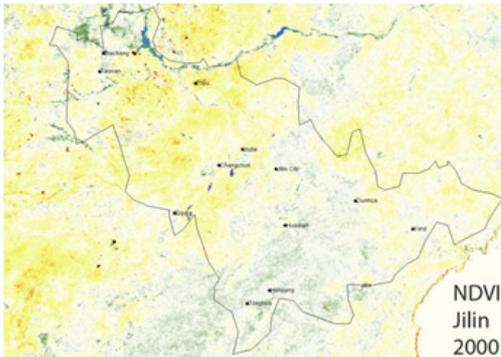


## DROUGHT RISK MAPPING



Drought risk maps based on NDVI anomalies aggregated over the entire growing season of 2000 and 2010 in the Jilin province, China. The images show dry conditions in NW-Jilin in 2000 (yellow color), whereas 2010 was a year with crop yields above normal (green color). Normal (white color?) is based on a 11 years of annual NDVI averages for the period 2000-2010.

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### NDVI

Normalized Difference Vegetation Index, is an index based on the difference between the Near Infrared Band and the Red Band. The rationale is that plants absorb the solar radiation during the photosynthesis in the near-infrared spectrum. NDVI is therefore an expression of the current plant production.

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In many regions of the world drought is a key peril that can severely impact agriculture production levels (yield) of many agriculture commodities including grains, sugarcane and grass land used for cattle feed. In the view of climate change projections, drought risk is likely to increase in of today's key producing markets and can affect more regions in the future. COWI provides maps showing drought risk and potential crop yield losses.

### TECHNOLOGY AND KNOW HOW

COWI uses NDVI data from satellite images of the MODIS sensor provided by NASA. This sensor gives a moderate spatial resolution 1 x 1 km and a high temporal resolution covering the entire earth every 1 or 2 days. With MODIS NDVI data COWI is able to generate Drought Risk Maps covering almost any part of the globe with a 1 x 1 km resolution which allows interpretations at small geographical entities (eg. district or village).

COWI has for years been among the leading providers of aerial imagery and mapping services in Europe. The staff at COWI has a long experience in product extraction and interpretation of aerial and satellite sources and is experienced in adapting end products to its customers.

### PRODUCTS

Using COWI's experience in mapping tailored services are provided depending on the customer's actual need and environment:

- › Drought risk assessment – mapping past droughts in order to assess severity and frequency to understand future impact.
- › Drought risk monitoring – mapping of the geographical extent and severity of present droughts on a monthly basis to initiate and coordinate mitigation measures.
- › Loss adjustments – Use real-time drought maps to extrapolate on-ground loss adjustments from sampled villages to wider areas that show similar drought signatures and expected damage extents.

COWI has also the skills to analyze NDVI maps to use it as a proxy for the current state of water resources.

## USE OF DRAUGHT RISK MAPPING

Drought risk mapping has useful applications in a large number of different industry segments that depend on agricultural yield, directly or indirectly, examples include:

- › Insurance industry where drought risk maps can be used in coordinating loss adjustment activities or where NDVI can be used as a proxy for loss severity in an actual insurance product.
- › Food processing industry where drought risk maps can be used to manage volume risks in the supply chain and resulting business interruption in case of a shortfall in supply due to drought.
- › Government entities where drought maps can assist in coordinating mitigation activities or plan contingency measures a head of time.

In combination with knowledge of water resources other applications of drought risk maps include:

- › Presentation of drought information in general
- › Prediction of drought or famine

## CUSTOMER STATEMENT (SWISS RE)

*By Dr. Roman Hohl, Director, Head Agriculture Asia-Pacific Swiss Re*

As test customer for the Crop Insurance Service Trial as funded by ESA (European Space Agency), we have been delighted to experience the possibilities of using drought information from satellite data (NDVI) for:

- › (1) The production of risk maps in order to better understand the spatial and temporal extent of severe droughts in NE China
- › (2) The possibility to monitor developing droughts and the use of real-time drought maps to coordinate loss adjustment activities
- › (3) The possibility to develop NDVI-based insurance products where NDVI values can be used as proxies for yield reduction and settlement of claims.

As the leading reinsurer for agriculture risks in Asia-Pacific, Swiss Re values the use of NDVI-based products to map past and monitor current droughts across the region. We have been promoting the use of the NDVI technology to our clients that are insurers, corporates in the agriculture supply chain as well as government entities.

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