

An aerial photograph of a river network, likely a delta or floodplain, with a teal-colored overlay that highlights the main channels and some smaller tributaries. The background is a mosaic of brown and tan colors, representing agricultural fields or natural terrain. The teal overlay is most prominent in the upper right and central parts of the image.

Deepfaking ecosystem response to climate extremes

Deep V

Stef Lhermitte & Ben Somers

KU LEUVEN





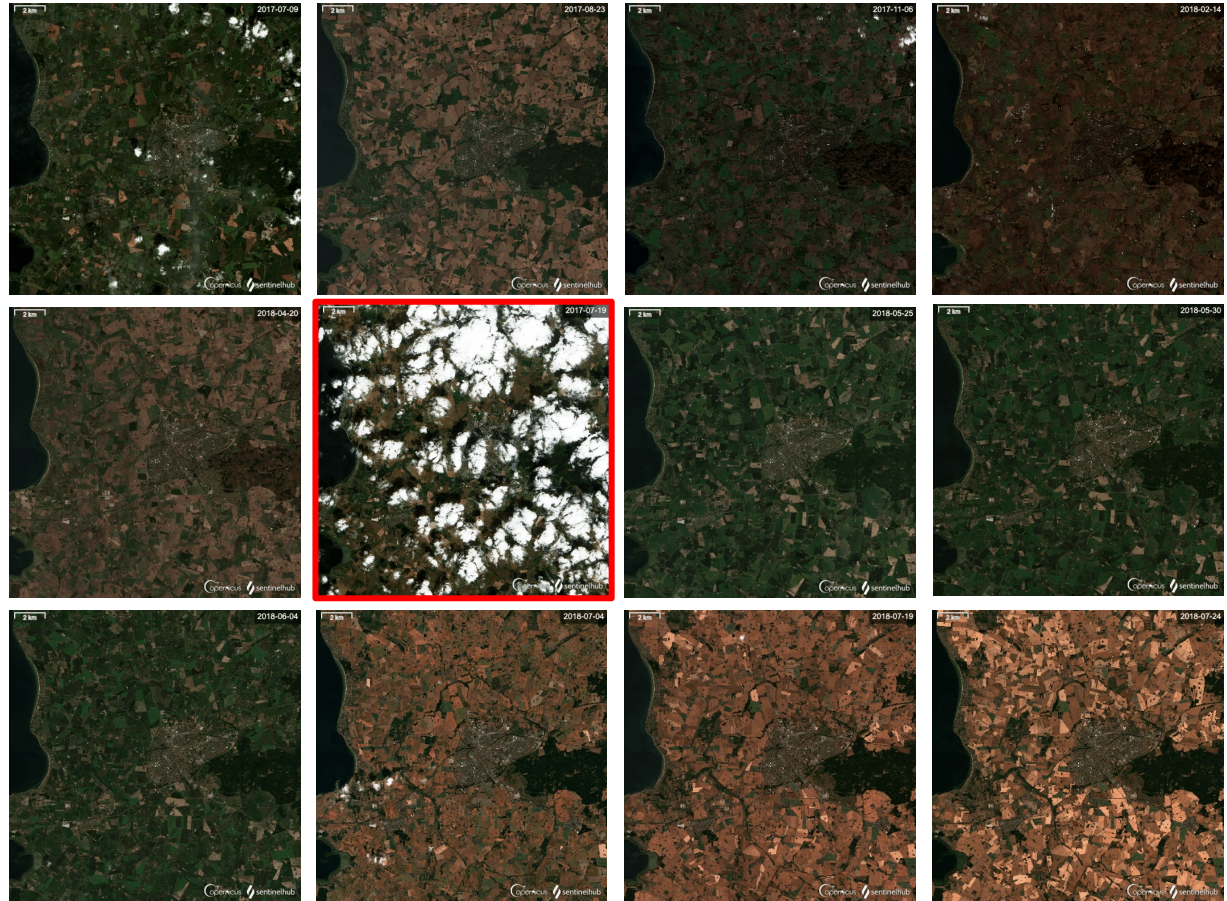
What if?

