APPLICATIONS OF SPACE TECHNOLOGY FOR SOCIO-ECONOMIC BENEFITS IN MONGOLIA

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OUTLINE

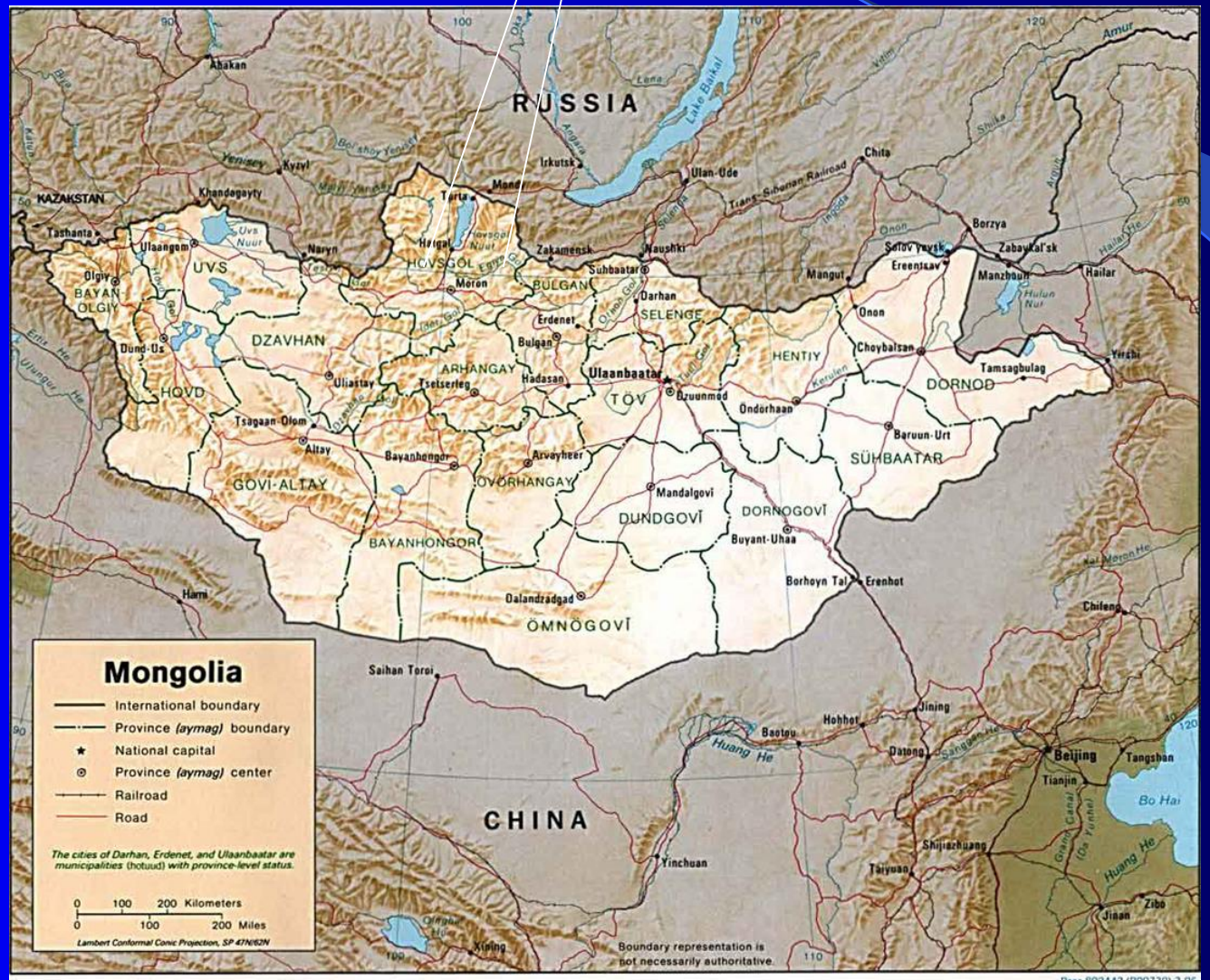
- Introduction
- Pasture Monitoring System (PMS)
- Products of the PMS
- Pasture model validation
- SAR technology for pasture management
- Conclusion

