Utilizing the protein structure analysis algorithm SPACEBALL for remote sensing applications

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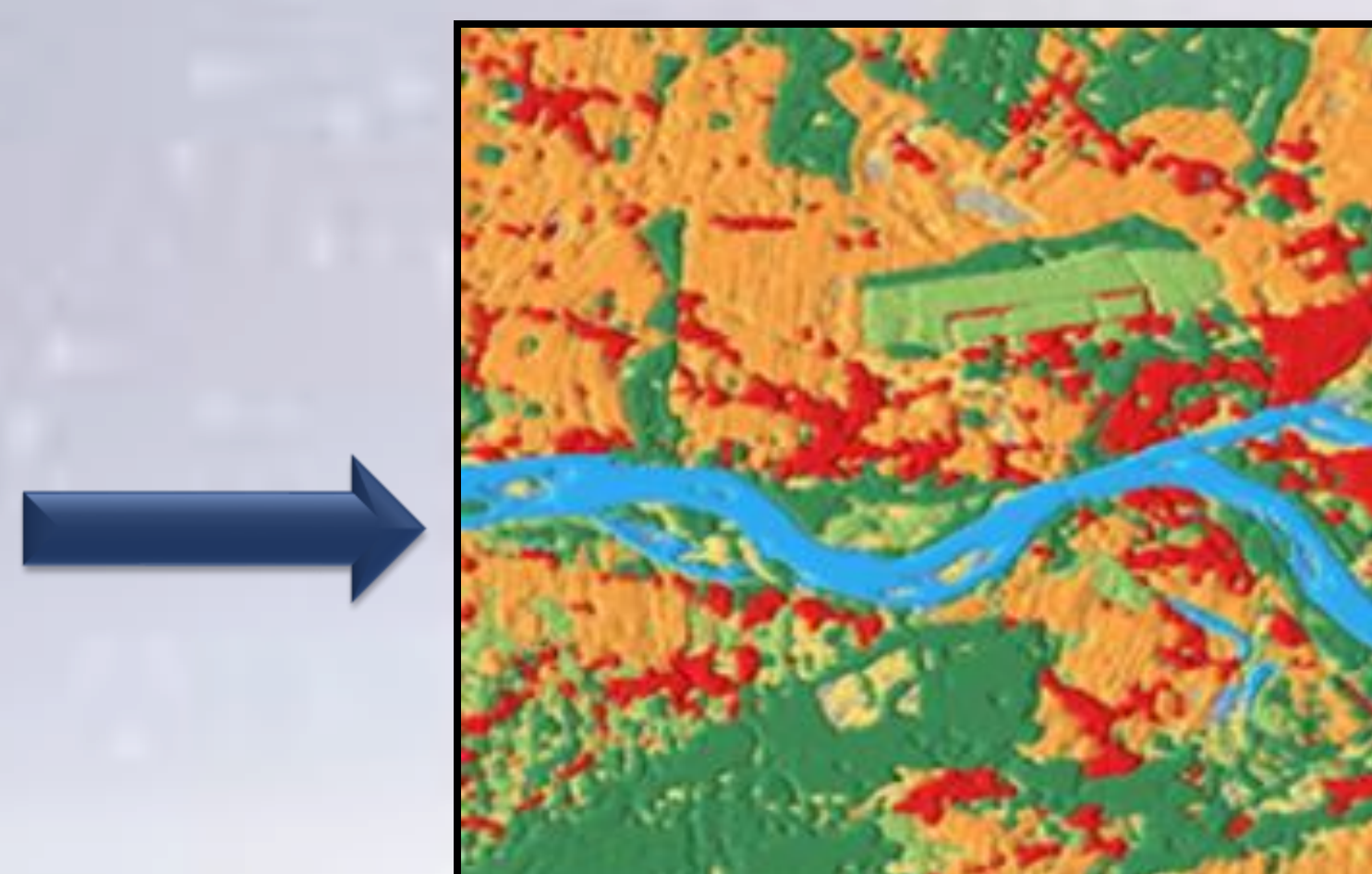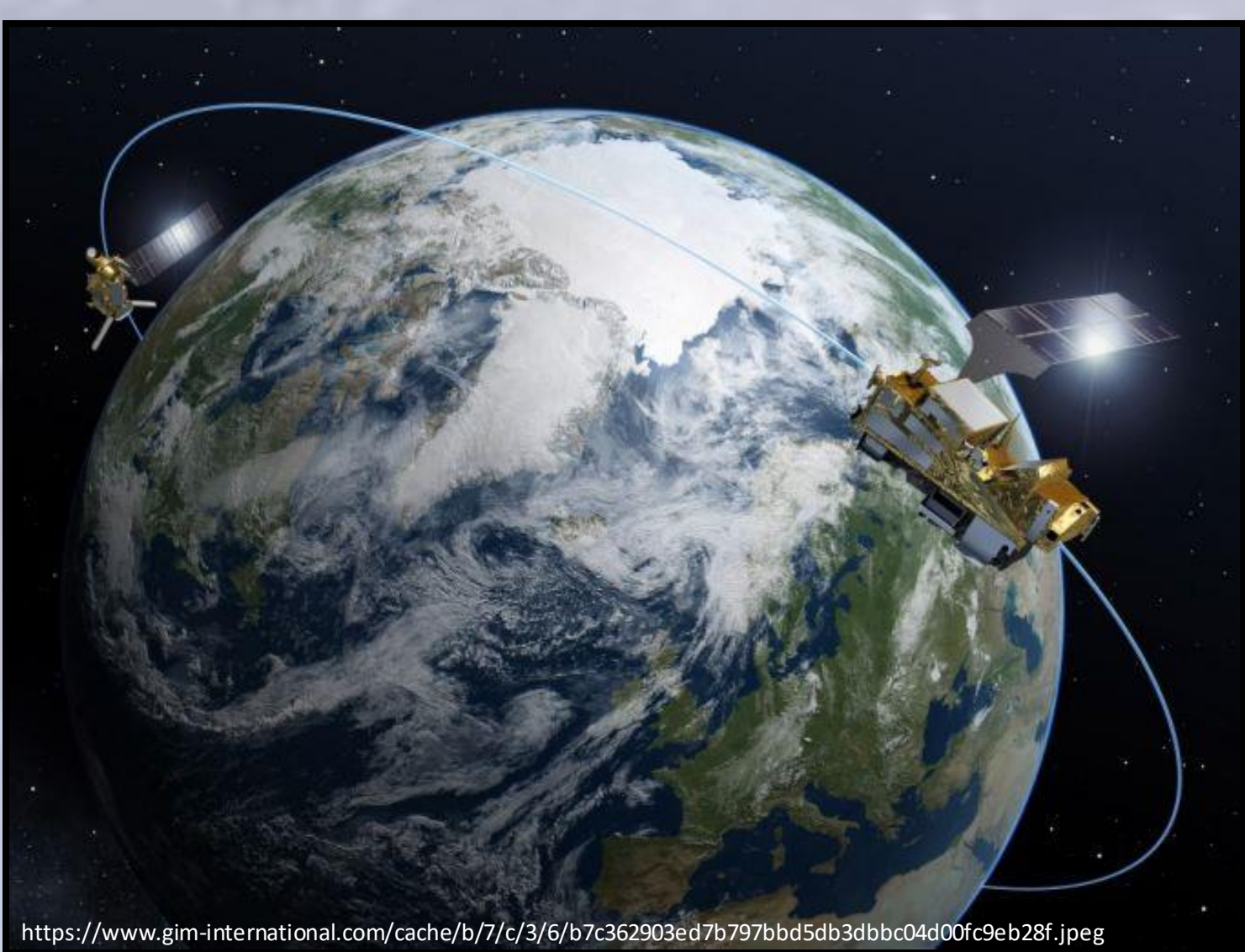
ABSTRACT

The development of remote sensing as a scientific discipline, which enables the remote determination of physical characteristics of objects on the Earth's surface based on the characteristics of electromagnetic radiation recorded by specialized instruments, continues to present new challenges. A crucial aspect of remote sensing is the selection of appropriate algorithms for processing the radiation spectrum to obtain high-quality information. In this study, we demonstrate the utilization of the protein structure analysis algorithm SPACEBALL for this purpose.

We perform a two-dimensional analysis of discontinuities in forest complex boundaries and the clustering of visible tree crowns in the Mazowieckie Voivodeship. To accomplish this, we obtained classification data from the Dynamic World land cover dataset, processed using machine learning algorithms based on data from the Sentinel-2 satellite constellation. Subsequently, we applied the SPACEBALL algorithm to analyze the matrix representing tree crown coverage in the Mazowieckie region. Based on these findings, we illustrate how this modified approach, originally designed for protein structure analysis, can effectively detect tree clusters and accurately determine forest boundaries. These results are crucial not only for various economic sectors but also for research in the natural sciences.
