**COSMO6 and ERA5 Forcing**

**COSMO6 Variable Info:**

<https://opendata.dwd.de/climate_environment/REA/ParameterTables.pdf>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COSMO6**  **Variable name** | **File name in NAS folder** | **Description** | **Level** | **Type** | **Unit** |
| T\_2M | Temp | 2m temperature | 2m | instantaneous | K |
| TOT\_PRECIP | ACPC | total precipitation | - | accumulated | kg/m^2 |
| U\_10M | UGRD | 10m zonal wind speed | 10m | instantaneous | m/s |
| V\_10M | VGRD | 10m meridional wind speed | 10m | instantaneous | m/s |
| PS | Press | not reduced surface pressure | - | instantaneous | Pa |
| QV\_S | SPFH | Specific humidity at the surface | - | instantaneous | kg/kg |
| ASWDIFD\_S | DSWR | short wave diffuse downward radiation flux at the surface | - | average | W/m^2 |
| ATHD\_S | DLWR | long wave downward radiation flux at the surface | - | average | W/m^2 |

**ERA5 Variable Info:**

<https://confluence.ecmwf.int/display/CKB/ERA5%3A+data+documentation#ERA5:datadocumentation-Table8>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ERA5**  **Variable name in CDS** | **ShortName** | **ParamId** | **Level** | **Type** | **Unit** |
| T\_2M | 2t | 167 | 2m | instantaneous | K |
| mean\_total\_precipitation\_rate | avg\_tprate | 235055 | - | average | kg m^-2 s^-1 |
| 10m\_u\_component\_of\_wind | 10u | 165 | 10m | instantaneous | m/s |
| 10m\_v\_component\_of\_wind | 10v | 166 | 10m | instantaneous | m/s |
| surface\_pressure | SP | 134 | - | instantaneous | Pa |
| specific\_humidity (pressure level: 1000 pa) | q | 133 | 1000pa | instantaneous | kg/kg |
| mean\_surface\_downward\_short\_wave\_radiation\_flux | avg\_sdswrf | 235035 | - | average | W/m^2 |
| mean\_surface\_downward\_long\_wave\_radiation\_flux | avg\_sdlwrf | 235036 | - | average | W/m^2 |

**ERA5 terminology: analysis and forecast; time and steps; instantaneous and accumulated and mean rates and min/max parameters:**

<https://confluence.ecmwf.int/pages/viewpage.action?pageId=85402030#ERA5terminology:analysisandforecast;timeandsteps;instantaneousandaccumulatedandmeanratesandmin/maxparameters-Instantaneous,accumulated,meanrateandmin/maxparameters>

**Note**: The forcing variables of year 2022 are downloaded from ERA5 dataset. The 3 variables in blue are forecast data, and they are structured in different way from the other 5 analysis variables. Some modification have made so that the 8 variables can have same shape in application. The 8 variables are compared with the variables of 2018 downloaded from COSMO6 dataset. The histograms of each variable from the two datasets are shown below.

A graph of a temperature

Description automatically generated

A graph of a graph of a number of values

Description automatically generated with medium confidence

A graph of a graph of vgrd values

Description automatically generated

A graph of a press value

Description automatically generated with medium confidence

A graph of a graph of spfh values

Description automatically generated

Note: The right shows the histogram of the mean values, and the plot is normalized.

A close-up of a graph

Description automatically generated

A graph of a number of data

Description automatically generated with medium confidence

A graph of a graph of a graph

Description automatically generated with medium confidence