# Satellite products at SHMÚ and their potential in monitoring precipitation and drought conditions

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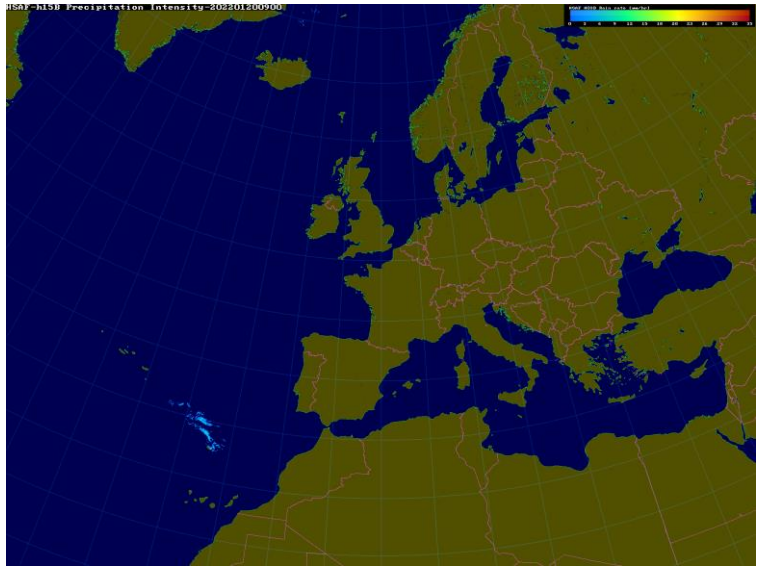
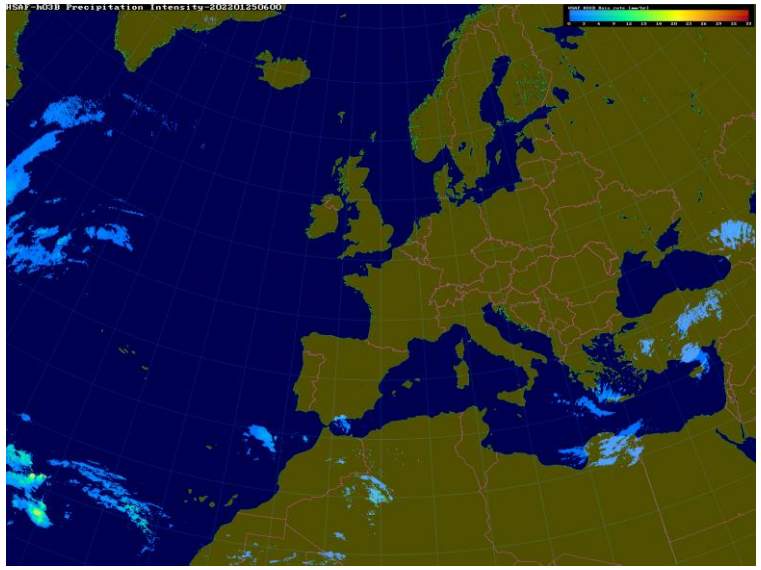
# HSAF Precipitation products at SHMÚ

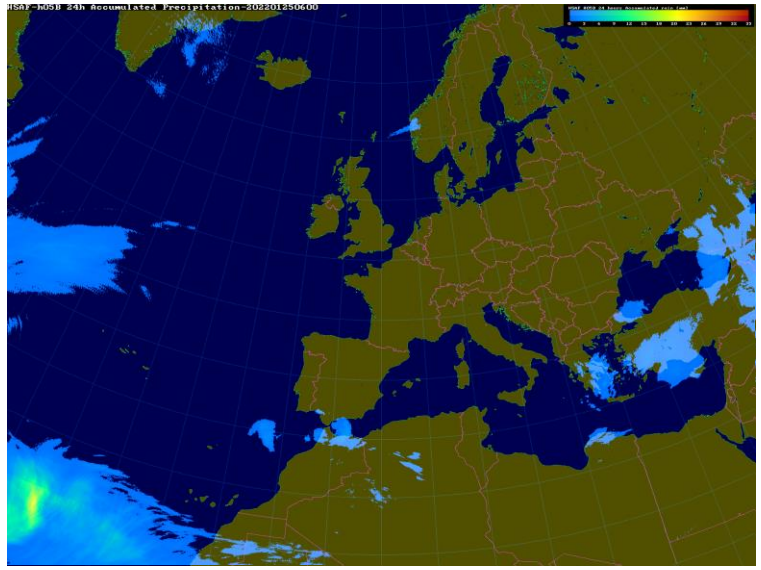
- Operational reception of products via EUMETCast satellite service
- FTP-download from HSAF ftp-server for regular validation
- Operational processing and visualization of products for internal usage