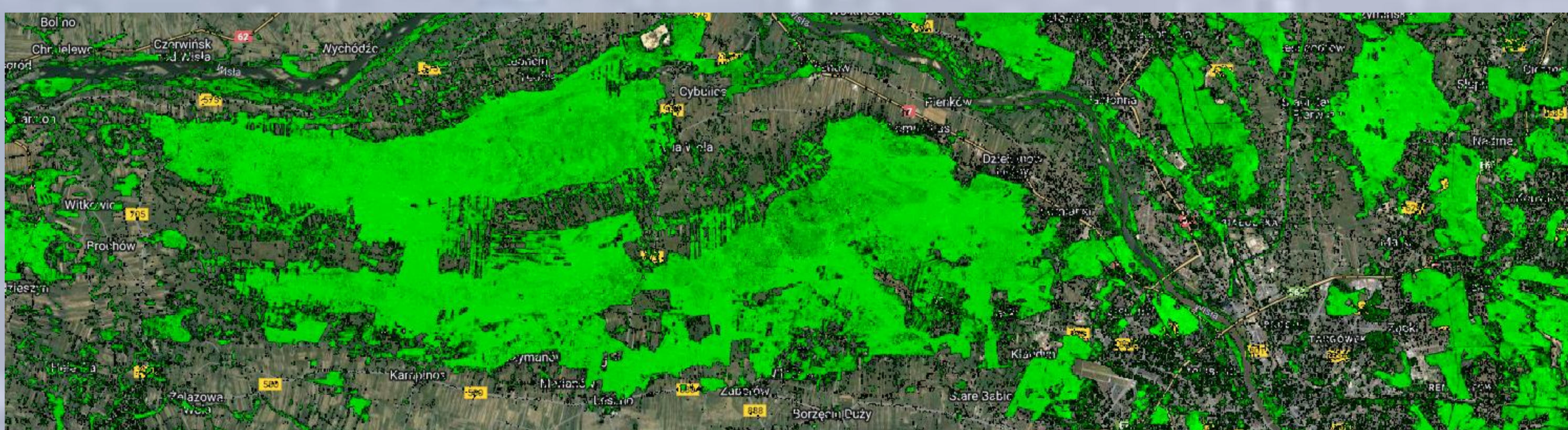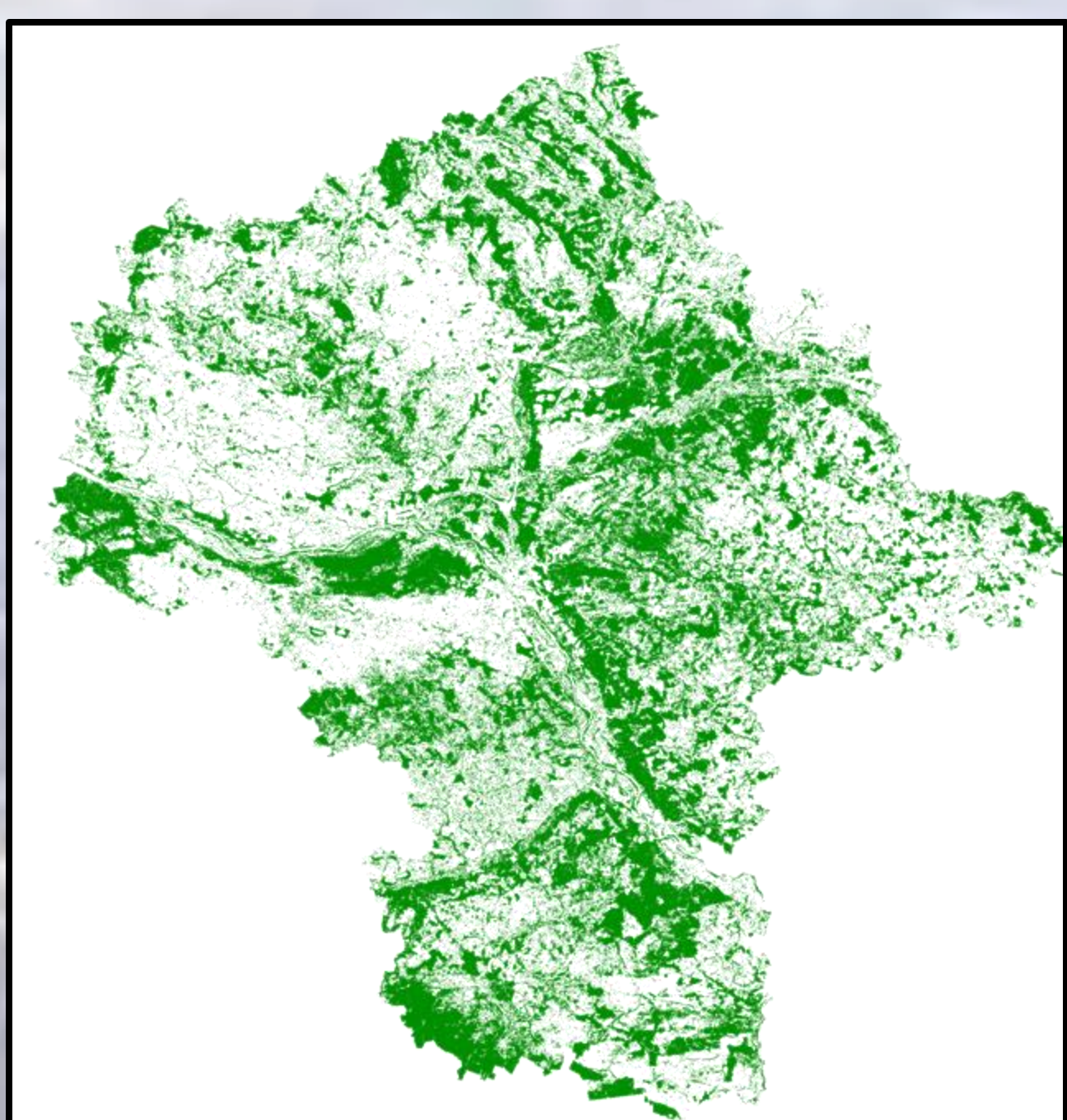
Tree cover edge - the extent of Kampinos National Park, Poland, as a result from the time-series analysis of Landsat images used to characterize global forest extent and change.
