

# CAGM Expert Team 3.1 Update

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# Commission of Agrometeorology

## Management Committee

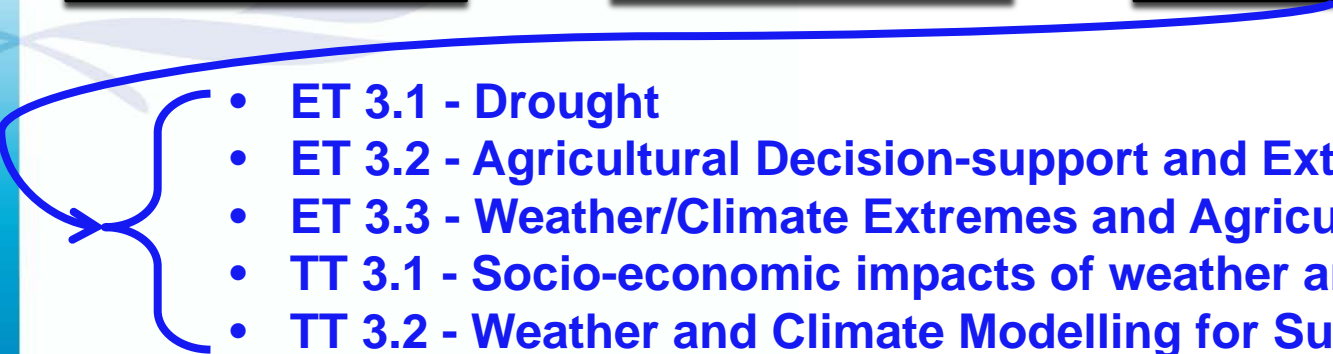
### Focus Areas (FA)

FA 1  
Operational  
Agricultural  
Meteorology

FA 2  
Science &  
Technology  
for Agricultural  
Meteorology

FA 3  
Natural  
Hazards &  
Climate Change  
in Agriculture

FA 4  
Capacity  
Development in  
Agricultural  
Meteorology

- 
- ET 3.1 - Drought
  - ET 3.2 - Agricultural Decision-support and Extension Services on Climate Extremes
  - ET 3.3 - Weather/Climate Extremes and Agricultural Industry Needs
  - TT 3.1 - Socio-economic impacts of weather and climate extremes on Agriculture
  - TT 3.2 - Weather and Climate Modelling for Sustainable Agriculture

# Drivers for Expert Team 3.1

- ❑ Research publications have pointed out that the lack of universally accepted definition has complicated and limited the ability to fully understand drought (e.g. when does a drought start or end?; is the condition in question really a drought?)
- ❑ HMNDP (2013) Outcome:
  - ❑ Develop proactive drought impact mitigation, preventive and planning measures, risk management, fostering of science, appropriate technology and innovation, public outreach and resource management as key elements of effective national drought policy
- ❑ Resolution from the 17<sup>th</sup> World Meteorological Conference
  - ❑ Supporting the Sendai framework for Disaster Risk reduction IN-MHEWS
  - ❑ standardize natural hazards and to create a system of unique identifiers in order to catalogue droughts
- ❑ CAgM TOR 3 (16<sup>th</sup> Session of the CAgM, Antalya Turkey, 2014):
  - ❑ Promote a better understanding of the interactions and impacts of weather and climate in regards to drought and desertification;

# Expert Team 3.1 Drought

## Terms of Reference

- a) Review the definition of drought. Conduct a comprehensive review of the definitions and phases of drought e.g. onset, duration, recovery and the 'end point' of drought in all regions.
- b) Identify case studies and conduct a literature review of the socio-economic impacts of drought for regions or countries with successful mitigation and preparedness programs and policies.
- c) Report on existing material on likely drought changes under future climate variability and change



## Expert Team 3.1 Drought Terms of Reference

- d) Conduct a literature review of the climate science to identify the main mechanisms behind drought onset and persistence in order to develop guidance material for drought preparedness.
- e) Report and make recommendations to CAgM on existing drought indices and potential new drought indices in consultation with the Integrated Drought Management Programme (IDMP).
- f) Engage with the GEO groups on global drought information systems, NIDIS, and other relevant groups (incl. GEOGLAM, EDO, South Pacific Drought Group), and report on changes.

