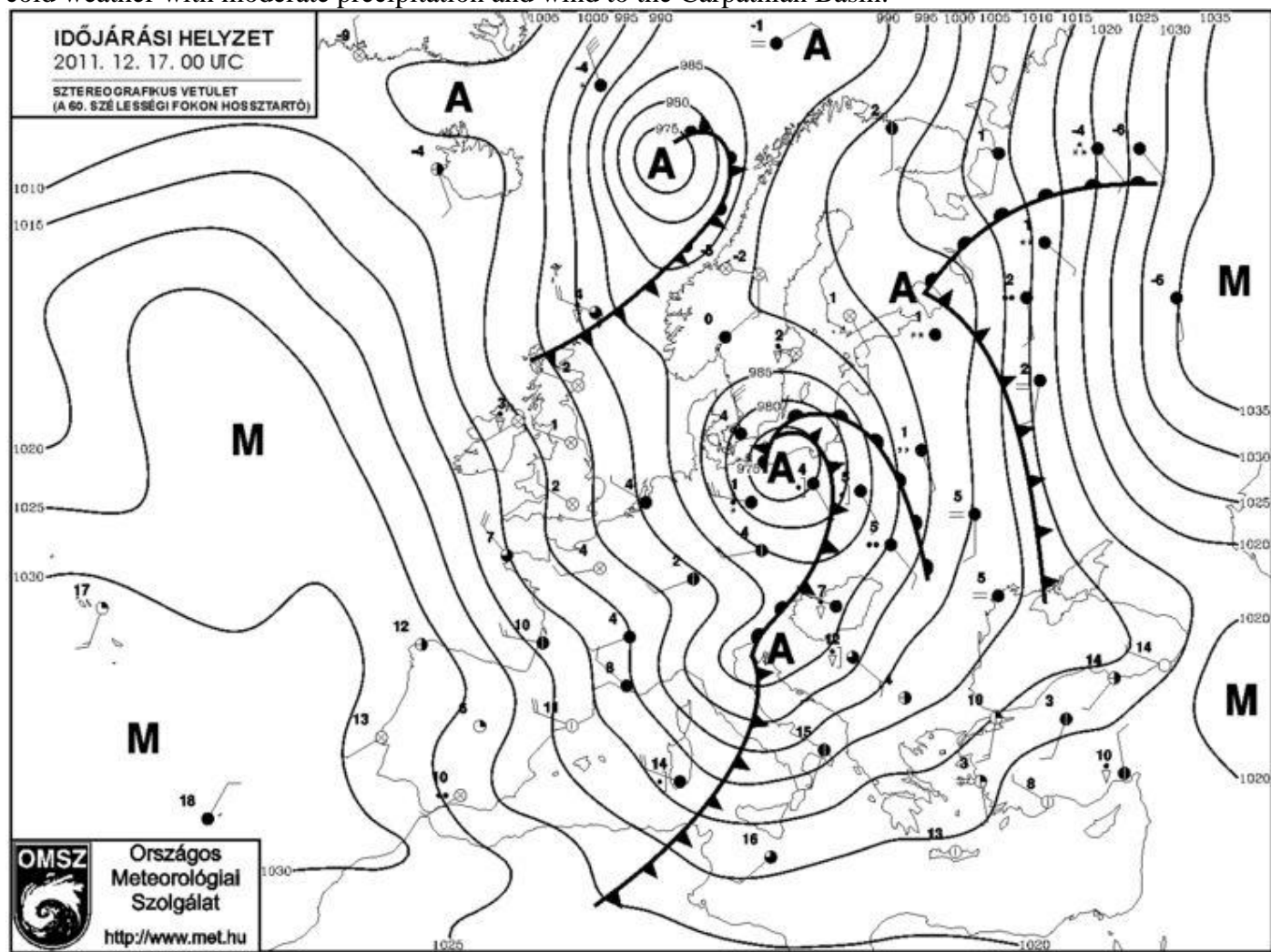


<b>PRODUCT NAME:</b> PR-OBS-2, PR-OBS-3, PR-OBS-4		
<b>CASE STUDY PERIOD:</b> 17 December 2011	<b>METEOROLOGICAL EVENT:</b> a cyclone system over Central Europe	
<b>VALIDATION INSTITUTE:</b> OMSZ-Hungarian Meteorological Service	<b>Responsible:</b> Judit Kerényi	<b>Contact point:</b> kerenyi.j@met.hu
<b>PRODUCT DEVELOPER INSTITUTE:</b> CNR- ISAC	<b>Developers:</b> Mugnai A. , Sanò P.	<b>Contact point:</b> <a href="mailto:a.mugnai@isac.cnr.it">a.mugnai@isac.cnr.it</a>
<b>OPERATIONAL CHAIN INSTITUTE:</b> CNMCA	<b>Responsables:</b> Zauli F, Melfi D.	<b>Contact point:</b> <a href="mailto:zauli@meteoam.it">zauli@meteoam.it</a>

