Estíbaliz Gascón, Tim Hewson

Probability of precipitation type

(new possible product of ECMWF)

Case study – Moscow freezing rain

20161110/11

Thanks to the Hungarian Met. Service for the original idea

Description

- The **ECMWF probability of precipitation type** algorithm is based on the IFS atmospheric model ensemble 15-day forecast (ENS) with 1 control and 50 perturbed forecasts.
- The precipitation type variable is provided by the model in HRES and ENS forecast and it describes the type of precipitation at the surface at the validity time. A precipitation type is assigned wherever there is a non-zero value of precipitation in the model output field (however small).
- In this new product, the probability of precipitation type is used together with the precipitation rate variable to provide for example indication of potential freezing rain events.
- A filter is applied to remove any type of precipitation in case we have **precipitation rates** less than **0.1 mm/h**. Secondly each member of ENS system is classified depending on two ranges of precipitation rates: 0.1-1 mm/h (low intensity) and >1 mm/h (high intensity).

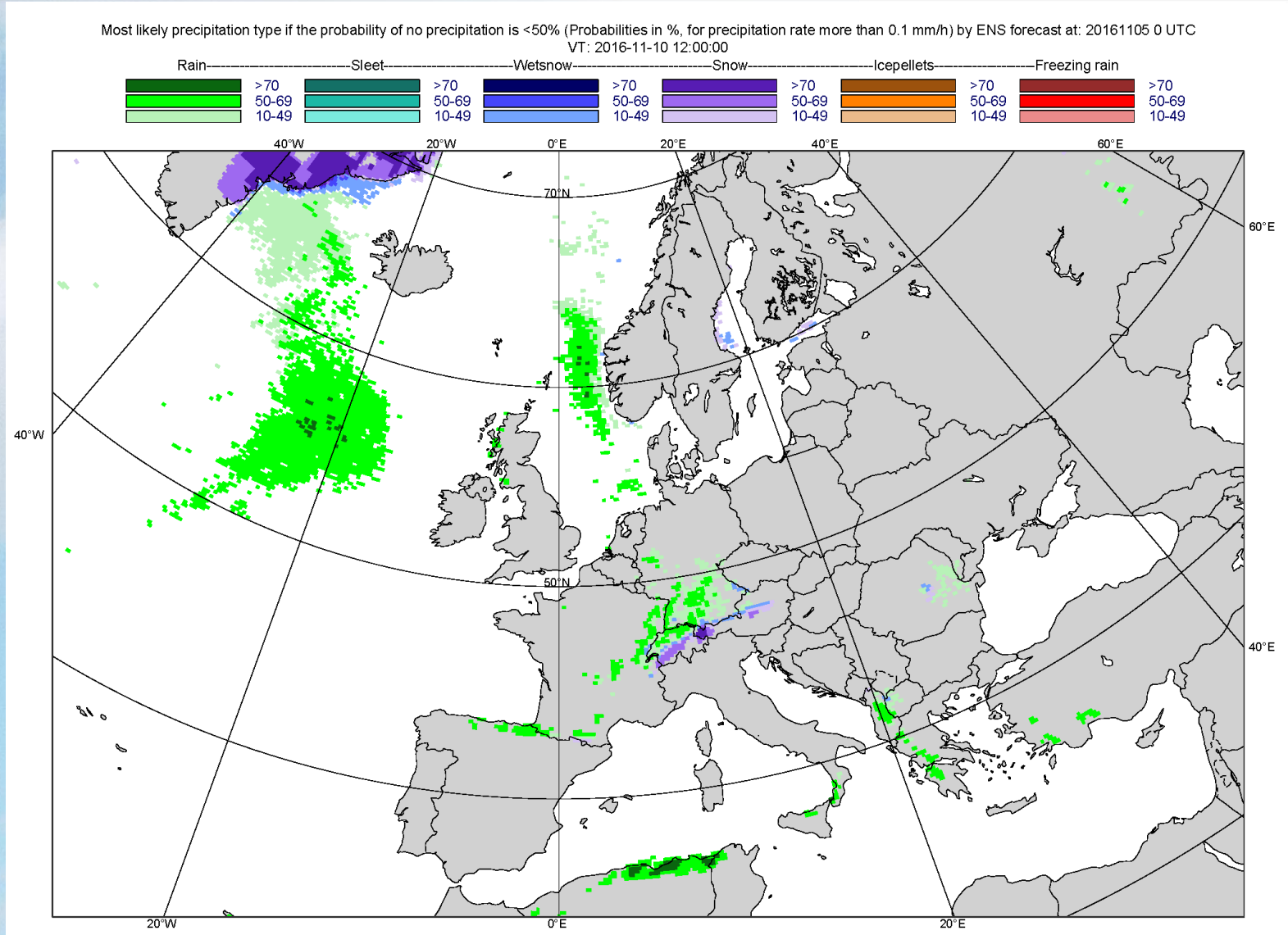
Description

- The probabilities are calculated for 6 different categories of precipitation: rain, freezing rain, snow, wet snow, sleet and icepellets and the two different intensities of precipitation that we defined before. It is important to take into account that the results that we obtain are for instantaneous probabilities.
- We are working on its verification to check its capability to predict properly every type of precipitation and create a final product in the future.
- Other second product derivate from last one is the calculation of **most probable precipitation type**. It gives us what type of precipitation type is most probable, taking into account a first filter: if the NO precipitation case is >50%, we consider we will not have any precipitation.
- This second product provides a first guess of what is going to happen while with the first product we can analyse all the probabilities and make better decisions about a particular event.

