European
Civil Protection

Civil Protection Prevention & Preparedness Projects

Hazard Assessment based on Rainfall European Nowcasts (HAREN)

Centre de Recerca Aplicada
en Hidrometeorologia
UNIVERSITAT POLITÈCNICA DE CATALUNYA

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

ZAMG

SISÄASIAINMINISTERIÖ
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meteoalarm
alerting europe for extreme weather

JRC
EUROPEAN COMMISSION

Institute for Environment and Sustainability

DIRECCIÓN GENERAL
DE PROTECCIÓN CIVIL
Y EMERGENCIAS

NÖZSV

OPERA
EIG EUMETNET PROGRAMME

Coordinating Beneficiary and Associated Beneficiaries

CO: Universitat Politècnica de Catalunya (UPC, ES)

AB1: Finnish Meteorological Institute (FMI, FI)

AB2: Central Institute for Meteorology and Geodynamics (ZAMG, AT)

AB3: Department for Rescue Services (DRS, FI)

Non-funded Stakeholders

Dirección General de Protección Civil y Emergencias de España (DGPCE, ES)

Civil protection section, Provincial Government of Lower Austria (FWZIVIL, AT)

OPERA-EUMETNET (OPERA, EU)

METEOALARM-EUMETNET (METEOALARM, EU)

Directorate General Joint Research Centre - EC (JRC, EU)

Budget

Total Eligible Costs: **650.351 €**
EU Contribution: **487.763 €**
Duration: **18 months**

Coordinating Beneficiary's contribution				
Coordinating Beneficiary	**Short name**	**Total costs of the actions in €**	**Own contribution in €**	**Amount of EC contribution in €**
CO	UPC-CRAHI	309.610	77.403	232.208

Associated Beneficiaries' contribution				
Assicated Beneficiary	**Short name**	**Total costs of the actions in €**	**Own contribution in €**	**Amount of EC contribution in €**
AB1	FMI	160.295	40.074	120.222
AB2	ZAMG	160.403	40.101	120.303
AB3	DRS	20.042	5.010	15.031
Total Associated Beneficiaries		340.740	85.185	255.555

Total Project	**650.351**	**162.588**	**487.763**

Objective

HAREN

Heavy precipitation is one of the agents leading to major natural hazards in EU

THE CHALLENGE

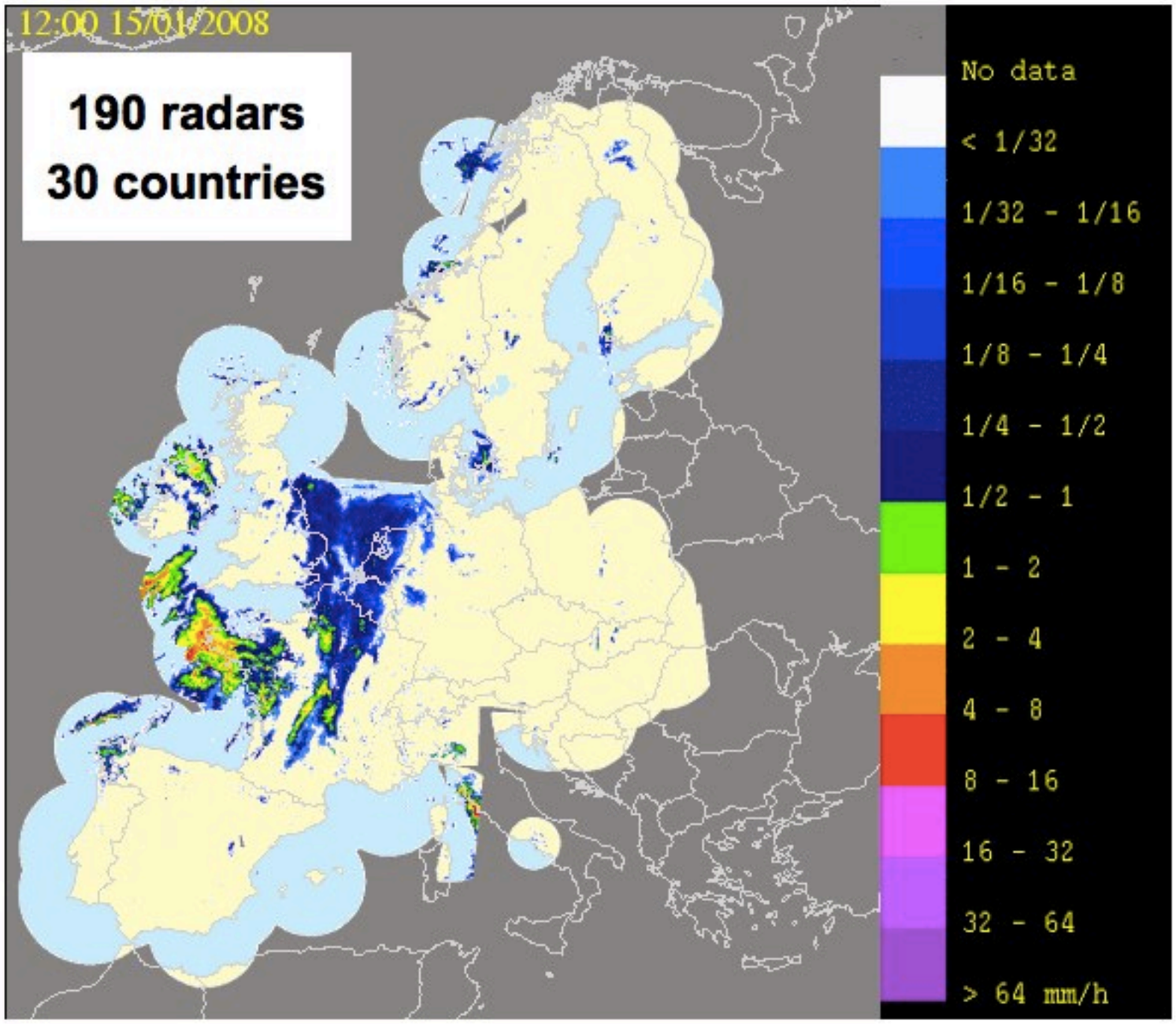
Forecast the precipitation field at very high-resolution to produce better warnings for hazards induced by precipitation

Using the EU continental precipitation maps generated from the National radar networks provided by OPERA

EU PRECIPITATION MAPS

OPERA radar mosaic:

precipitation observations over Europe @2 km and every 15 minutes.



