

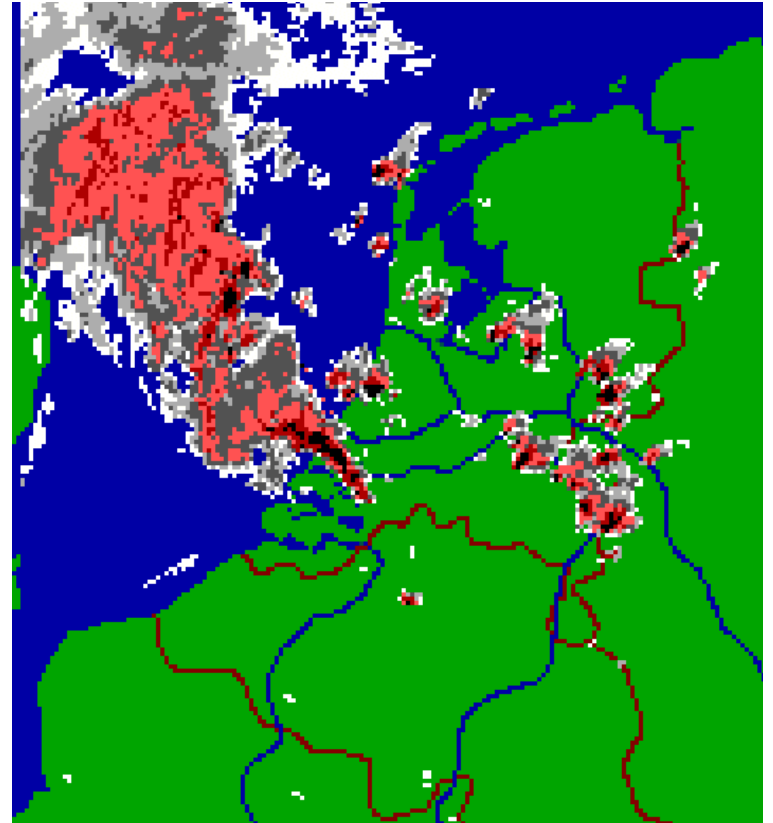
Voortgang afstudeeronderzoek

Fedde Hop

Ralf Linneman & Bram Schnitzler

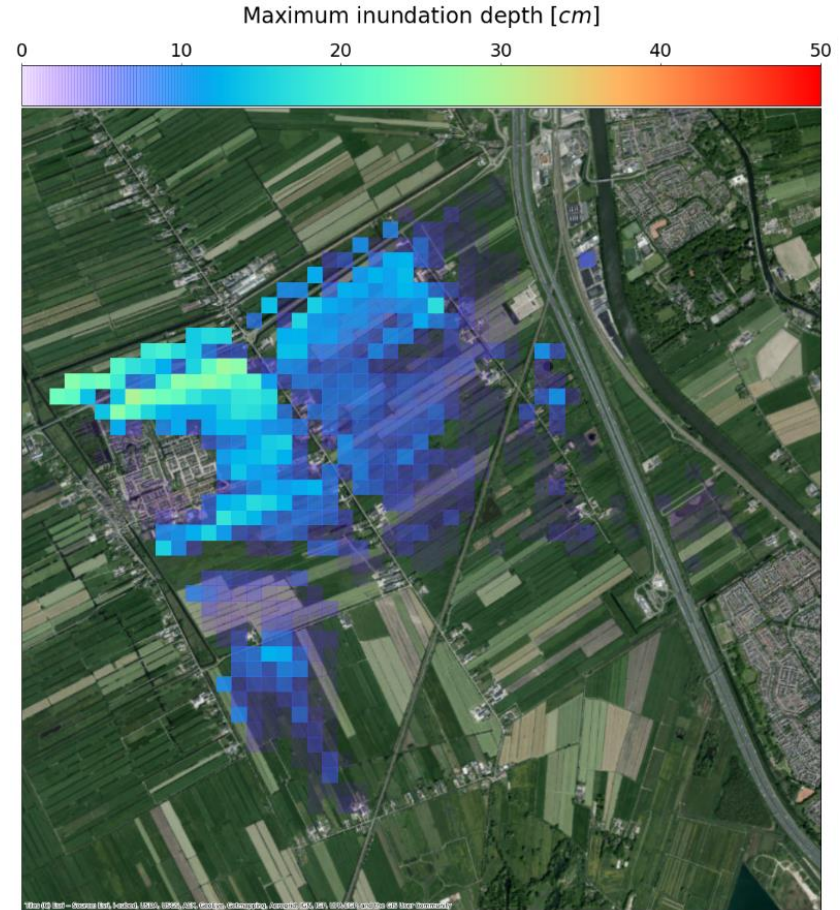
Introductie

- Extreme neerslag
- Voorspelling inundatie
 - D-HYDRO model
 - 1D2D + Rainfall runoff
 - D-HYDAMO model generator



Maar...

- Wat voor bui?