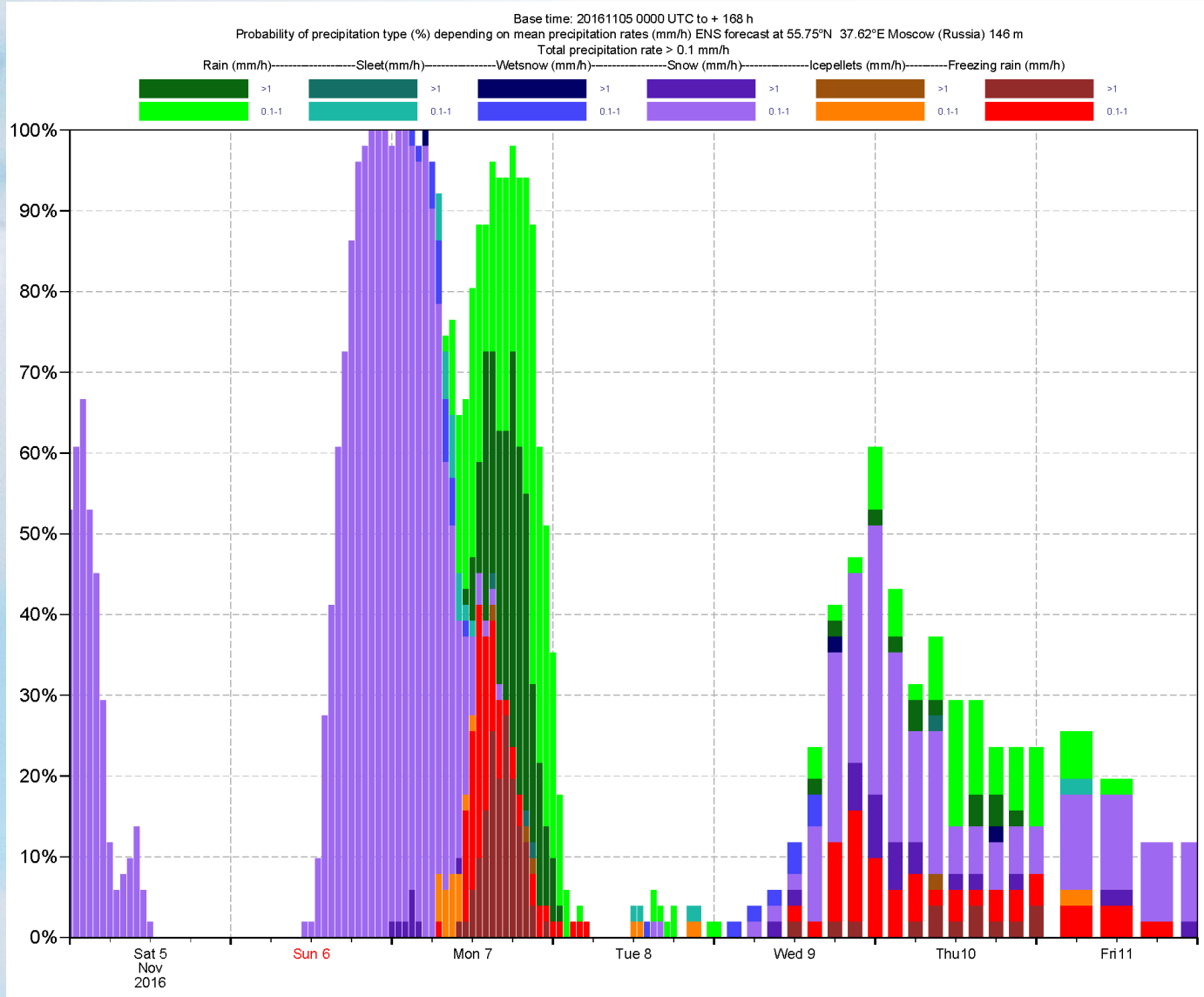
Moscow freezing rain:

- Extreme event of freezing rain on 10 and 11 /11/2016 in Russia.
- Red weather warnings from Met. Services two days before the event.
- The most probable precipitation type product, detected the event 3-4 days in advance.
- The probability of precipitation type graphic for Moscow , detected the event more than 6 days in advance.