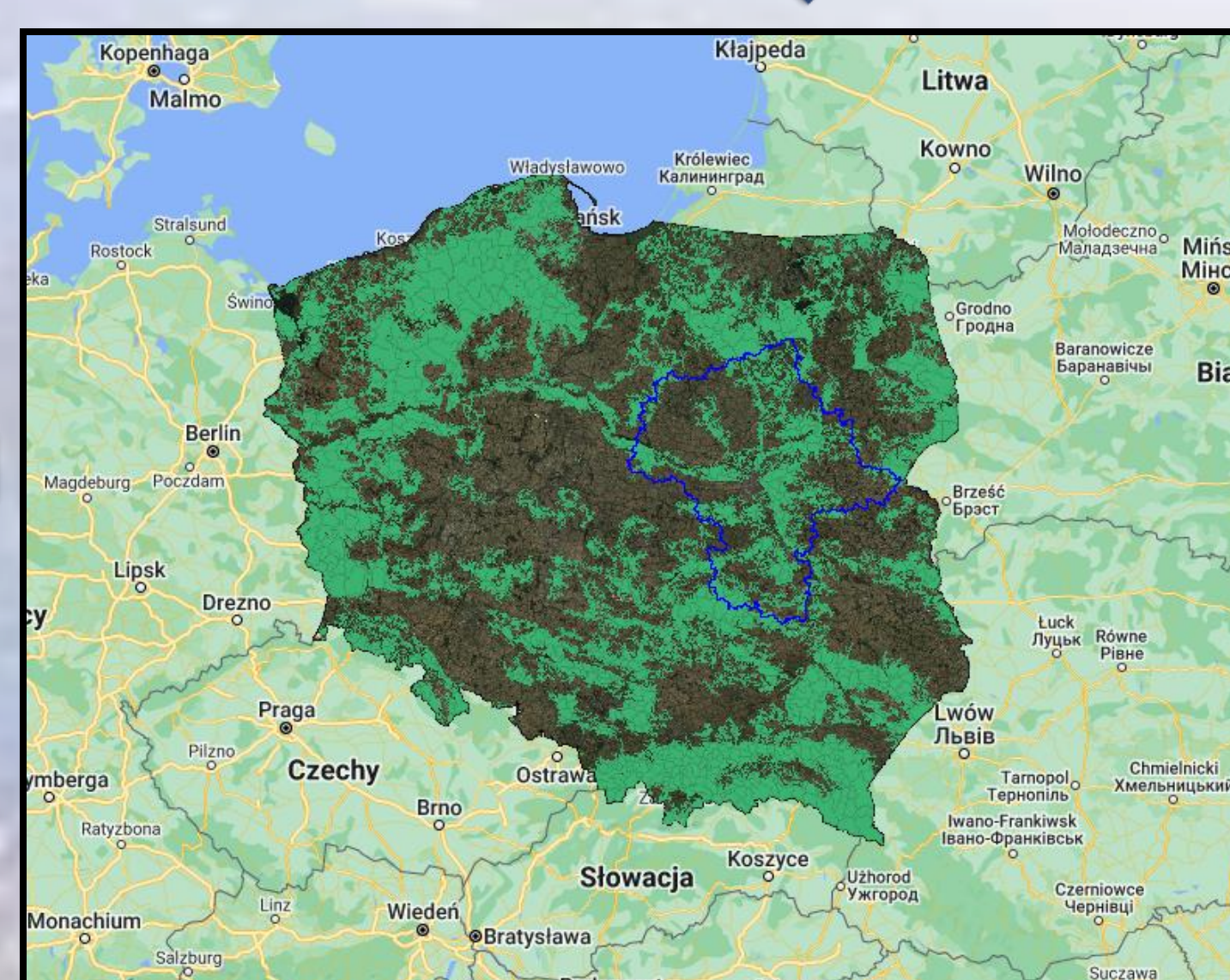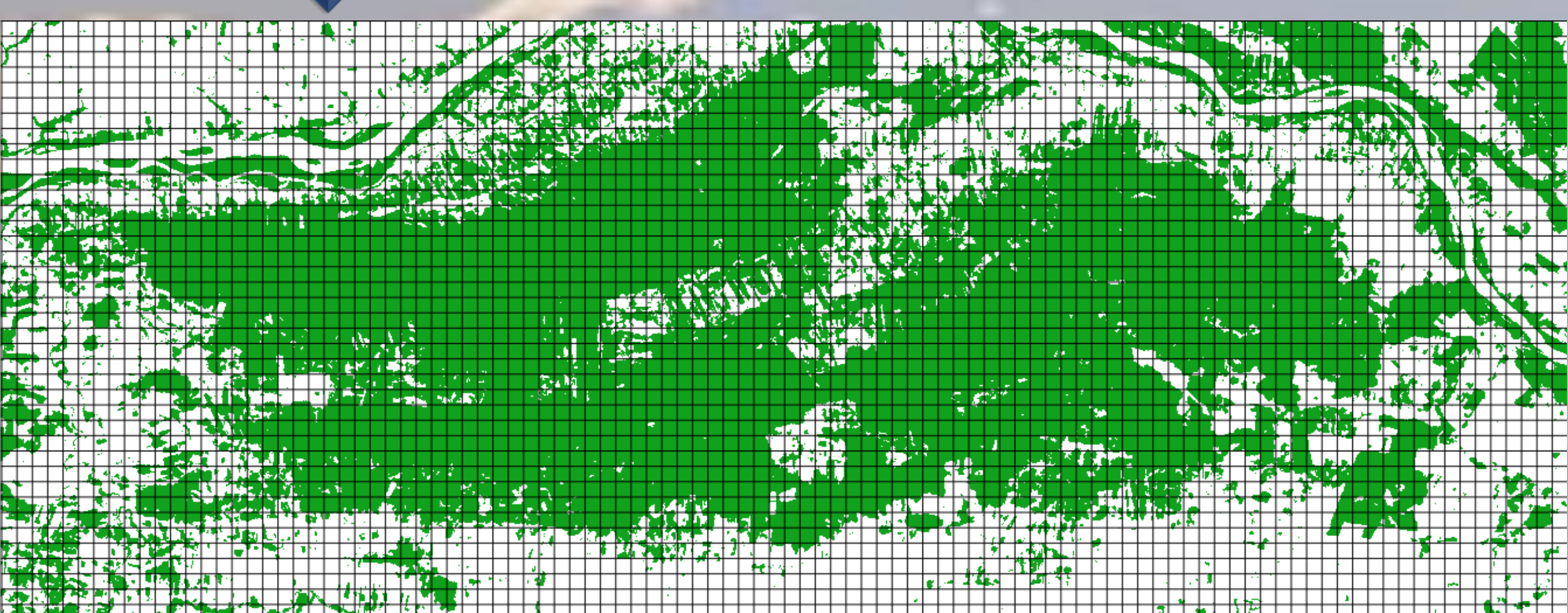
SPACEBALL ALGORITHM

internal cavity in a closed protein

FOREST MAP GENERATION