Decision support

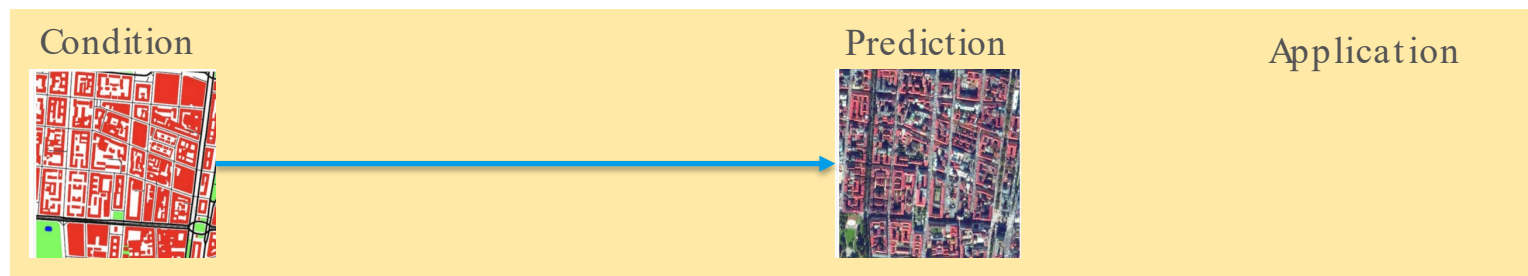
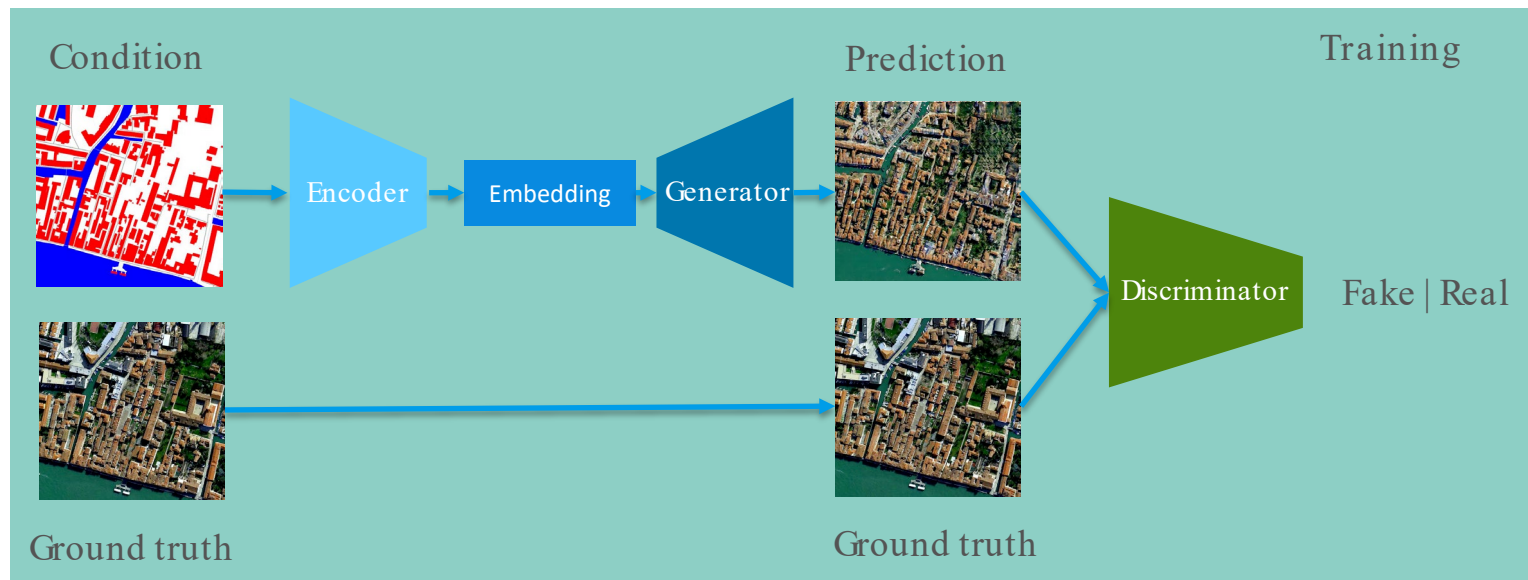
Early warning