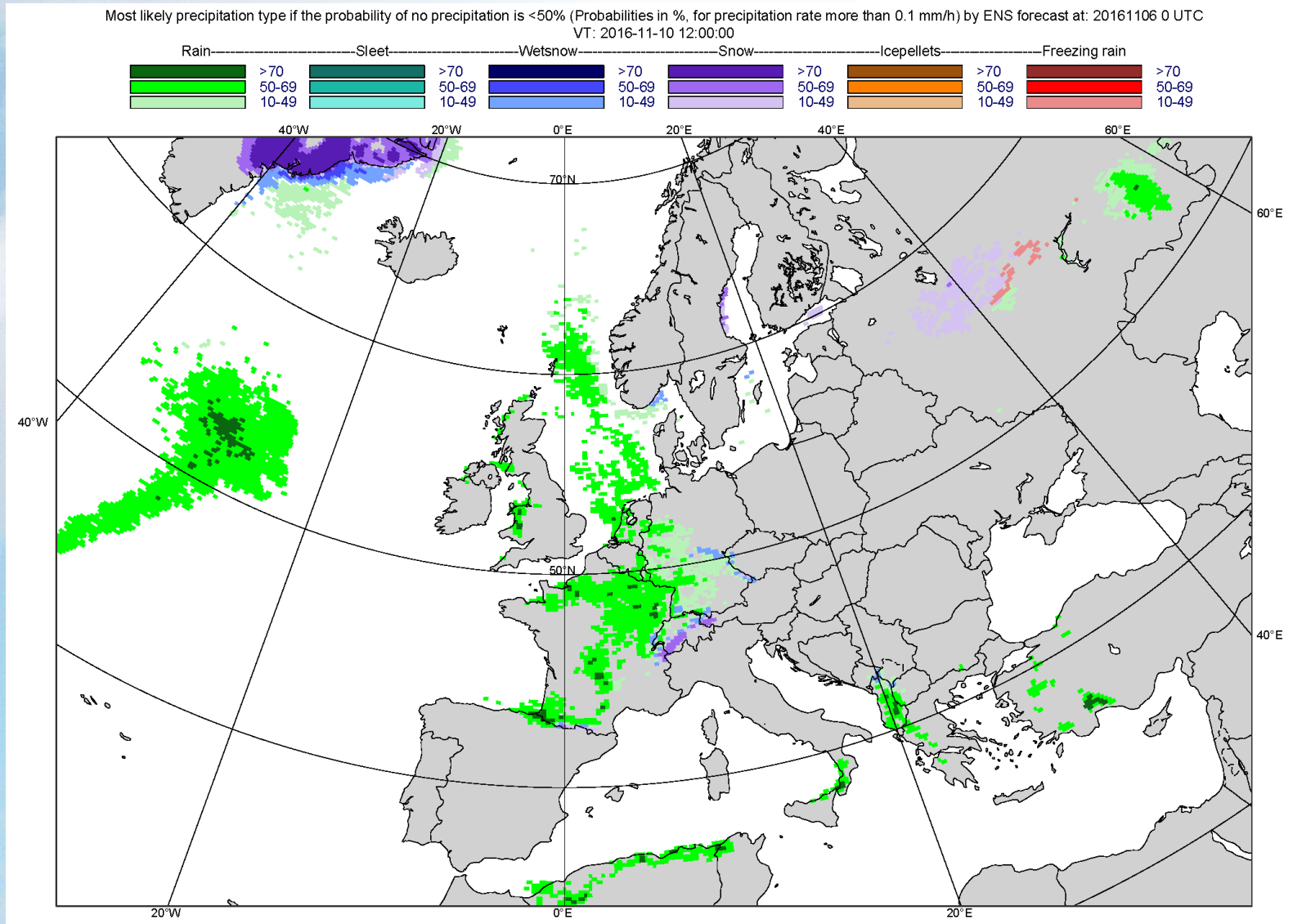
ENS forecast at 20161105 00UTC t+132h



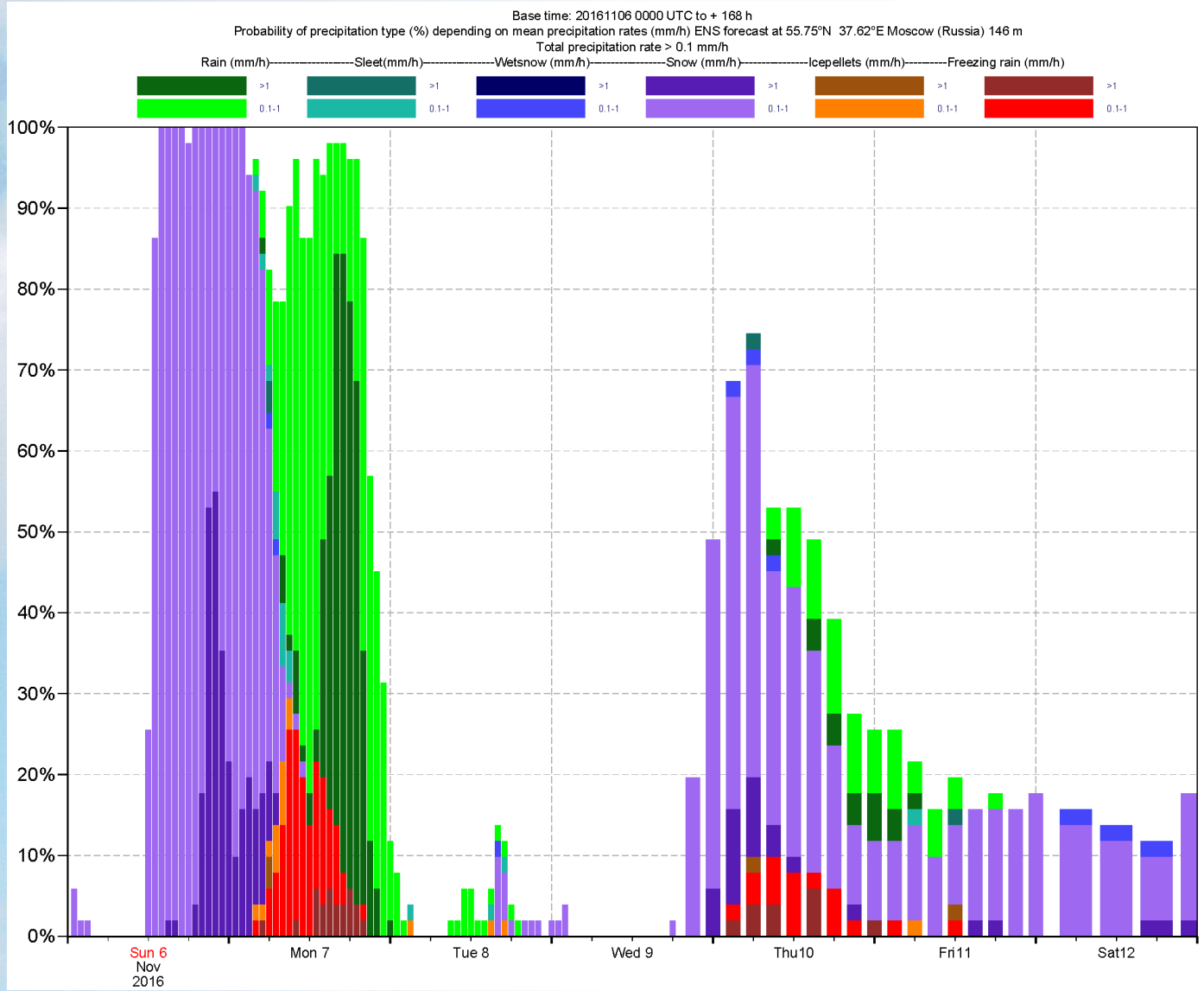
Probability of precipitation type Moscow. Base time: 20161105 00UTC