H15B Precipitation intensity



H03B Precipitation intensity



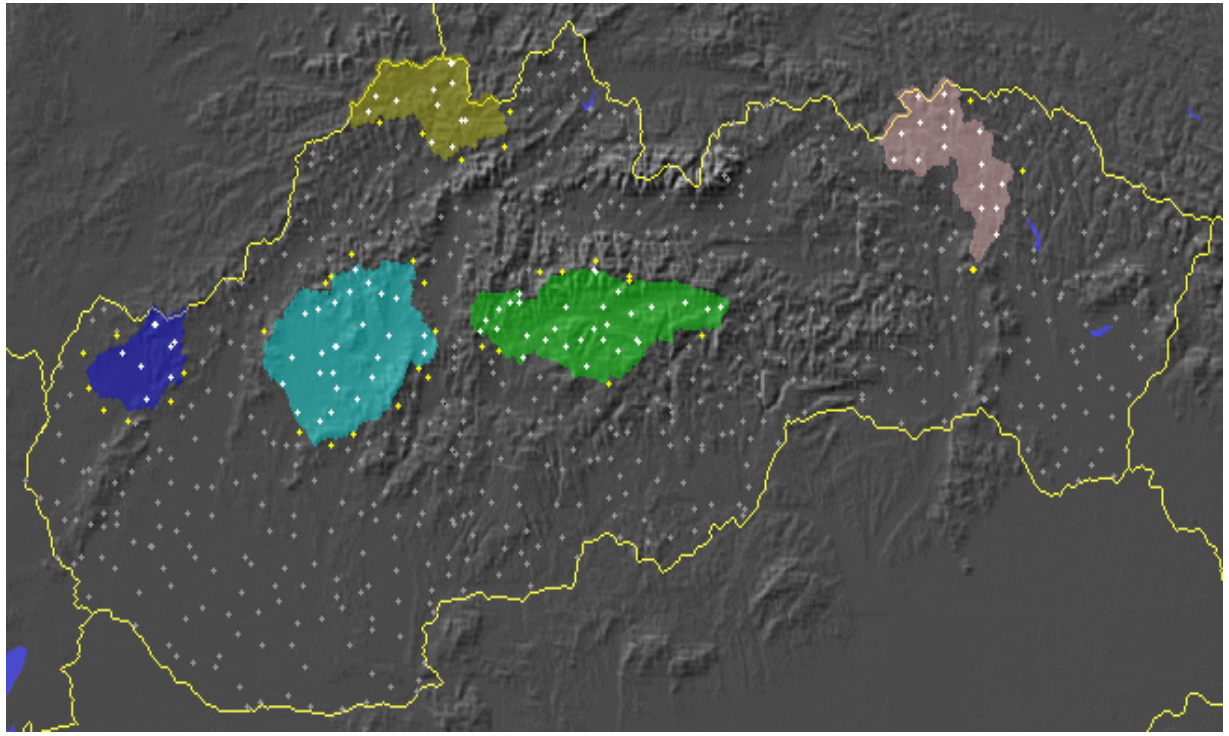
H05B Accumulated Precipitation

SHMÚ participates in validation activities from the starting H-SAF in 2005.
We present here the utilization of long-term precipitation product H05(A,B) from the period of years:

**1.1.2012 – 31.1.2020**

# Study of drought 2020 on the base of H05B product - River catchments

In this study, we compared satellite data of daily precipitation totals for 5 selected river basins in Slovakia (Myjava, Nitra, Hron, Kysuca and Topľa) against average precipitation determined from available precipitation stations in these river basins.



| River catchment | Number of stations inside catchment | Number of stations closed to catchment | Sum of all stations used for catchment |
|---|---|---|---|
| Myjava | 8 | 7 | 15 |
| Nitra | 26 | 13 | 39 |
| Hron | 30 | 9 | 39 |
| Kysuca | 12 | 5 | 17 |
| Topľa | 16 | 4 | 20 |

# SHMÚ database - 24-hour rain totals:

- We checked the availability of data in the period 2012-2020 and selected only stations without gaps (9 years)
- To improve basins coverage by rain gauges we decided to use also gauges closed to the basin
- We calculated the average value of the totals over the basin for 9 years for each day of the year
- We obtained a long-term precipitation average as a replacement of the climatological standard (Hereinafter referred to as CS)

# HSAF database - 24-hour rain totals:

- H05 data previous versions (before 2012) were considered inconsistent for further use so we have available 9 years of data covering continuously this time period

- Therefore our decision to work with the years from 2012 to 2020

- Advantage – we could use already pre-processed satellite data thanks to previous
- validation and hydro validation activities

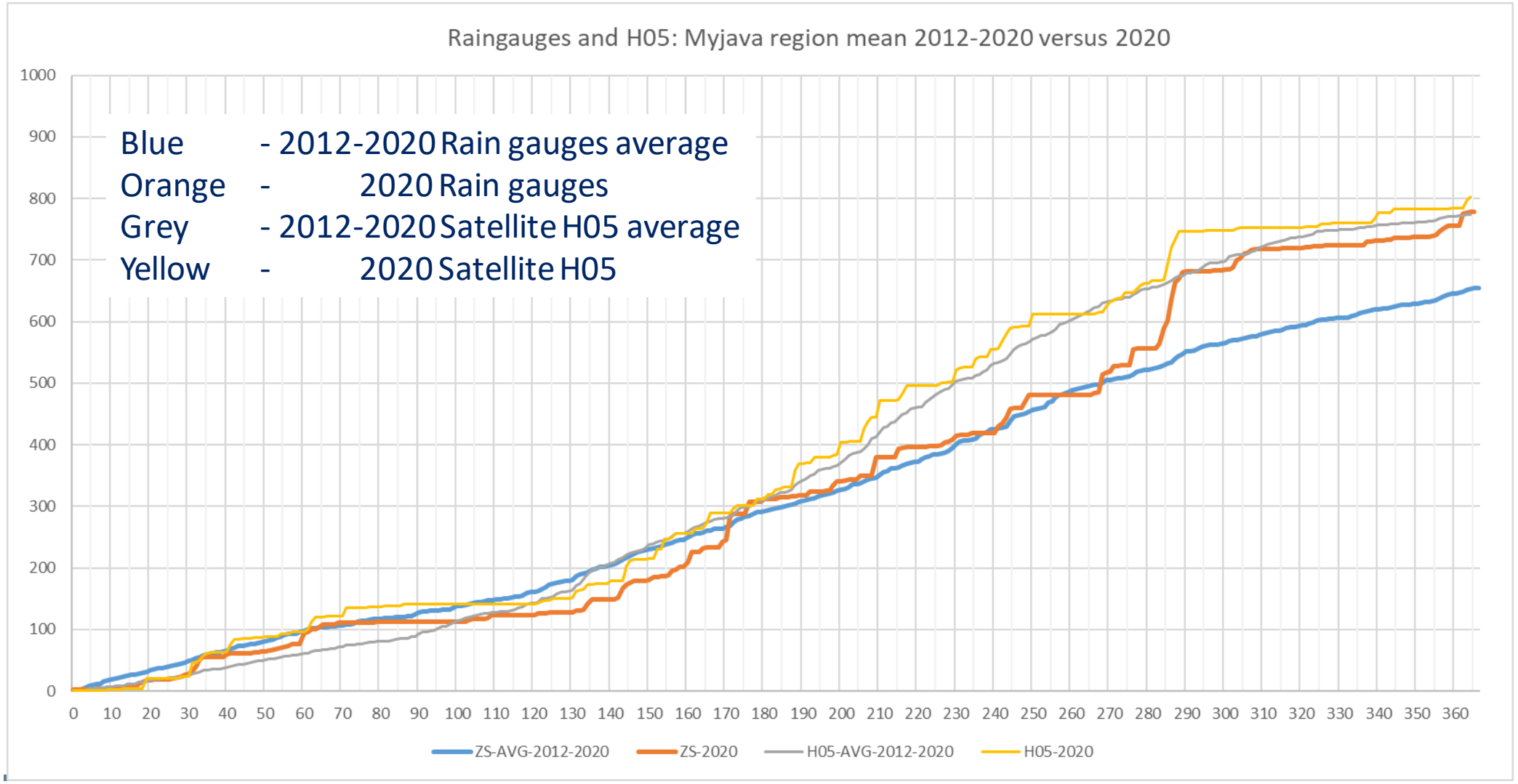
- We obtained a long-term precipitation average as a replacement for
- the climatological standard (CS)