Digital twin

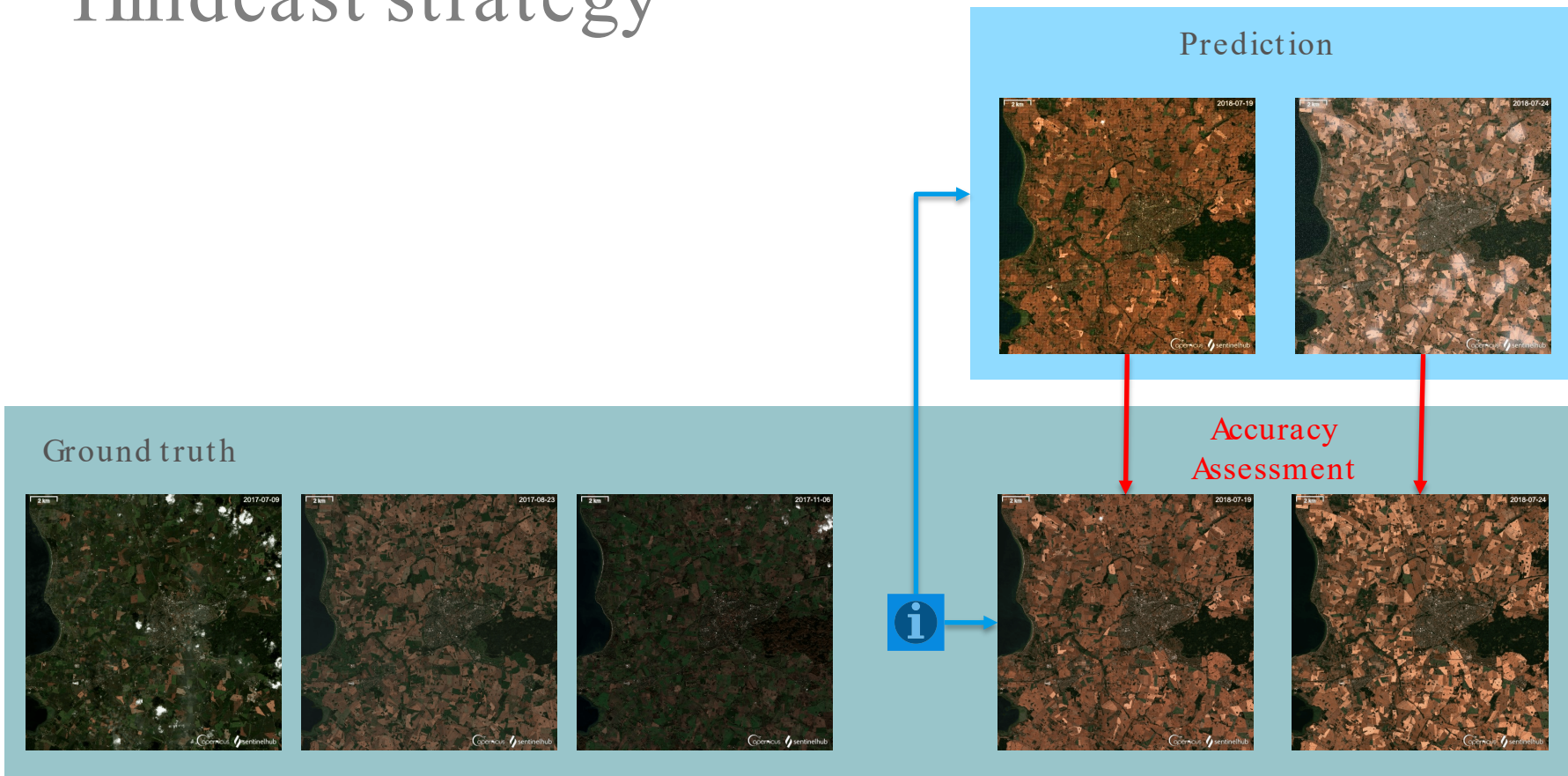
Inpainting



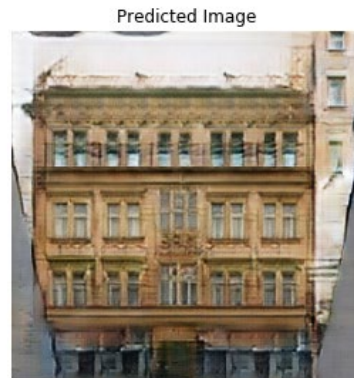
