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The impact study for the Northern Asia

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This paper is focused to develop an optimal scenario to redesign an existed network by redistribution of stations and network extension in order to maximize the information content of observing data with account to height and wind fields (H500, U700 and V700). This task was formulated among others in list of science questions where THORPEX can help. Objective classification of wind and height re-analysis fields for North Asia by fuzzy logic tools permit us to reveal major regimes of atmospheric circulation and acquire statistical samples responded to each of corresponding classes. The information model of the combined Siberian land surface and satellite (NOAA/ATOVS/SATW) observing systems based on Kalman filter methodology was developed and applied to determine corresponding information content function. Implementation of numerical optimal search algorithms leads us to acquisition of consecutive sequence of optimal designs for RAOB network with various numbers of stations when remote sensing data contribution was taken into account within the information model. These numbers should lies between 14 and 42. Former is designed as minimal network, latter - as sufficient one. Each of scenarios assumes a recovering of currently closed RAOB stations located in North and North-Eastern Siberia. RMS (root mean square) error fields for major meteorological variables describe an efficiency of network design. Heavy clouds occur most part of the year in these areas. H500 objective analysis accuracy providing by optimal RAOB is equal to 30-45 m, while existed network delivers only 60-70 m and NOAA remote sensing system - about 70-80 m. Impact experiments were carried out with simplified forecasting model under conditions of various atmospheric circulation regimes. These experiments, which were designed as denial ones, demonstrated major information content of the RAOB sites located along Arctic and Pacific Ocean coasts. It was found also that most meteorological parameters have largest variance just in these regions. North and North-Eastern

Siberia also perform the most important low oscillation patterns: East and West Pacific oscillations, Polar-Euro-Asian oscillation and others. Latter regulate the airflow not only over Asia, but also over North Pacific and Western coast of North America. We found the most important impact areas for the 1-3 days NWP in Northern Pacific, Alaska and Western Canada. . It was found that, when West Pacific oscillation index attains the negative magnitudes RAOB stations at Kamchatka and Chukotka peninsula can provide some important pieces of data to predict weather over Polar Canada and Western coast of North America for 3-5 days.