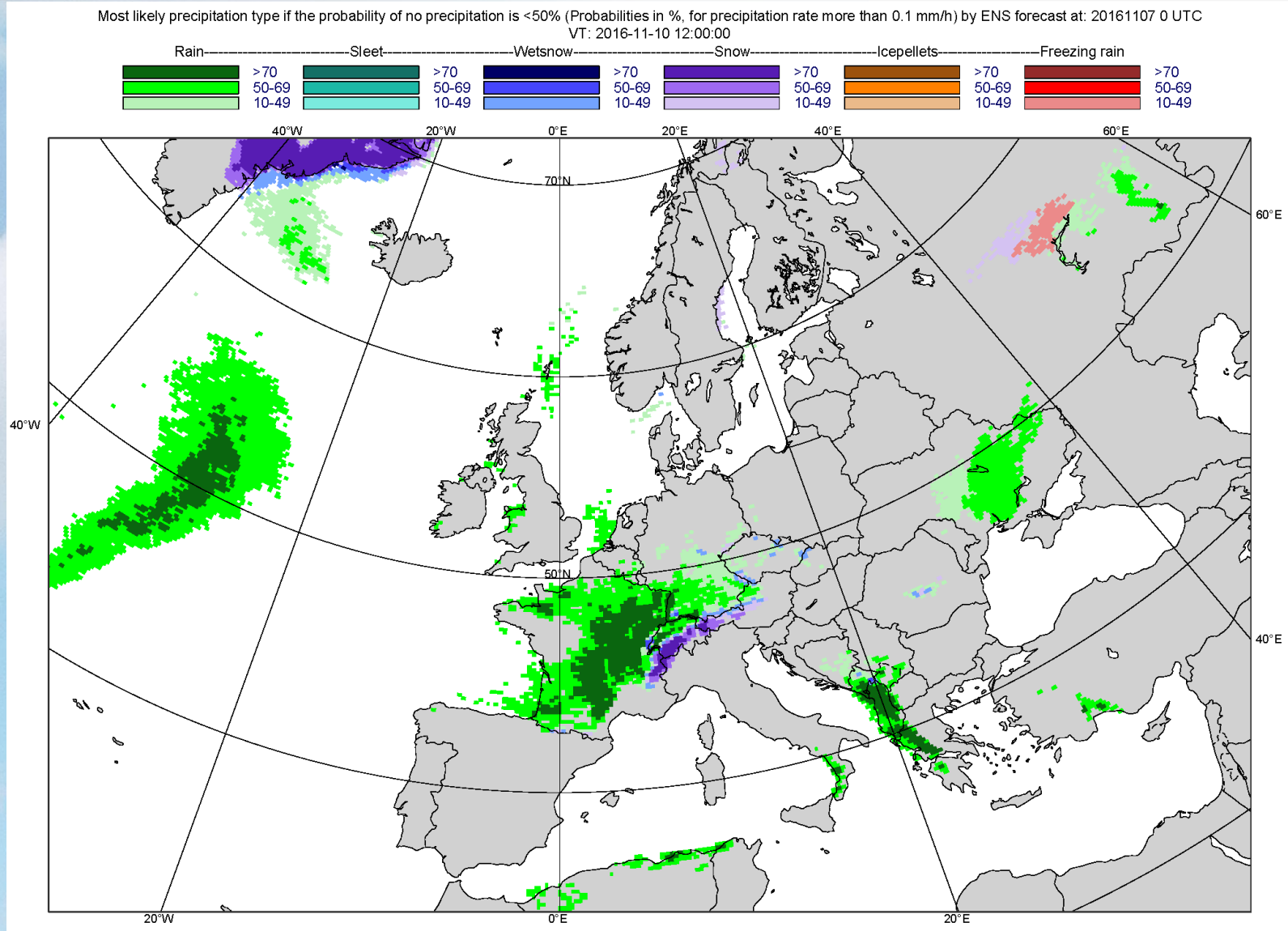
ENS forecast at 20161106 00UTC t+108h



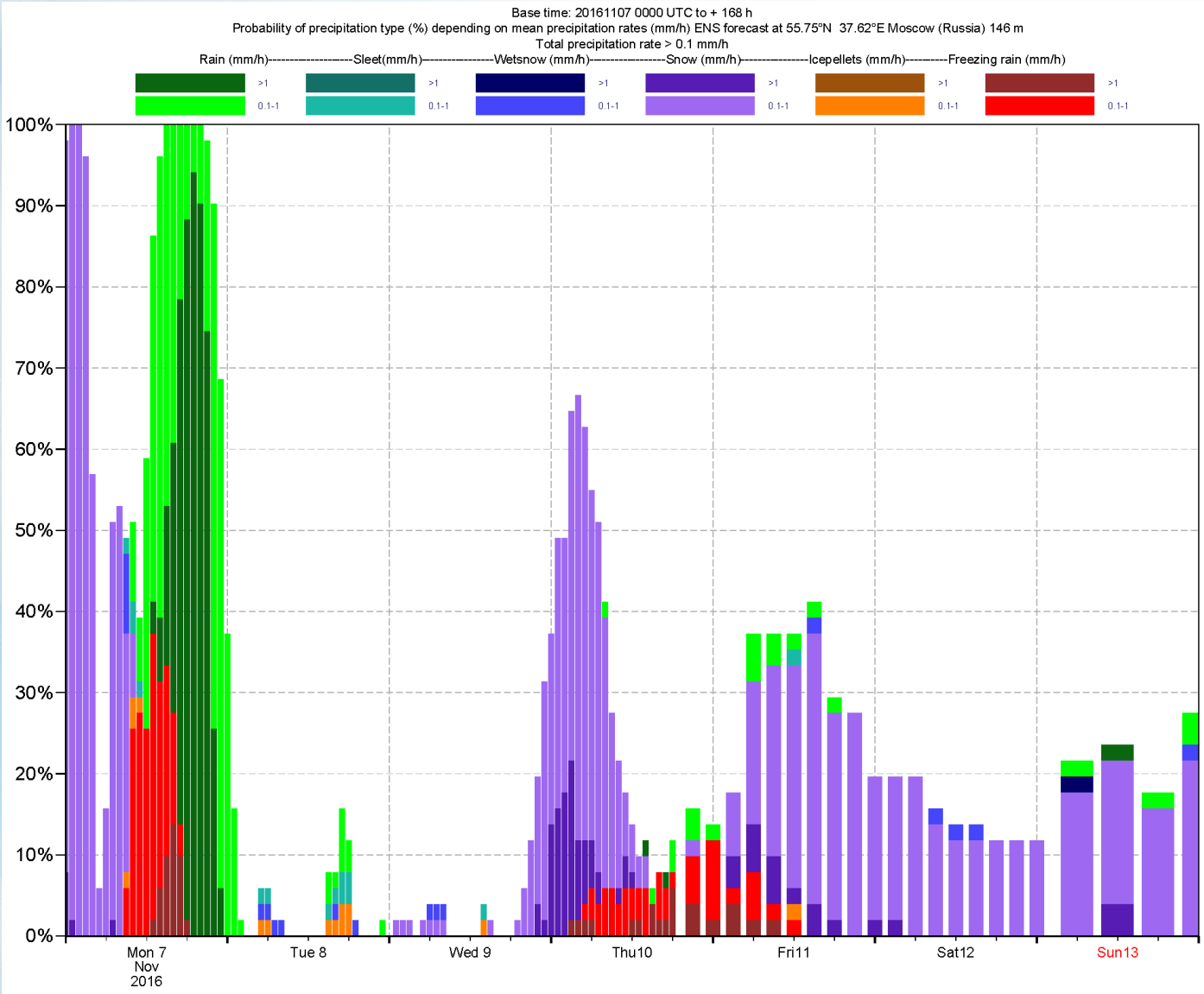
Probability of precipitation type Moscow. Base time: 20161106 00UTC