https://www.gim-international.com/cache/b/7/c/3/6/b7c362503ed7b797bbd5db3dbbc04d00fc9eb28f.jpeg

Dynamic World dataset 2022
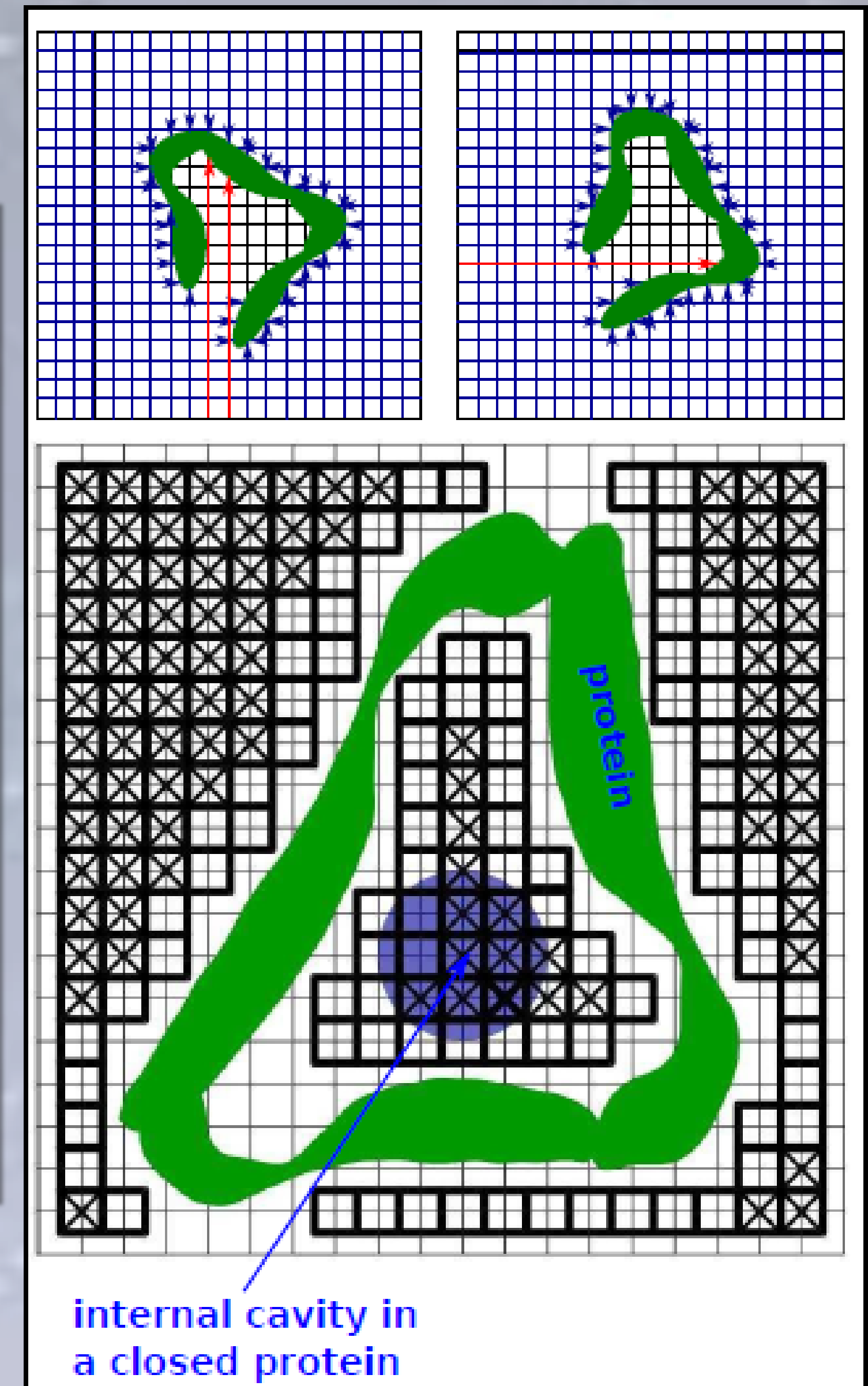