Singapore's 3rd National Climate Change Study (V3)

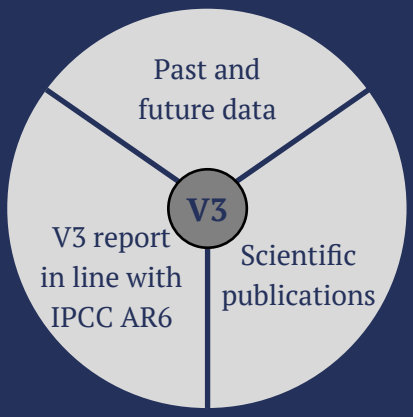
Building the next generation of climate projections for a climate-resilient Singapore

Singapore recognises the need to meet the challenges of climate change with actions based on robust science.

To further advance our understanding of tropical climate variability and change for Singapore and the Southeast Asia region, CCRS is carrying out V3 for building the next generation of climate projections for a climate-resilient Singapore.

METEOROLOGICAL SERVICE SINGAPORE
Centre for Climate Research Singapore

V3 Output



V3 Underpinning CSRPO's Key Areas of Research

- **Sea level research**
  Future sea level rise around Singapore and associated risks under various global warming scenarios
- **Water resources**
  Changes to the intensity, duration and frequency of rainfall over Singapore and related impacts under various global warming scenarios
- **Human health and energy**
  Impacts on human health and energy needs of Singapore under various global warming scenarios
- **Biodiversity and food security**
  Impacts on biodiversity and food security of Singapore under various global warming scenarios

Abbreviations

CCRS: Centre for Climate Research Singapore
CMIP6: Coupled Model Intercomparison Project Phase 6
CSRPO: Climate Science Research Program Office
GCM: Global Climate Model
GHG: Greenhouse Gas
IPCC: Intergovernmental Panel on Climate Change
RCP: Representative Concentration Pathway
SINGV-RCM: Singapore Variable Resolution Model–Regional Climate Model
SSP: Shared Socioeconomic Pathway

What Is New in V3

	V2	V3
Global model	CMIP5	CMIP6 New!
Regional model	HadGEM3-RA	SINGV-RCM New!
Future scenarios	RCP4.5 RCP8.5	SSP1-2.6 New! SSP2-4.5 New! SSP5-8.5 New!
Spatial resolution	12km	8km Higher res! 2km Higher res!
Temporal resolution of rainfall	Daily	12min@8km Higher res! 10min@2km Higher res!
Addressing dynamical downscaling uncertainty	No	Yes (Additional simulations with a different RCM)

Descriptions of SSPs

SSP1-2.6

- SSP1 socioeconomic pathway + RCP2.6 GHG concentration scenario
- "Taking the green road" scenario with **low challenges** to mitigation and adaptation
- Sustainable growth with lower resource and energy intensity