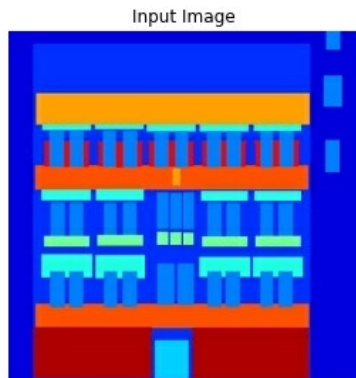
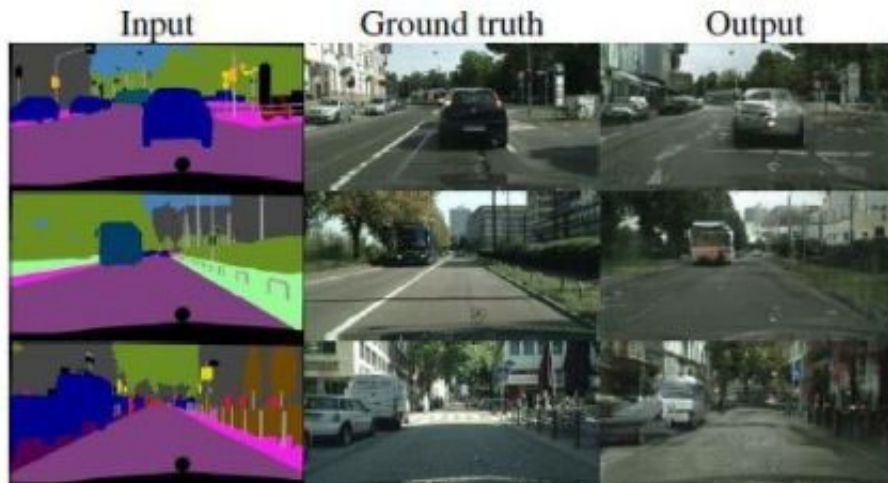
Conditional GANs: theory