### METEOROLOGICAL EVENT DESCRIPTION

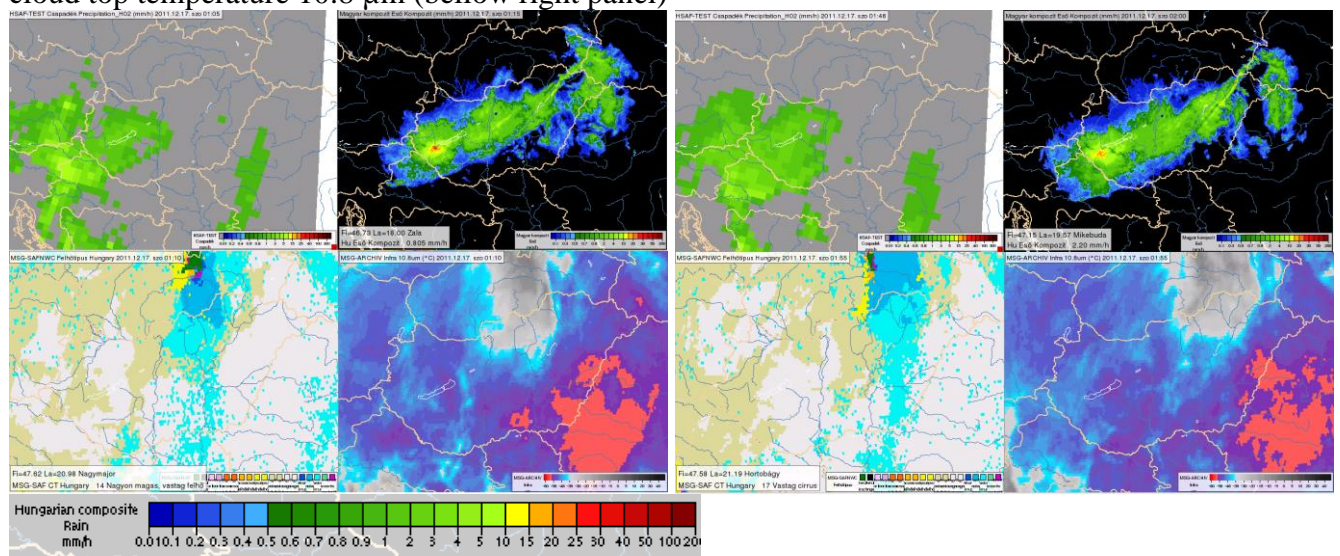
A cyclone system with more centers derives the weather of Europe. The cold front of this system brought cold weather with moderate precipitation and wind to the Carpathian Basin.



### DATA/PRODUCTS USED

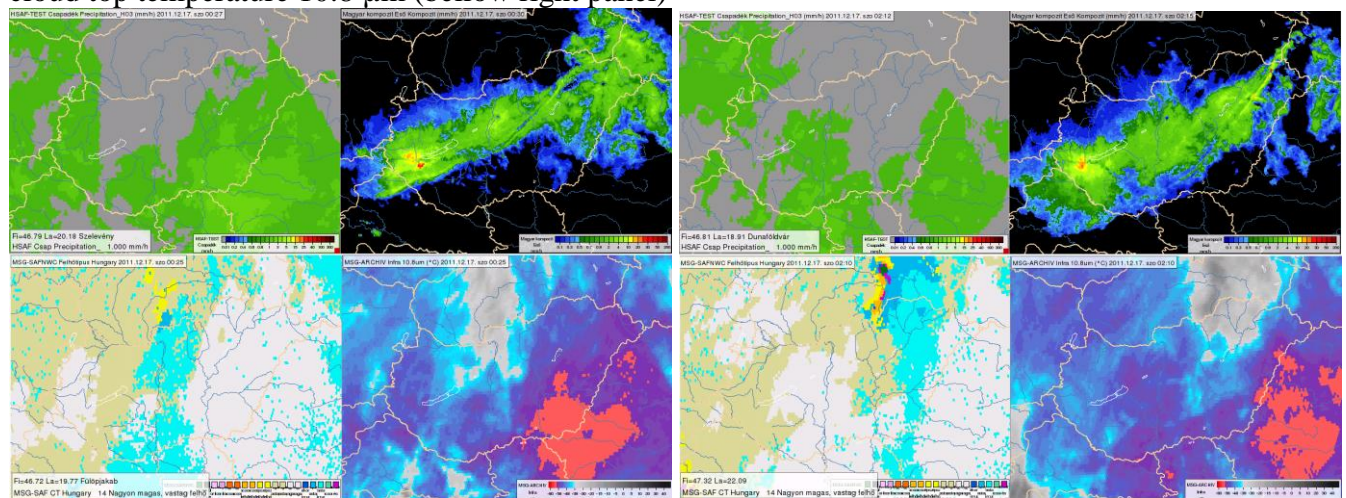
H02, H03 and H04 product was investigated during this day. We compared these products with the cloud type derived by NWC-SAF. We also investigated the 10.8  $\mu\text{m}$  brightness temperature fields.

