

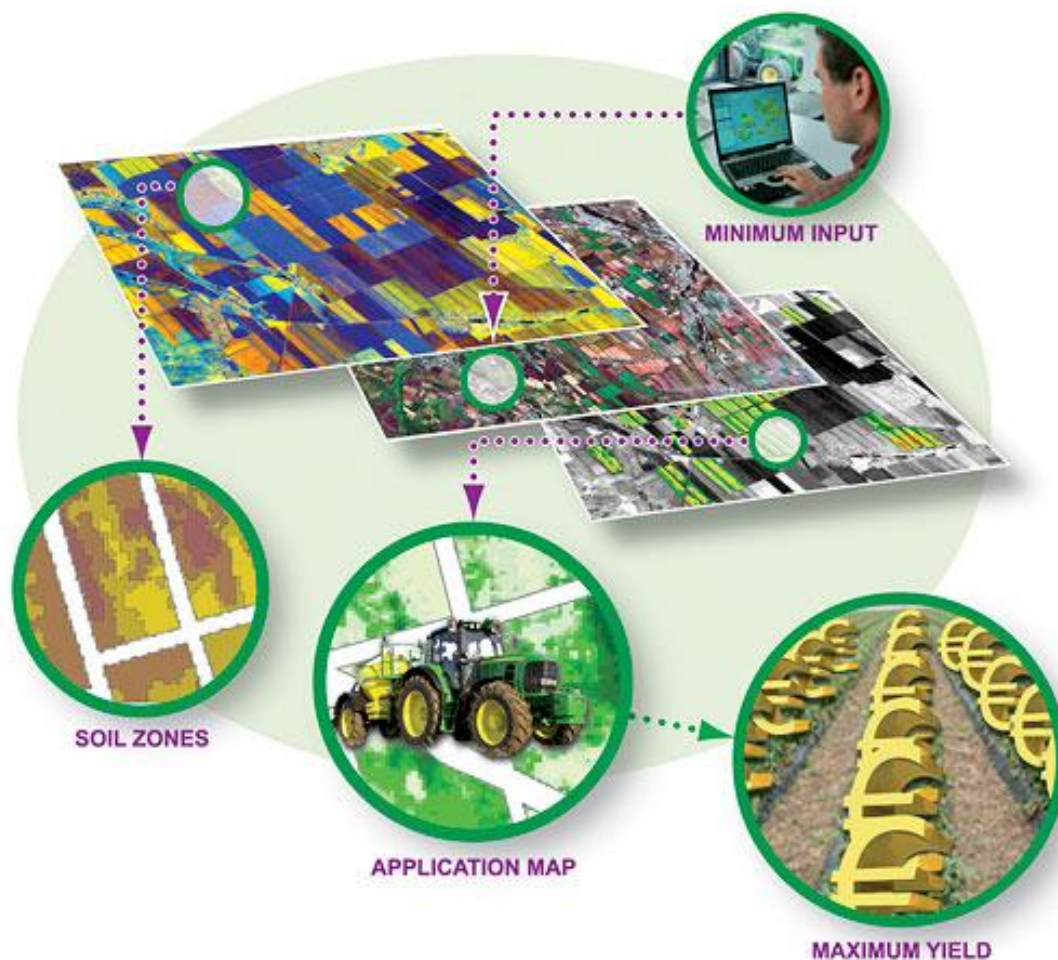
talkingfields Products

Satellite images provide overview, show patterns and allow estimation of in-field **heterogeneity**. Thus, these images can support the farmer in his **decision making** process.

By using satellite data, a field-specific crop vigor analysis can be done to derive a **site characterization**. This allows an estimation of the possible economic benefits of future application of precision farming techniques.

Parameters which can't be directly observed with remotely sensed data like **dry biomass** and **grain yield** are modeled by **talkingfields** using a crop growth model which uses remotely sensed data as up-to-date spatial input.