# Expert Team 3.1 members

Chair: Roger Stone

Co-chair: Ray Desjardins

Region 1. Rachid Sebbari

Region 2. Alexander Kleschenko

Region 3. Karim Quevedo

Region 4. Mike Hayes

Region 5. Lynette Bettio

Region 6. Andreja Susnik

Lead: Allan Howard

# Results

## ❑ Europe:

- ❑ Since 1950 drought in NE Europe had decreased whereas drought in SW Europe has increased
- ❑ Of the 21 major droughts from 1950 – 2012, 6 occurred since 2000.
- ❑ The EU adopted (2007) a communication on water scarcity and drought... drought management plans are seen as a key element in future water resource policies and strategies<sup>1</sup>
- ❑ Overall economic impacts of water scarcity and drought over the past 30 years at EUR 100 B<sup>2</sup>
  - ❑ 2003 drought alone cost EUR 8.7 B
- ❑ From 2006-2010 15% of the EU territory and 17% of the population were affected by drought on an annual basis<sup>2</sup>.

<sup>1</sup>EEA (2010). Mapping the impacts of natural hazards and technological accidents in Europe — An overview of the last decade..

<sup>2</sup>EC (2007). Communication from the Commission to the European Parliament and the Council - Addressing the challenge of water scarcity and droughts in the European Union.

# Results (cont'd)

## ❑ Russia:

### ❑ Impacts of the 2010 drought

- ❑ Extreme heat exacerbated impacts
- ❑ 20 temperature records set in Moscow, including an all time high of 38.2°C
- ❑ Crop loss (death) on 13.3 M ha: 17% of crop acreage
- ❑ Affected > 25,000 farms
- ❑ Caused > 28,000 wildfires
- ❑ > 2500 homes burnt; 3500 left homeless
- ❑ Total damage estimated at as much as 450 B rubles (1% of GDP)

## ❑ South America

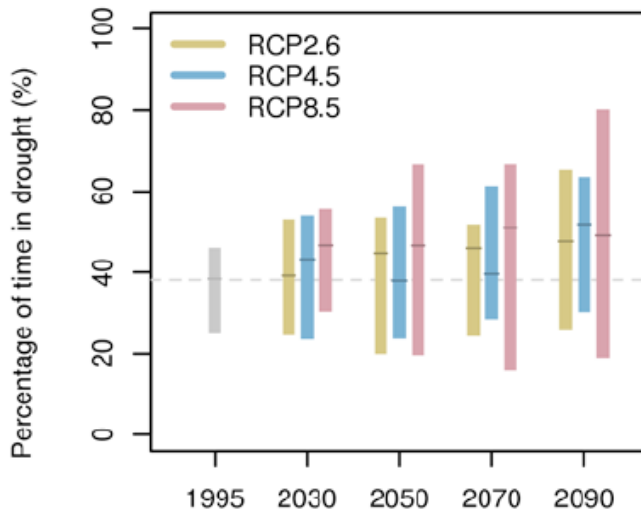
- ❑ Very few studies on the systematic assessment of damage
- ❑ 2005 drought in Amazonia provided a rare case for study
  - ❑ Investigated climatic, hydrological, ecological, human perspectives and impacts
  - ❑ Reported significant increase in respiratory problems in children
  - ❑ Severely impacted the livelihood of residents



