Der Wasserstand am Neusiedler See: Analysen und Simulationen mit SAS Viya

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Sailor at Lake Neusiedl

- Video in Youtube:

- Hydro English: https://www.youtube.com/watch?v=KFsuxc_3mDo&list=PLdMxv2SumIKs0A2cQLeXg1xb9OVE8e2Yq&index=10&t=0s
- Hydro Deutsch: https://www.youtube.com/watch?v=weIhH1x7hdk&list=PLdMxv2SumIKs0A2cQLeXg1xb9OVE8e2Yq&index=2&t=0s

- Home Alone Series Playlist: https://www.youtube.com/playlist?list=PLdMxv2SumIKs0A2cQLeXg1xb9OVE8e2Yq

Lake Neusiedl
Burgenland, Austria
47°50′N 16°45′E

Historical Low-Level at Lake Neusiedl


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POLITIK

Land plant Wasserzufuhr für Neusiedler See

Der Wasserstand des Neusiedler Sees ist derzeit bedenklich niedrig. Laut Experten des Landes für Wasserwirtschaft könnte der See in absehbarer Zeit sogar komplett austrocknen. Für den zuständigen SPÖ-Landesrat Heinrich Dorner führt an einer technischen Wasserzufuhr kein Weg vorbei.

29. Mai 2020, 13.30 Uhr


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CHRONIK

Neusiedler See: Historischer Tiefstand für Mai

Im Mai ist der Pegelstand des Neusiedler Sees seit Beginn der Aufzeichnungen im Jahr 1965 noch nie so niedrig wie heuer gewesen. Normalerweise ist der Wasserstand im Frühling noch höher und sinkt über den Sommer. Die Segelboote haben heuer aber schon jetzt Probleme.

21. Mai 2020 / BURGENLAND 619

Neusiedler See trocknet zunehmend aus

Der mittlere Wasserstand liegt unter dem langjährigen Tiefstwert. Nun wird wieder über eine Wasserzufuhr diskutiert

29. Mai 2020 / NEUSIEDLER SEE 333

Grüne und WWF gegen Wasserzufuhr in den Neusiedler See

Landtagsabgeordneter Spitzmüller spricht von einer Gefahr für ein sensibles Natursystem, der WWF gar eine ökologische Katastrophe

26. Mai 2020 / KLIMASTATUSBERICHT 823

Wie die Klimakrise Österreich erfasst: Dürre, Hitze und Starkregen häufen sich

Hitzesommer und Rekordniederschläge sind längst keine Ausnahme mehr. Künftig werden lange und extreme Wetterperioden laut Klimaforschern zunehmen


Wien

„Verdammt wenig Wasser“

Zu wenig Regen. Ist das Wasser weg, ist der Tourismus weg. Der Neusiedler See leidet unter der Trockenheit. Nicht nur er

