

# **GNSS data processing package to adress climate change and disaster -induces challenges in safeguarding land rights**

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## **SUMMARY**

Living in the context of global climate change and increasing frequency of natural disasters requires paying special attention to safeguarding of land rights. To enhance the capabilities of communities, surveyors and organizations, it is necessary to quickly equip them with software and hardware tools that can be used in assessing and mitigating the consequences of natural disasters. The universal means used in all these works are sets of instruments for precise navigation on the ground, which make it possible to measure areas of destruction and possible violations of the boundaries of existing land plots.

The Russian Company "Progress" is engaged in research and development in the field of microelectronics and navigation equipment. We would like to present our own software developments of the ProGeo family. We believe that our developments will have a positive impact on global climate responsive land governance.

The ProGeo package is a vertically integrated comprehensive GNSS data processing tool. At the upper cloud level, it includes the ProGeoNet processing service and NTRIP caster - essential for transmitting base station data to a field receiver operating in RTK mode via the Internet. The office level is covered by ProGeoOffice – a full featured enhanced version of well-established software, Its GIS interface facilitates flexible post-processing of GNSS data and ensures compatibility with popular GIS/CAD software, making data exchange seamless. The software leverages advancements in GNSS technology, satellite signal reception, and online data resources to deliver high-precision results with minimal operator intervention. ProGeoMobile, the versatile field software, activates the ProGeo receiver in differential mode RTK as a base or rover, perfect for field geodesy tasks like surveying and

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stakeout.

Data processing can be conducted on any device with Internet access via a web browser, without needing pre-installed applications.

For short distances (up to 15 km), ionospheric influence is minimal, enhancing productivity in urban environments or dense foliage. GNSS receivers estimate the distance to the base station to activate the ionosphere computing mode. With a virtual base station (VRS) provided by ProGeoNet, ionospheric accounting is unnecessary. The VRS is emulated near the receiver, matching ionospheric components to real ones at the observation point.

ProGeo package offers a proprietary coordinates transformation geo database with 2629 cartographic projections, 305 datums, 50 ellipsoids, global and regional geoids.

On the later stage the PROGeo Complex including HW,SW and service to be introduced. Also the results of usage PRO GEO in safeguarding land rights.

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