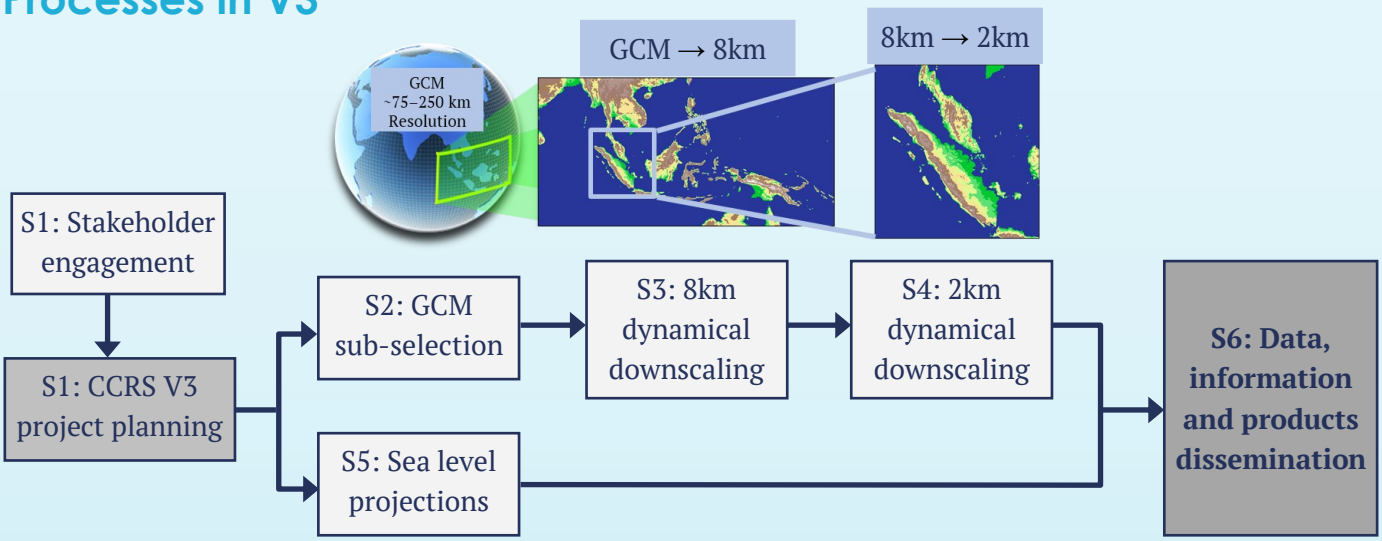
SSP2-4.5

- SSP2 socioeconomic pathway + RCP4.5 GHG concentration scenario
- "Middle of the road" scenario with **medium challenges** to mitigation and adaptation
- Social, economic and technological trends largely follow historical patterns

SSP5-8.5

- SSP5 socioeconomic pathway + RCP8.5 GHG concentration scenario
- "Fossil-fueled development" scenario with **high challenges to mitigation** and **low challenges to adaptation**
- Rapid non-green technological progress, and ability to manage social and ecological systems, including the possibility of adopting geo-engineering