Introduction

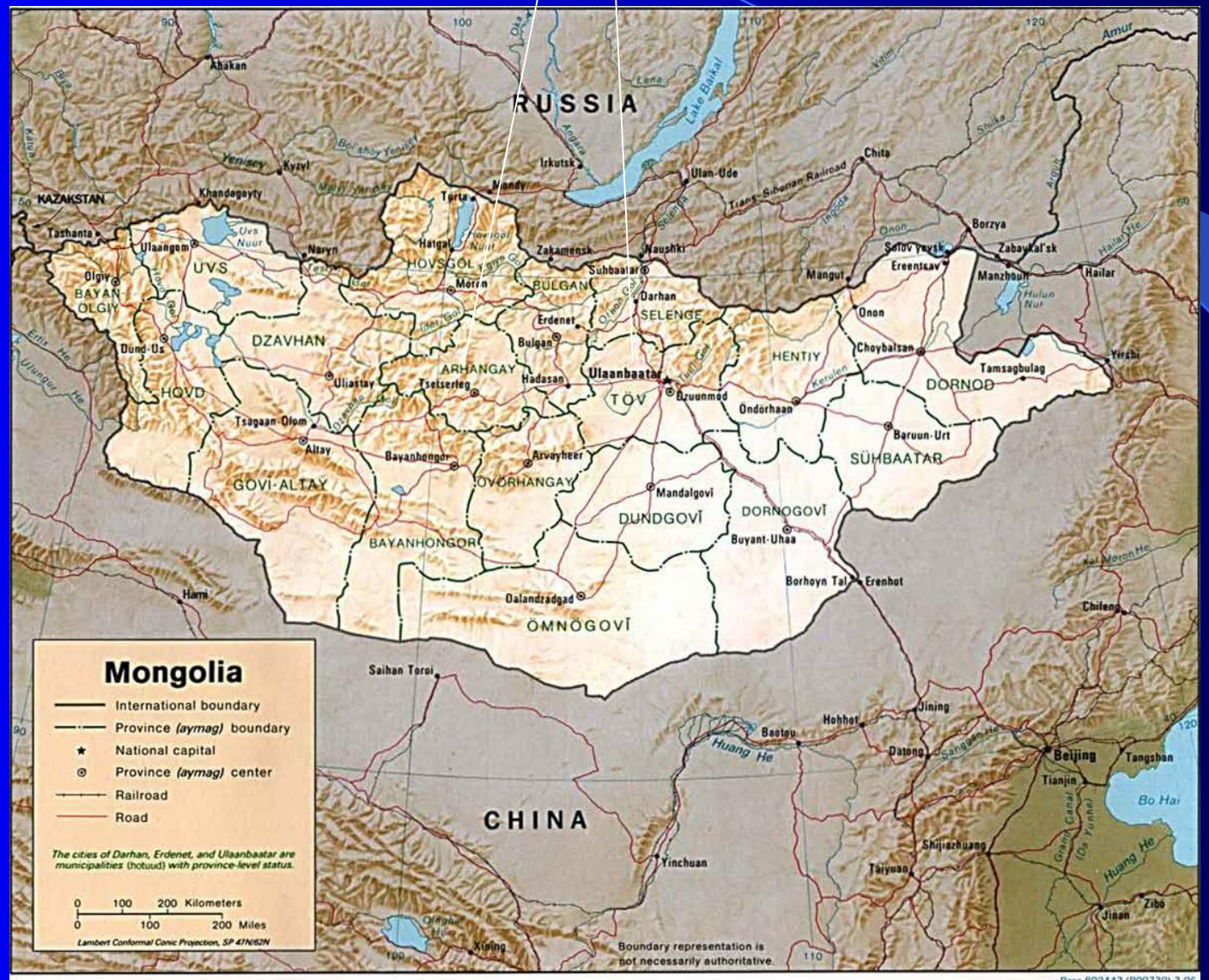
- Total area - 1,565,000 sq.km
- Population over 3 million
- Capital city - Ulaanbaatar with population of 1.4 million people.

