The main aim of the project is the development of high resolution, combined global ionosphere model based on multi-frequency carrier phase satellite observations from GNSS (Global Navigation Satellite Systems) and DORIS (Doppler Orbitography and Radiopositioning Integrated by Satellite) and radio soundings from terrestrial ionosonde network. Deterministic and stochastic modeling techniques will be applied for the combination of data from different observation techniques. Independent observations of vertical TEC from Jason-2 and Jason-3 altimeters, occultation observations from FORMOSAT/COSMIC constellation and slant TEC from very long baseline interferometry (VLBI) will be used for external, independent validation of the model accuracy and precision.

The proposed model will offer better accuracy than the existing solutions, e.g., due to the use of precise phase observations from GNSS and DORIS, the joint processing of data from various measurement techniques, exact parametrization of the modeling function and combination of deterministic (mathematical) and stochastic methods.

The developed model will be subsequently used for space weather climatology analyses during selected, extreme geomagnetic disturbances of 24 solar activity cycle. The proposed model will provide information about local effects of the disturbed ionosphere at global scale, which allows for the better knowledge of the influence of space weather on the Earth ionosphere. The new model will be also applicable in broad range of geophysical studies that utilize microwave satellite data affected by the ionospheric delay.