- We used satellite products declared as “operational products” only

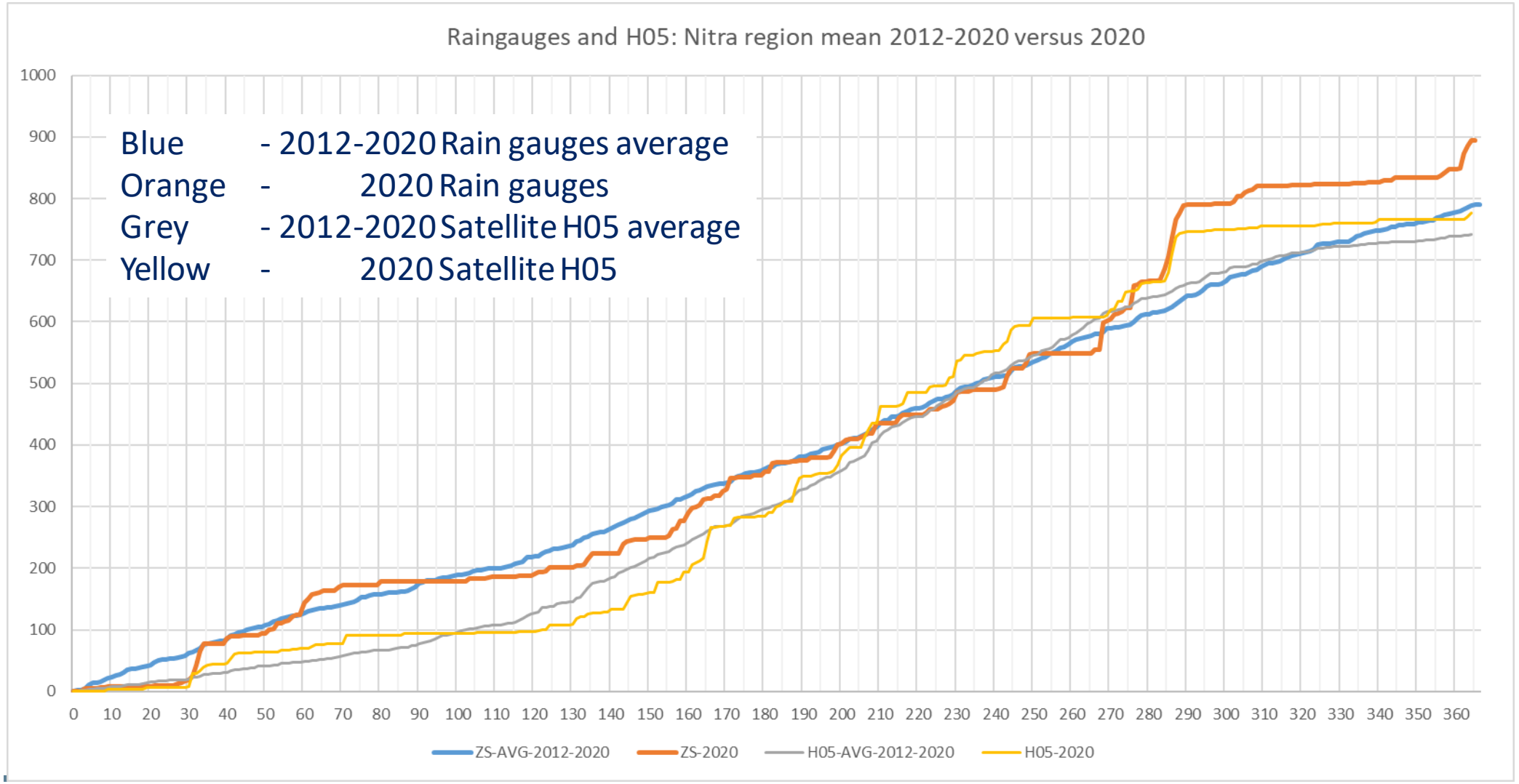
# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge considerations

- The mentioned CSs for individual river basins from rain gauges and satellite data are naturally not identical.
- The differences result from different precipitation measurement methodologies - direct point versus distance measurements of radiances and the application of complex algorithms to satellite data.
- The results of the comparison will be demonstrated in the Hron basin and are shown in the following slides.