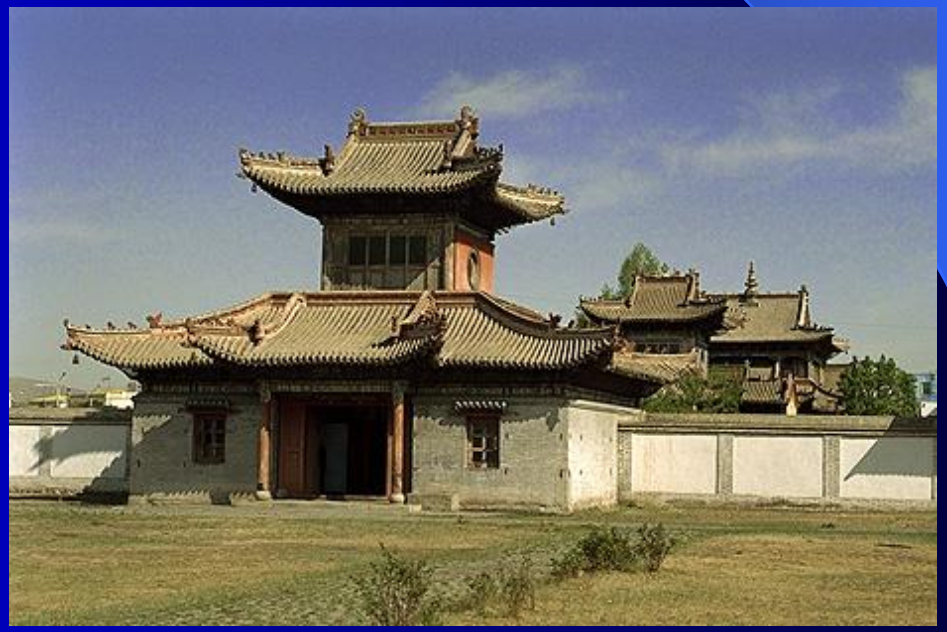
General Impression

Northern Mongolia

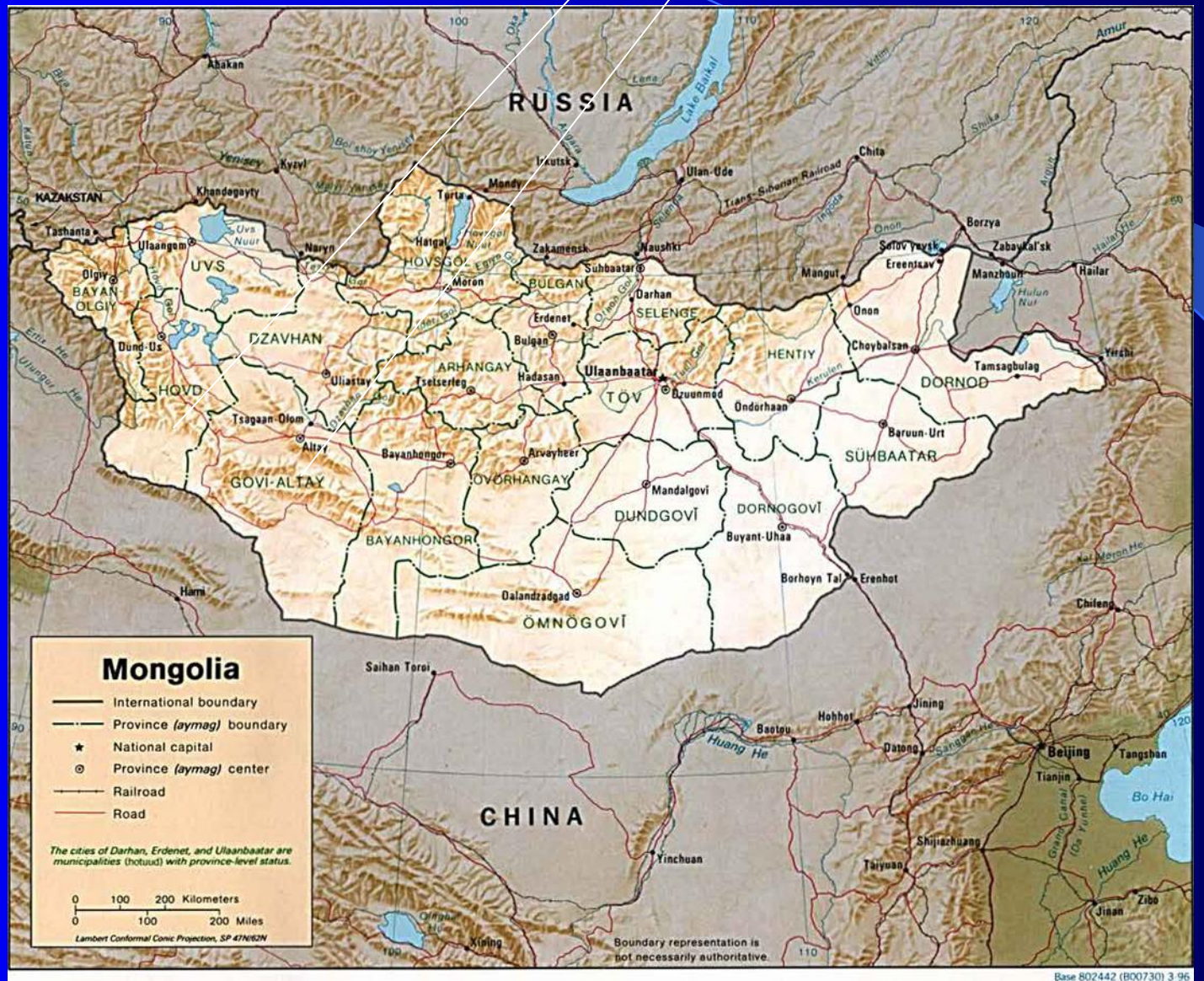


Central Mongolia





Western Mongolia



Eastern Mongolia

Gobi (Semi-Desert)

Ulaanbaatar City

Pasture Monitoring System

This system is based on data acquired from FY-2 geostationary satellite and Energy and Water Balance Monitoring System (EWBMS). It uses

- ***radiation,***
- ***temperature,***
- ***relative evapotranspiration data***

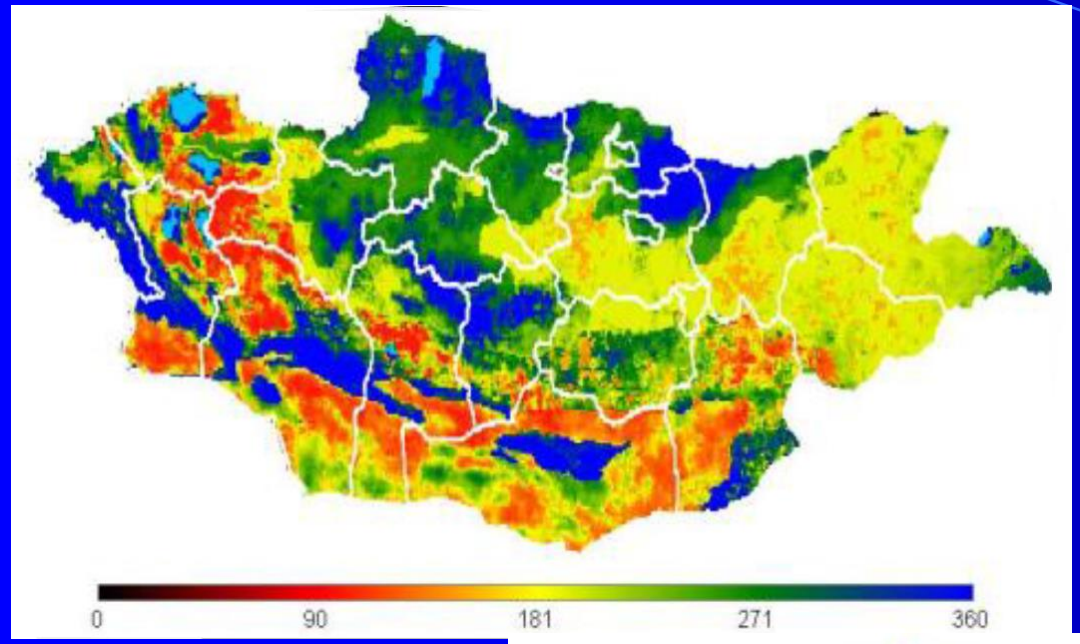
to simulate pasture growth from the EWBMS.