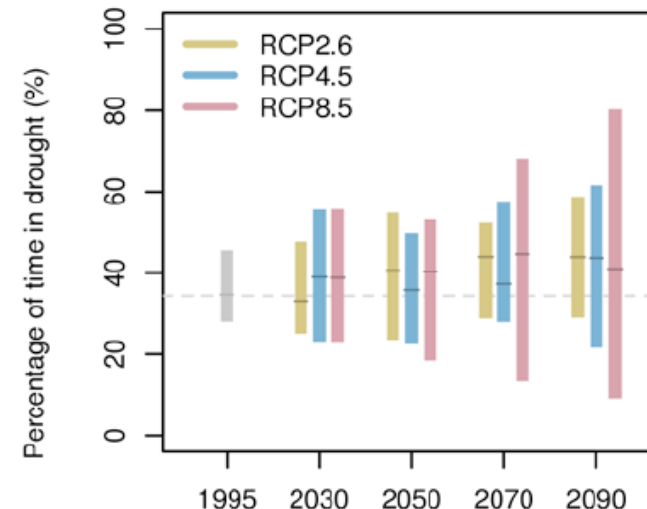
# Climate change and drought

Increase in the amount of time spent in drought under future climate scenarios in Australia.

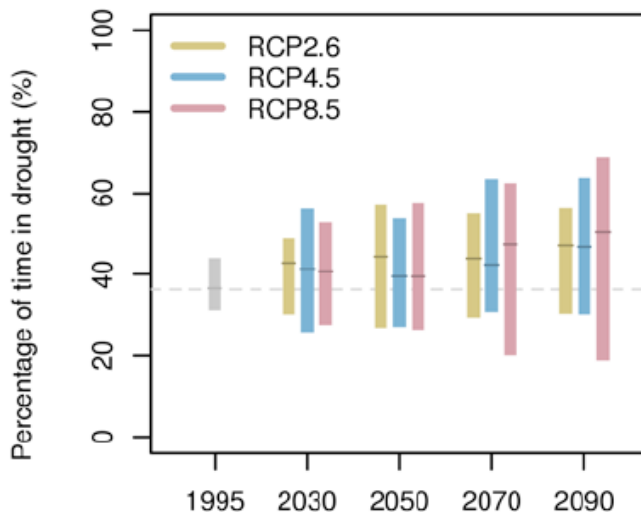
Projections of time spent in drought (SPI<-1) for Eastern Australia



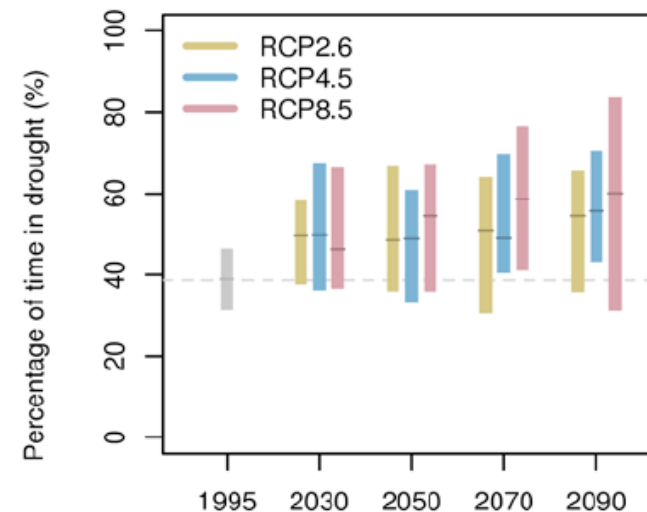
Projections of time spent in drought (SPI<-1) for Northern Australia



