

Monitoring of Natural Hazards in Slovakia – Slope Deformations in Upper Nitra

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INTRODUCTION

The slope deformations represent the most frequently occurring type of deformation of the Earth's surface in the territory of the Slovak Republic. They represent one of the most significant manifestations of exogenous geodynamic processes not only in Slovakia but also in Central Europe. Based on the Atlas Map of Stability Slope of the Slovak Republic, 21.190 slope deformations are found in Slovakia. They damage a territory of 257.5 thousand hectares (5.25% of the total area of Slovakia). The monitoring of slope deformations is performed by means of engineering-geological surveys including geological, geodetic and hydrological measurements. At the last season, efforts have been made to include satellite radar interferometry in these surveys. In this case, it is an InSAR application to monitor slope deformation in the Upper Nitra region.

AREA OF INTEREST

The area of interest includes three cadastral territories: Hradec, Veľká Lehôtka and Koš. The villages are located in the Prievidza district in the Trenčín Region and lie on the western and northwestern slopes of the Vtáčnik mountain range at an altitude of approximately 420-500 m (Hradec), about 400 - 470 m (Veľká Lehôtka) and about 242 - 412 m (Koš).

Interesting location is influenced by slope disturbances of two types:

- landslides,
- block type slopes.

The rise of slope deformations in the Veľká Lehôtka and Hradec was affected by geological structure and natural conditions. The risk of their occurrence is supported by negative anthropogenic interventions in the geological structure. In the case of the Koš locality, it is mostly negative for anthropogenic interferences caused by predominantly mining activity.

