



GLOBAL CLIMATE OBSERVING SYSTEM

GCOS

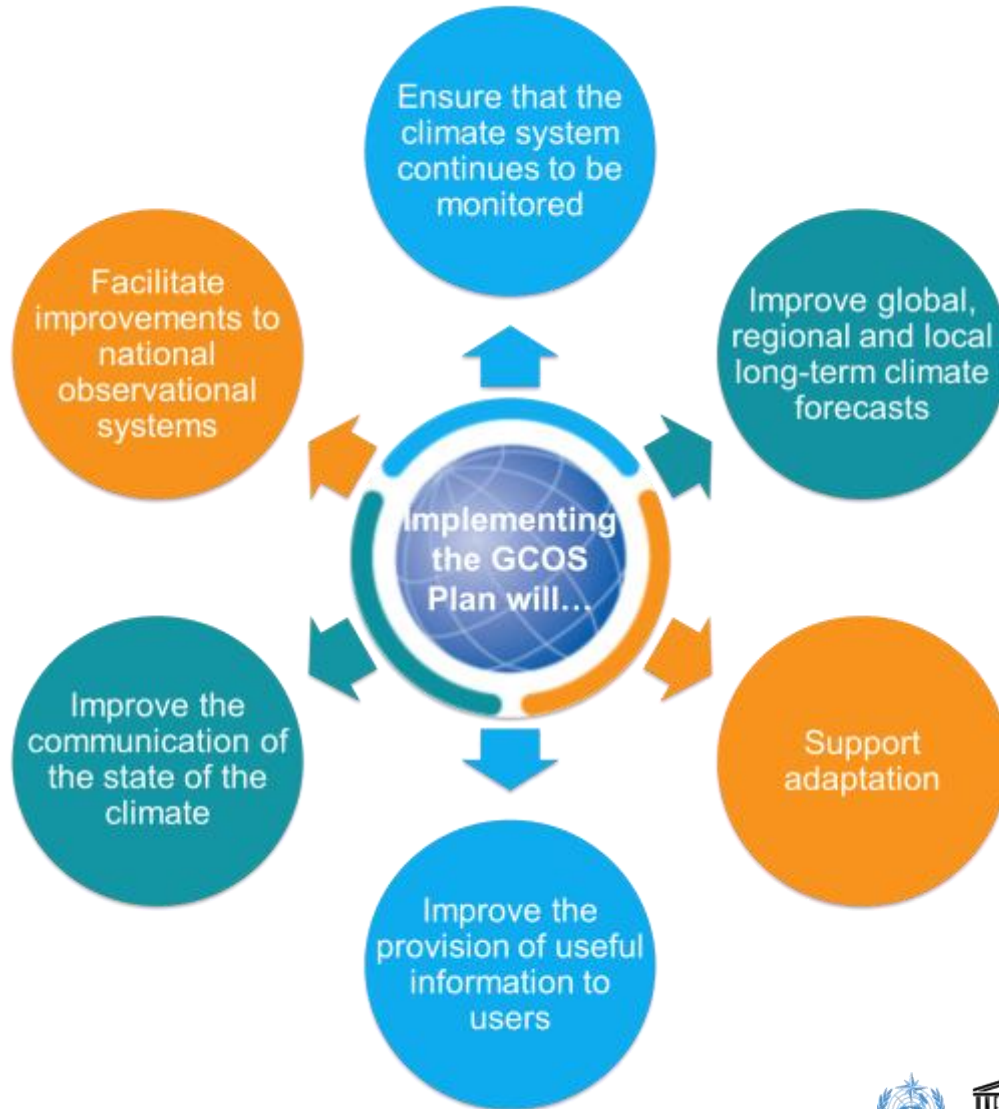
Simon Eggleston

GOFC-GOLD Land Cover Science Meeting

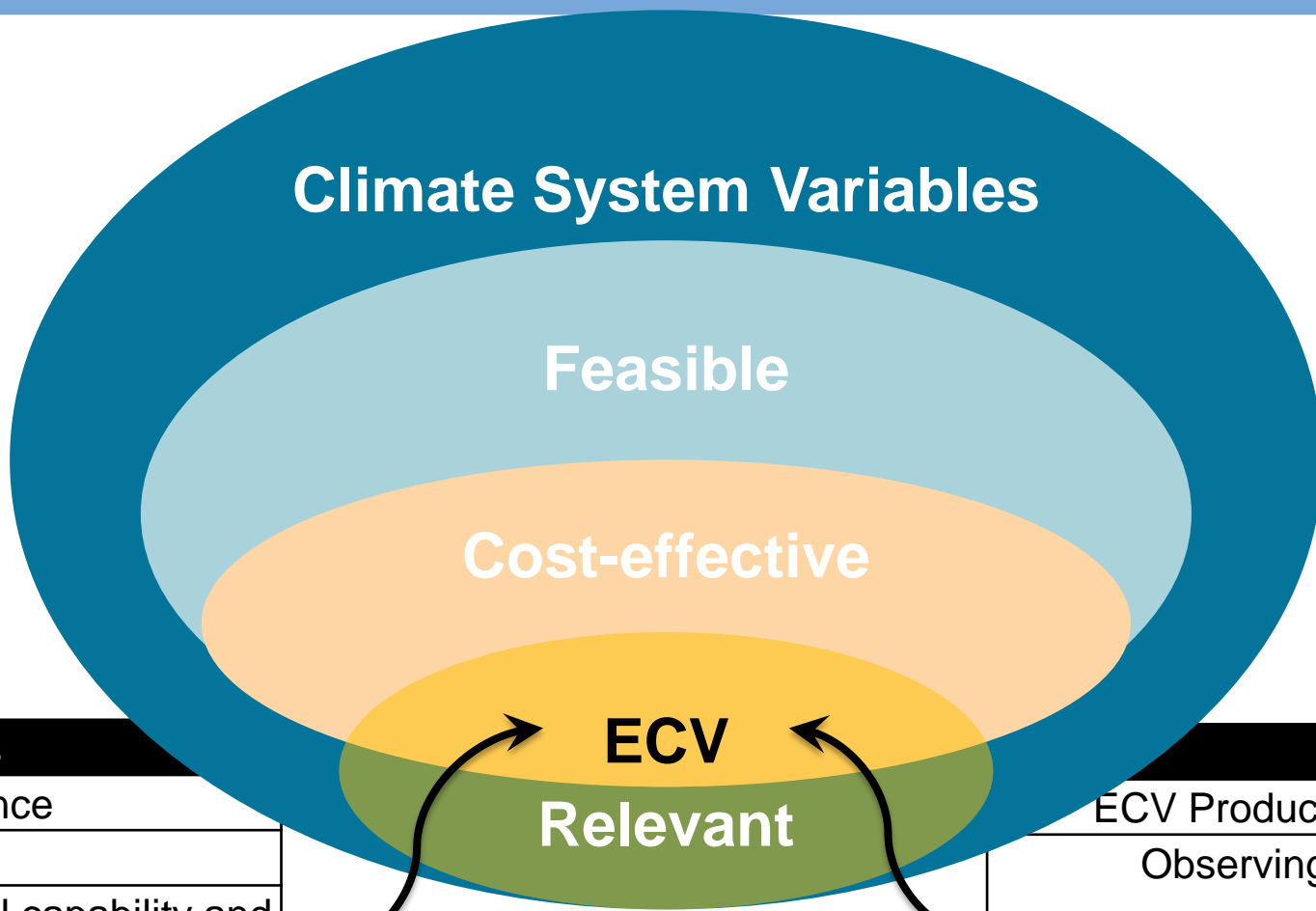
The Hague, The Netherlands, 2 November, 2016

- Requested by UNFCCC and will be presented to COP 22 next week
- Based on:
 - last year's GCOS Report *Status of the Global Observing System for Climate*
 - GCOS Science Conference, Amsterdam, 2016
 - Observation needs in the UNFCCC Paris Agreement
 - Adaptation needs
 - Climate Science
- Developed by team of authors, Science panels and extensive public review





ESSENTIAL CLIMATE VARIABLES (ECV)