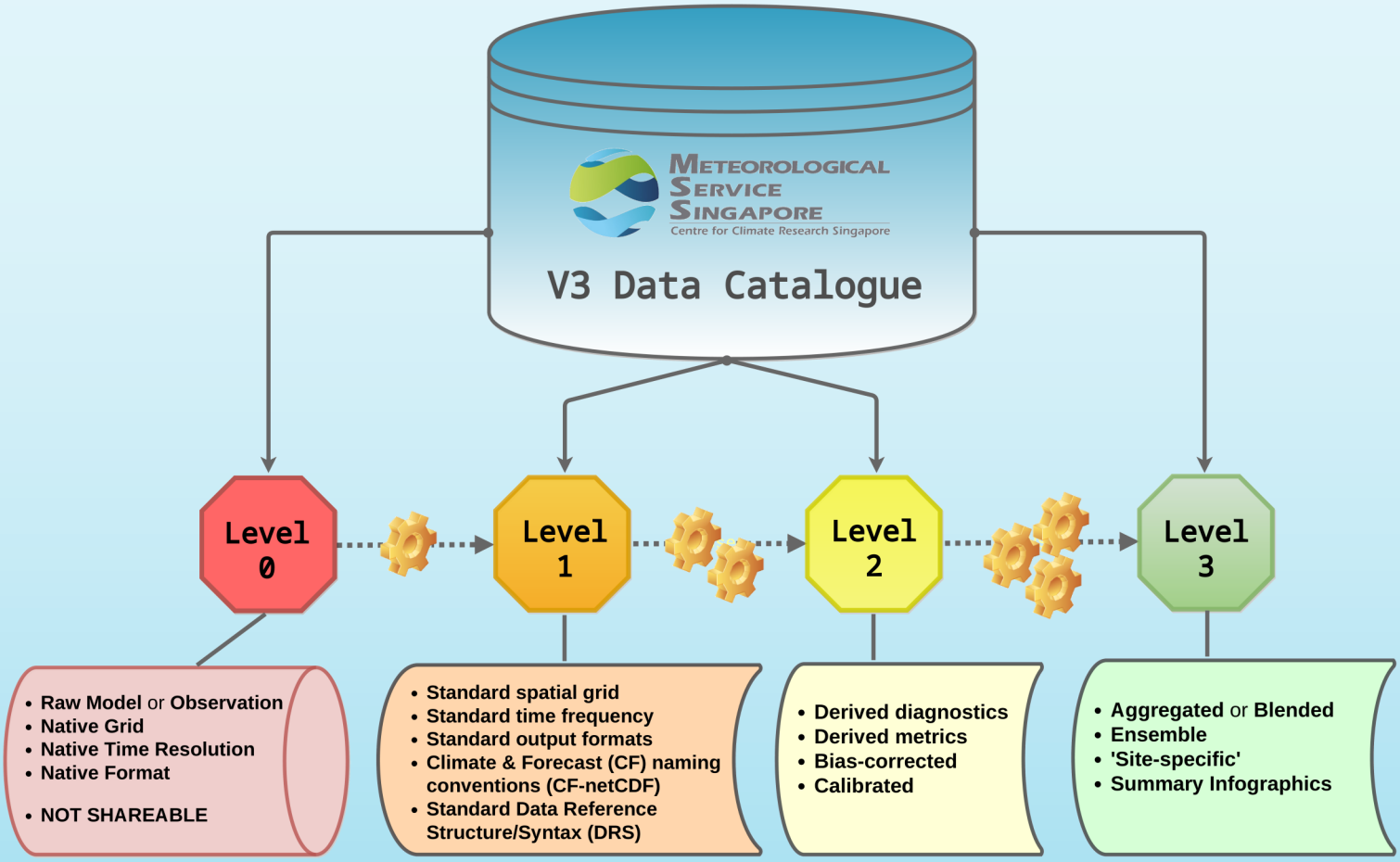
Processes in V3



Expected V3 Data

	Rainfall	Temperature	Winds	Relative humidity
Domain (Resolution)	SG (8km, 2km)			
Models	5 CMIP6 GCMs downscaled by SINGV-RCM			
Scenarios	Historical, SSP1-2.6, SSP2-4.5, SSP5-8.5			
Timeline	1955–2100 @ 8km resolution; 1995–2014, 2040–2060, 2080–2100 @ 2km resolution			
Temporal resolution	• 12 min @8km • 10 min @2km • 1 hr @8km & 2km • Daily mean @8km & 2km • Monthly mean @8km & 2km	• Daily mean • Daily maximum • Daily minimum • Monthly mean • Monthly mean profiles (pressure levels)	• Daily mean 10m wind speed • Daily maximum 10m wind speed • Daily mean 10m wind direction • Monthly mean wind profiles (pressure levels) • Daily maximum wind gusts	• Daily mean • Daily maximum • Daily minimum • Monthly mean • Monthly mean profiles (pressure levels)
Vertical levels	Surface	1.5m (daily) Pressure levels (monthly)	10m (daily) Pressure levels (monthly)	1.5m (daily) Pressure levels (monthly)
Products	• Frequency and intensity of extreme rainfall events • Dry spells • Wet spells	Frequency and intensity of extreme temperature events (e.g. hot days, warm nights)	Frequency and intensity of extreme winds	—
Solar radiation	Projections of net incoming solar radiation will be provided for SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios at daily frequency over Singapore at 8km and 2km spatial resolutions.			
Sea level projections	Probabilistic sea level projections with SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios. Projections of wave and storm surge will be made available as a part of V3+ (pending additional resources).			

V3 Data and Products Categories



Access to V3 Data

- Levels 1, 2 and 3 data and products will be made available through a dedicated dissemination platform.
- Details of how to access the data and products will be made available in a future Stakeholder Workshop.
- V3 data may be expected by Q1 2024.

Centre for Climate Research Singapore

A research centre under the Meteorological Service Singapore and part of the National Environment Agency. It was officially launched in March 2013, with the vision to be a world leading centre in tropical climate and weather research focusing on the Southeast Asia region.

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