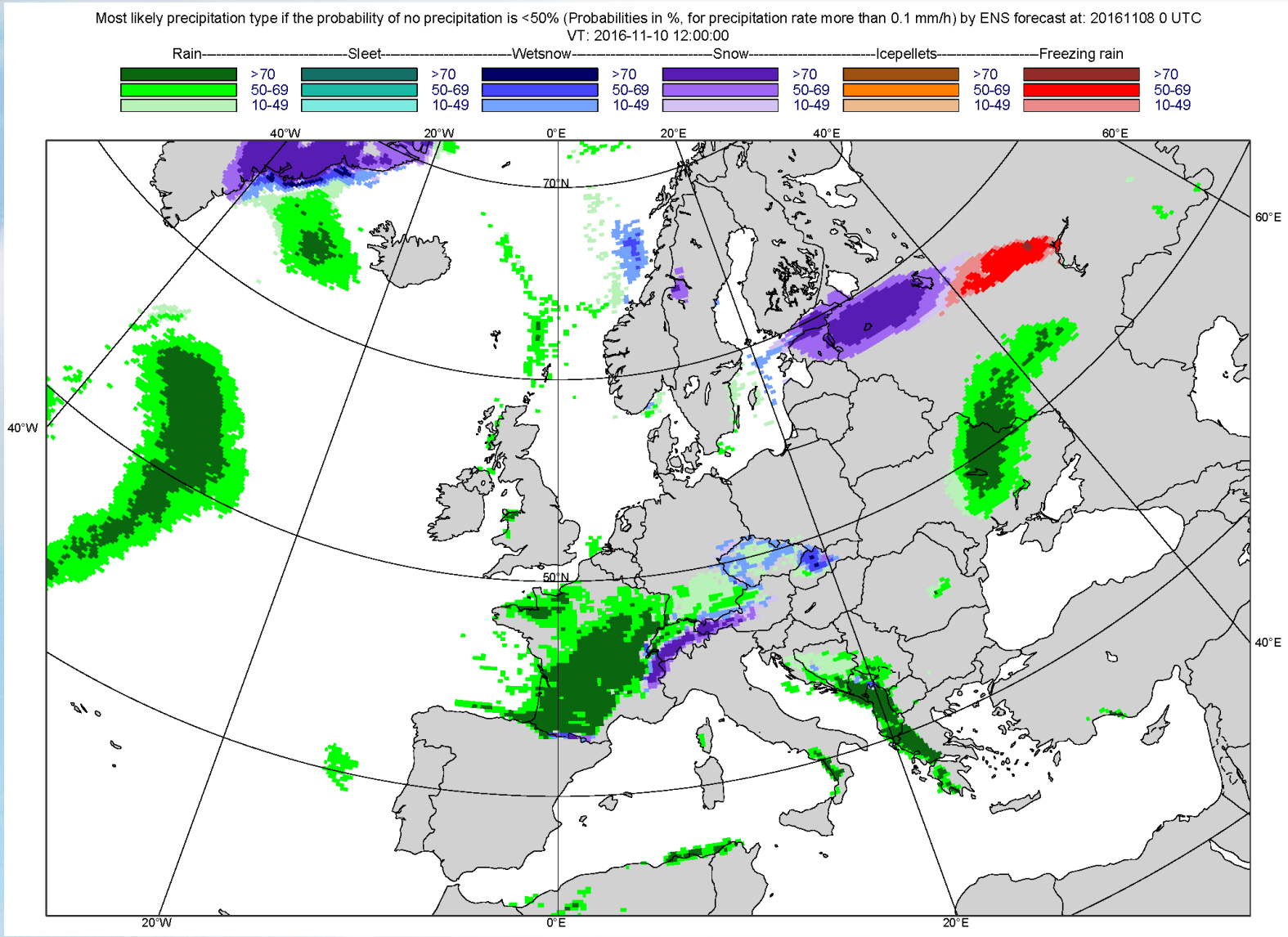
ENS forecast at 20161107 00UTC t+84h



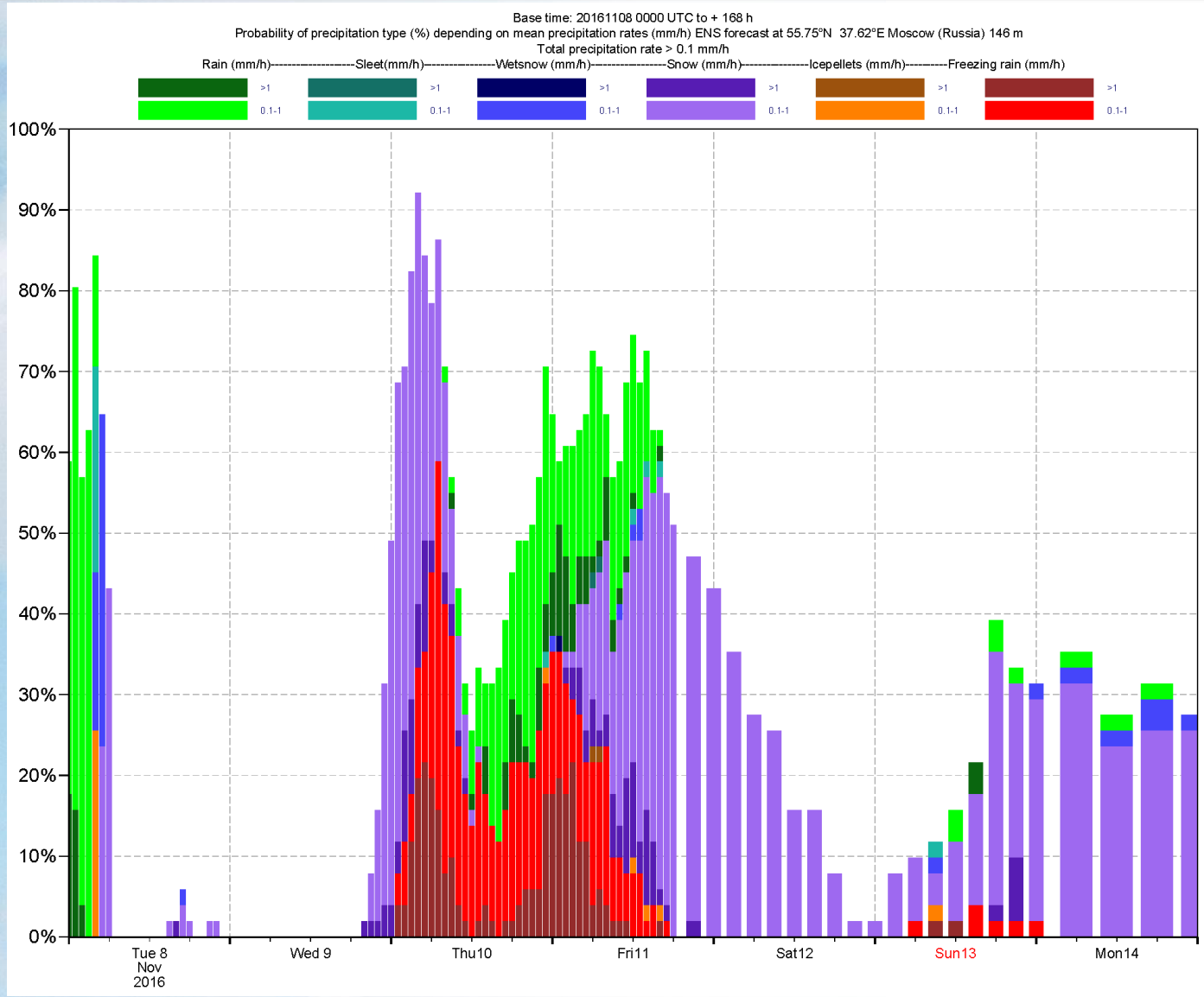
Probability of precipitation type Moscow. Base time: 20161107 00UTC