Fakten

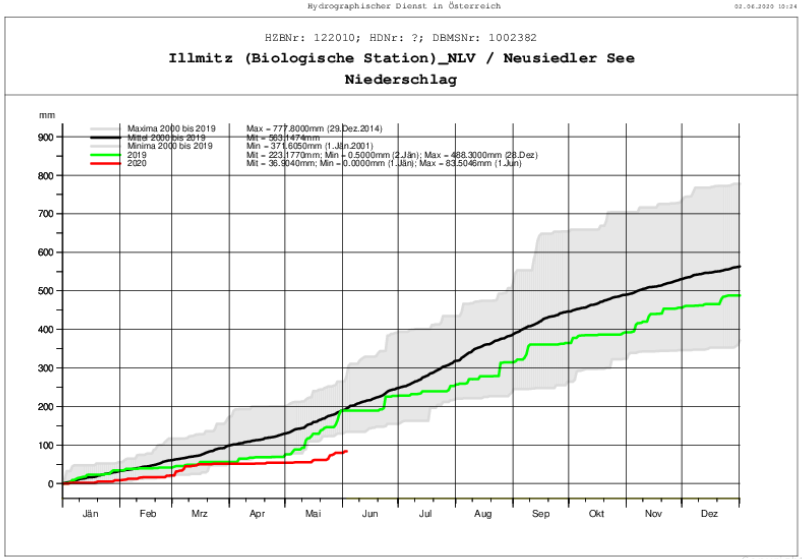
90

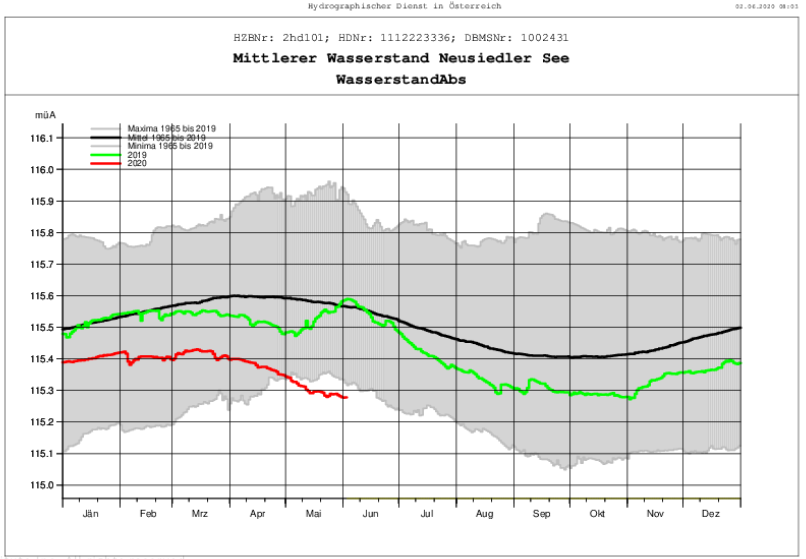
1865

1–2

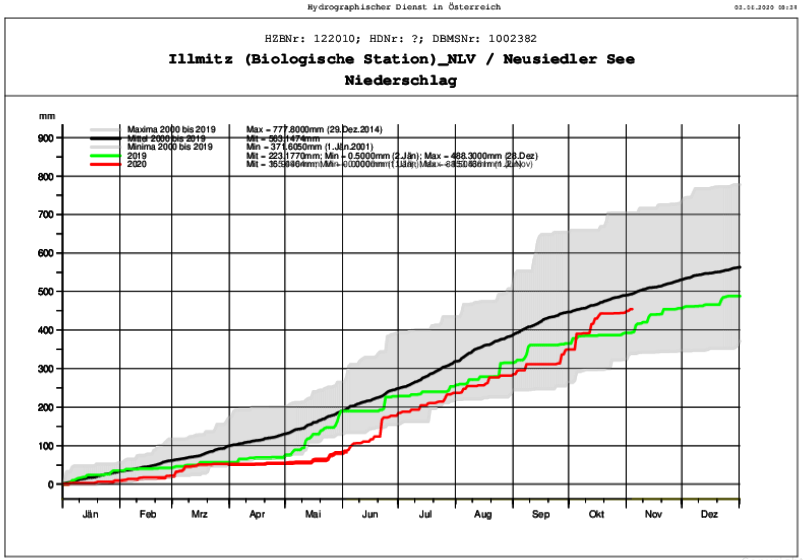
How come?

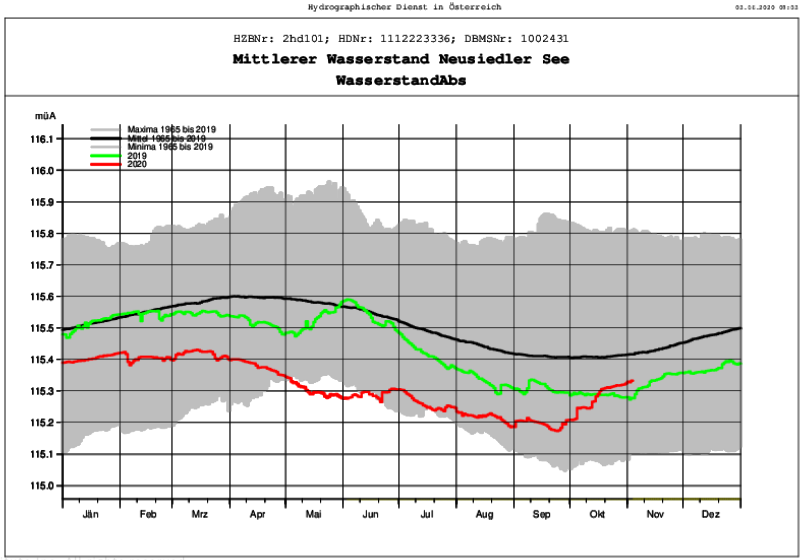
- 80% -90% of the water balance is fed by precipitation
- January – May 2020 have been extremely dry
- Karl Maracek (Hydrology Burgenland): precipitation in winter strongly contributes to the creation of water reserves (little evaporation)





Status per Nov, 4th, 2020

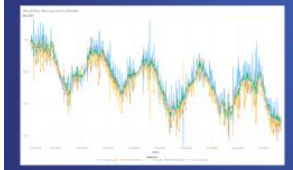




How is the author involved?