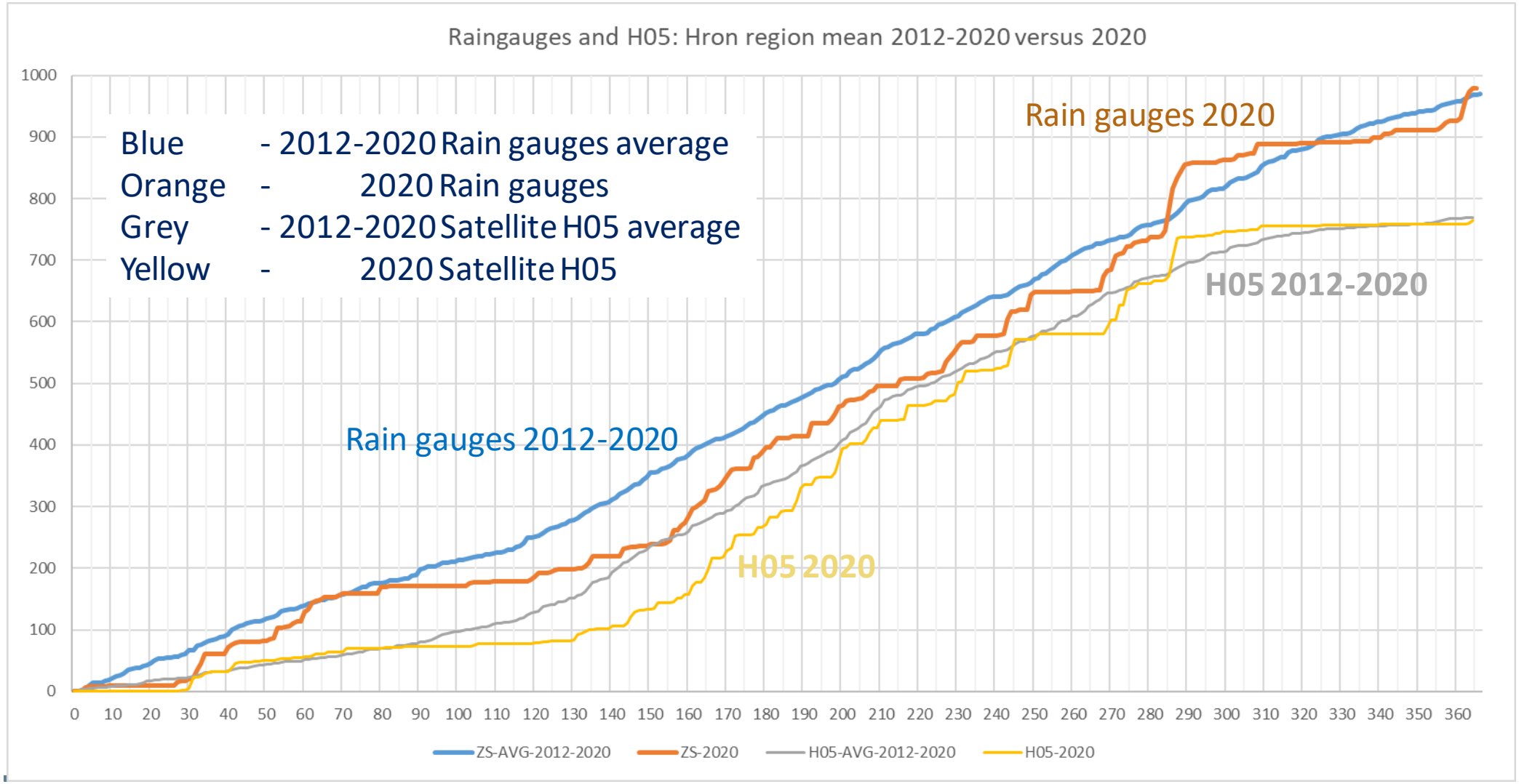
# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge MYJAVA basin



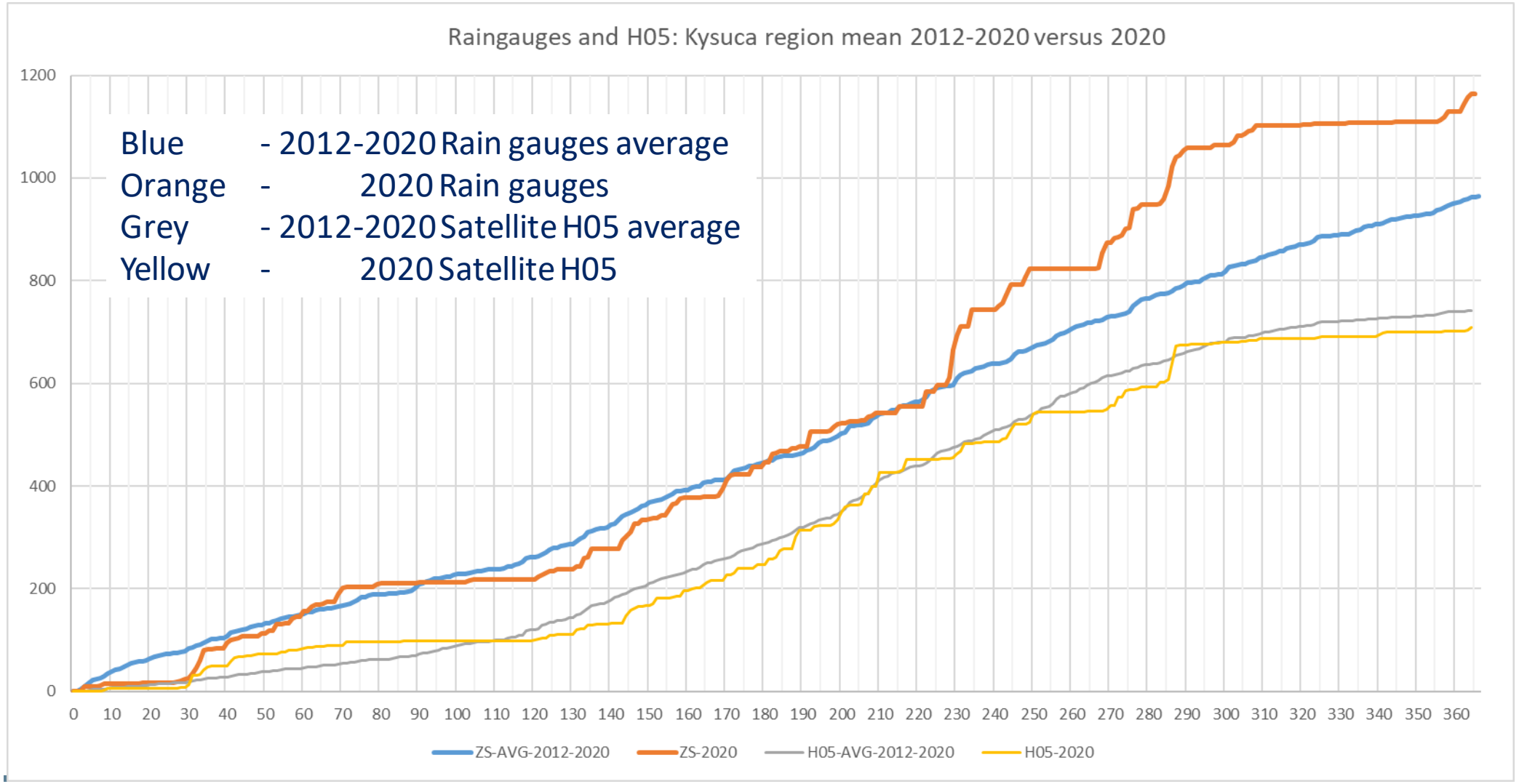
# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge NITRA basin