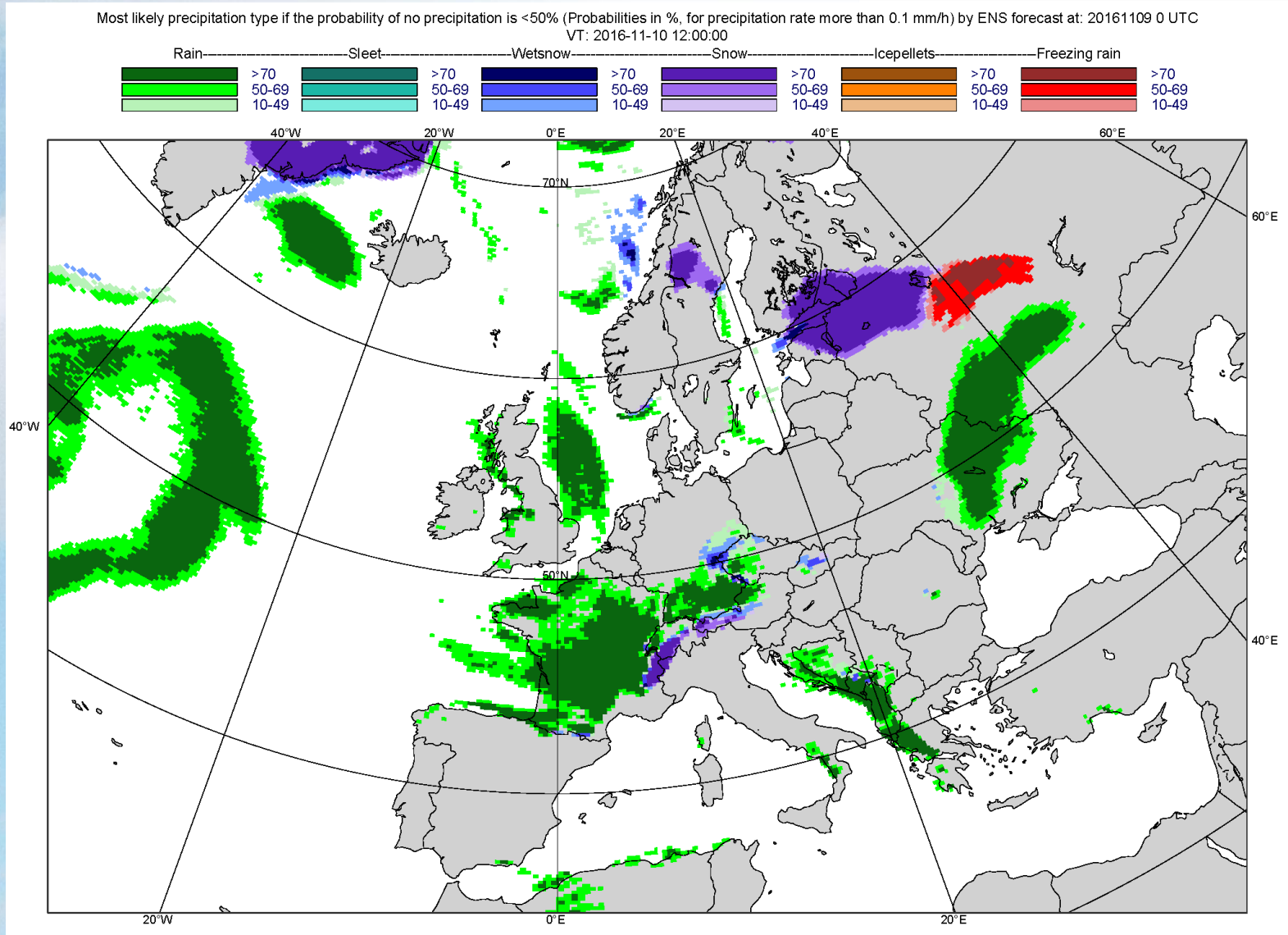
ENS forecast at 20161108 00UTC t+60h