- Onzekerheid weersvoorspellingen
- Ensemble forecast
 - 50 neerslag voorspellingen
- Problemen?
 - Rekentijd

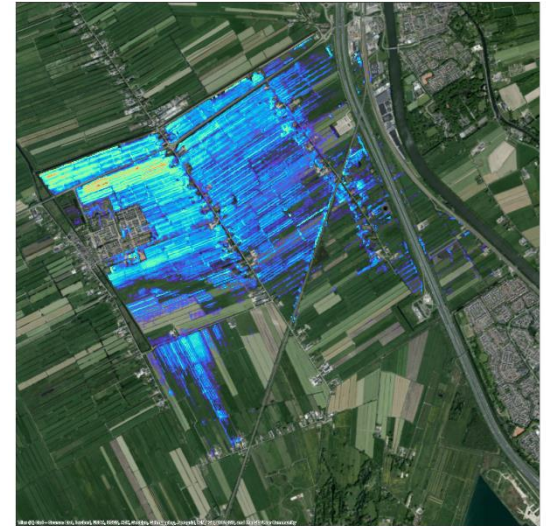
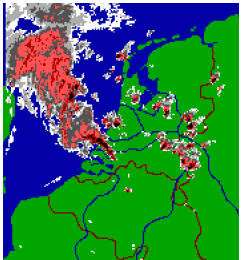


Cloud computing

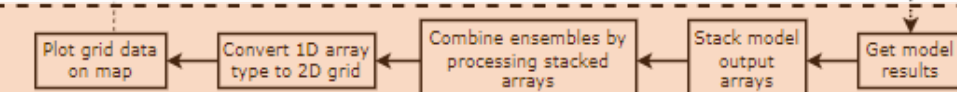
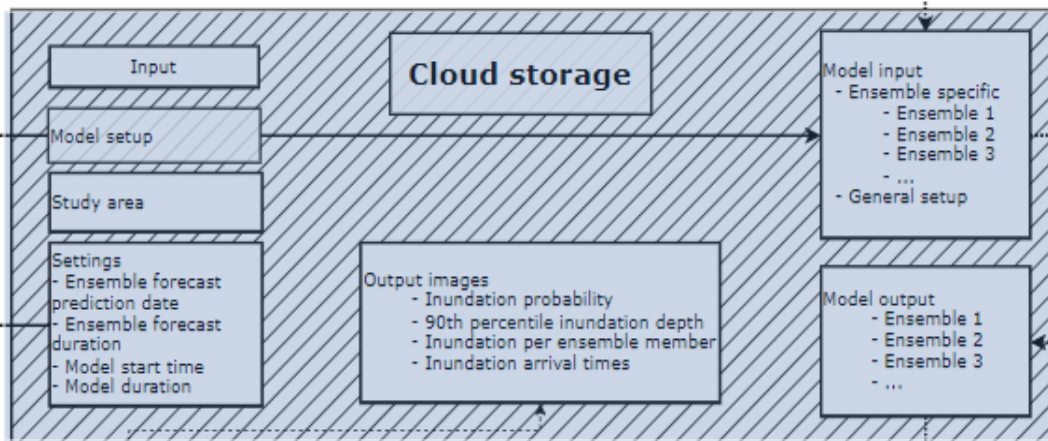
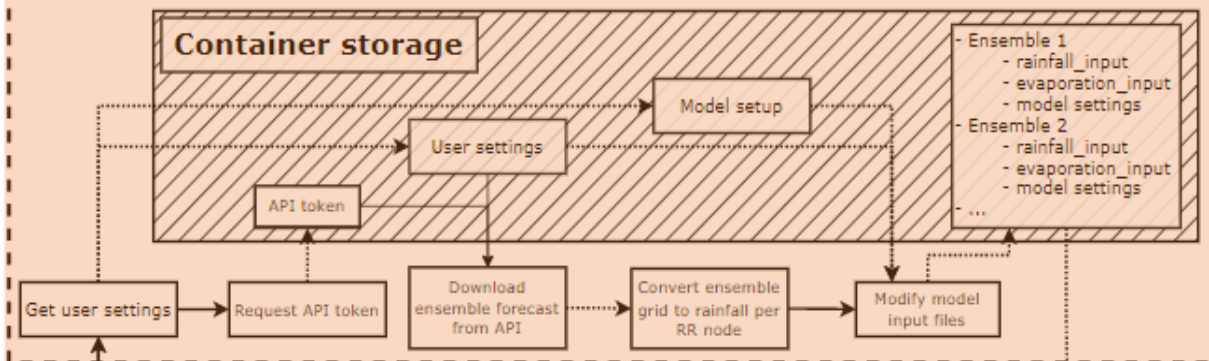