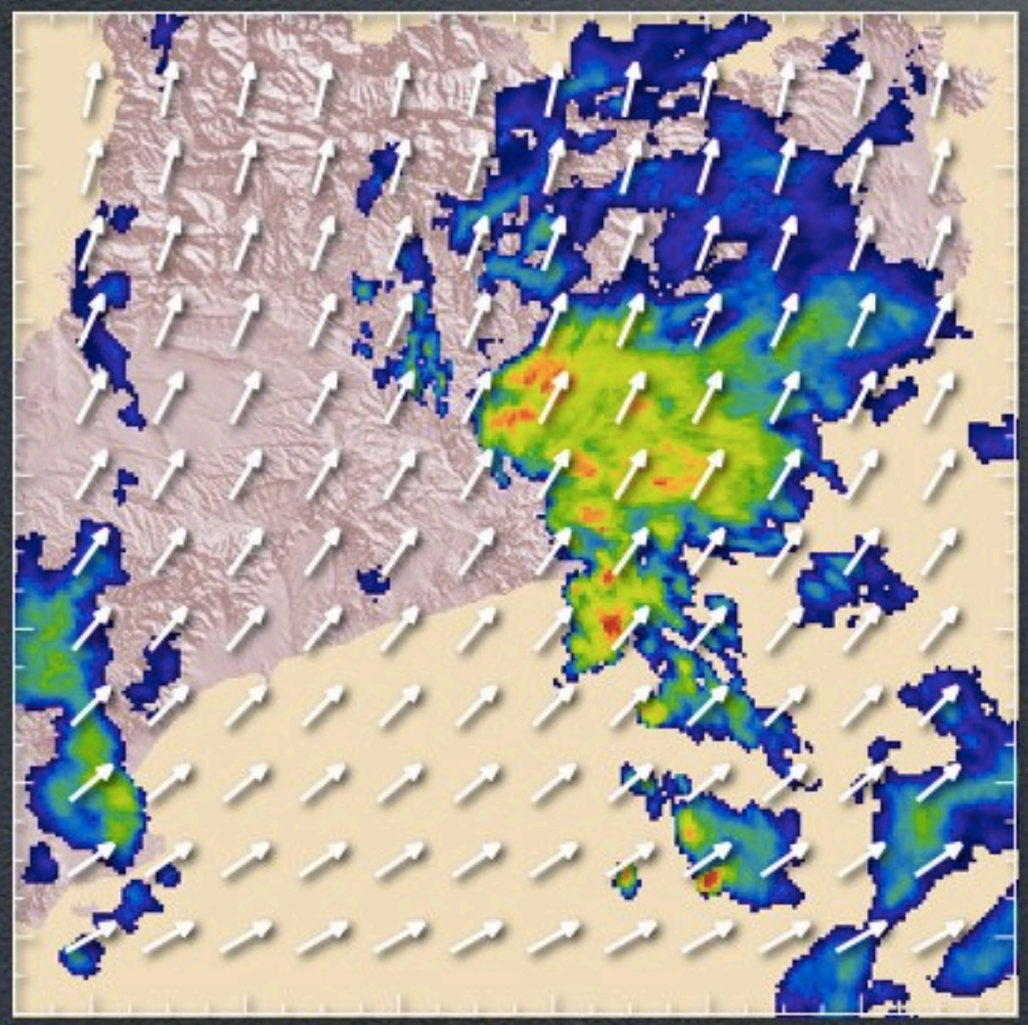
Goal of the Project: precip nowcasting on European radar mosaics.