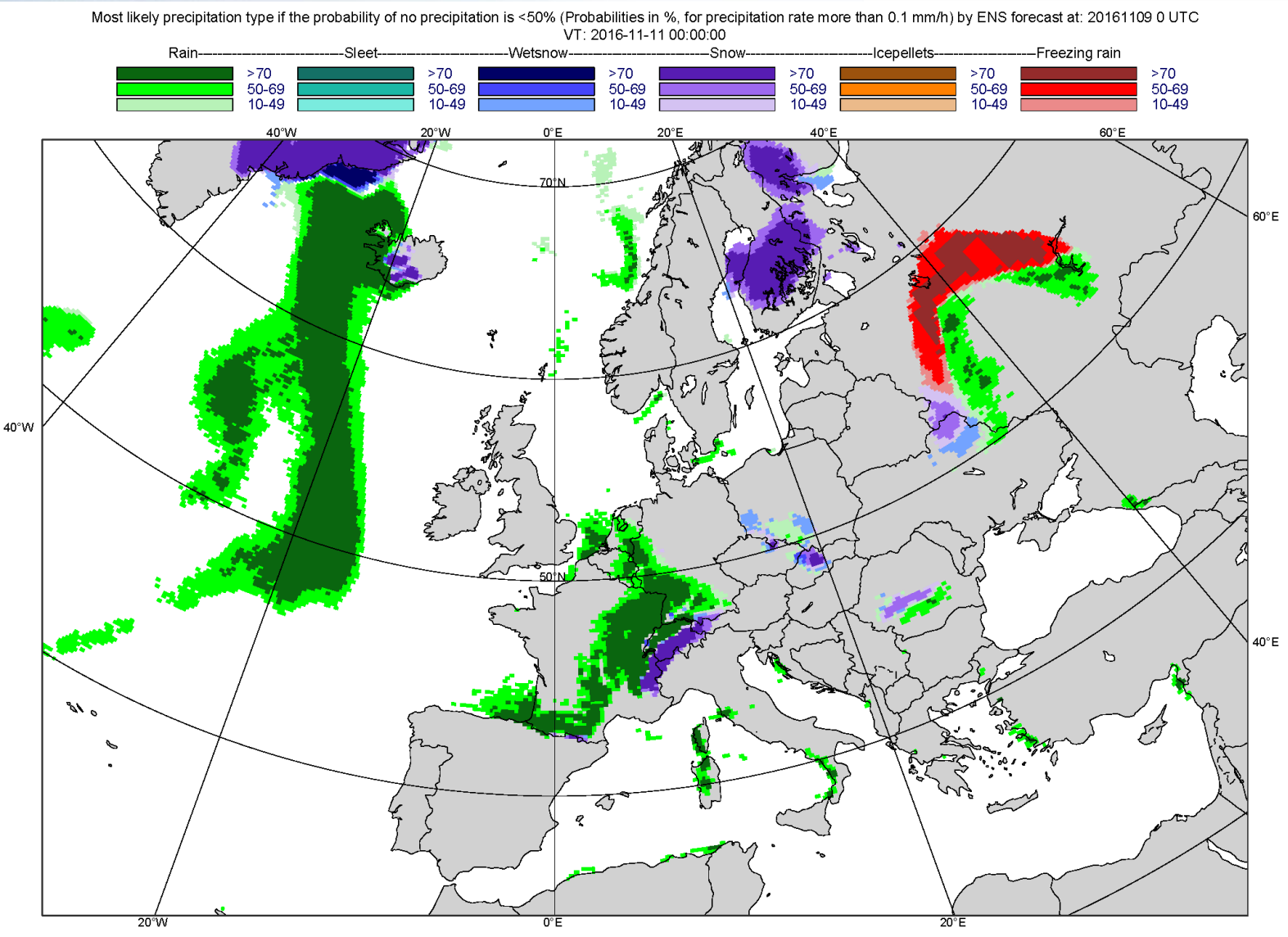
Probability of precipitation type Moscow. Base time: 20161108 00UTC