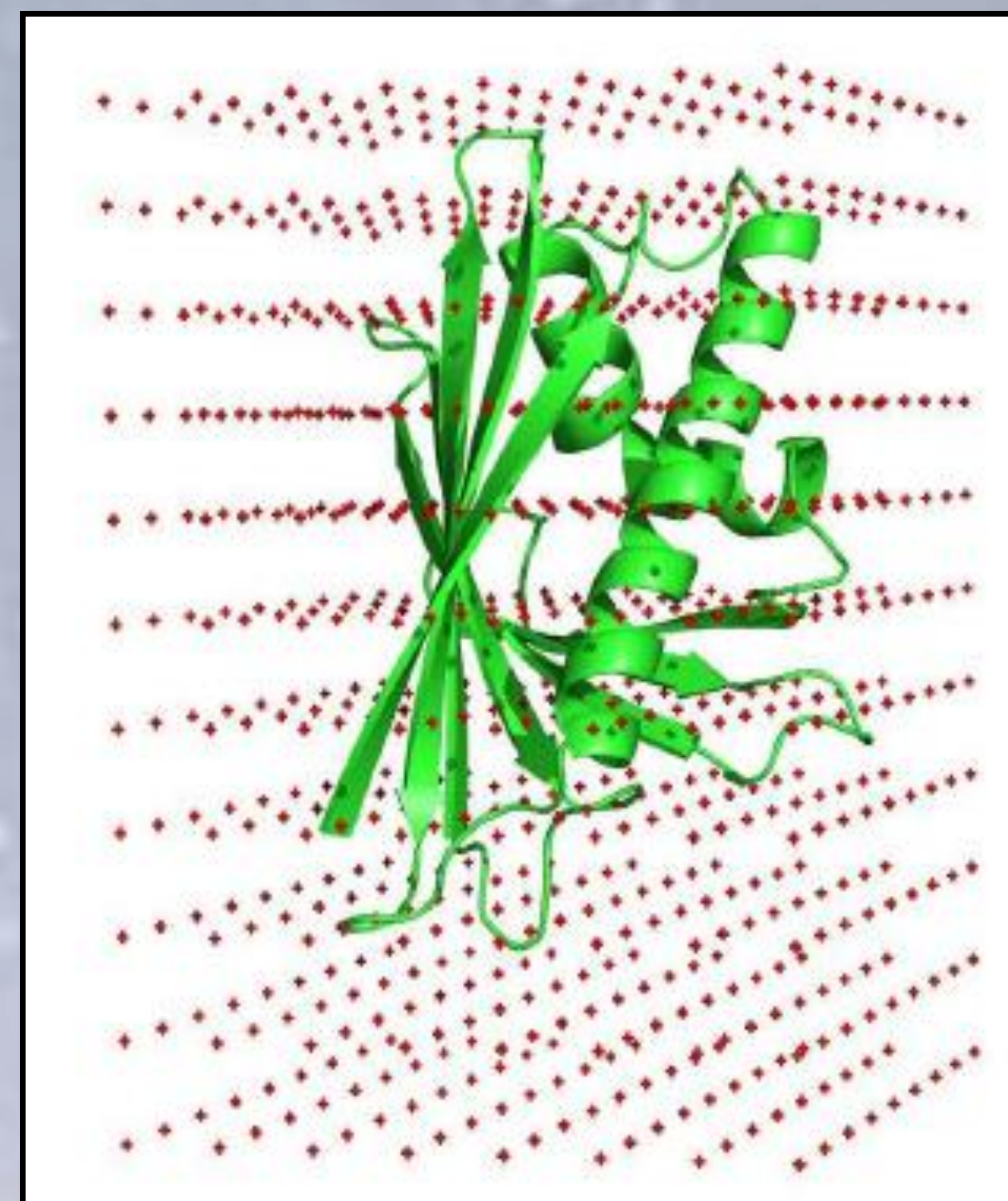

Tree cover in Poland – Dynamic World dataset

Tree cover in Mazovian Voivodeship – Dynamic World dataset