Analyzing Hydrological Data with my Students at Fachhochschule Burgenland since 2016

Task 1.1
Erstellen eines Liniendiagrams pro Station



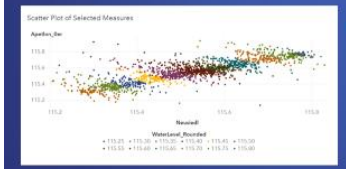
- Rollenzuordnungen
- Filtern auf Wasserstand (und Messstellen)
- Zuweisung von Farben zu MessStellen
- Override System-Limit for #DataPoints

Task 3.4
Create a cumulative chart per year for the number of hours > 30°C

- Similar to task 3.1
- Be careful with the defintion
- GREATER THAN or GREATER EQUAL

sas

Task 4.3
Detail analysis of the scatter plot



- Subgroup the dots by general (average) water level

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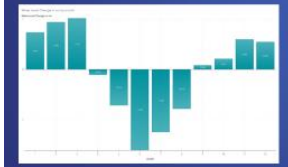
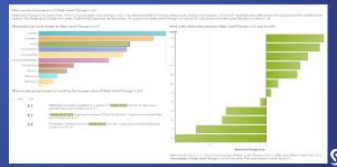
Task 5.2
Study Individual Variables and their Influence

Use Task „Automated Analysis“





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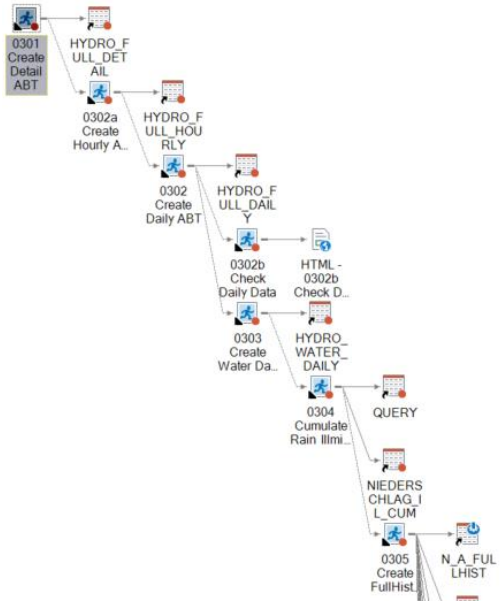
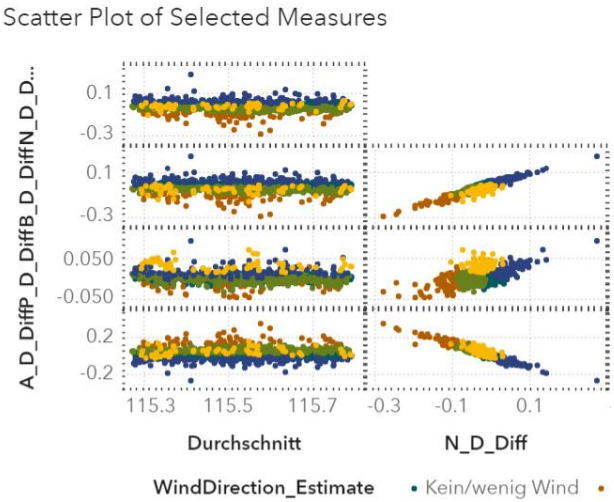
Typical Analysis Process
(using SAS Viya)

Load the data from Hydrologie Burgenland

Join, Aggregate, Prepare the Data



Perform descriptive and predictive analysis methods



Why worry?
115.28 (müA) is not too bad.

Really?

Analyse the yearly course of the water level

Build a simple „concatenation“ model

What-if …

Year 2020 continues in the same way
as 2019, 2018, 2017, …

Build predictive model and display the results

1. Train a regression model
2. Run various scenarios for the input parameters
3. Display the results interactively with sliders

Train a (simple) regression model

```
proc glmselect data=monthly_abt_month_sort;
 model WaterLevelChange = RainSum Cnt_TmpGT25 /selection=none;
 where month in (6,7,8,9);
 code file="&path.\Hydro_WaterChange_Mod1.0.sas";
run;
```

- Simple model uses
  - monthly rain sum (mm)
  - number of days with temperature > 25 °C

Parameter Estimates

Parameter	DF	Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-58.153454	7.587593	-7.66	<.0001
RainSum	1	1.096672	0.062758	17.47	<.0001
Cnt_TmpGT25	1	-3.330063	0.338838	-9.83	<.0001

