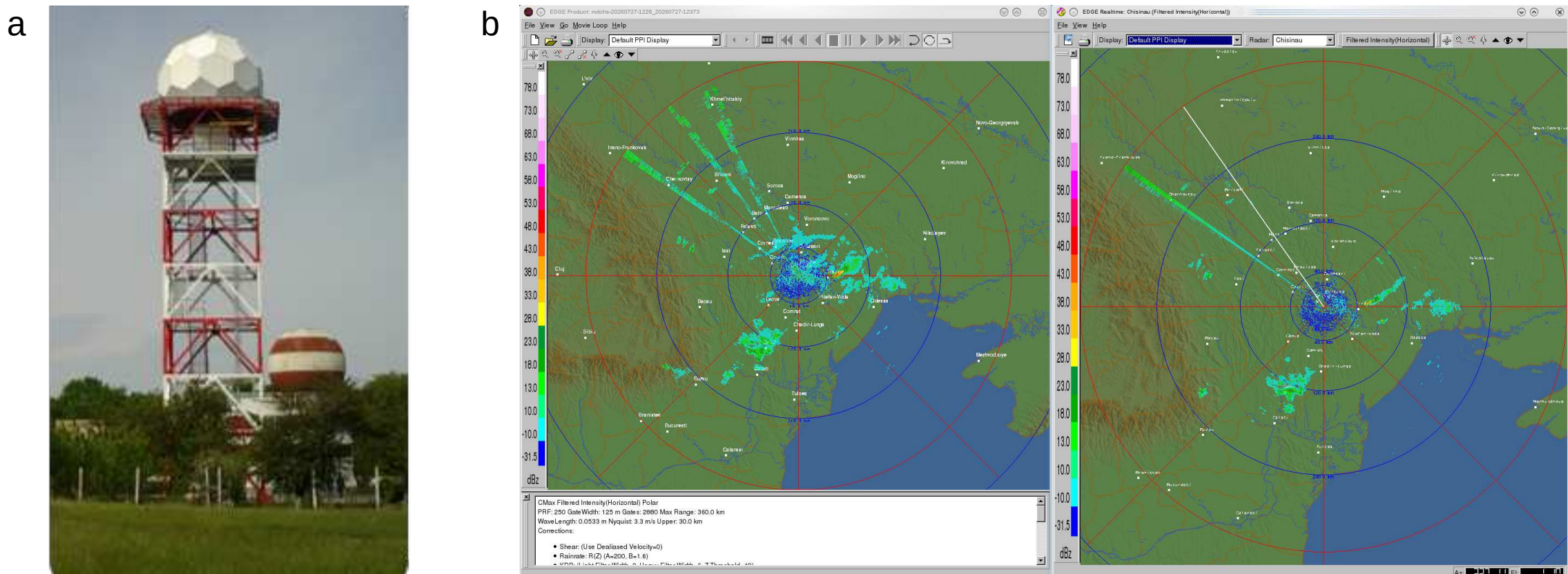


Figure 1: (a) EEC C-band dual-polarization weather radar at Chișinău Airport, mounted on a truss tower. (b) Vertical maximum of DBZH on 27 July 2026 between 12:28 and 12:37 UTC (left) and DBZH at an elevation angle of 1.1° at 12:56 UTC (right).