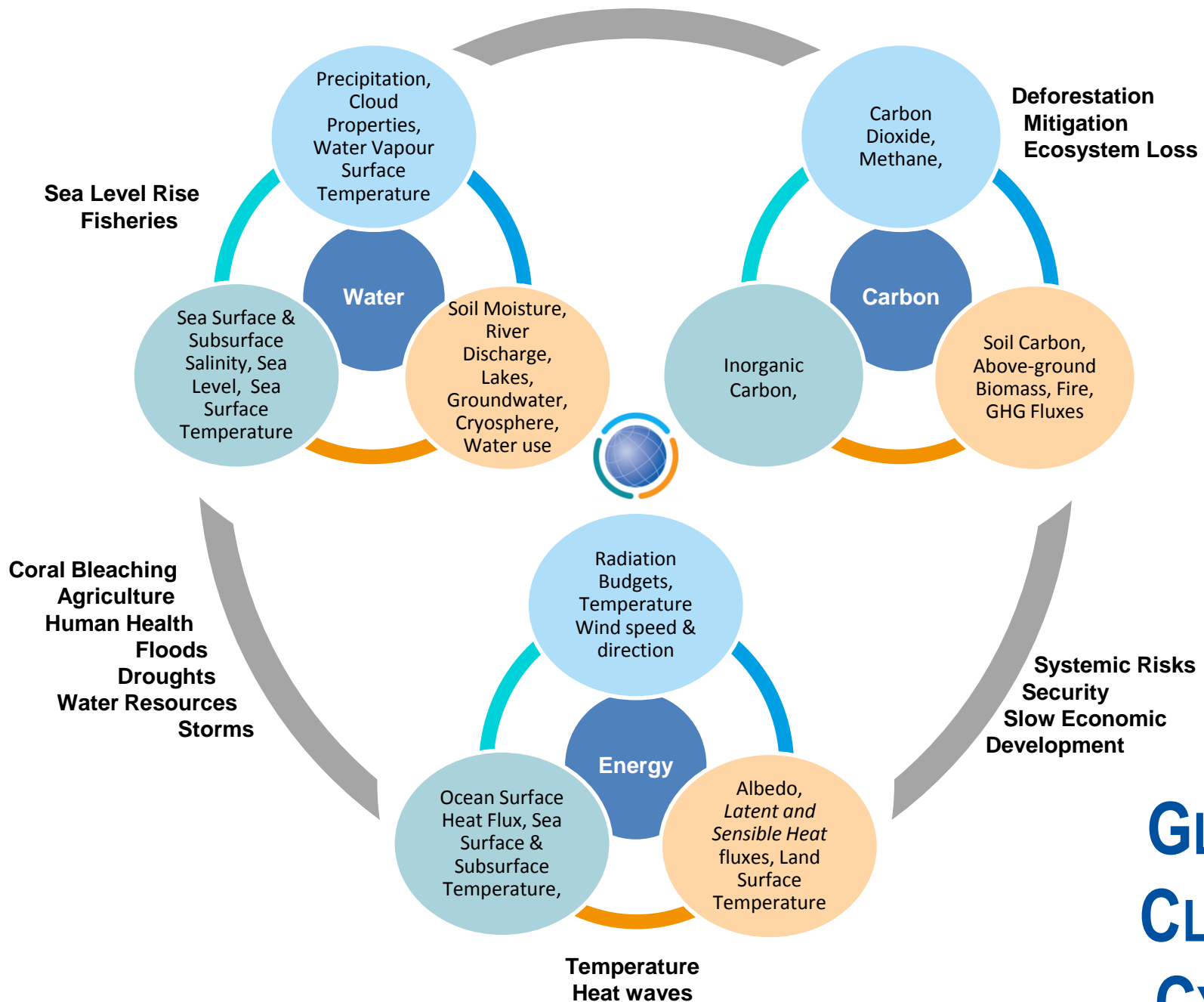
Foundations
Climate Science
Climate Data
Observational capability and infrastructure
Adaptation and mitigation needs
Climate Impacts

Guidance
ECV Product Requirements
Observing Principles and Standards
Data Access and Stewardship
Actions to maintain and improve observational systems
Review of Monitoring

ESSENTIAL CLIMATE VARIABLES (ECV)