Yield modeling gives an early overview over the canopy development of the canopy within fields and results in a realistic prognosis of the final yield.



talkingfields enables you:

- To get valuable information for your crop management and a basis for your application maps via the **TF Base Map**, which shows the persistent relative fertility based on multi-year satellite images.
- To apply a cost-efficient solution for soil probing using the satellite-based **TF Zone Map**.
- To plan your plant protection measures with an optimized risk assessment using the **TF Biomass Map**.
- To optimize your economic planning using the **TF Yield Map** and **TF Yield Forecast**.
- To check the success of your management decisions.

TF Base Map

The **TF Base Map** shows statistically significant, persistent patterns of relative biomass. The satellite-based **TF Base Map** is calculated from multi-year satellite data to exclude influences of current weather conditions and different crop types.

Validation of the TF Base Map:

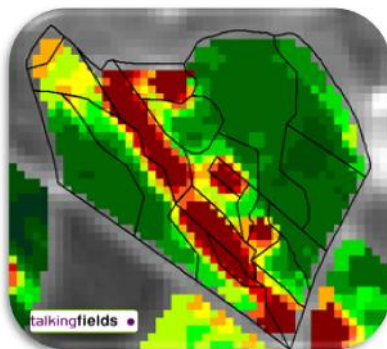
The quality of this product has been proven by several validations. Validation of our measurement methods has been done via direct comparison with other widely recognized methods like e.g. the German Reichsbodenschätzung, EM38 electrical conductivity measurements or yield maps from combine harvesters.

The satellite-based TF Base Map:

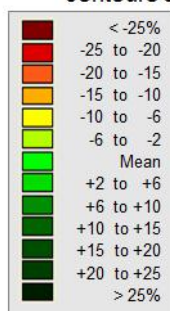
- shows different site-qualities.
- can be used as information source for the creation of application maps.
- serves for site-mapping, also in combination with other methods.
- allows large-scale analyses at a budget price.

On the image below you see on the left side the calculated persistent relative fertility, the satellite-based **TF Base Map**. The next two images show the results of the farm soil map and the EM38 electrical conductivity measurements. The patterns calculated by our considerably cheaper method widely match the two other measurement methods, without having to buy extensive data sets or having to conduct own measurements on the fields.

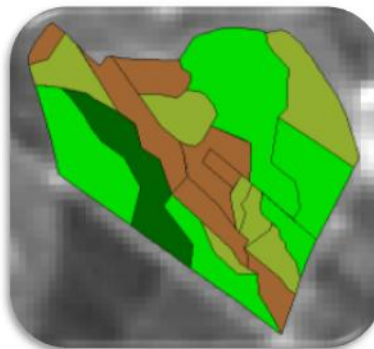
Validation of the TF Base Map:



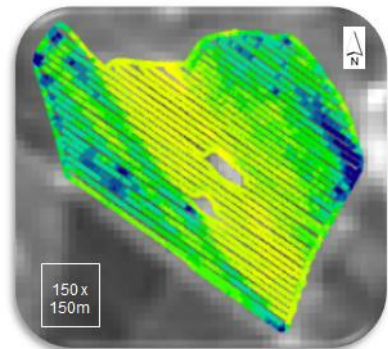
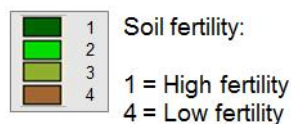
TF Base Map (superposed with contours of farm soil map)



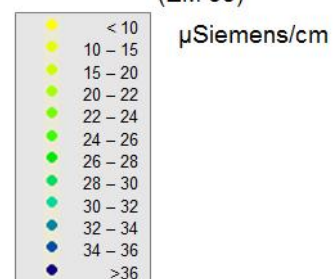
Persistent relative biomass in %



Farm Soil Map



Electrical Conductivity (EM 38)



Currently, we offer the processing of data for fields with a size of 2 ha and above. The minimum order size is 200 ha. In case you order less, the price for 200 ha will be charged. The surcharge can be reimbursed with later orders.