Tree cover in 500 m grid – the extent of Kampinos National Park, Poland

RESULTS

http://info.ifpan.edu.pl/~chwastyk/spaceball
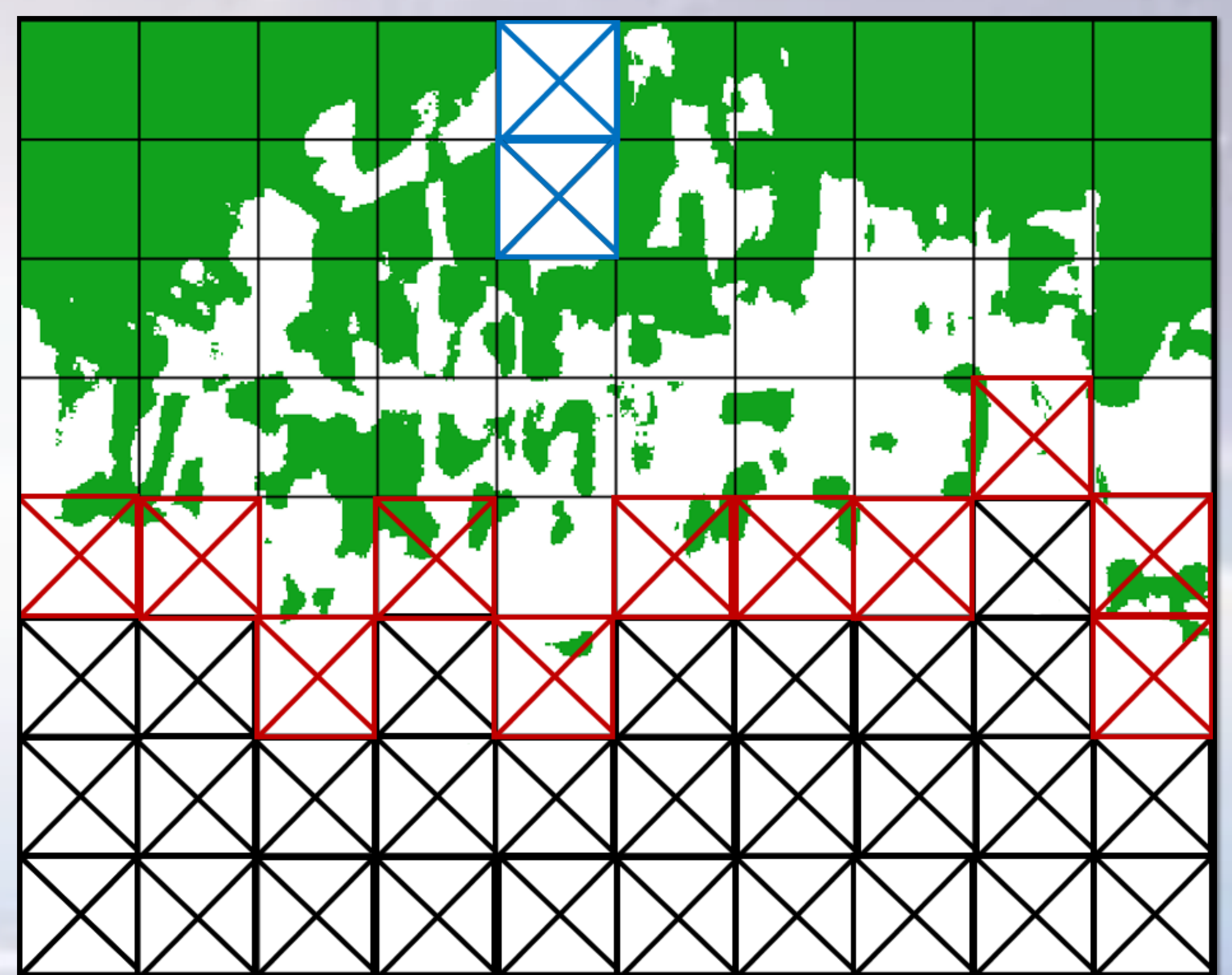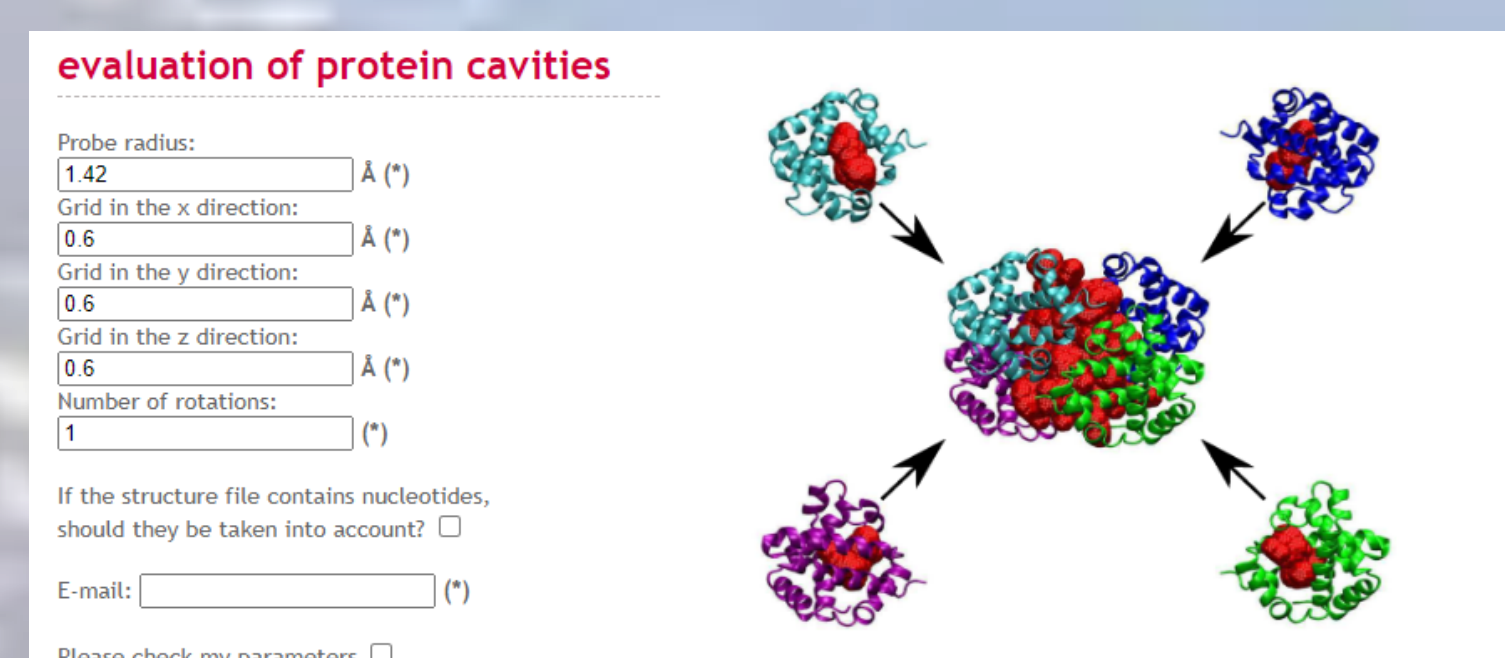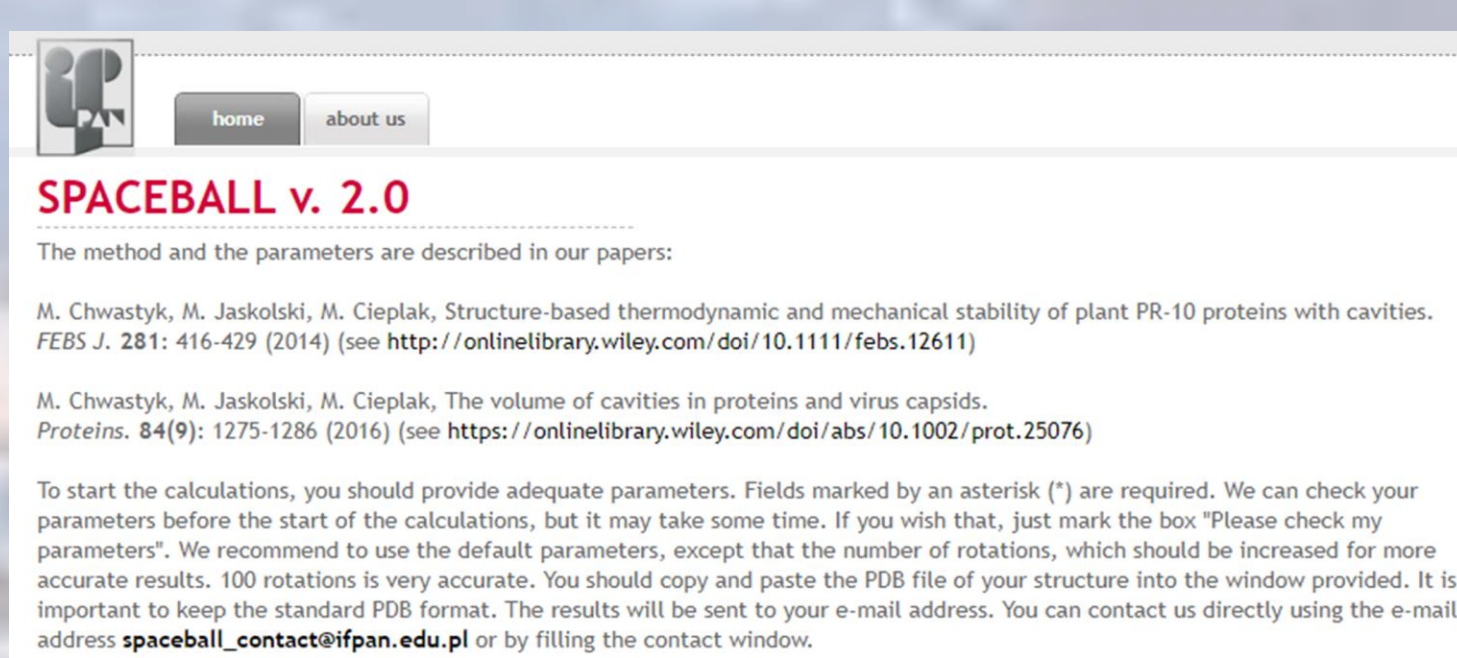
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