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Project IMA: Lessons Learned from Building the Belgian Operational Seamless Ensemble Prediction System

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In recent years, several national meteorological services (NMSs) have invested considerable resources in the development of a seamless prediction system: rapidly updating forecasts that integrate the latest observations, covering timescales from minutes to days or longer ahead (e.g. DWD's SINFONY; FMI's ULJAS, MetOffice's IMPROVER and Geosphere Austria's SAPHIR) [1]. This move was motivated mainly by rising expectations from end users such as hydrological services, local authorities, the renewable energy sector and the general public. The development of seamless prediction systems was made possible thanks to the increasing availability of high-resolution observations, continuing advances in numerical weather prediction (NWP) models, nowcasting algorithms, and improved strategies to combine multiple information sources optimally. Moreover, the rise of AI/ML techniques in forecasting and nowcasting can further reduce the computational cost to generate frequently updating seamless operational forecast products.

We present the journey of building the Belgian seamless prediction system at the Royal Meteorological Institute of Belgium, with the working title "Project IMA". IMA uses both the deterministic INCA-BE and the probabilistic pysteps-BE systems to combine nowcasts with the ALARO and AROME configurations of the ACCORD NWP model. In the lessons learned along the way, we focus on what is often omitted, moving from research to operations, and integrating what we learn from operations back into research. We discuss the benefits of integrating new developments within the free and open-source software (FOSS) pysteps [2]. Our experience shows that using and contributing to FOSS not only leads to more transparency and reproducible, open science; it also enhances international collaboration and can benefit other users, including developing countries, bringing us a step closer to the ambitious goal of Early Warnings for All by

2027 [3].

References

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