Should processing of parts of this area not be possible, then these areas will not be taken into account in the cost calculation.

Thus, you will only pay for the areas for which we can deliver our products.

For 5 €/ha you get the following products if you order the service:

Product name	Description	Price in €/ha (only analyzed data)	Unit	Output format
TF Base Map	Shows the persistent relative fertility	5 € excl. VAT	%	TF-XML, Point-Shape-Files

The delivery of the TF Base Map includes:

- **TF Base Map** showing the persistent relative fertility.
- Spatial resolution in a fixed raster cell size of 20 x 20m.
- Delivery in an Agrar Office-compatible format or as point-shape file which can be read by the most prevalent agricultural software packages which include GIS functionality.

Upon receipt of an order we require the boundaries of the ordered fields **as well as** of the environmental protection zones, preferably in TF-XML- format.

Please also note our attractive package deal:
TF Base Map & TF Zone Map for only 6€/ha excl. VAT!

Additionally, we can of course offer you the agricultural software with which you can import this data and further process it to e.g. application maps. Information on this can be found here:

www.eurosoft.de

If you like our offer or have additional questions about our product, we would be pleased to take some time to get in touch with you personally! Please use our email address info@talkingfields.de or our phone number +49 89 28 77 95 24 to contact us.

Additional information can be found at www.talkingfields.de

TF Zone Map

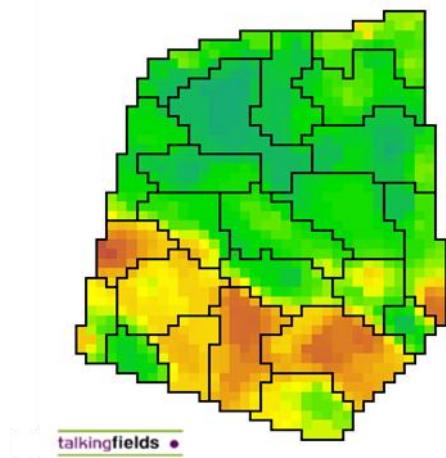
Besides the **TF Base Map** there is the possibility to receive the **TF Zone Map**, which can be used as a base for soil sampling.

The example below shows in the background the **TF Base Map**, which results from the spectral analysis of the satellite images, overlaid with the **TF Zone Map**.

The TF Zone Map allows:

- The optimization of your soil probing strategy for an improved soil database.
- The reduction of the number of laboratory probes and resp. costs.

TF Zone Map With TF Base Map in the background



Areas of similar values in the TF Base Map are merged into one zone in the TF Zone Map.

These zones enable you to conduct a cost-saving soil probing which well represents well the range of soil characteristics within your field.

You decide on the average size of the zones. Thus, the TF Zone Map can be adapted exactly to your needs.

Currently, we offer the processing of data for fields with a size of 2 ha and above. The minimum order size is 200 ha. In case you order less, the price for 200 ha will be charged. The surcharge can be reimbursed with later orders.

Should processing of parts of this area not be possible, then these areas will not be taken into account in the cost calculation. Thus, you will only pay for the areas for which we can deliver our products.

For 4€/ha you get the following products if you order the service:

Product name	Description	Price in €/ha (only analyzed data)	Output format
TF Zone Map	Zones for optimized soil probing	4 € excl. VAT	TF-XML, Point-Shape-Files

Please also note our attractive package deal:

TF Base Map & TF Zone Map for only 6€/ha (excl. VAT!)

The delivery of the TF Zone Map includes:

- The digital **TF Zone Map** with zone extent and zone number.
- Zones in designated average zone size by definition of the minimal and maximal zone size during the ordering process.
- Delivery in an Agrar Office-compatible format or as point-shape file which can be read by the most prevalent agricultural software packages which include GIS functionality.