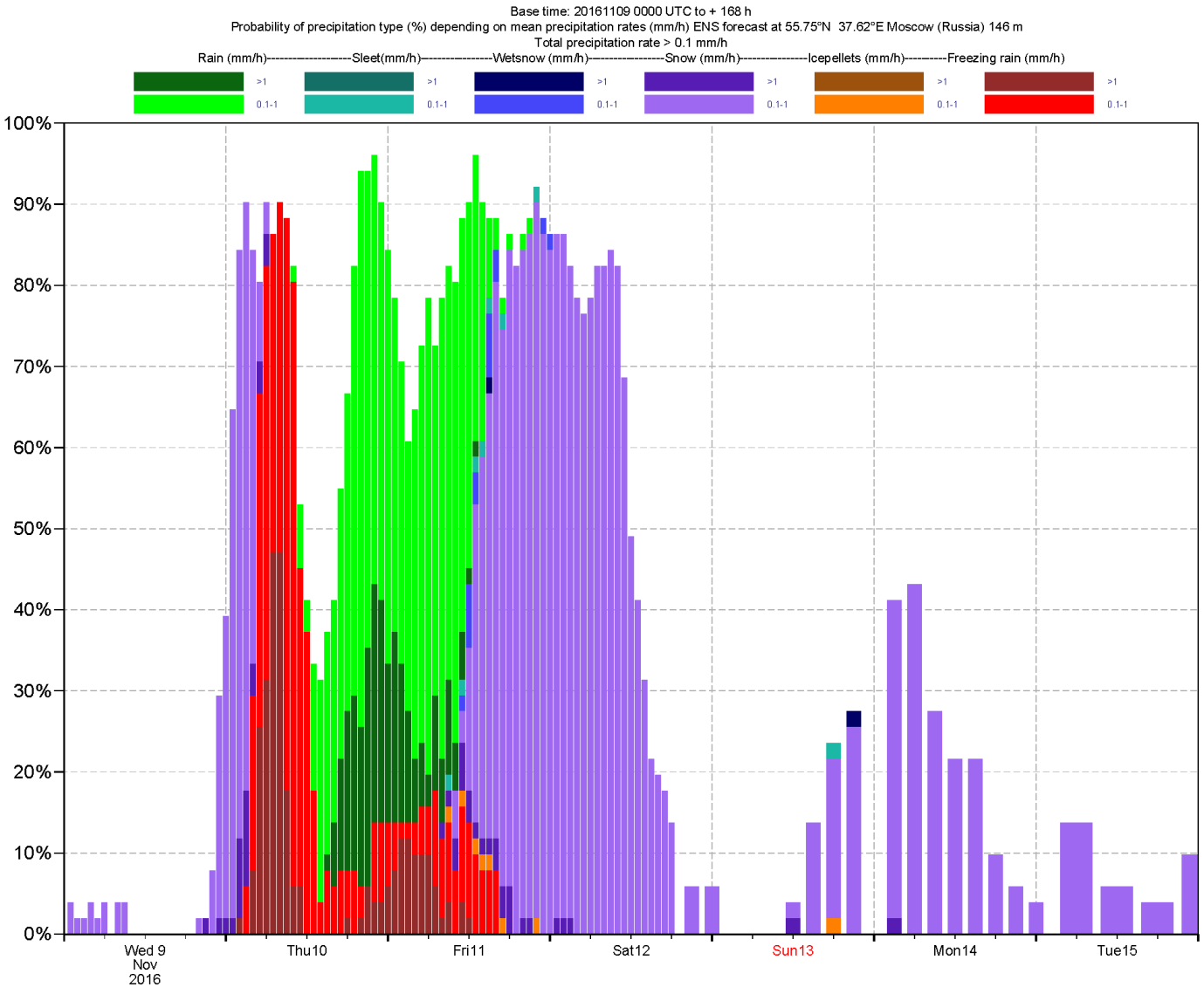
ENS forecast at 20161109 00UTC t+36h



ENS forecast at 20161109 00UTC t+48h



Probability of precipitation type Moscow. Base time: 20161109 00UTC



Thank you very much

estibaliz.gascon@ecmwf.int