HAREN

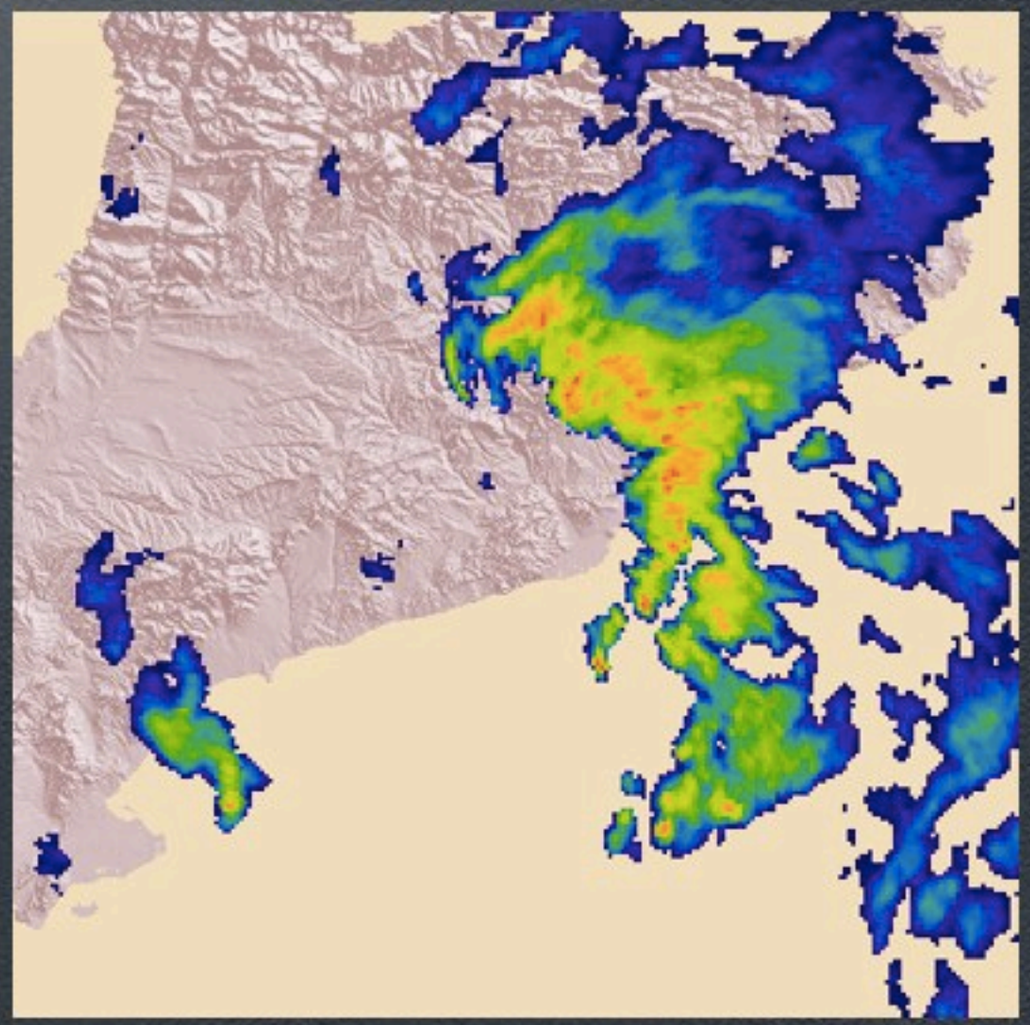
Radar-based rainfall nowcasting

Lagrangian Persistence
Based on radar data extrapolation

Previous precipitation fields



Nowcasted fields



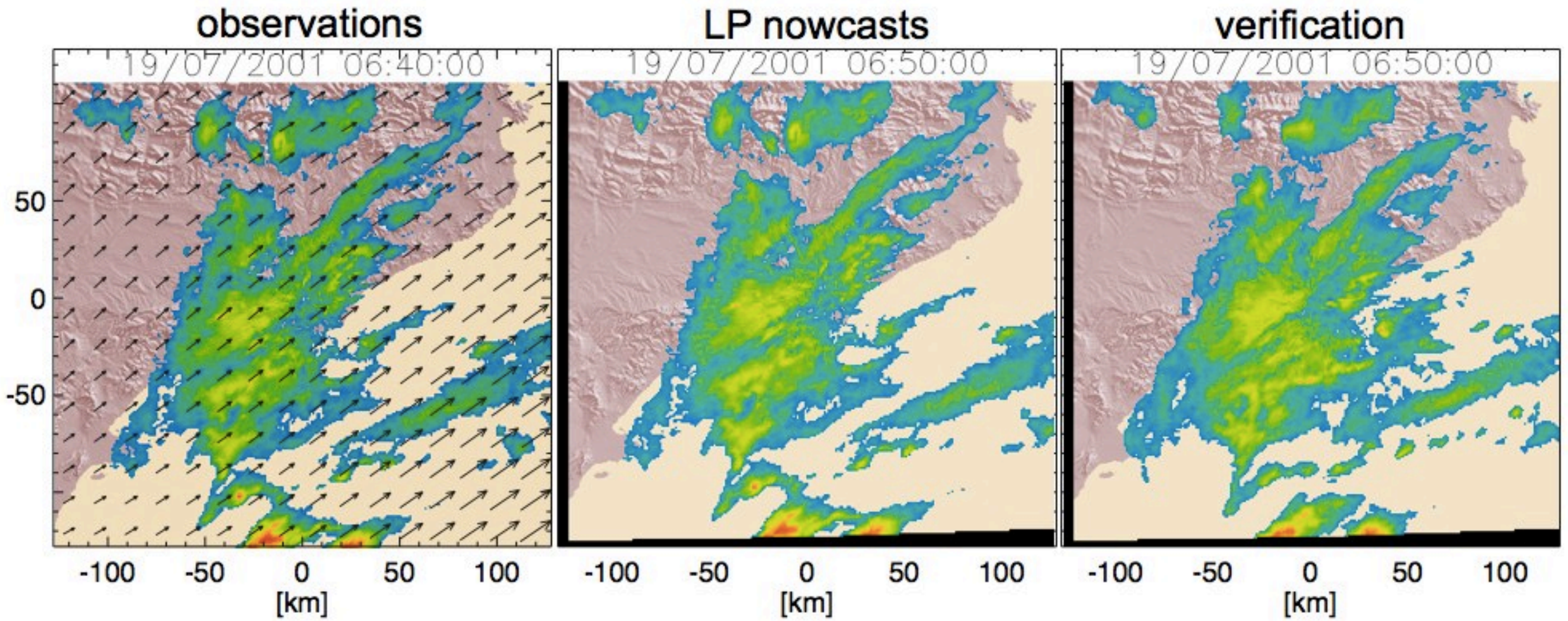
Estimates of the precipitation motion field

