**Microwave radiometry experiment for snow in Altay China: in situ time series of data for electromagnetic and physical features of snow pack and environment**

The dataset include ground-based passive microwave brightness temperature, multi-angle brightness temperature, ten-minute 4-component radiation and snow temperature, daily snow pit data and hourly meteorological data observed at Altay base station（lon：88.07、lat: 44.73）from November 27, 2015 to March 26, 2016. Daily snow pit parameters include: snow stratification, stratification thickness, density, particle size, temperature.

These data are stored in five NetCDF files: TBdata.nc, TBdata-multiangle.nc, ten-minute 4 component radiation and snow temperature.nc, hourly meteorological and soil data.nc, and and daily snow pit data.nc.

TBdata.nc is brightness temperature at 3 channels for both polarizations automatically collected by a six-channel dual polarized microwave radiometer RPG-6CH-DP. The contents include Time（Year, month, day, hour, minute, second）, Tb1h, Tb1v, Tb18h, Tb18v, Tb36h, Tb36v, incidence angle, azimuth angle.

TBdata-multiangle.nc is 7 groups of multi-angle brightness temperatures at 3 channels for both polarizations. The contents include time (Year, month, day, hour, minute, second), Tb1h, Tb1v, Tb18h, Tb18v, Tb36h, Tb36v, incidence angle, azimuth angle.

The ten-minute 4 component radiation and snow temperature.nc contains 4 component radiation and layered snow temperatures. The contents include time (Year, month, day, hour, minute), SR\_DOWN, SR\_UP, LR\_DOWN, LR\_UP, T\_Sensor, ST\_0cm, ST\_5cm, ST\_15cm, ST\_25cm, ST\_35cm, ST\_45cm, ST\_55cm

The hourly meteorological and soil data.nc contains hourly weather data and layered soil data. The contents include time (Year, month, day, hour), Tair, Wair, Pair, Win, SM\_10cm, SM\_20cm, Tsoil\_5cm, Tsoil\_10cm, Tsoil\_15 cm, Tsoil\_20cm

The daily snow pit data.nc. is manual snow pit data. The observation time was 8:00-10:100 am local time. The contents include time (Year, month, day), snow depth, thickness\_layer1, thickness\_layer2, thickness\_layer3, thickness\_layer4, thickness\_layer5, thickness\_layer6, Long\_layer1, Short\_layer1, Long\_layer2, Short\_layer2, Long\_layer3, Short\_layer3, Long\_layer 4, Short\_layer4, Long\_layer5, Short\_layer5, Long\_layer6, Short\_layer 6, Stube, Snow shovel\_0-10, Snow shovel \_10-20, Snow shovel \_20-30, Snow shovel \_30-40, Snow shovel \_40-50, Snow fork\_5, Snow fork \_10, Snow fork \_15, Snow fork\_20, Snow fork\_25, Snow fork\_30, Snow fork\_35, Snow fork\_40, Snow fork\_45, Snow fork\_50, shape1, shape2, shape3, shape4, shape5, shape5

Table explanation of contents in NetCDF files.