Cloud computing

- Alle simulaties tegelijkertijd
- Op computers bij een datacenter
 - Azure
 - Google
 - Amazon
 - Etc...
- Automatisch
 - Ensemble members neerslag voorspellingen ophalen
 - Omzetten tot model input
 - Modellen tegelijkertijd draaien
 - Plaatjes maken

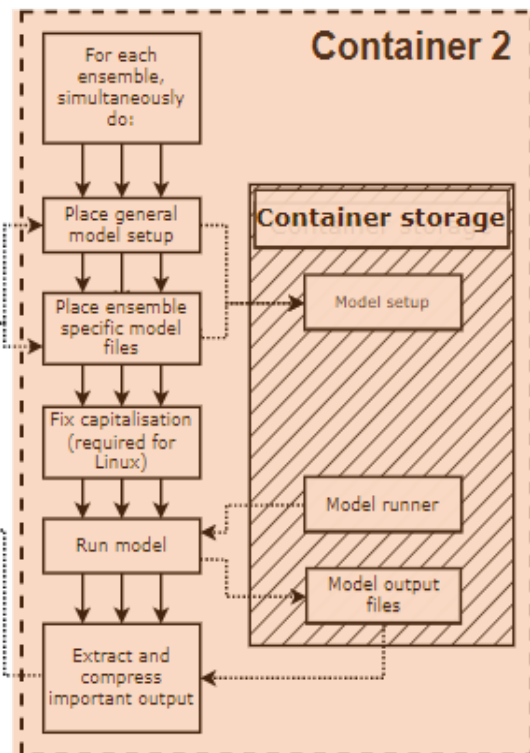


Container 1



Container 3

Container 2



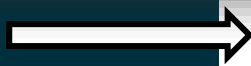
Progressie cloud computing

- Werkt in lokale testomgeving
 - Een “mini datacenter” op eigen laptop
- Met één druk op de knop
 - Probabilistische voorspelling
- Test versie!
 - Dus nog niet echt in de cloud
 - Oefenen op eigen laptop zonder te hoeven betalen
 - En daarom maar 3 ensemble forecasts i.p.v. 50
 - Lage resolutie