Pasture Monitoring System can generate the following products:

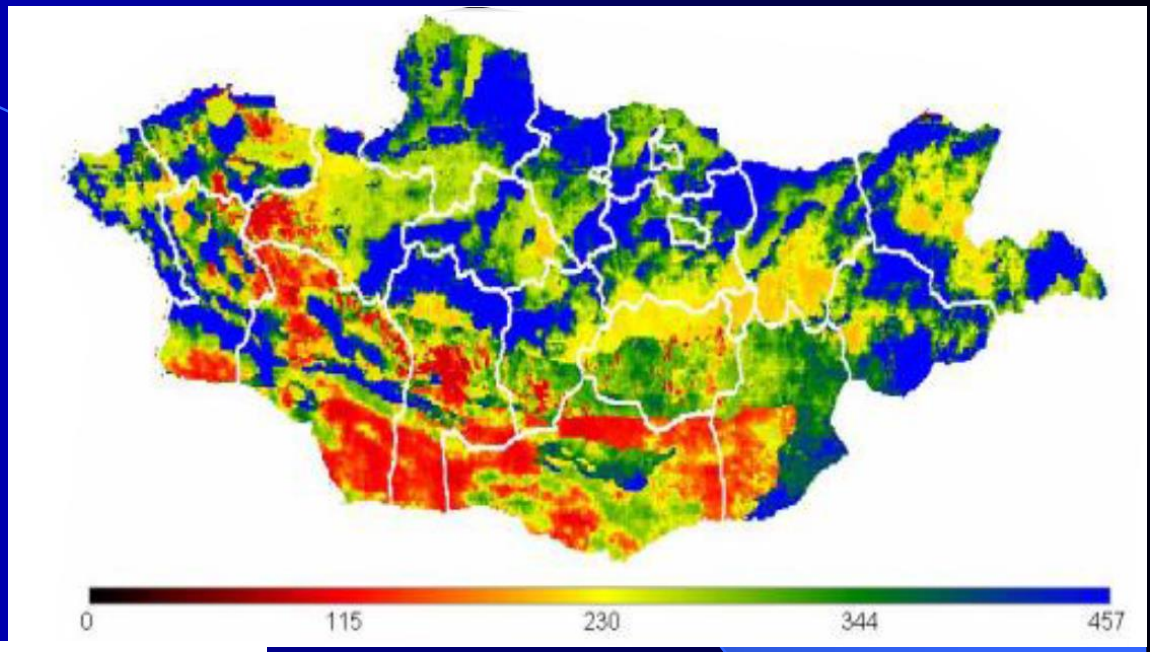
- ***Actual biomass:*** **pasture absolute yield (kg/ha) as the amount of aboveground green biomass in dry matter.**
- ***Relative biomass:*** **pasture relative yield (%) or the actual biomass relative to the aboveground green biomass of pasture that would be attained without water limitations to the plant.**
- ***Biomass available for grazing livestock:*** **daily optimum amount of biomass (kg/ha) that is available for grazing.**
- ***Pasture carrying capacity:*** **number of cattle (Sheep units/ha) that the pasture can support.**

Pasture maps (kg/ha)-August of 2007(a), 2008(b) and 2009(c)

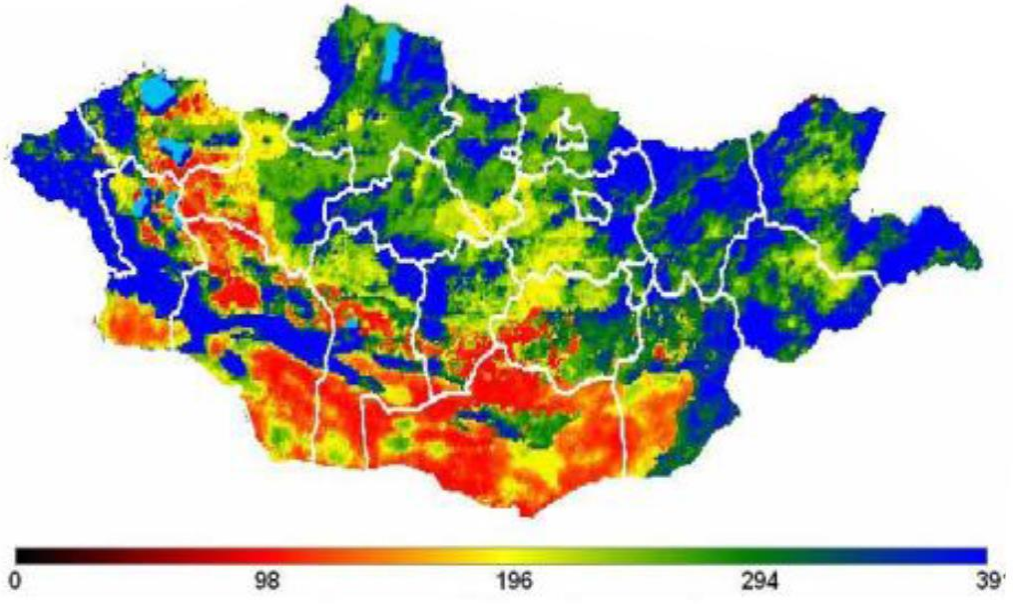
(a)



(b)