Background: Rainfall Nowcasting

Precipitation nowcasting by extrapolation of radar observations

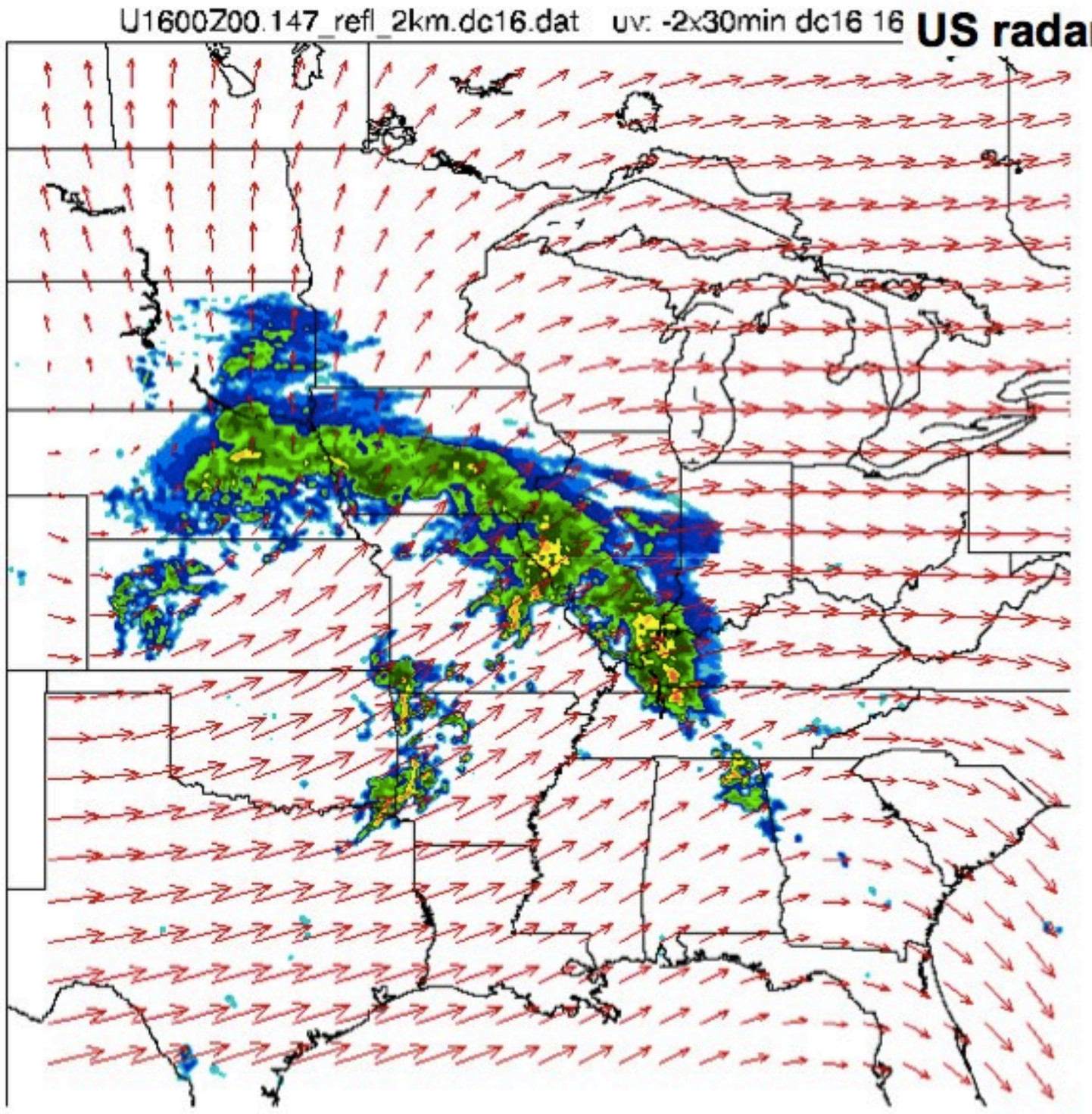
1. The motion field of rainfall is estimated from observations.
2. The most recent field is extrapolated accordingly.