Upon receipt of an order we require the boundaries of the ordered fields **as well as** of the environmental protection zones, preferably in TF-XML- format.

Additionally, we can of course offer you the agricultural software with which you can import this data and further process it to e.g. application maps. Information on this can be found here:

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TF Biomass Map

The **TF Biomass Map** delivers the small-scale absolute biomass distribution on winter wheat and maize fields 3 times a year.

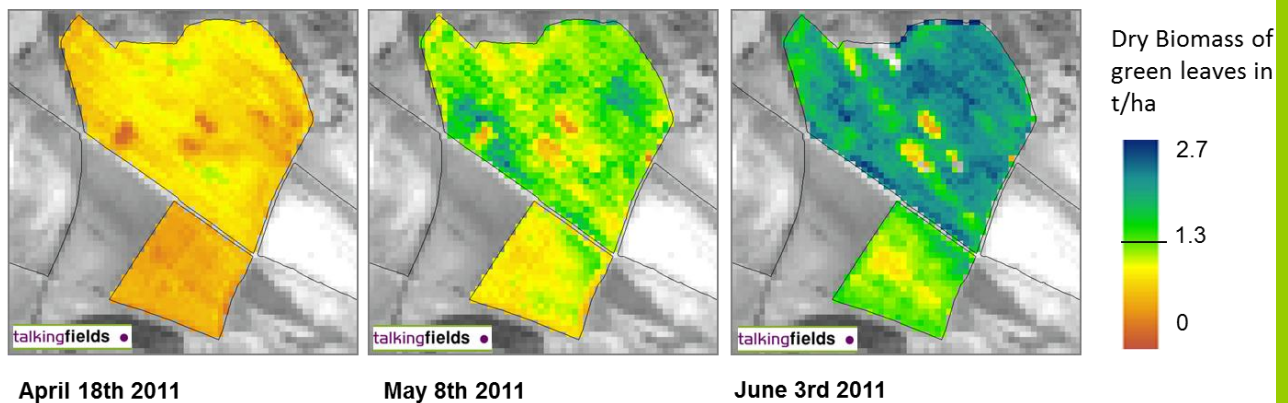
Using a crop growth model and the integration of biomass observation from up-to-date satellite imagery, the **TF Biomass Map** can be calculated for any desired date.

With the **TF Biomass Map**, the increased plant disease risk of dense canopy parts can be taken into account for the creation of application maps for plant protection measures.

The TF Biomass Map:

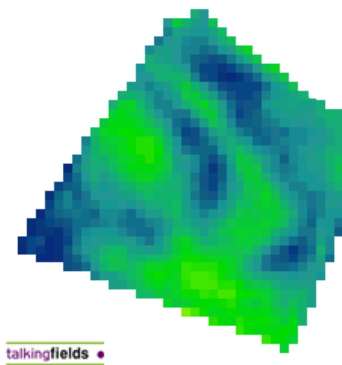
- Gives the biomass in absolute values (t/ha) for winter wheat and maize fields in a spatial resolution of 20x20m.
- Delivers absolute, spatially and temporally comparable biomass information.
- Allows an optimized risk assessment for plant disease and serves as offline information source for application maps for plant protection measures.
- Allows a continuous monitoring of leased fields for the green energy industry.

The following figure shows the biomass development in spring 2011 for winter wheat. The values of the TF Biomass Map are absolute and directly comparable.



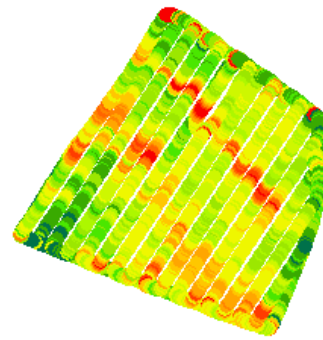
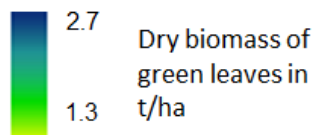
Currently, validation via comparison with field measurements as well as online sensor values of relative biomass distribution is taking place.