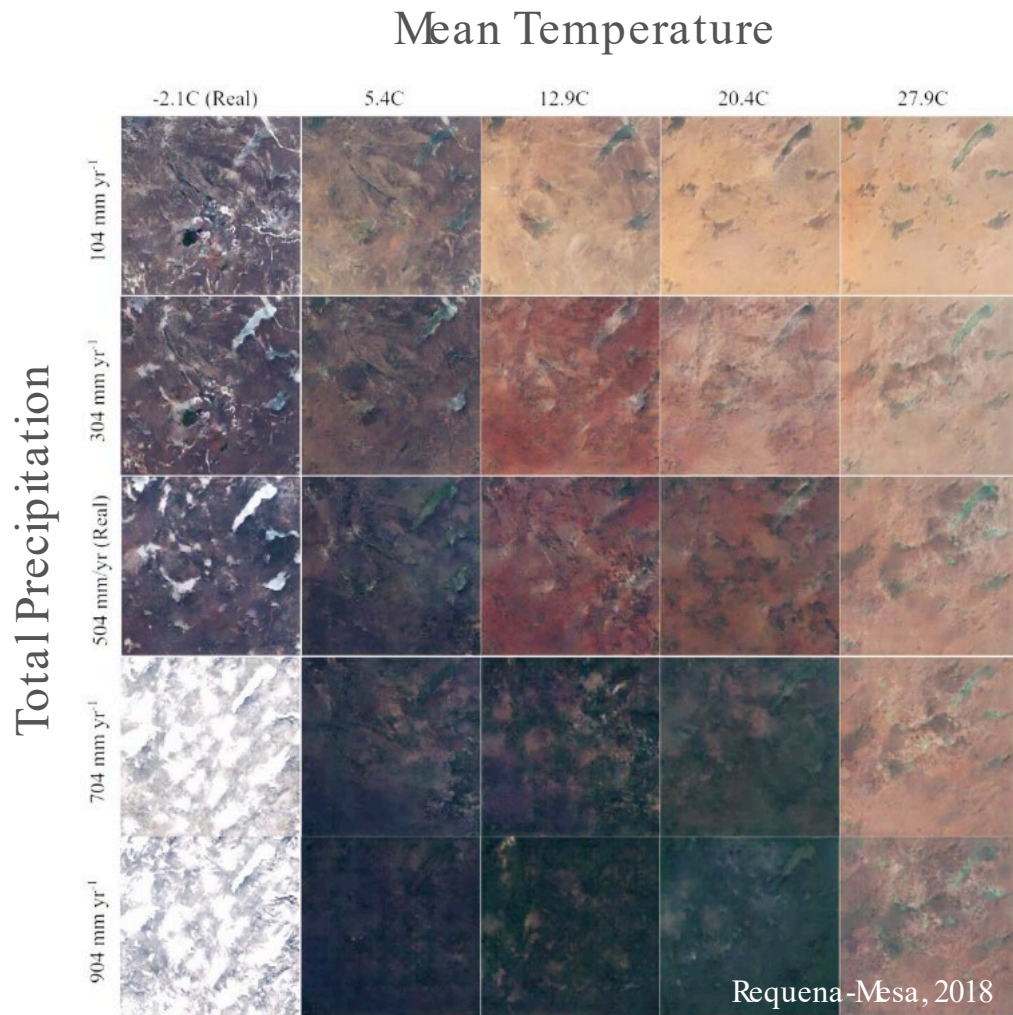
Hindcast strategy



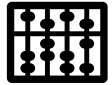
cGANs example



cGANs example



Current problems with cGANs



Based on mean conditions

WP2

Unitemporal cGAN



Optimised on landscape metrics



No temporal context

WP3

Multitemporal cGAN



No biophysical constraints

WP4

Biophysically constrained cGAN



Dissemination



Website



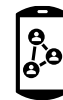
Publications
& conferences



Github
Open source packages



Teaching



Social
media

An aerial photograph of a river delta, likely the Rhine-Meuse delta, showing a complex network of waterways and agricultural fields. A teal-colored overlay is applied to the image, highlighting the river channels and creating a stylized, almost abstract effect. The text is overlaid on this image.

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WP1: Data management & preprocessing

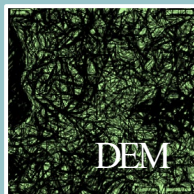
Images

Global
Sentinel-2 record
with focus on
specific AOI

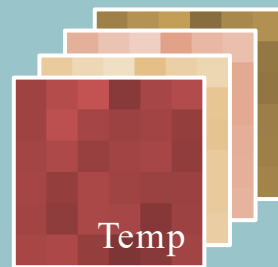


Conditions

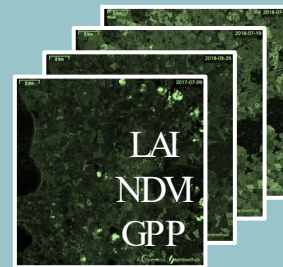
Static
environmental



Dynamic
hydro-meteorological

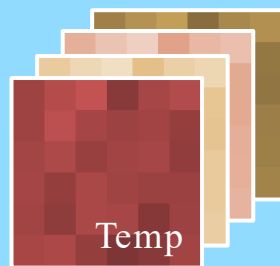
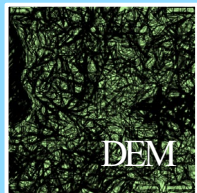