1 radar ⟶ up to 2 hours



Background: Rainfall Nowcasting

Precipitation nowcasting by extrapolation of radar observations



US radar mosaic

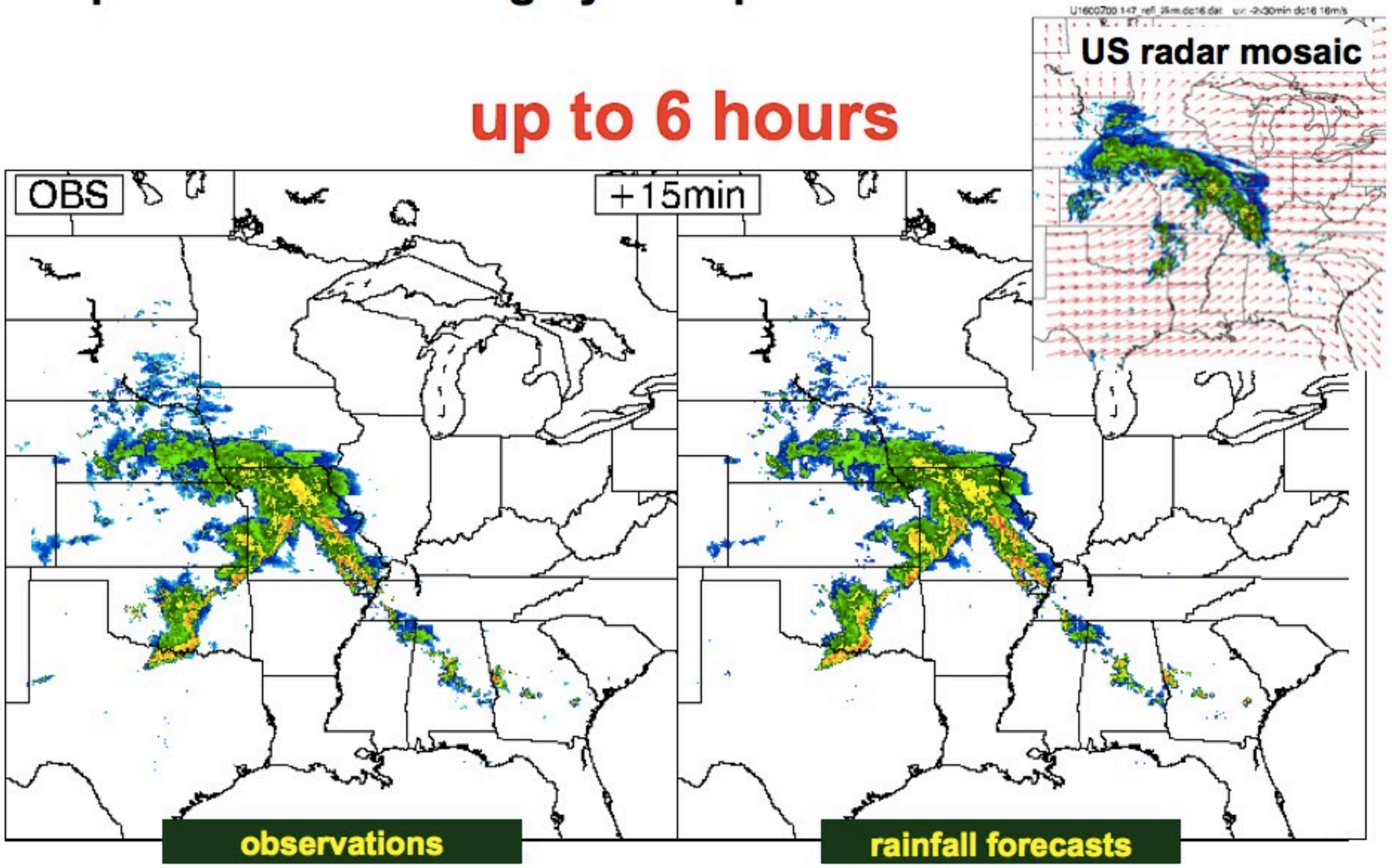
NEXRAD network

159 radars

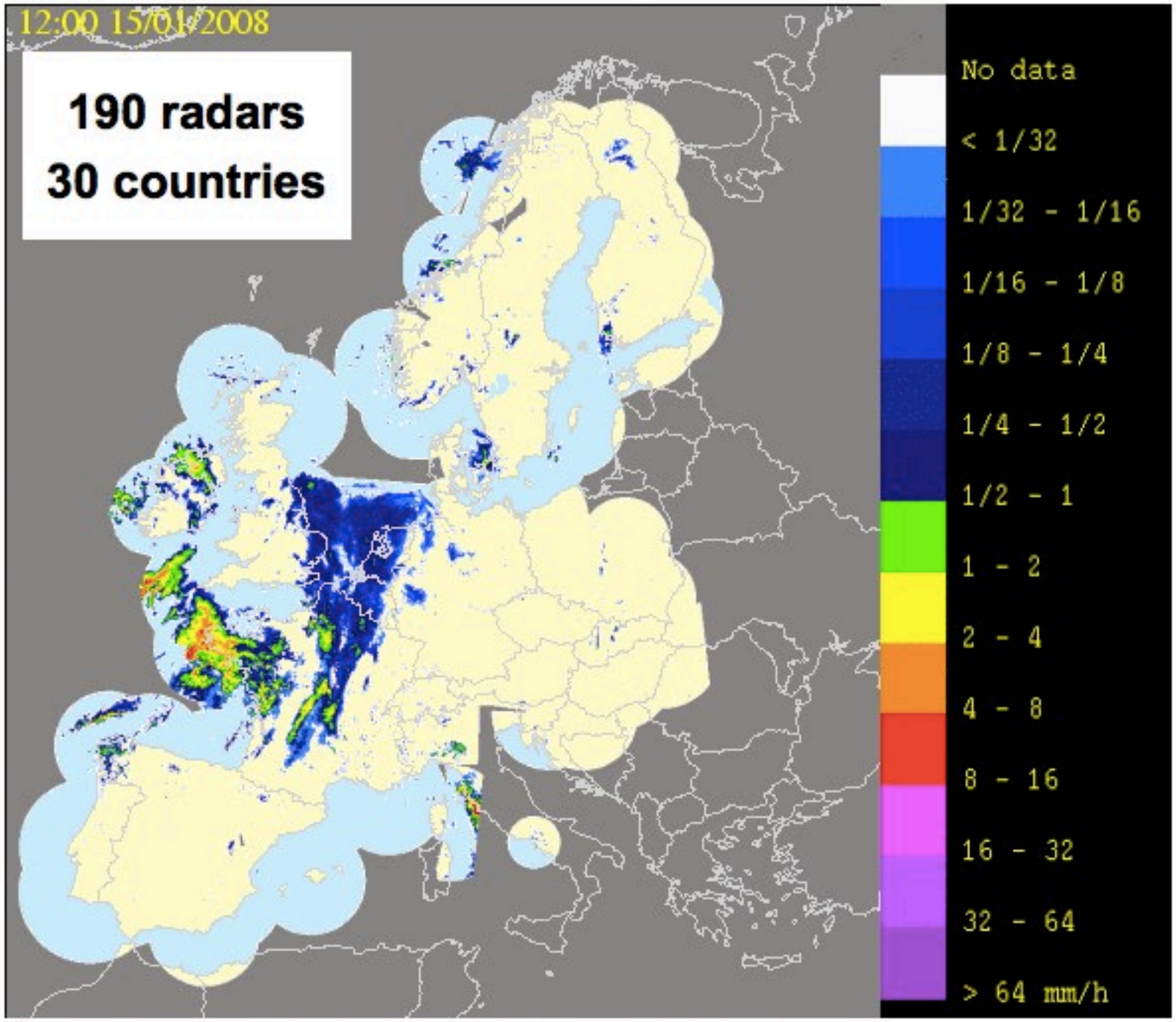
Background: Rainfall Nowcasting