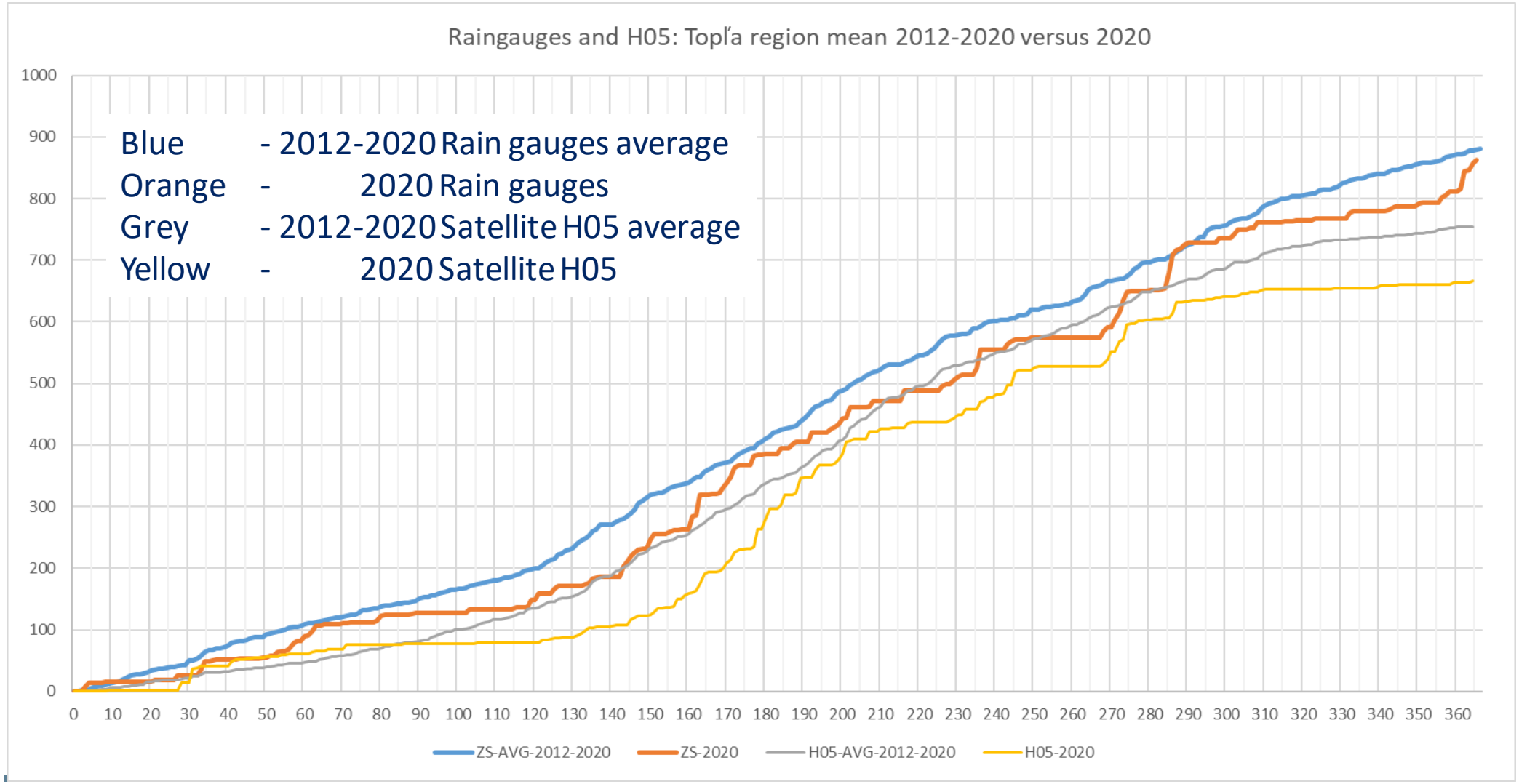
# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge HRON basin



# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge KYSICA basin



# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge TOPĽA basin



# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge Yearly Totals corrections