MinIO Browser

my-bucket / model-setup / +

Name	Type	Compressed size	Password ...	Size	Ratio	Date modified
fm	File folder					26-09-2022 18:53
rr	File folder					26-09-2022 18:53
dimr_config	XML Document	1 KB	No	7 KB	87%	26-09-2022 17:45
run	Windows Batch File	1 KB	No	1 KB	11%	26-09-2022 17:45



model-setup.zip



settings.txt

model-setup.zip				2.50 MB		Oct 11, 2022 11:42 AM
meteo-areas.zip				16.75 KB		Oct 11, 2022 11:42 AM
settings.txt				680 bytes		Oct 11, 2022 11:42 AM
case-sensitivity.py				552 bytes		Oct 11, 2022 11:42 AM
run_docker.sh				183 bytes		Oct 11, 2022 11:42 AM



settings - Notepad

File Edit Format View Help

```
# which model to use to get the ensemble forecast (models look 48 ahead and are created every 6 hours) YYYY/MM/DD_HH:MM:SS
```

```
# when you start at hour 12 you have data from hour 13 until hour 48
```

```
start_model_ensemble = 2022/08/17_12:00:00
```

```
# For how many hours to get the ensemble forecast data. In hours
```

```
duration_ensemble_forecast_data = 42
```

```
# start time of model YYYY/MM/DD_HH:MM:SS
```

```
start_time_model = 2022/08/17_13:00:00
```

```
# duration of model in hours
```

```
duration_model = 24
```

```
# folder to use as a base
```

```
main_folder = /app/fedde-prepare-model/
```

```
multiplication_rain = 1
```

```
add_rain = 8
```

```
# select the ensemble members you want to use
```

```
ensembles_from = 45
```

```
ensembles_to = 48
```



! working.yaml X

D: > 2. Cloud computing > Argo workflow > Workflow 1 > ! working.yaml

```

1  apiVersion: argoproj.io/v1alpha1
2  kind: Workflow
3  metadata:
4    generateName: run-
5  spec:
6    entrypoint: run
7    imagePullSecrets:
8      - name: regcred
9
10   templates:
11     - name: run
12       steps:
13         - name: generate-setup
14           template: generate-setup
15         - name: gen-file-list
16           template: gen-file-list
17         # Iterate over the list of numbers generated by the generate step above
18         - name: dhydro
19           template: dhydro-run
20           arguments:
21             parameters:
22               - name: file
23                 value: "{{item}}"
24             withParam: "{{steps.gen-file-list.outputs.result}}" # you have a problem if output size is greater than 256 kB
25         - name: post-processing
26           template: post
27
28
29   # Generate model input files
30   - name: generate-setup
31     inputs:
32       artifacts:
33         - name: model-setup
34           path: /model-setup/model-setup.zip
35           s3:
36             bucket: my-bucket
37             endpoint: argo-artifacts:9000
38             insecure: true

```



i You have Docker installed on your system. Do you want to install the recommended extensions for it?

[Install](#) [Show Recommendations](#)

Resultaat


STEP	TEMPLATE	PODNAME	DURATION	MESSAGE
run-pf49q	run			
├── generate-setup	generate-setup	run-pf49q-1311462056	25s	
├── gen-file-list	gen-file-list	run-pf49q-3291526542	4s	
├── dhydro(0:47)	dhydro-run	run-pf49q-3823519365	2m	
│ ├── dhydro(1:46)	dhydro-run	run-pf49q-4208553427	2m	
│ ├── dhydro(2:48)	dhydro-run	run-pf49q-760952796	2m	
│ └── dhydro(3:45)	dhydro-run	run-pf49q-3205356882	2m	
└── post-processing	post	run-pf49q-366867112	20s	