Precipitation nowcasting by extrapolation of radar observations

up to 6 hours



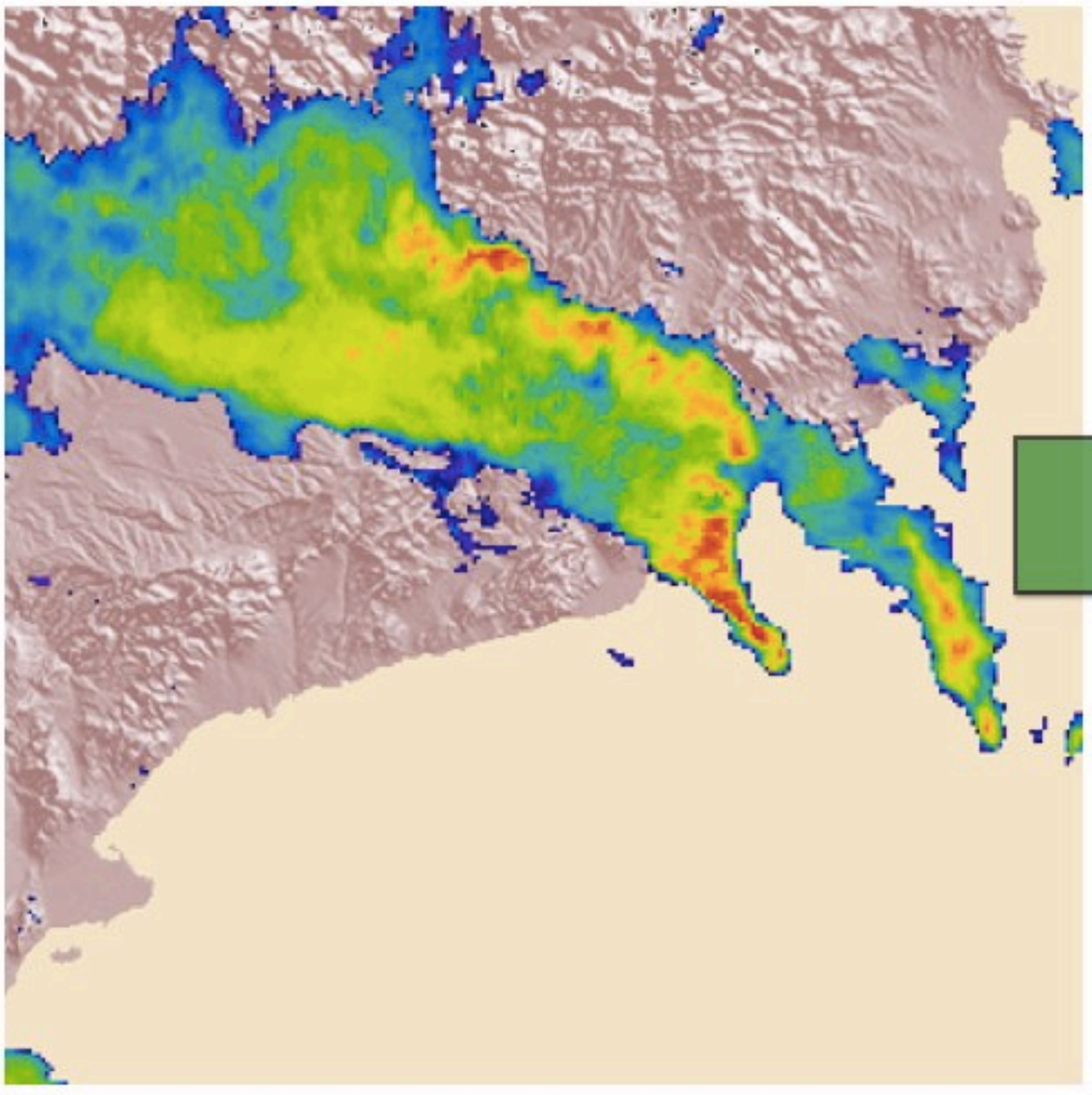
AIM: Rainfall Nowcasting in EU up to 6h based on OPERA Radar Composites



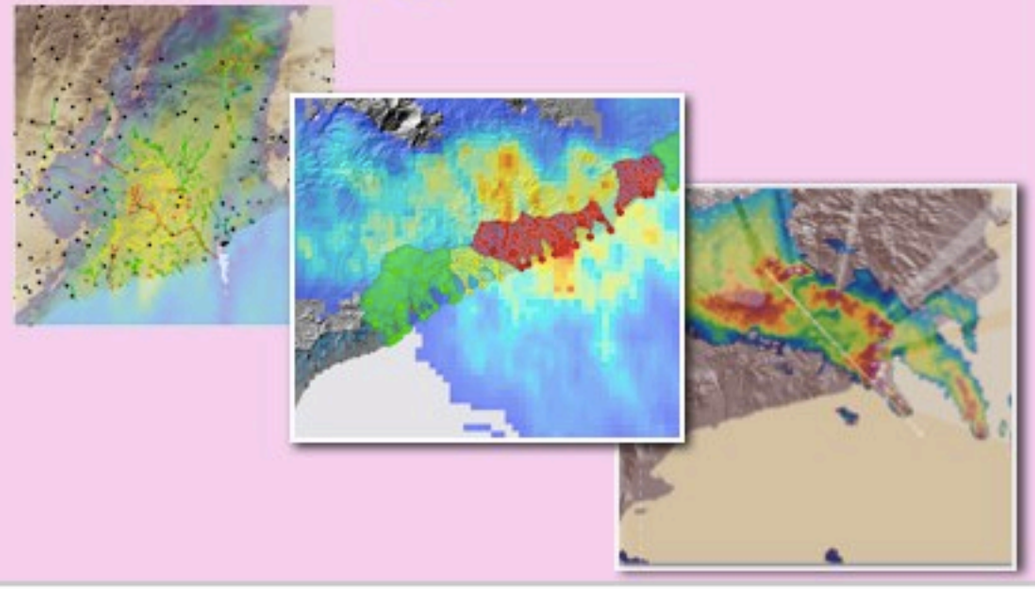
precipitation observations over Europe @2 km and every 15 minutes.