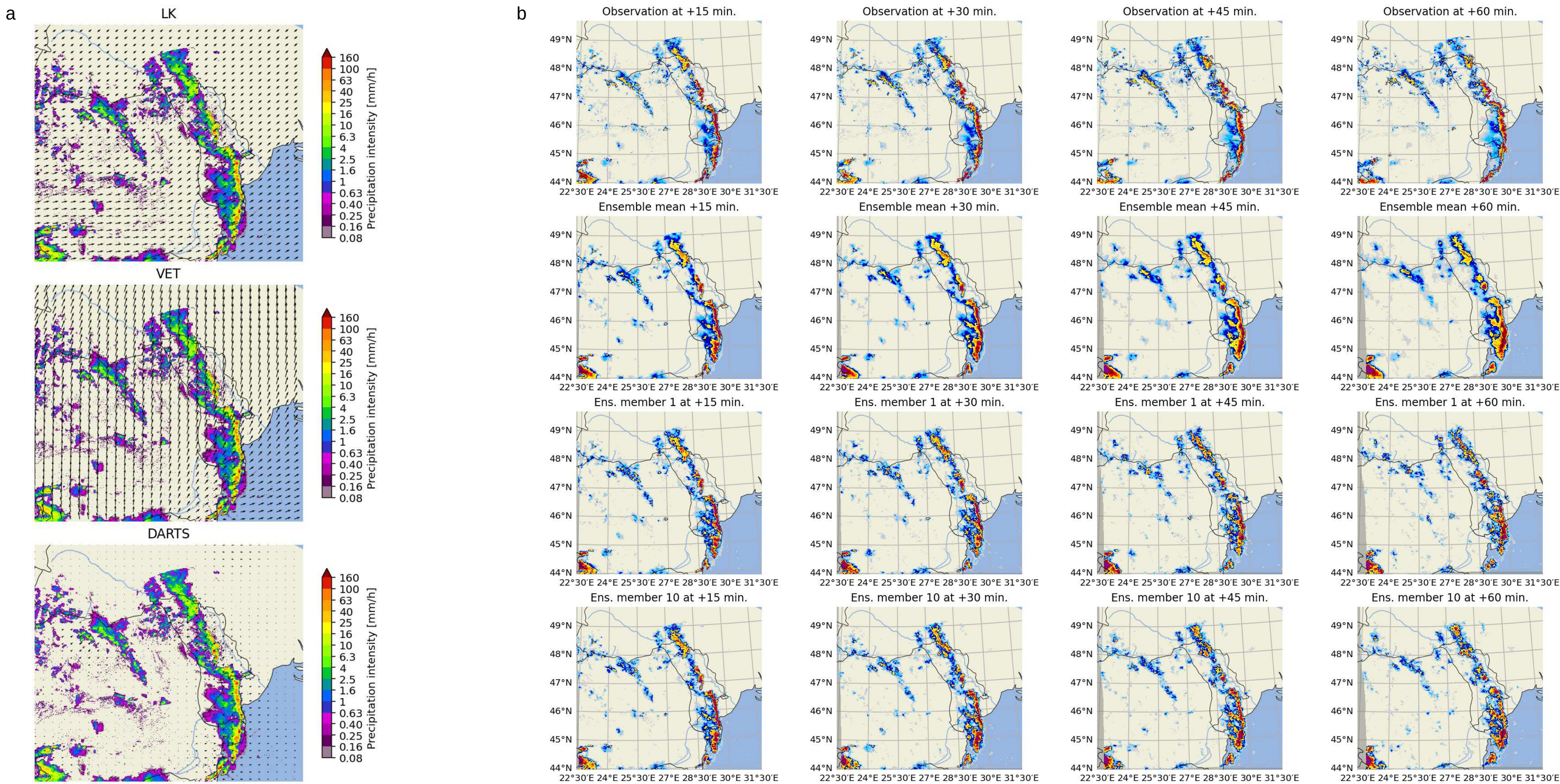


Figure 2: (a) Example of the optical-flow methods implemented in the pySTEPS module “motion”. (b) Ensemble nowcast with 10 members and 12 lead times, generated on 12 May 2026 at 00:20 UTC using LK and STEPS.

4 NOWCASTING

The pySTEPS nowcasting system will be implemented in AMM’s hydrometeorological production chain. Initially, radar composites from Meteo Romania will be used as input because they provide partial coverage of Moldova. These will later be replaced by regional composites that also include data from radar Chișinău.

Lagrangian advection is a key component of the pySTEPS nowcasting methods. Table 1 provides an overview of the methods implemented in the pySTEPS modules “motion” and “nowcasts”. The ensemble methods account for two sources of uncertainty: advection-field estimation and Lagrangian growth and decay.

Figure 2 illustrates some of these methods using an example over Moldova.

Table 1: Methods implemented in the pySTEPS modules “motion” and “nowcasts”.		
Module “motion”	Module “nowcasts”	
Optical-flow methods	Deterministic methods	Ensemble methods
Lucas-Kanade (LK) [1]	Extrapolation	STEPS (stratiform events)
Variational Echo Tracking (VET) [2]	S-PROG	LINDA-P (convective events)
Dynamic and Adaptive Radar Tracking of Storms (DARTS) [3]	LINDA-D	

5 OUTLOOK

In the next project phase, we will improve radar data quality and generate regional composites. Preliminary tests using the open-source BALTRAD software [4] show promising results.

Optimizing the radar configuration and scan strategy could further improve data quality. In addition, polarimetric moments need to be calibrated for use in downstream processing.

For nowcasting, the blending of radar-based nowcasts with NWP forecasts will also be evaluated.

Finally, SMHI and its partners will continue their successful training courses for forecast meteorologists on radar meteorology, nowcasting, and uncertainty assessment.

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