|  |  |  |
| --- | --- | --- |
| name | explanation | unit |
| Tb1v | brightness temperature at 1.4 GHz for vertical polarization | K |
| Tb1h | brightness temperature at 1.4 GHz for horizontal polarization | K |
| Tb18v | brightness temperature at 18.6 GHz for vertical polarization | K |
| Tb18h | brightness temperature at 18.6 GHz for horizontal polarization | K |
| Tb36v | brightness temperature at 36.5 GHz for vertical polarization | K |
| Tb36h | brightness temperature at 36.5 GHz for horizontal polarization | K |
| incidence angle | incidence angle | degree |
| azimurth angle | azimurth angle | degree |
| shape\_layer1 | snow grain shape within the first layer | \ |
| shape\_layer2 | snow grain shape within the secon layer | \ |
| shape\_layer3 | snow grain shape within the third layer | \ |
| shape\_layer4 | snow grain shape within the fourth layer | \ |
| shape\_layer5 | snow grain shape within the fifth layer | \ |
| shape\_layer6 | snow grain shape within the sixth layer | \ |
| snow depth | depth of snowpack | cm |
| long\_layer1 | long axis of snow grains within the first layer | mm |
| long\_layer2 | long axis of snow grains within the second layer | mm |
| long\_layer3 | long axis of snow grains within the third layer | mm |
| long\_layer4 | long axis of snow grains within the fourth layer | mm |
| long\_layer5 | long axis of snow grains within the fifth layer | mm |
| long\_layer6 | long axis of snow grains within the sixth layer | mm |
| short\_layer1 | short axis of snow grains within the first layer | mm |
| short\_layer2 | short axis of snow grains within the second layer | mm |
| short\_layer3 | short axis of snow grains within the third layer | mm |
| short\_layer4 | short axis of snow grains within the fourth layer | mm |
| short\_layer5 | short axis of snow grains within the fifth layer | mm |
| short\_layer6 | short axis of snow grains within the sixth layer | mm |
| thickness\_layer1 | snow thickness of the first layer | cm |
| thickness\_layer2 | snow thickness of the second layer | cm |
| thickness\_layer3 | snow thickness of the third layer | cm |
| thickness\_layer4 | snow thickness of the fourth layer | cm |
| thickness\_layer5 | snow thickness of the fifth layer | cm |
| thickness\_layer6 | snow thickness of the sixth layer | cm |
| snow tube | snow density of a whole snowpack observed using snow tube | g/cm3 |
| snow fork\_5cm | snow density at 5 cm over soil/snow surface observed by snow fork | g/cm3 |
| snow fork\_10cm | snow density at 10 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_15cm | snow density at 15 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_20cm | snow density at 20 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_25cm | snow density at 25 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_30cm | snow density at 30 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_35cm | snow density at 35 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_40cm | snow density at 40 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_45cm | snow density at 45 cm over soil/snow interface observed by snow fork | g/cm3 |
| snow fork\_50cm | snow density at 50 cm over soil/snow interfaceobserved by snow fork | g/cm3 |
| snow shovel\_0-10 cm | snow density of 0-10 cm over soil/snow inferface observed by snow shovel | g/cm3 |
| snow shovel\_10-20 cm | snow density of 10-20 cm over soil/snow inferface observed by snow shovel | g/cm3 |
| snow shovel\_20-30 cm | snow density of 20-30 cm over soil/snow inferface observed by snow shovel | g/cm3 |
| snow shovel\_30-40 cm | snow density of 30-40 cm over soil/snow inferface observed by snow shovel | g/cm3 |
| snow shovel\_40-50 cm | snow density of 40-50 cm over soil/snow inferface observed by snow shovel | g/cm3 |
| Win(m/s) | wind velocity | m/s |
| Tair(℃） | air temperature | ℃ |
| Wair (%) | air wetness | % |
| Pair (hPa) | air pressure | hPa |
| Pair\_Sea(hPa) | air pressure at sea level | hPa |
| SM\_10cm (%) | soil moisture at 10 com below soil/snow interface | % |
| SM\_20cm(%) | soil moisture at 20 com below soil/snow interface | % |
| ST\_5cm（℃） | soil temperature at 5 cm below soil/snow interface | ℃ |
| ST\_10cm（℃） | soil temperature at 10 cm below soil/snow interface | ℃ |
| ST\_15cm（℃） | soil temperature at 15 cm below soil/snow interface | ℃ |
| ST\_20cm（℃） | soil temperature at 20 cm below soil/snow interface | ℃ |
| SR\_DOWN | down ward short radiation | W/m2 |
| SR\_UP | up ward short radiation | W/m2 |
| LR\_DOWN | down ward long radiation | W/m2 |
| LR\_UP | up ward long radiation | W/m2 |
| NR01TK | sensor temperature | K |
| Snow\_T\_AVG | average snow temperature | ℃ |
| Snow\_T\_0cm | snow temperature at snow/soil interface | ℃ |
| Snow\_T\_5cm | snow temperature at 5 cm over snow/soil interface | ℃ |
| Snow\_T\_15cm | snow temperature at 15 cm over snow/soil interface | ℃ |
| Snow\_T\_25cm | snow temperature at 25 cm over snow/soil interface | ℃ |
| Snow\_T\_35cm | snow temperature at 35 cm over snow/soil interface | ℃ |
| Snow\_T\_45cm | snow temperature at 45 cm over snow/soil interface | ℃ |
| Snow\_T\_55cm | snow temperature at 55 cm over snow/soil interface | ℃ |