Average monthly water loss per summer month

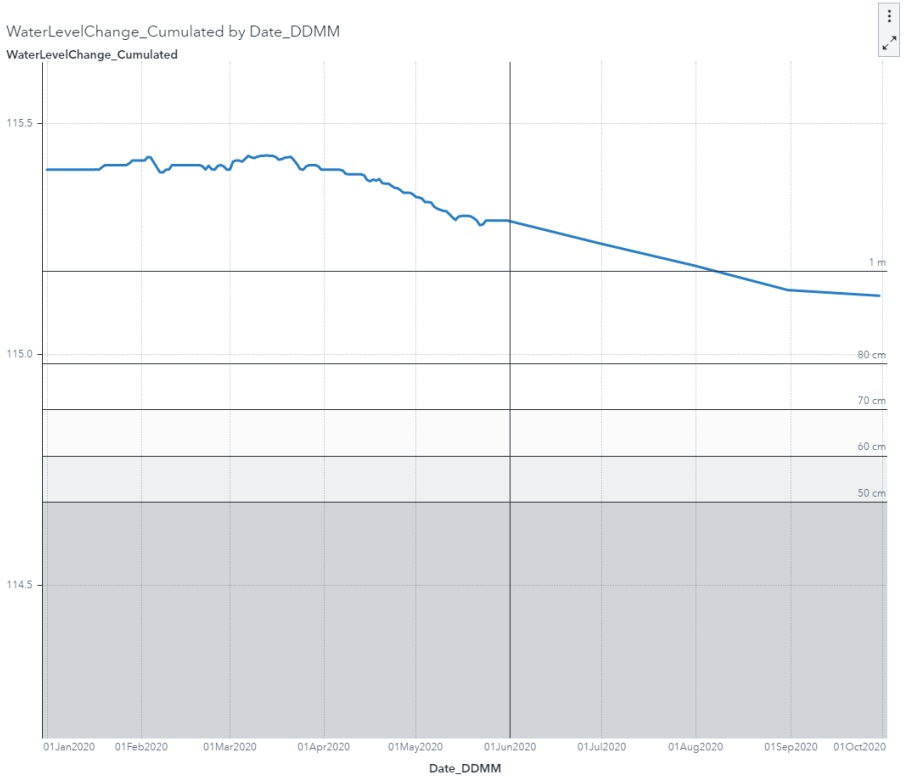
Rain adds to the water level with a factor of ~ 1

Day >25 °C „costs“ 3.3 mm of water level

Run various scenarios for the input parameters

```
Data hydro3.PredWaterLevelChange;
 format month 8. P_WaterLevelChange 8.2;
 do month = 5 to 10;
  do Cnt_TmpGT25 = 0 to 30;
    do RainSum = 0 to 200 by 5;
       %include "&path.\Hydro_WaterChange_Mod1.0.sas";
       output;
       end;
  end;
 end;
run;
```

Display the results interactively with sliders



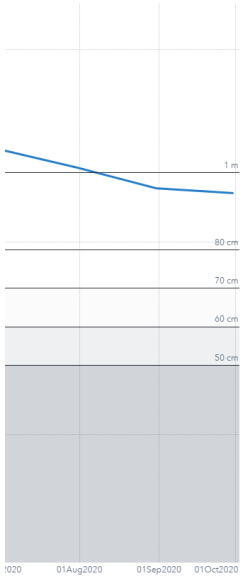
Next Steps

- Perform additional feature engineering
  - Average Temperature
  - Number of days > 30°C
  - Number of rain-days per month
  - Number of consecutive days without rain
  - Number of days with water movement > 5 cm (north-south, east-west, …)
  - Average Water Level
- Train a more complex model
  - What is important? Predictive Power or Interpretability?
  - Train a decision tree

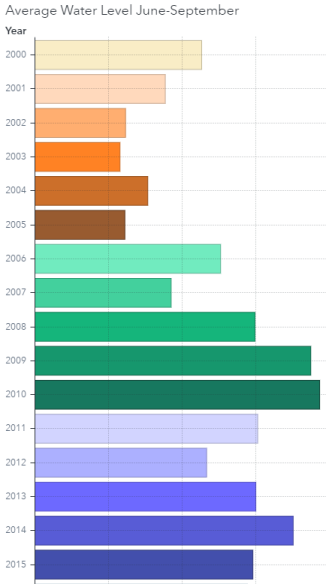
Some considerations from a business interpretation point of view

Use „Days > 25°C“ instead of „Average Temperature“

Add reference lines with „relevant“ dimensions



Select the year based on a bar chart that displays the average water level



Add average values per month to the slider labels