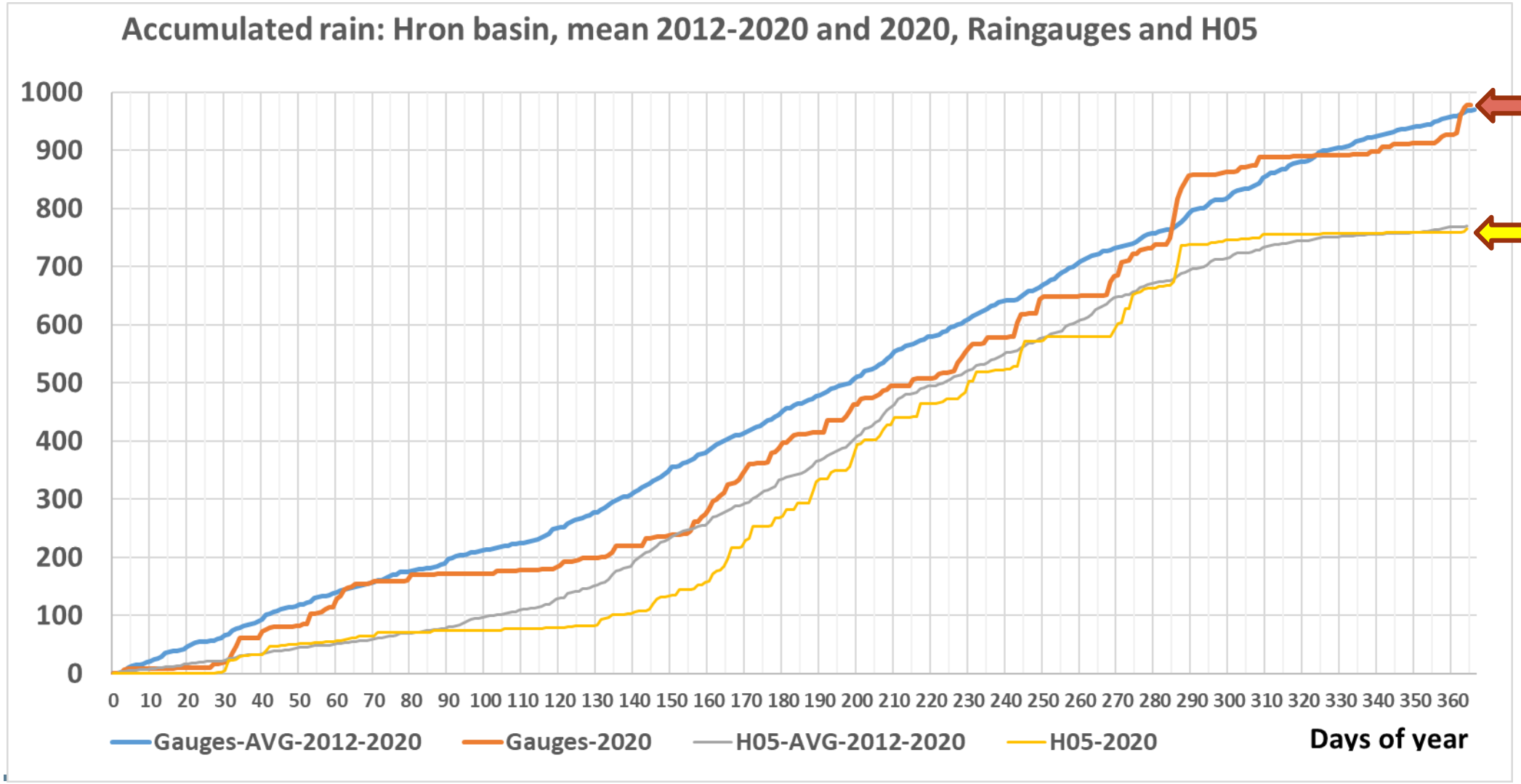
**Question/task:**

Can we find a correction that shifts the gray curve (long-term mean of H05) to the blue curve (long-term mean of rain gauges)?

**Objective:**

When finding a correction, it would be possible to adjust the yellow curve so that it is in the best possible match with the orange curve (Year 2020-H05 and 2020-rain gauges yearly totals

# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge Specification of drought period