Rainfall nowcasting based on radar

Based on radar data extrapolation



Warnings

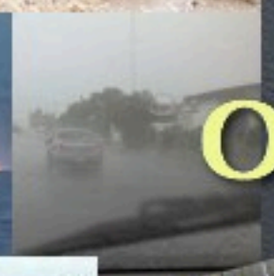


Heavy Rainfall Warnings

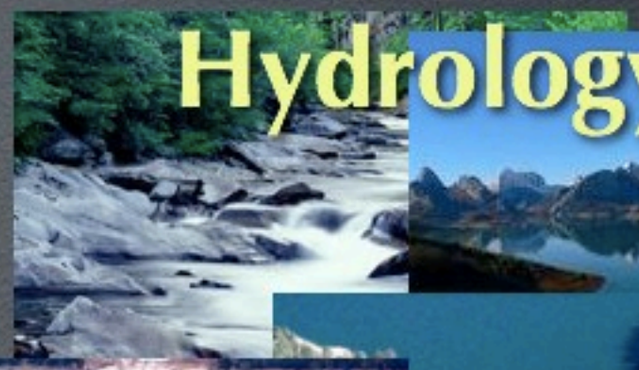
CRAHI

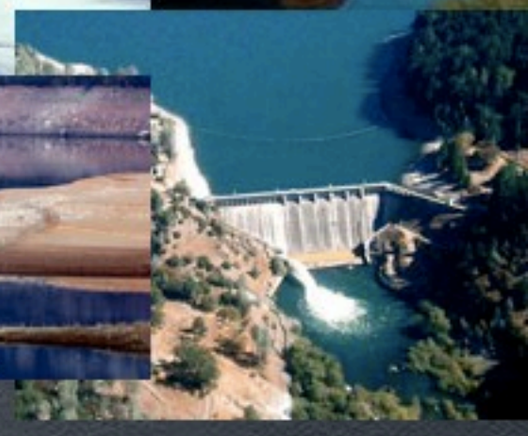
UPC

Transportation

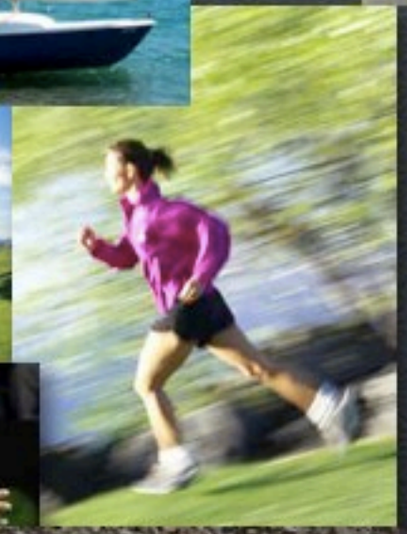


Hydrology

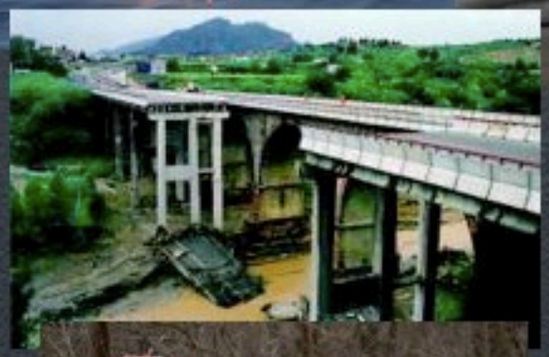




Sports



Outdoor Activities



TASKS

HAREN

- **TASK A:** Adapting a **Radar-based nowcasting** technique to the use of OPERA EU composites.
- **TASK B:** Advanced precipitation nowcasting at European scale based on a **multi-sensor approach**.
- **TASK C: Probabilistic precipitation nowcasting** at European scale: Implementation of an ensemble approach.
- **TASK D:** Implementation of a **prototype operational system for precipitation nowcasting** at European scale.
- **TASK E:** Implementation of a **hazard warning system** for the purposes of civil protection.
- **TASK F:** Verification and **demonstration** of the developed system.
- **TASK G:** Management and reporting to the Commission.
- **TASK H:** Publicity

Tasks and deliverables

		T1	T2	T3	T4	T5	T6
A	Radar-based precipitation nowcasting at European scale: Adapting a nowcasting technique to the use of OPERA mosaics.						
B	Advanced precipitation nowcasting at European scale based on a multi-sensor approach.						
C	Probabilistic precipitation nowcasting at European scale: Implementation of an ensemble approach.						
D	Development and implementation of a prototype operational system for precipitation nowcasting at European scale.						
E	Development and implementation of a risk warning system for the purposes of civil protection.						
F	Verification and demonstration of the developed system.						
G	Management and reporting to the Commission.						
H	Publicity						