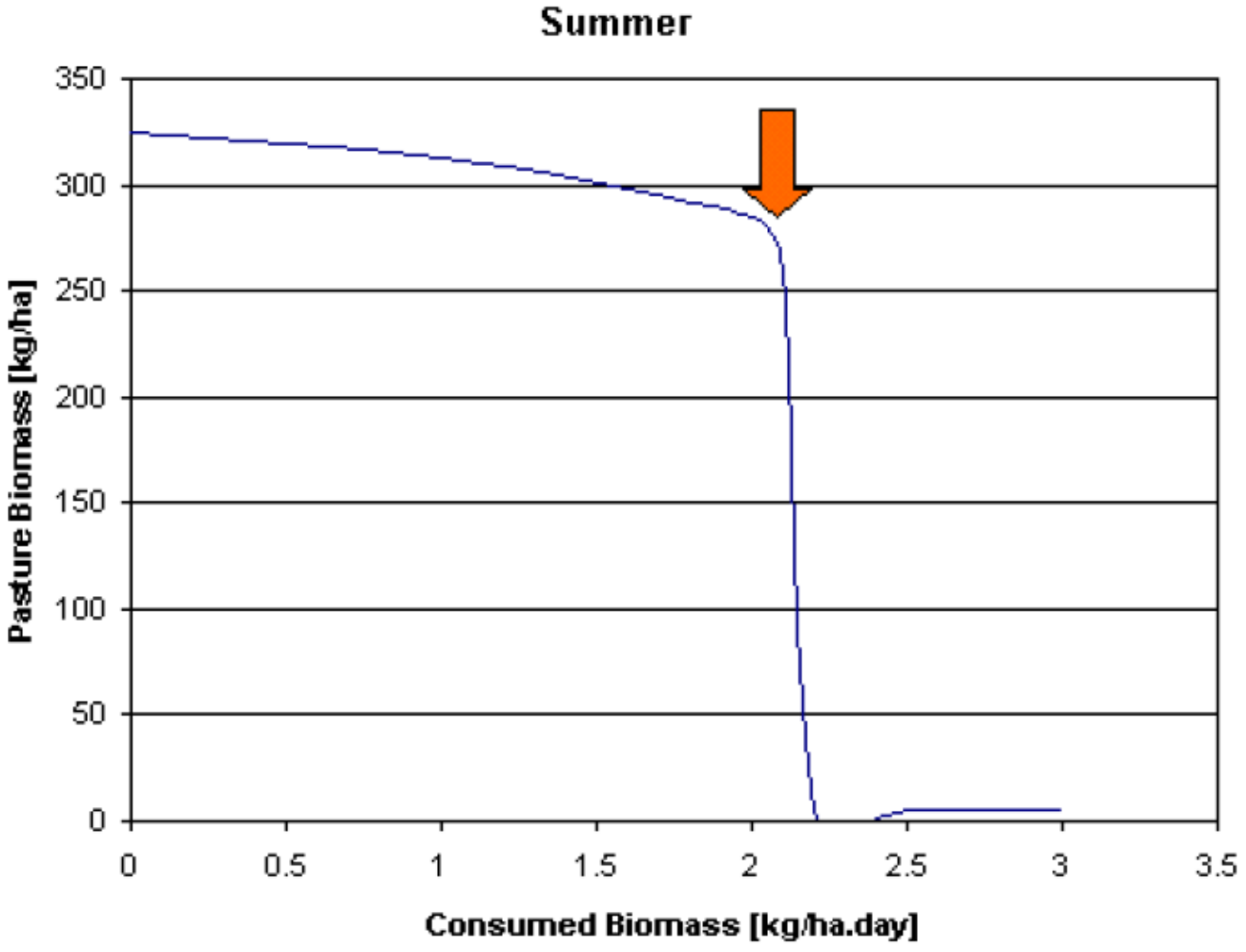


(c)



Pasture carrying capacity

- It is defined as the maximum amount of pasture biomass that can be grazed without causing irreversible damage to the pasture.

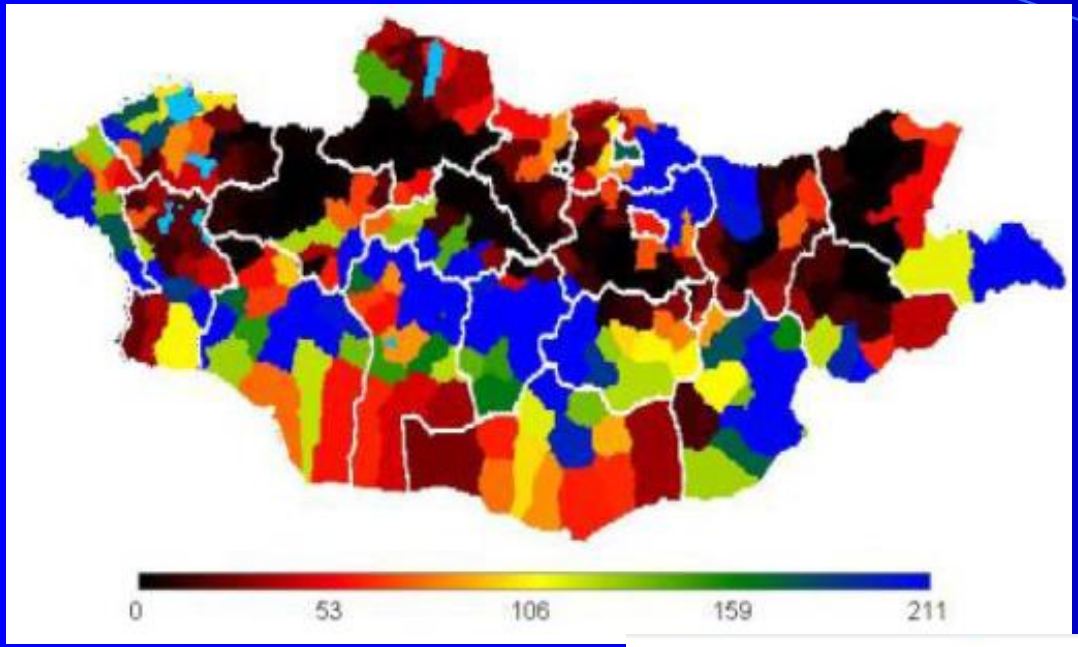


Determination of Pasture Carrying Capacity:

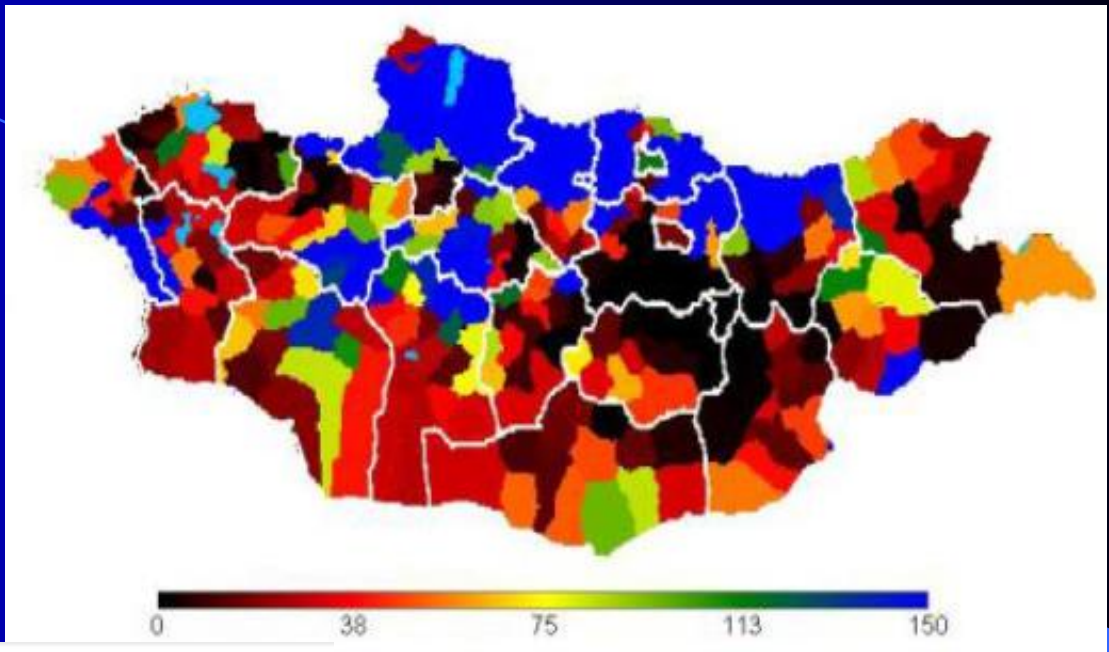
If grazing stays between 0 to 2 kg/ha per day, the influence on total pasture biomass at the end of the growing season is negligible.

Pasture carrying capacity maps (SU/ha)-2007(a), 2008(b) and 2009(c)

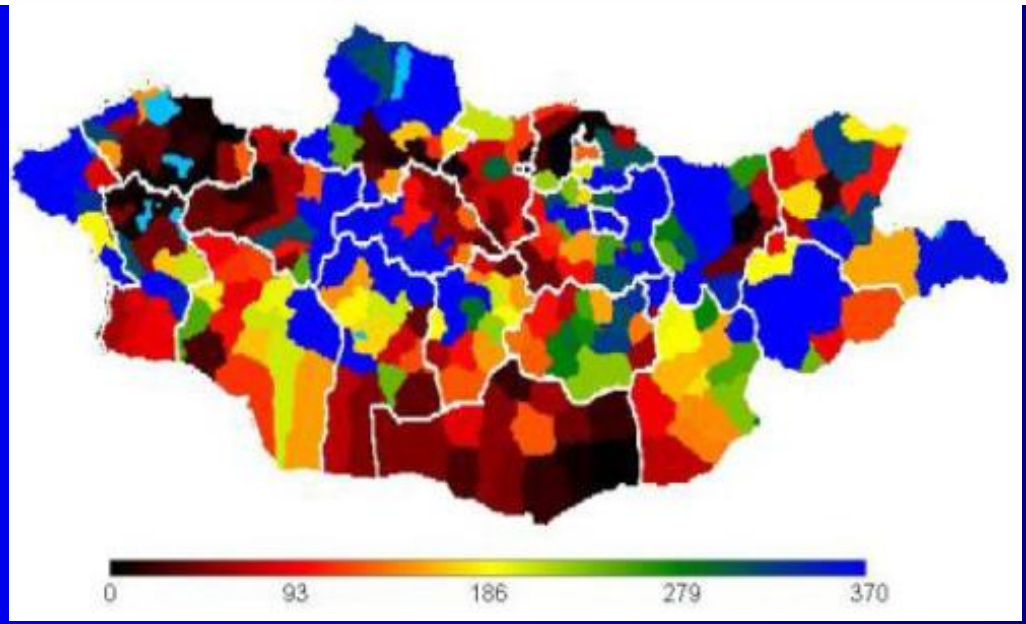
(a)



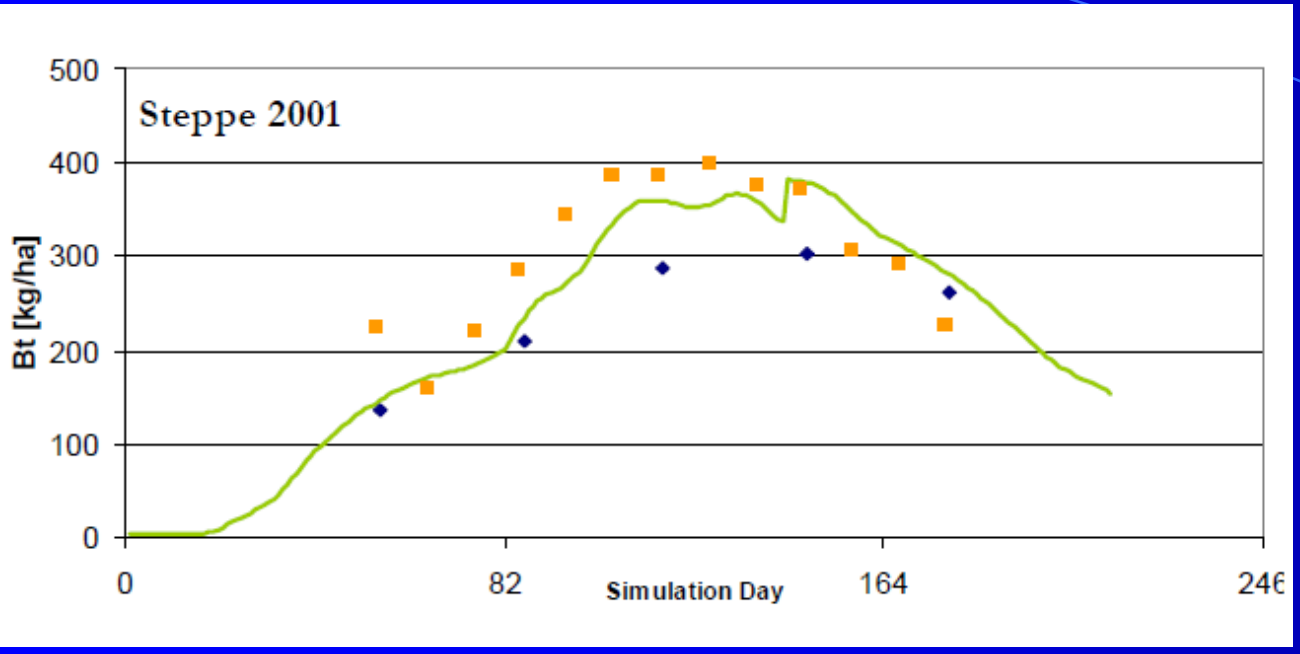
(b)

