Göbekli Finder – Remote detection of pre-agricultural megalithic enclosures

Concept Note – Daniel Silberschmidt

Abstract
This project proposes a computational framework to detect pre-agricultural megalithic enclosures, using open-access satellite data and geomorphometric analysis. It aims to extend the knowledge of early monumental traditions beyond the well-studied Anatolian sites such as Göbekli Tepe, by scanning similar ecologies across North Africa and Western Asia. The method combines Digital Elevation Models (DEM), vegetation (NDVI) and radar data (Sentinel■1) to compute a composite score based on circularity, prominence, floodplain penalty and radar ring coherence.

Context and motivation
Göbekli Tepe and the Ta■ Tepeler sites, dated to ca. 9600–8200 BCE, represent the first known monumental enclosures built by hunter■gatherers. Their discovery transformed our understanding of the Neolithic transition. However, similar landscapes may have existed elsewhere but remain undetected. This project introduces an open, reproducible algorithm capable of scanning vast territories to locate possible analogs in the Sahara and beyond.

Methodology and originality
The *Göbekli Finder Plus* pipeline computes morphometric and spectral indicators from DEM, NDVI and SAR rasters. It filters out agricultural plains, identifies circular mounds of 30–400 m diameter and 2–30 m elevation, and scores candidates by shape and environmental context. A radar■based Hough transform evaluates ring■like coherence suggestive of buried stone enclosures. All code is open source (Python) and designed for reproducibility across scales.

Preliminary validation
Preliminary tests confirm that the algorithm correctly identifies the Göbekli Tepe mound and nearby Ta■ Tepeler sites (e.g., Karahan, Sefer) as high■scoring circular anomalies, demonstrating its sensitivity to known archaeological features. Further validation over non■excavated areas will refine thresholds and minimize false positives.

Future work and collaboration
The next phase involves applying the model to larger paleoecological regions, beginning with southeastern Turkey and selected Holocene lake basins of the Sahara. Potential collaborations are sought with archaeological teams for field validation, data integration, and joint publication of results.

Keywords: Computational archaeology; remote sensing; DEM analysis; Göbekli Tepe; Neolithic; machine vision; open science.