

## 2nd Review

“The S2M meteorological and snow cover reanalysis over the French mountainous areas, description and evaluation (1958 - 2020)”

by Matthieu Vernay et al.

### Comments

I really appreciate that the authors addressed snow cover duration in Figure 6d in their revised version of the manuscript! However, I still see some points that could be improved:

- The literature review has been improved and the statement on limitations is important here. Thank you! However, it still does not reflect early work in modelling snow cover with the concept of hydrological similar units, or more specifically “snow cover units” (SCU). I would recommend to replace the references in line 90 (in the track changes document) by more related earlier work referring to the SCU concept (even though more related to remote sensing of snow): Seidel et al. (1983) and Ehrler et al. (1997).
- The Section 3.1.1 on Metadata is not really helpful in its present form. I suggest to a few more details: What means “metadata” in the first column of Table 2? The definition of the dimension “number\_of\_points” is still missing. However, it would really help people to get in touch with your very useful dataset. I tried to follow your example (enumeration of details in Sect. 3.1.1). Please accept my apologies if I missed something but I still find it hard to put your example into practice. I took me some time and several lines of Python code to unravel your example by defining a selection which refers to the dimension “number\_of\_points”. I think a few more technical details would be helpful to get started with the data. Maybe you could add a few lines of example code to the appendix or at least some pseudocode to better explain data usage (see my example, which indeed could be improved)? Maybe there are better ways to apply your example I am not aware of 😊

The paper has a very high quality and I would suggest technical revisions to better reflect the literature on hydrological similar units and to improve the details on the nc files.

I am looking forward to your final published paper!

Best wishes.

### References

- Ehrler, C., Seidel, K., & Martinec, J. (1997). Advanced analysis of snow cover based on satellite remote sensing for the assessment of. *Remote Sensing and Geographic Information Systems for Design and Operation of Water Resources Systems*, IAHS Publication (242), 93.
- Seidel, K., Ade, F., & Lichtenegger, J. (1983). Augmenting LANDSAT MSS data with topographic information for enhanced registration and classification. *IEEE transactions on geoscience and remote sensing*, (3), 252-258.

## Code listing

```
import xarray as xr
import numpy as np
import matplotlib.pyplot as plt

# open nc file
ncdata = xr.open_dataset('PRO_2019080106_2020080106.nc')

# retrieve data for dimensions / variables
index = ncdata.coords['time'].to_dataframe()['time'].values
var_swe = ncdata.variables['SWE_1DY_ISBA']
var_slope = ncdata.variables['slope'].data
var_aspect = ncdata.variables['aspect'].data
var_massif = ncdata.variables['massif_num'].data
var_zs = ncdata.variables['ZS'].data

# select data according to Sect. 3.1.1
selection = np.squeeze(np.where((var_zs>=1800)&(var_massif==1)&(var_aspect==180.)), axis=0)

# define labels for different elevation zones
labels = [var_zs[si] for si in selection]

# plot data & quit
plt.contourf(labels,index,var_swe[:,selection].data)
plt.colorbar()
ncdata.close()
```