In the image below, you can see on the left side the biomass distribution on the **TF Biomass Map**, on the right side, you can see the field as measured with an online sensor. The spatial distribution of the biomass from both observations is congruent.

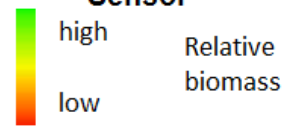


talkingfields •

TF Biomass Map



Biomass observation of N-Sensor



In opposition to online sensors, the **TF Biomass Map** delivers absolute values. The TF Biomass Map allows an optimized, site-specific risk assessment for plant disease to plan plant protection measures. Through its absolute nature, the TF Biomass Map makes a comprehensive monitoring of the biomass development on all fields possible.

The **TF Biomass Map** is expected to be ready for a wider market in the harvest year 2013. Until then, we test and validate the TF Biomass Map in close cooperation with selected demo farms.

If you are nevertheless already now interested in this product, please contact us for further information at info@talkingfields.de or call us at +49 89 28 77 95 24.

Additional information can be found at www.talkingfields.de.

TF Yield Map and TF Yield Forecast

Currently still in the pilot phase are the **TF Yield Map** and **TF Yield Forecast**. These products, which are specialized for winter wheat and maize, deliver absolute yield values in t/ha in a spatial resolution of 20x20m.

TF Yield Map

The **TF Yield Map** allows us to deliver small-scale information about the yield level at the harvest date retrospectively. Using meteorological data, a crop growth model and the assimilation of canopy observations from satellite images of the respective harvest year, the **TF Yield Map** is deducted.

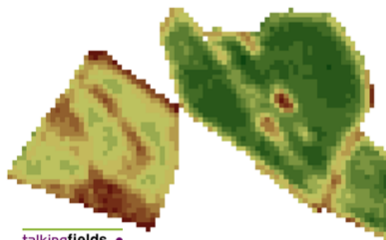
Validation currently takes place via a comparison with yield maps of a combine harvester. In the following image you can see on the left side the **TF Yield Map** and on the right side the results of the yield mapping using a GPS combine harvester.

The TF Yield Map:

- Delivers comprehensive yield information for maize and wheat in values of t/ha.
- Completes and substitutes existing yield maps, also in retrospective.
- Allows a consistent and comprehensive overview of the harvested areas.
- Allows yield mapping without having to harvest with specially equipped combine harvesters.
- Allows comparison of harvest success of different varieties and management methods.

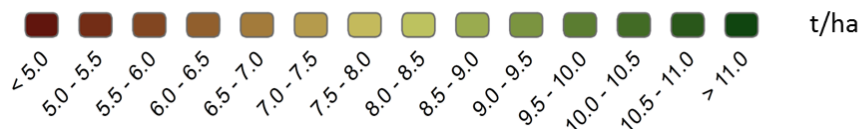
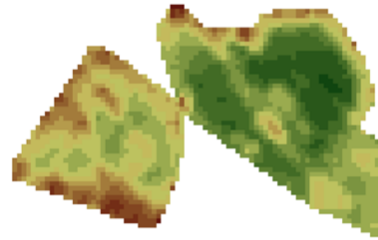
TF Yield Map

Ex post modelled yield for winter wheat, 2010



Yield Mapping result

Yield Mapping result, extreme values excluded



The spatial congruence of the **TF Yield Map** and the conventional yield mapping with the combine harvester is high.

The accuracy of the yield estimation in the first results hovers around 95%.