Dynamic/static
Biophysical

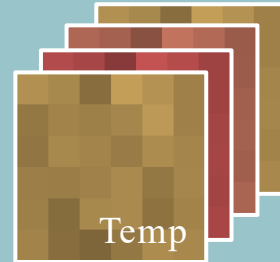


WP1: Data management & preprocessing

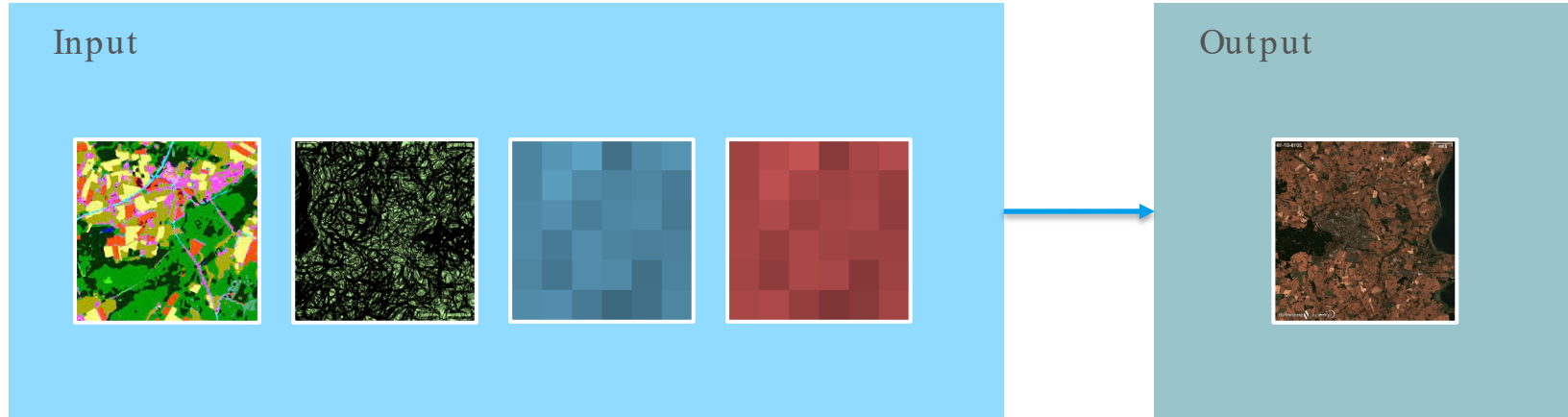
Training / validation



Testing

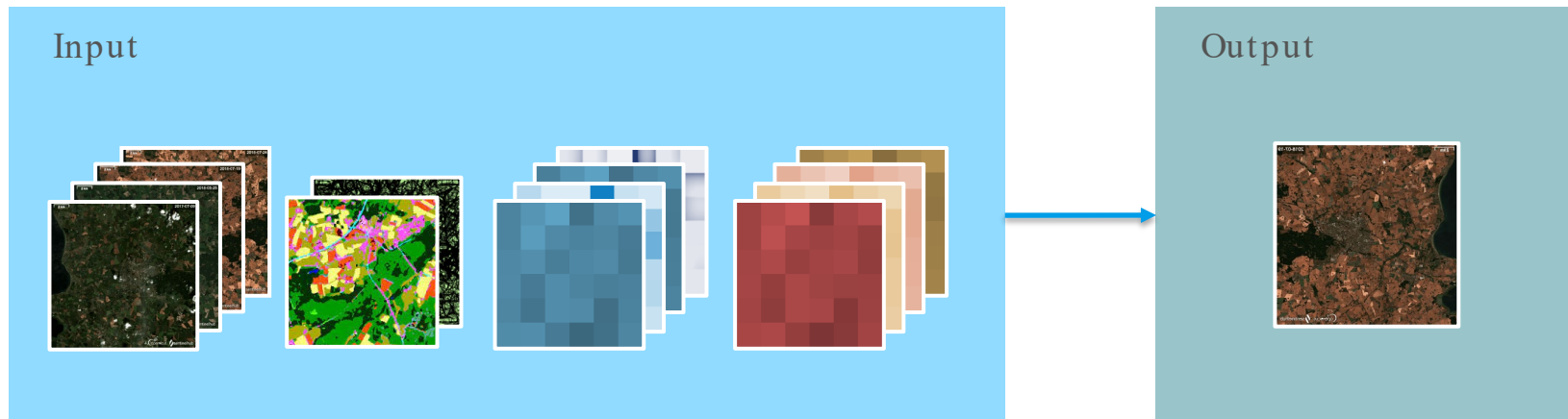


WP2: Unitemporal (benchmark) cGAN



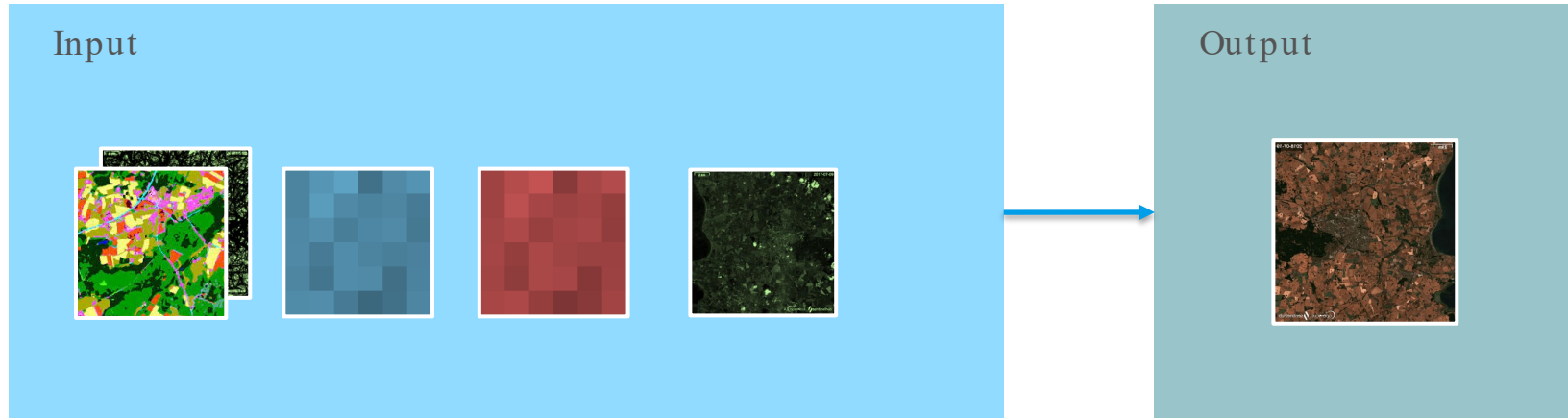
- Response to extremes instead of mean conditions