Measurement Domain	Essential Climate Variables in the 2016 Implementation Plan
Atmospheric	<p>Surface: Air temperature, Wind speed and direction, Water vapour, Pressure, Precipitation, Surface radiation budget.</p> <p>Upper-air: Temperature, Wind speed and direction, Water vapour, Cloud properties, Earth radiation budget, Lightning.</p> <p>Composition: Carbon Dioxide (CO₂), Methane (CH₄), Other long-lived greenhouse gases (GHGs), Ozone, Aerosol, Precursors for aerosol and ozone.</p>
Oceanic	<p>Physics: Temperature: Sea surface and Subsurface, Salinity: Sea Surface and Subsurface, Currents, Surface Currents, Sea Level, Sea State, Sea Ice, Ocean Surface Stress , Ocean Surface heat Flux</p> <p>Biogeochemistry: Inorganic Carbon, Oxygen, Nutrients, Transient Tracers, Nitrous Oxide (N₂O), Ocean Colour</p> <p>Biology/ecosystems: Plankton, Marine habitat properties</p>
Terrestrial	<p>Hydrology: River discharge, Groundwater, Lakes, Soil Moisture</p> <p>Cryosphere: Snow, Glaciers, Ice sheets and Ice shelves, Permafrost</p> <p>Biosphere: Albedo, Land cover, Fraction of absorbed photosynthetically active radiation, Leaf area index, Above-ground biomass, Soil carbon, Fire, Land Surface Temperature</p> <p>Human use of natural resources: Water use, GHG fluxes</p>

Ocean Acidification



○ Mainly:

- Land cover,
- Above-ground biomass,
- Fire,
- Soil carbon,
- Anthropogenic GHG fluxes

○ But also:

- Albedo,
- Fraction of absorbed photosynthetically active radiation,
- Leaf area index,
- Land Surface Temperature,
- Soil Moisture