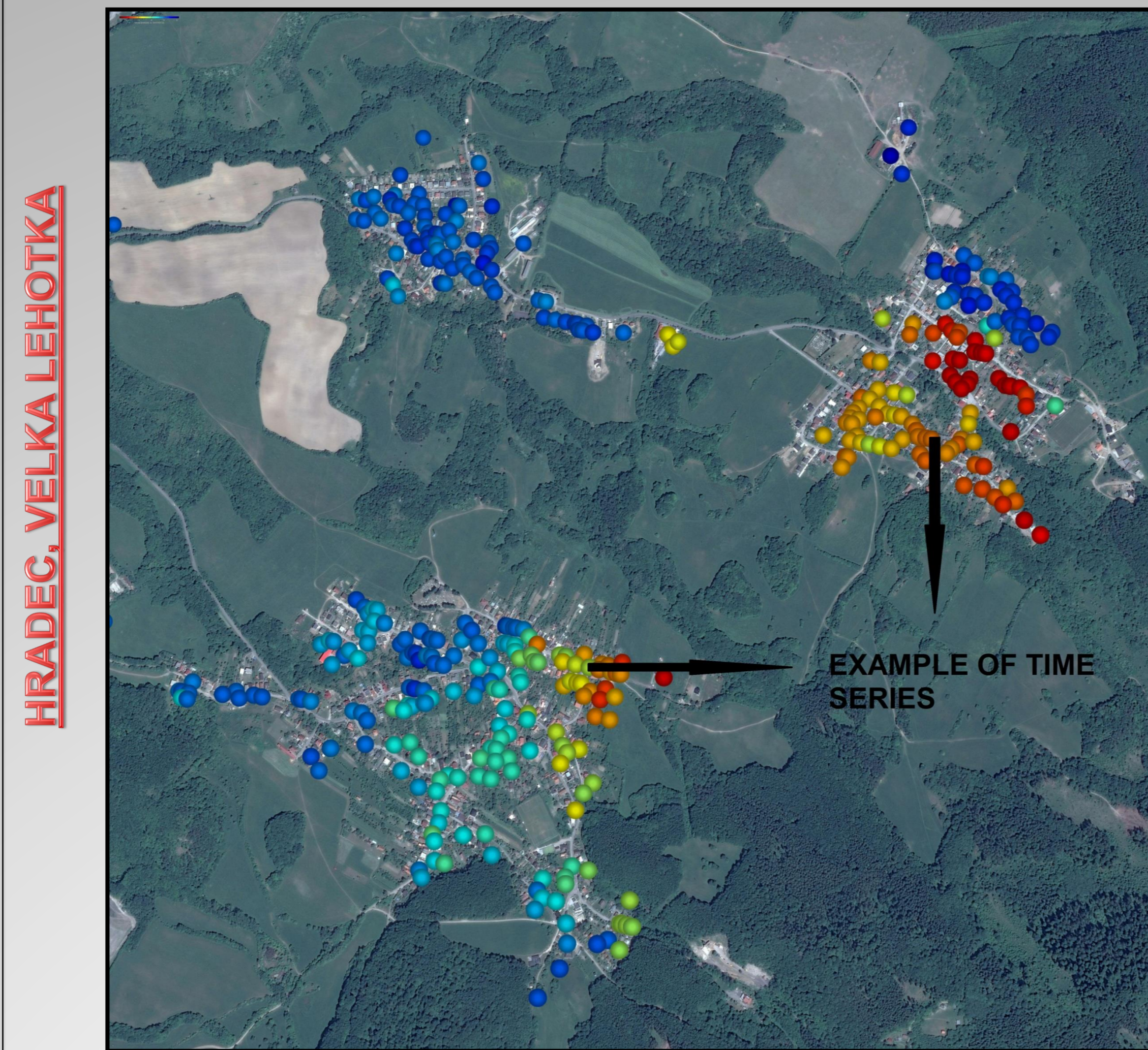
PRACTICAL EXPERIMENT

InSAR processing makes it possible to monitor large areas in a relatively short time with minimal field activity. For the processing of interest areas, the advanced radar interferometry method called PSInSAR was used to track terrain changes through time series. The method uses tracking