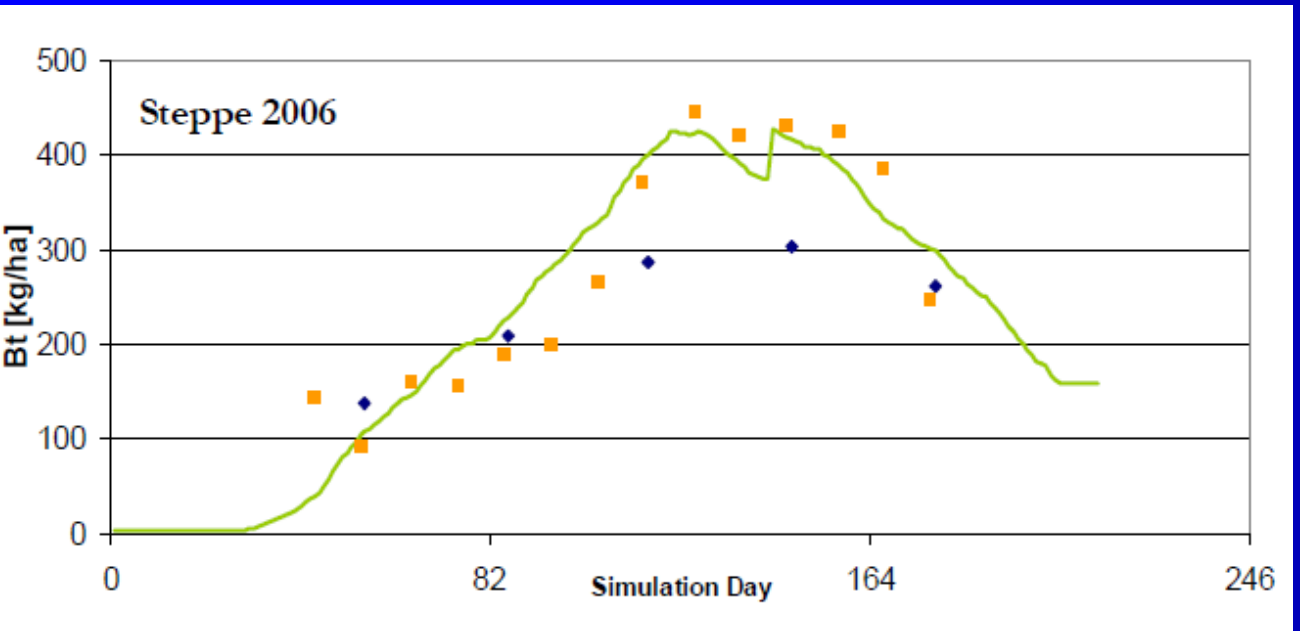


(c)



Pasture model validation





Pasture model in a steppe zone of Mongolia (green-pasture model, yellow-ungrazed biomass, blue-grazed biomass)

- **Pasture model validation was conducted on each natural zone using data sets of June-September from 1999, 2000, 2001, 2006.**
- **Validation results were based on 548 biomass data of 37 stations in steppe zone and the correlation was quite good (R2 = 0.71).**

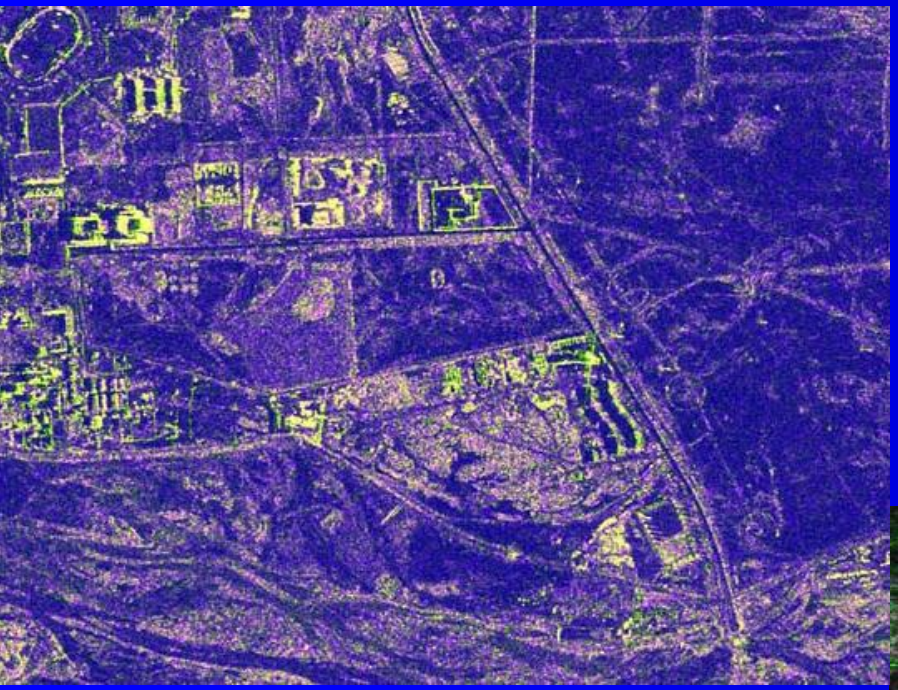
Pasture biomass map (kg/ha) (Soum averaged) and Pasture carrying capacity map (SU/ha) at Soum level

- We compared the results of a soum averaged yield with
  - Ground point biomass of meteorological stations
  - Number of livestock
  - Some socio-economic data sets.