Output

my-bucket / images / 

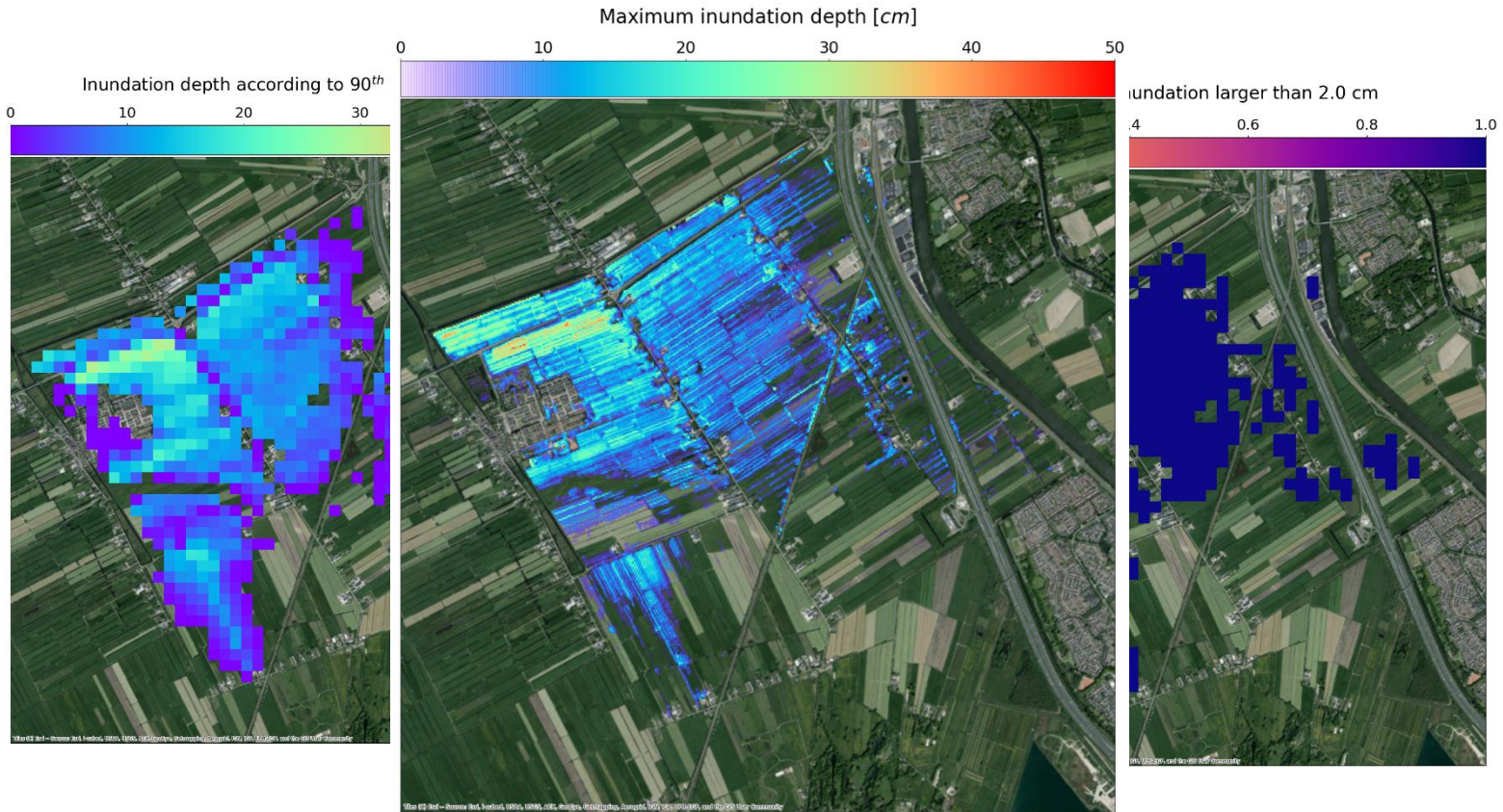


Used: 14.15 MB

 Search Objects...

Name	Size	Last Modified	
 images.tgz	4.54 MB	Oct 11, 2022 11:52 AM	

Dit zijn maar weinig ensemble members, en de grid is grof. Dit is een versie die lokaal is gedraaid.



Vervolg stappen

- Daadwerkelijk in de cloud
 - Azure
- Rekentijden
- Kosten
- Training data neuraal netwerk genereren
 - Ander deel van onderzoek