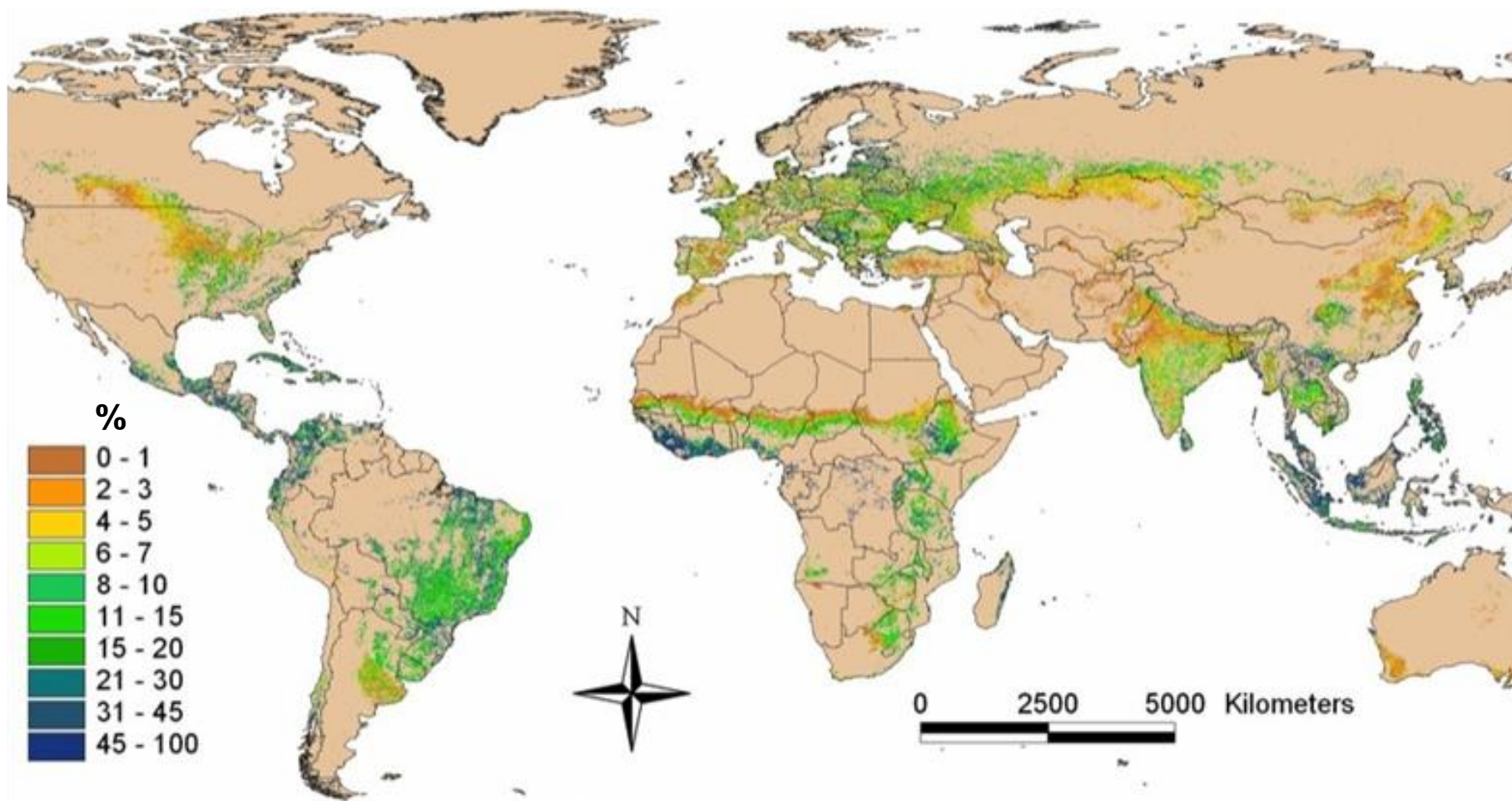
Annex A - Terrestrial ECV Product Requirements				
ECV	Products	Frequency	Resolution	Required measurement uncertainty
Above-ground biomass	maps of AGB	Annual	500m-1km based on 100-200m observations	< 20% error for biomass values > 50 t/ha, and 10 t/ha for biomass values ≤ 50 t/ha
Land cover	maps of land cover	Annual	250m	15% (maximum error of omission and commission in mapping individual classes), location accuracy better than 1/3 IFOV with target IFOV 250 m
	Maps of high resolution land cover	5 year	10 - 30m	5% (maximum error of omission and commission in mapping individual classes), location accuracy better than 1/3 IFOV with target IFOV 10-30 m
	Maps of key IPCC land use, related changes and land management types	1-10 years (incl. historical data)	10-1000 m (depending on time period)	20% (maximum error of omission and commission in mapping individual classes), location accuracy better than 1/3 IFOV with target IFOV

Annex A - Terrestrial ECV Product Requirements

ECV	Products	Frequency	Resolution	Required measurement uncertainty
Fire	Burnt Areas	24 hours	30m	15% (error of omission and commission), compared to 30 m observations
	Active fire maps	6 hours at all latitudes from Polar-Orbiting and 1 hour from Geostationary	0.25-1 km (Polar); 1-3 km (Geo)	5% error of commission 10% error of omission Based on per-fire comparisons for fires above target threshold of 5 MW/km ² integrated FRP
	Fire radiative power	6 hours at all latitudes from Polar-Orbiting and 1 hour from Geostationary	0.25-1 km (Polar) 1-3 km (Geo)	10% integrated over pixel. Based on target detection threshold of 5 MW/km ² and with the same detection accuracy as the Active Fire Maps.

Annex A - Terrestrial ECV Product Requirements				
ECV	Products	Frequency	Resolution	Required measurement uncertainty
Anthropogenic Greenhouse Gas Fluxes	Emissions from fossil fuel use, industry, agriculture and waste sectors.	Annual	By country and sector	Globally 5% Nationally 10%
	Emissions/ removals by IPCC land categories	Annual	By country/ region	Globally 15% Nationally 20%
	Estimated fluxes by inversions of observed atmospheric composition - continental	Annual	1000 - 10,000 km	10%
	Estimated fluxes by inversions of observed atmospheric composition - national	Annual	100-1000 km	30%
	Hi-res CO2 column concentrations to monitor point sources	4 hourly	1 km	1ppm

TREE COVER ON AGRICULTURAL LAND





THANK-YOU

gcos.wmo.int