precipitation rate information from the Hungarian radar network (top right panel)  
 precipitation rate information from the H02 product (top left panel)  
 cloud classification from NWC-SAF (bellow left panel)  
 cloud top temperature 10.8  $\mu$ m (bellow right panel)

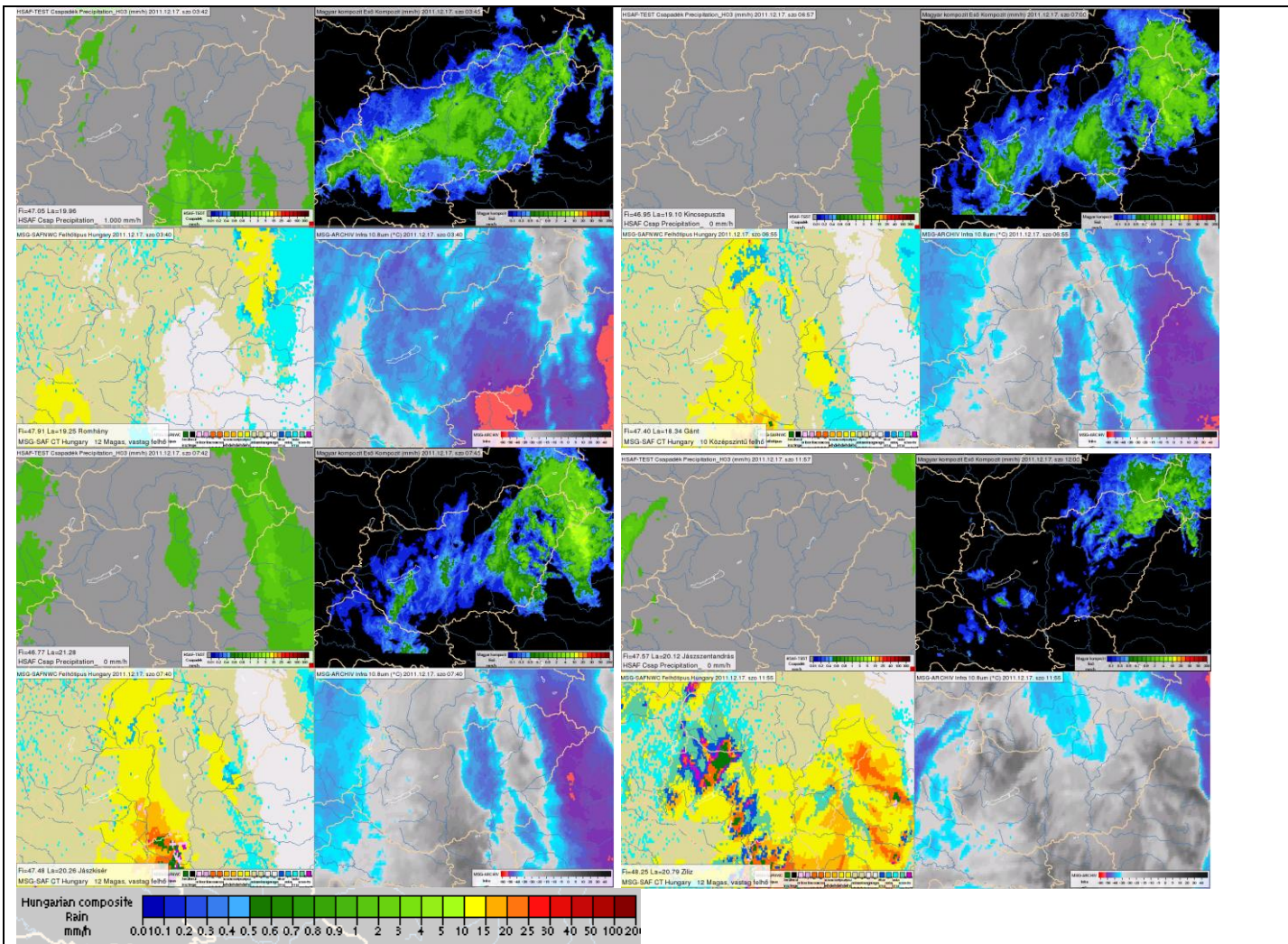


At 01:15 and 02:00 UTC

precipitation rate information from the Hungarian radar network (top right panel)  
 precipitation rate information from the H03 product (top left panel)  
 cloud classification from NWC-SAF (bellow left panel)  
 cloud top temperature 10.8  $\mu$ m (bellow right panel)