TF Yield Forecast

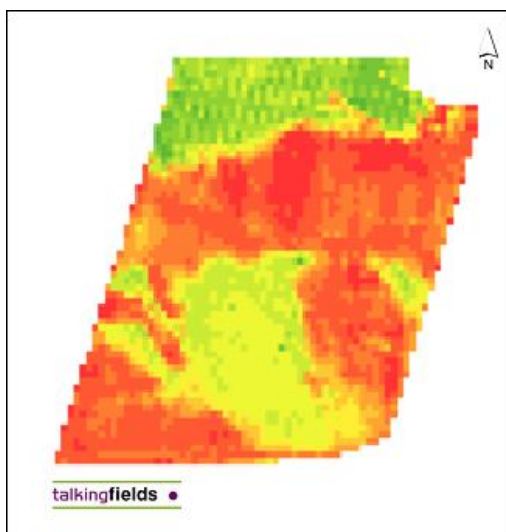
The **TF Yield Forecast** delivers a small-scale yield forecast two to four weeks before the desired harvest date.

Via assimilation of current weather forecasts as well as long-term weather observations into the crop growth model, grain yield can be derived even before the actual harvest date.

The **TF Yield Forecast** can serve as:

- support for strategic contract negotiations.
- effective management of truck pools and efficient factory utilization in the green energy industry.

The following image shows an exemplary **TF Yield Forecast** which was calculated using a satellite image six weeks before winter wheat harvest with a resulting accuracy of 88%.

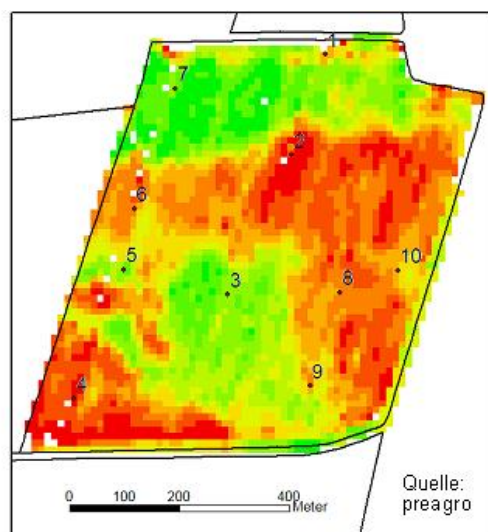


TF Yield Forecast

Mean of modelled yield:

5.5 t/ha

Forecasted using satellite imagery of June 19th.



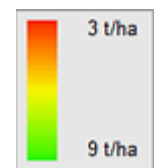
Yield Mapping result

Mean of measured yield:

6 t/ha

Harvest date: August 1st.

Yield in t/ha



These two products are expected to be ready for a wider market in the harvest year 2013.

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talkingfields – About Us

Cooperation as an important strategic goal: a competent network of strong partners.

For **talkingfields** this means: VISTA GmbH, in close collaboration with PC-Agrar GmbH, their marketing partner Land-Data Eurosoft and LMU Munich, coordinates the project activities.

Vista GmbH:

Besides coordination, VISTA Remote Sensing in Geosciences GmbH is responsible for the Earth Observation components of the TF products. Long-term expertise in the derivation of biomass, site information and yield from remotely sensed data and models for different applications guarantees the high quality of the products. Due to the close collaboration with the University of Munich, up-to-date research results are constantly integrated into product development.



PC-Agrar GmbH:


PC-Agrar Informations- und Beratungsdienst GmbH is responsible for the conceptual software design and development for the FMIS (Farm Management Information System). Together with Landdata-Eurosoft, they stand for customer friendly integrative products and development on the pulse of the times.



LMU/Department of Geography:

The Department of Geography at the Ludwig-Maximilians-University Munich is responsible for biomass modeling. Besides long-term experience in computerized environmental modeling, sound knowledge on plant modeling is used to derive information on the status of crop growth. Because of the active research at LMU, up-to-date research results are always integrated into **talkingfields**.



The **talkingfields** project is financially supported through the European Space Agency () ARTES-20 Programme as part of the ESA Integrated Applications Promotion (IAP).

The Feasibility Study was additionally supported through the Bavarian Ministry of Economics, Infrastructure, Traffic and Technology (StMWIVT).