- Optimise ecosystem variables instead of landscape metrics

WP3: Multitemporal cGAN



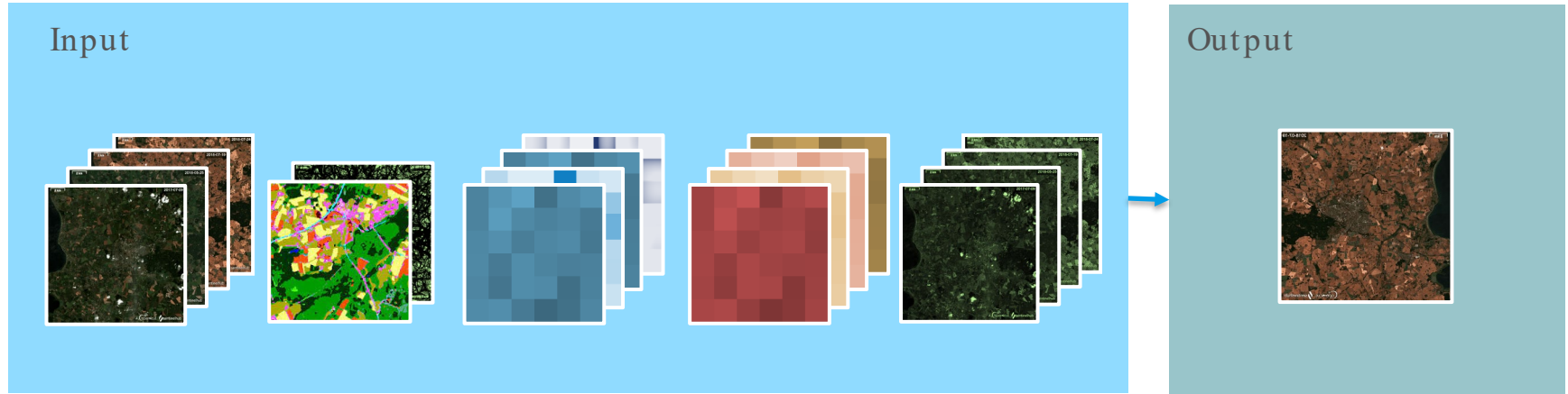
- Adding the time information
- Similar to video cGAN

WP4: Biophysically constrained cGAN



- Adding additional biophysical constraints
- Adapting loss function

WP5: Multitemporal Biophysically constrained cGAN



- Combining all advances
- Climate scenario analysis