of points with a stable electromagnetic track over the entire time interval of the interest area monitoring.

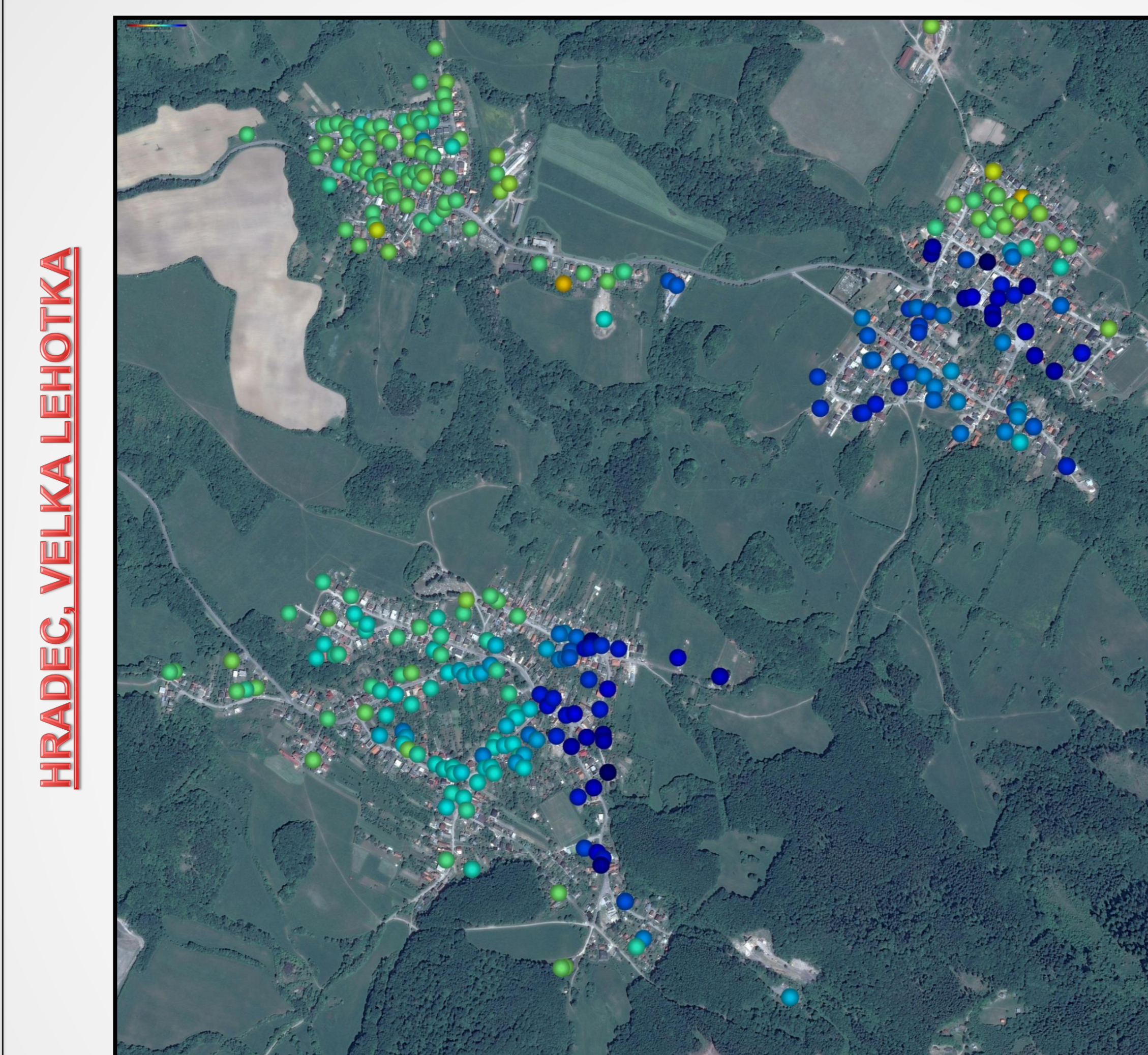
The radar data provided by the Copernicus space project was used for processing. This is data from October 2014 to July 2017. The images used were made using the Sentinel-1 satellite mission:

- Sentinel-1A - 82 images,
- Sentinel-1B - 85 images.

DESCENDING

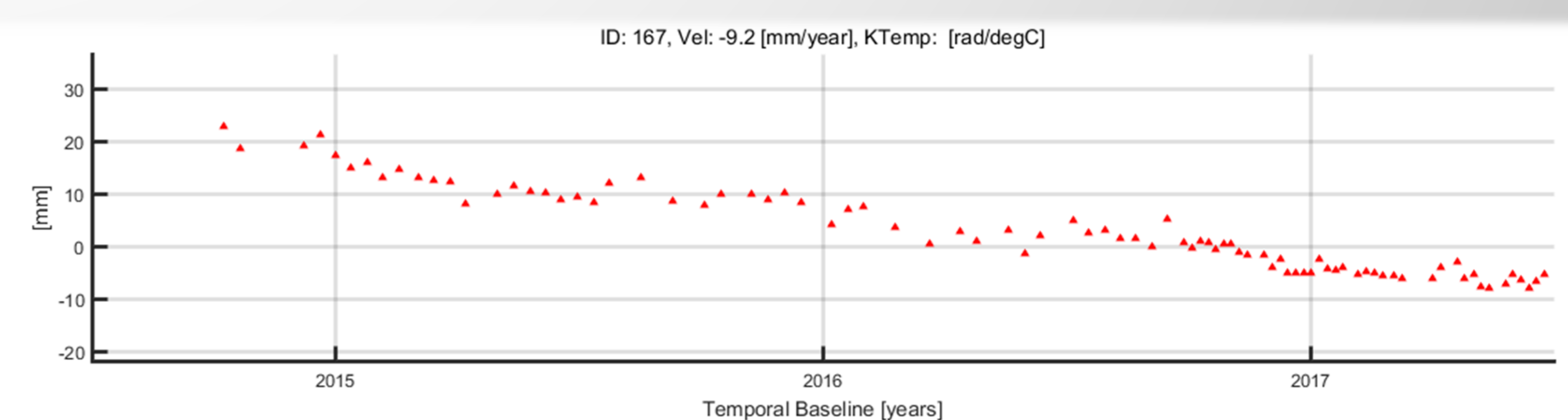


ASCENDING

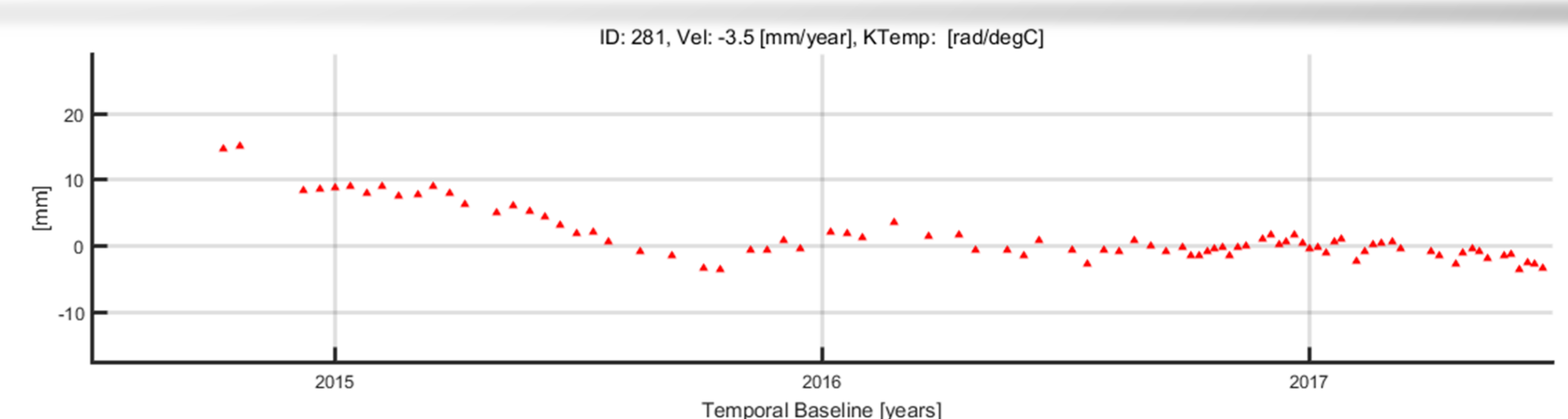


EXAMPLES OF TIME SERIES -POINTS WITH THE MOST VALUE OF THE COHERENCE

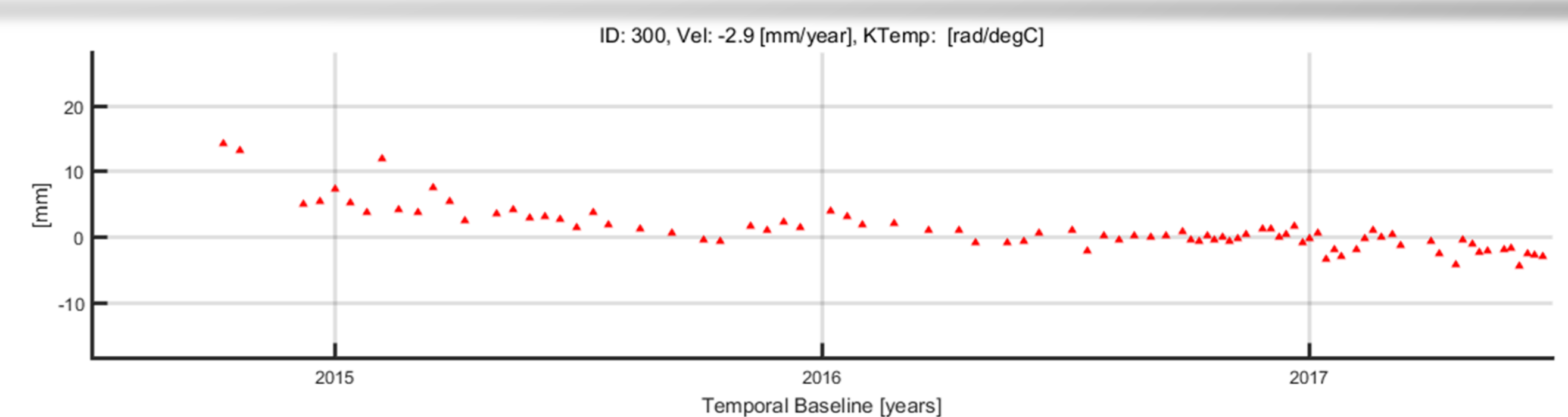
HRADEC



VELKA LEHOTKA



KOS



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