Tasks and deliverables

		T1	T2	T3	T4	T5	T6
A	Radar-based precipitation nowcasting at European sc Of **A1:** Report including (i) the analysis of results on past events, and (ii) a description of the technical specifications.			A1			
B	Advanced precipitation nowcasting at European scale ba **B1:** Report including (i) the analysis of results on past events, and (ii) a description of the technical specifications.			B1			
C	Probabilistic precipitation nowcasting at European sc **C1**: Report including (i) the analysis of results on past events, and (ii) a description of the technical specifications.			C1			
D	Development and implementation of a prototype op Eu **D1-D2:** Reports describing the prototype operational system for precipitation nowcasting at European scale.			D1	D2		
E	De sy **E1:** Report describing the proposed precipitation hazard warning system at European scale. **E2:** Operational system for issuing hazard warnings.				E1	E2	
F	Verification and demonstration of the developed sy **F1-F3**: Report describing the results of the verification tests of the developed system.						F1 F2 F3
G	Management and reporting to the Commission. **G1:** Project website. **G2-G4**: Final scientific, technical & administrative reports.	G1					G2 G3 G4
H	Publicity **H1:** DVD with a produced video on the results of the project. **H2:** Book of proceedings of the international workshop.						H1 H2

Major events
(Dates and places)

HAKEN

Kick Off Meeting Brussels 6th February 2012

1st Meeting: Barcelona (ES) 23rd February 2012

2nd Meeting: Helsinki (FI) September 2012

EC Coordination meeting: Brussels (BE) January 2013

3rd Meeting: Wien (AT) March 2013

Final International Workshop

Brussels (BE) June 2013

Follow-up

- The follow-up of the project will consist in the continued **real-time operation of the developed systems** in the servers of the partners, which is the final goal of the HAREN project.
- This will guarantee the service of the generated **Pan-European precipitation nowcasting and hazard warning products** to the end-users.

- The continuation of the activities of the project will require to **guarantee the real-time operation** of the servers generating precipitation nowcasts and hazard warnings and the **maintenance of the developed systems**.
- HAREN Consortium will need to raise funds to maintain the operation of the systems through the services to end-users

Expected Results

The main objective of the Project is to ***implement what has been/is being developed on the currently-available OPERA datasets to continuous operation at Continental scale*** (in Civil Protection and Emergency Agencies and National Hydrometeorological Services).

- Extended anticipation of precipitation events at local scale in Europe beyond the 2 hours achieved with National radar networks.
- An operational system for precipitation nowcasting and warning disseminated through the METEOALARM platform.
- Evaluation of the system in terms of its use in Meteorological Institutes, EFAS and Civil Protection Agencies.

HAREN PROJECT PAGE

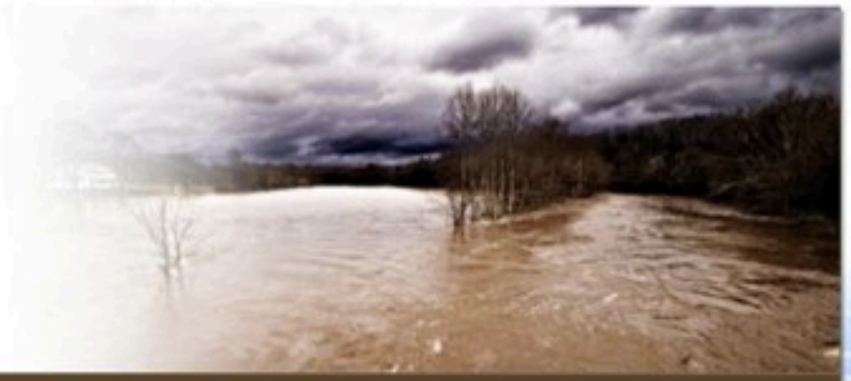
http://www.haren-project.eu/

Google

Maps analisis Google Ac SESAM ECAS Facebook FP7 Negotiation simyo Gmail Vuelos baratos "la Caixa" Amex SMC Radar-AEMET

HAREN PROJECT PAGE

HAREN



Overview | WorkPlan

- Objectives
- Project Coordinator
- Project Team
- Data Sheet
- Contact us

Precipitation is one of the agents leading to natural hazards that have very serious impacts on people's life and goods: i.e. floods, debris flows, landslides...

The challenge faced by this Project is monitoring and forecasting the precipitation field at very high-resolution to produce better **warnings for hazards induced by precipitation at local scale all over Europe.**

With this aim, the Project will focus on the use of the Continental precipitation maps generated from the National radar networks in Europe within the EUMETNET programme OPERA (Matthews et al. 2011). OPERA has succeeded in generating a **European precipitation field in real time** with the resolution of radar measurements (2x2 km2 and every 15 minutes), which fulfils the requirements of many applications involved in assessing precipitation-induced hazards used for decision-making in Civil Protection agencies.

www.haren-project.eu

Also, recent developments have been made to assess the uncertainty in radar-based nowcasting by **means of different approaches to provide probabilistic ensemble nowcasting** (e.g. Berenguer et al. 2011; Koistinen et al. 2011).

The goal of the Project is thus to develop a system for precipitation monitoring and forecasting to be used in the anticipation of hazards induced by precipitation at local scale and over Europe. The Project will capitalize on the OPERA mosaics and on the recent improvements on nowcasting techniques, some of which developed and tested within several FP6 and FP7 EC projects (among others FLOODSITE, HYDRATE, and IMPRINTS (**www.imprints-fp7.eu**), to generate high-resolution precipitation forecasts and warnings over Europe, as well as the associated uncertainty of these products.

European Civil Protection

Hazard Assessment based on Rainfall European Nowcasts
-HAREN-

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