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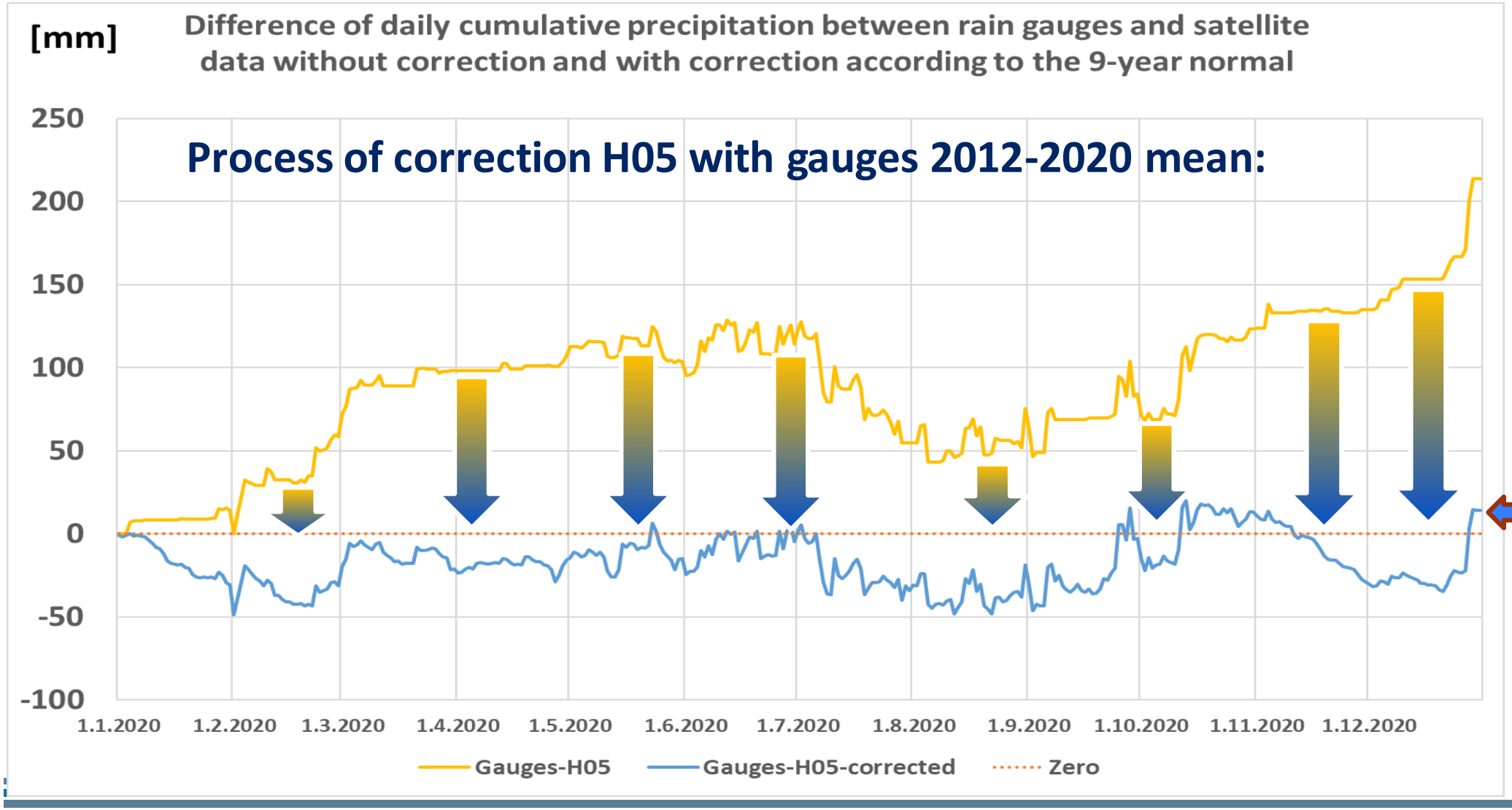
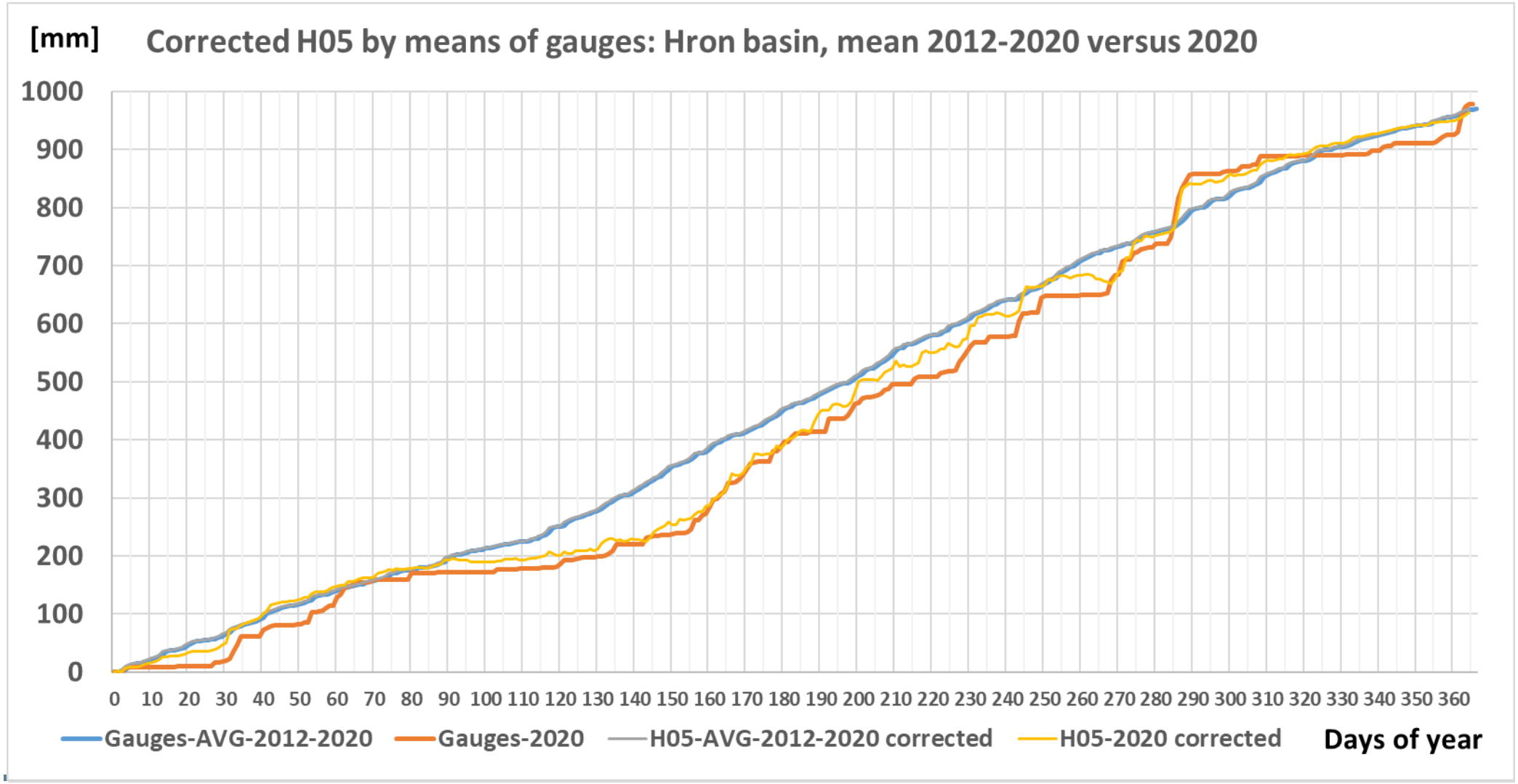



