Meteorological satellites are a valuable source of information for synoptical analysis, severe weather event analysis and nowcasting, as well as natural hazards and air quality monitoring. In Russian Federation polar-orbiting satellites are used because ground observations are sparse and a large part of the territory is located in high latitudes. R&D center ScanEx has the technologies to receive and process the direct broadcast data from 11 meteorological polar-orbiting satellites (see below). RT-STS, AAPP, MODIS L1 DB, IMAPP, IDEA-I, CSPP SDR and EDR, CLAVR-X, MIRS, HSRTV and OMPSNADIR_SPA are used to create atmosphere, ocean, land and polar products. Quicklooks packages, Polar2Grid, McIdas-V and PanOply are used for visualization.

Case studies of anomalous weather events reveal advantages and disadvantages of available meteorological information. Case studies of severe weather events also help to improve the accuracy of future forecasts and therefore prevent or mitigate damage caused by the severe weather event. In Russia most dangerous weather events are caused by severe convection – e.g. heavy rainfall, hail, strong winds, lightning. The next most dangerous category of weather events is represented by snowstorms, heavy snowfall, wet snow and riming. In the field of atmospheric chemistry an event of high ground ozone concentrations and thick smoke from forest fires could be viewed as a dangerous event due to the influence of smoke and ozone on human’s health.

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Using available DB satellite processing packages for case studies in Russia
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Severe storms
On 22nd of May 2013 an active atmospheric front was passing through the European territory of Russia. A small-scale tornado which is a very rare event occurred in the city of Efremov in Tula region.

Wet snow against a background of positive surface air temperatures
On 7th of May a cyclone from the Mediterranean region brought wet snow to Moscow. Wet snow was associated with the cloud structure in the rear part of the cyclone that is visible on VIS and IR MODIS images.

High ground ozone concentrations and forest fire smoke
Ground level ozone concentrations in Moscow are measured by several automatic stations maintained by Mosecomonitoring. Observations show that from 5th of May to 14th of May 2015 the mean daily ozone concentrations were above 0,048 mg/m3 with maximum values up to 0,201 mg/m3. Several Suomi NPP overpasses were processed by OMPSNADIR_SPA software. The total column ozone (TCO) values were found to be above 400 DU. The cyclonic structure is clearly visible on the maps of TCO.

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