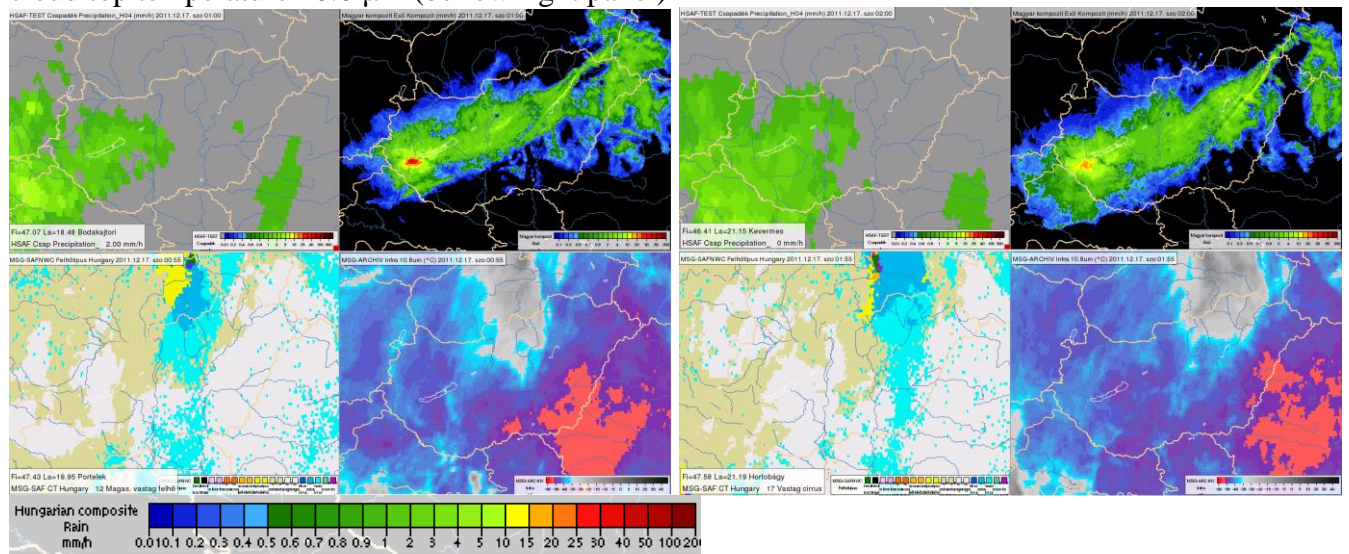



























At 00:30, 02:15, 03:45, 07:00, 07:45 and 12 UTC

- precipitation rate information from the Hungarian radar network (top right panel)
- precipitation rate information from the H04 product (top left panel)
- cloud classification from NWC-SAF (bellow left panel)
- cloud top temperature 10.8  $\mu\text{m}$  (bellow right panel)



At 01:00 and 02:00 UTC

	0 non-processed
	1 cloud free land, no contamination by snow/ice covered surface,
	2 cloud free sea, no contamination by snow/ice covered surface
	3 land contaminated by snow
	4 sea contaminated by snow/ice
	5 ---
	6 very low opaque clouds
	7 ---
	8 low opaque clouds
	9 ---
	10 medium opaque clouds
	11 ---
	12 high opaque clouds
	13 ---
	14 very high opaque clouds
	15 high semitransparent thin clouds
	16 high semitransparent meanly thick clouds
	17 high semitransparent thick clouds
	18 high semitransparent above low or medium clouds
	19 fractional clouds (sub-pixel water clouds)
	20 undefined (undefined by CMA)

## RESULTS OF COMPARISON

From midnight to noon the cold front caused moderate intensity precipitation in whole country. Between 00-02 UTC an embedded heavy intensity rain spot can be seen in the south-west part of Hungary. From 8 UTC the precipitation was measured only at the east part of Hungary. If we investigate the 00-02 UTC period we can see the H02, H03 H4 product did not detect this heavy rain spot, and only H03 gave precipitation for the east part of Hungary. If we look at the cloud classification fields we can see that very high and high opaque clouds covered Hungary at the beginning of the investigated period.

## COMMENTS

All of the investigated products did not detect or underestimated the precipitation fields. This problem was noticed mainly in winter time.

## INDICATION TO DEVELOPERS

It seems that further studies are needed at H02, H03 and H04 to derive the intensity values in winter time. .