Corrected difference Gauges-H05 must be close to zero

# Study of drought 2020 on the base of H05B product - H05B versus Rain Gauge Specification of drought period



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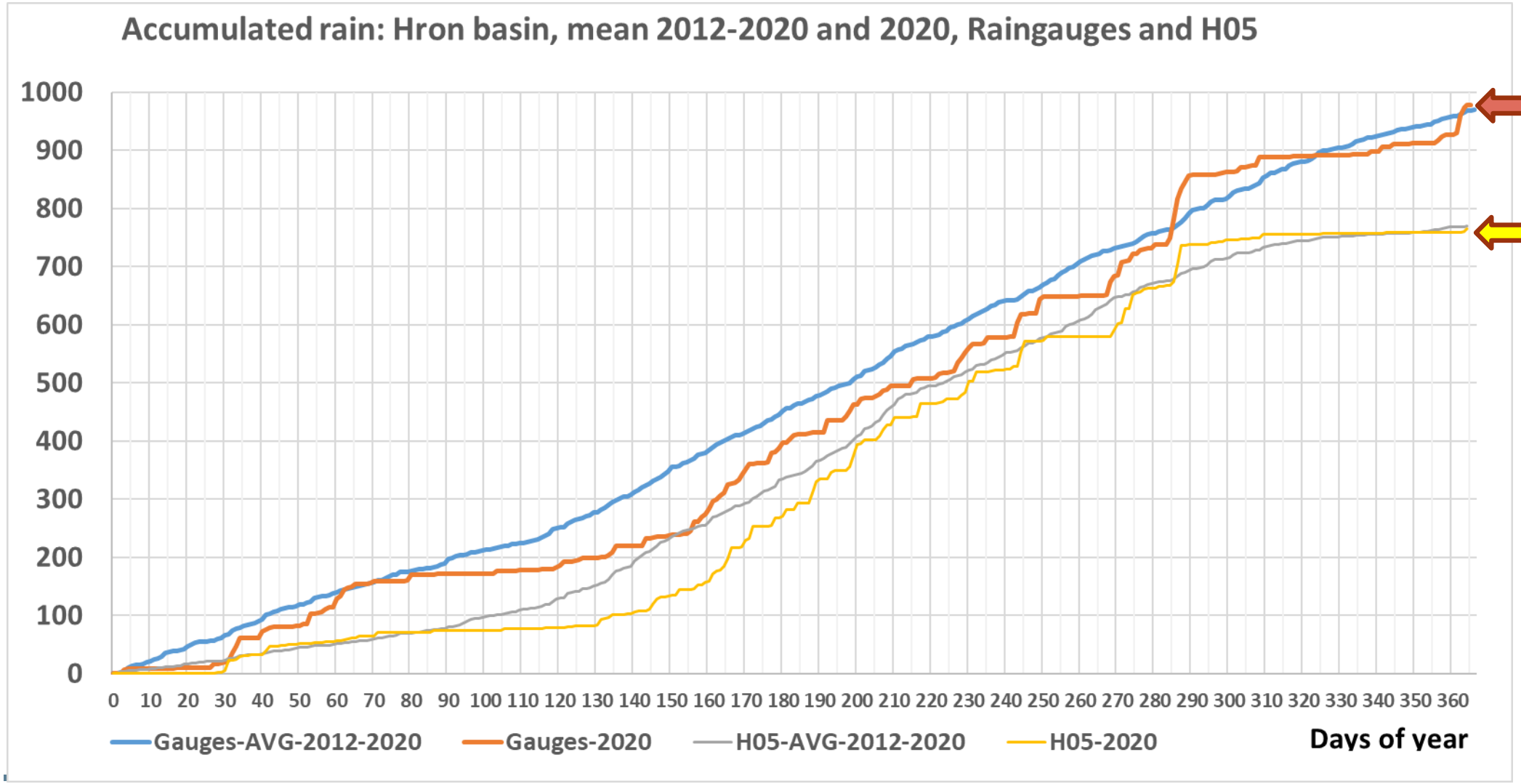

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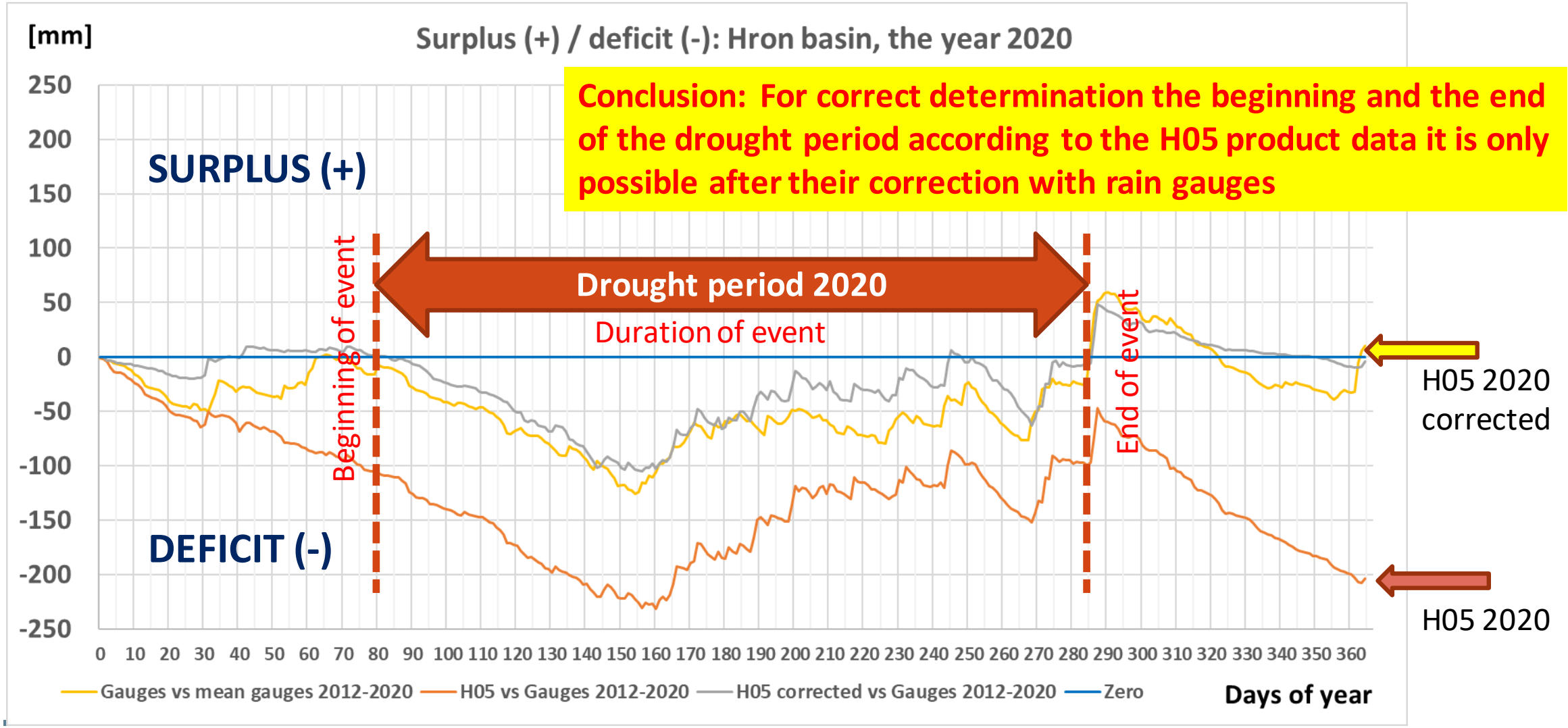

# Study of drought 2020 on the base of H05B product

## Conclusions

- The aim was to show the potential of satellite estimates of cumulative precipitation, which, when properly calibrated and corrected to local conditions using a network of rain gauges, can be useful in monitoring the long-term course of precipitation and can help assess both precipitation and drought events.
- The products of precipitation from satellites are generated globally by scanning the whole Earth with microwave and infrared sensors. From this we must to recognize advantages and disadvantages:
- Advantages: spatial and temporal continuity
- Disadvantage: the difference in regional influences of orography and climatic conditions.