Average pasture carrying capacity by natural zone

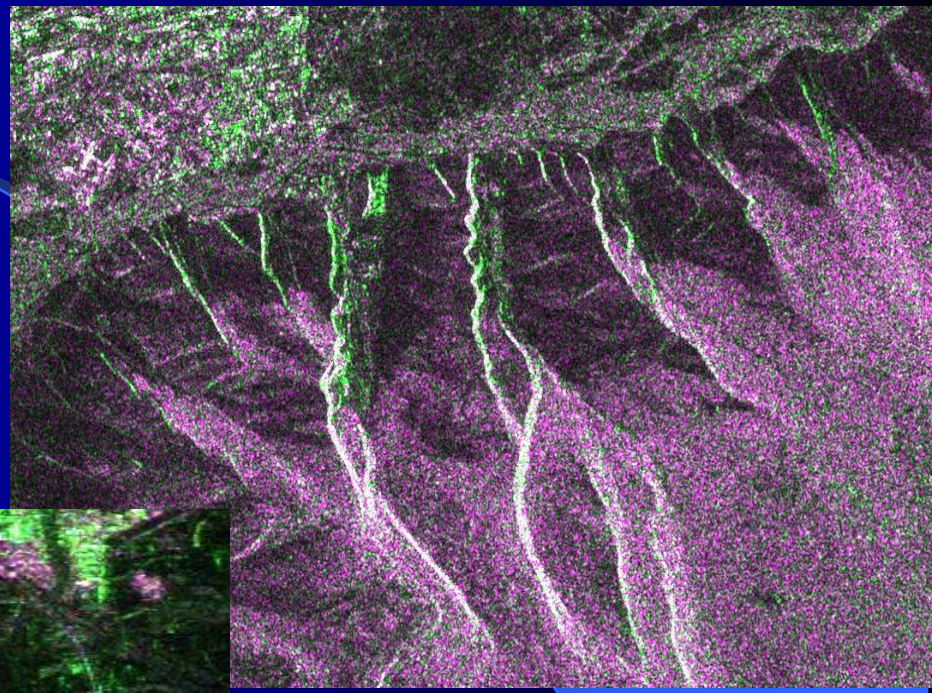
	Average peak biomass*		Carrying Capacity		
	kg/ha	%	kg/ha	kg/ha.day	(SU/ha)
Desert	150	40	60	0.18	0.13
Desert Steppe	235	40	94	0.28	0.20
Steppe	800	50	400	1.20	0.86
Forest Steppe	1550	60	930	2.79	1.99
Mountain Taiga	1300	60	780	2.34	1.67

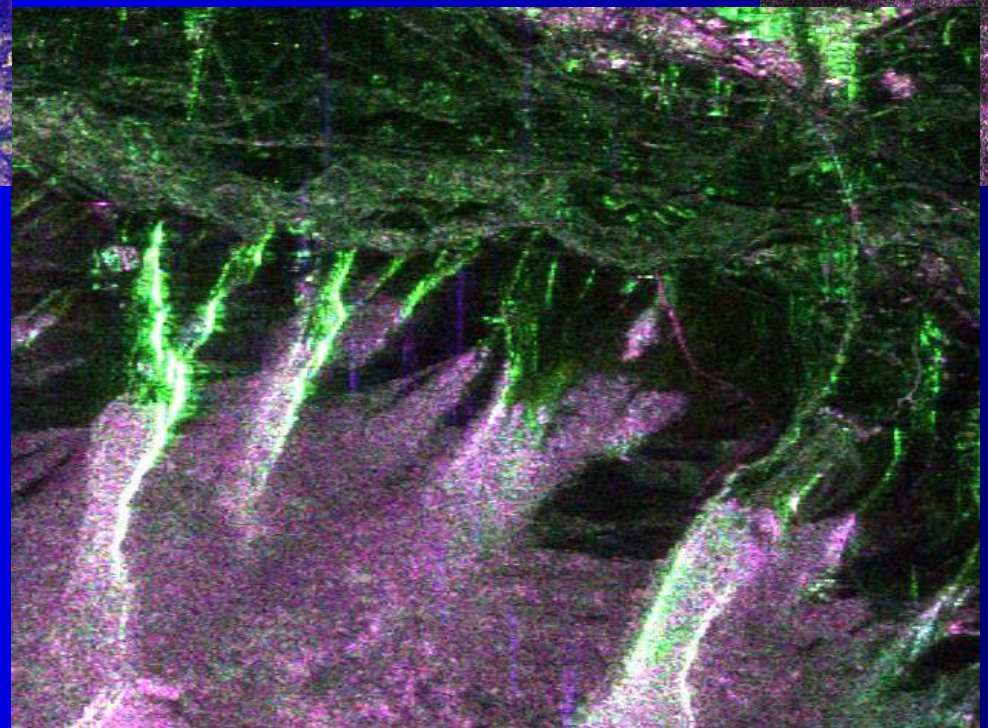
What the SAR technology can do?



TerraSAR

Envisat





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Conclusion

Overall, the research indicated that space technology based on modern RS, can be successfully used for pasture productivity assessment, which is in turn used for socio-economic benefits in Mongolia.

THANK YOU FOR THE ATTENTION