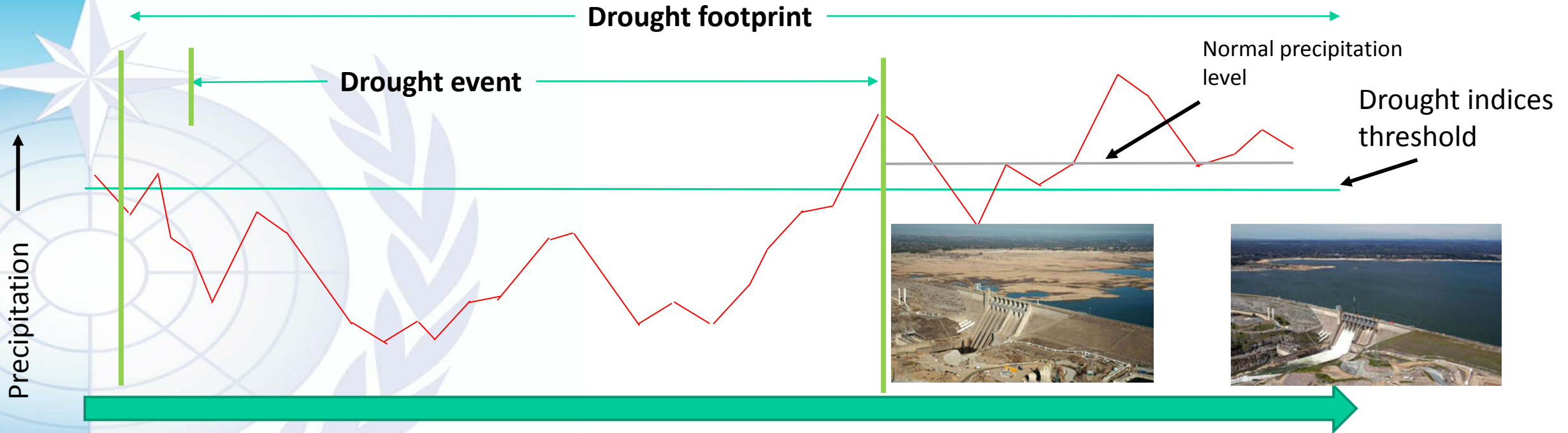
Projections of time spent in drought (SPI<-1) for Rangelands



Projections of time spent in drought (SPI<-1) for Southern Australia



# What is drought?



## Onset

- Abnormally dry (Level 0)
- Soil moisture levels are low, crop & pasture growth delayed
- Water alerts are issued

## Drought Event

### Intensification ↔ Persistence

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Moderate (Level 1 - 2)</li> <li>• Some crop &amp; pasture damage</li> <li>• Fire risk moderate - high</li> <li>• Water conservation measures activated</li> <li>• Socioeconomic impacts are mild to moderate</li> </ul> | <ul style="list-style-type: none"> <li>• Level 2 – 4 drought</li> <li>• Water shortages crop damage, and fires are widespread</li> <li>• Fire risk high to extreme</li> <li>• Socioeconomic impacts are moderate to severe and widespread</li> </ul> |
|--|--|

## Recovery

- Meteorological indices have returned to normal
- Soil moisture is restored in cultivated land
- Pasture growth re-establishes
- Forest growth re-establishes
- Reservoirs and lakes refill

## Drought Endpoint

- Agricultural and Natural ecosystem productivity returns to average pre-drought conditions
- Lake and reservoir levels return to average pre-drought conditions
- Socioeconomic conditions:
  - Do they return or stabilize?
- In some cases we hit a “new normal”

# Results (cont'd)

## ☐ Preliminary recommendations:

- ☐ Keep the definition of drought broad for policy purposes
- ☐ For scientific purposes define elements of the drought lifecycle precisely, respecting regional variability.
  - ☐ E.g. Drought footprint: Drought onset; Drought event; Drought recovery; Drought endpoint.
- ☐ Develop unique databases for drought footprints.
  - ☐ Include systematic comprehensive record of all droughts (impacts, severity, duration, costs, & collateral effects).
- ☐ Develop linkages between drought indices and impacts.

# Next Steps

- ❑ Drafts prepared for TORs (a), (b), and (c)
- ❑ Drafts for TORs (d) and (e) are due by Nov 30
- ❑ Regional response to TOR (a) due by Nov 30
- ❑ Synthesis of regional drafts due by Feb 28, 2017
- ❑ Draft report for Expert Team 3.1 due for team review by April 2017.
- ❑ TOR (f) will be a summary of team participation through 2016 -17
- ❑ Intent is to publish some in scientific journals jointly with Expert Team 3.3





# ***THANK YOU !***

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