



Atmospheric Rivers, Cyclones and Extreme Flood Estimation

FMA Newcastle 2017
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Overview

- Cyclone rainfall temporal patterns
- Storm and stream direction and alignment
- Atmospheric Rivers



Cyclones

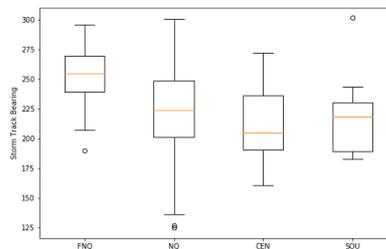
Cyclone Temporal Pattern

- Rainfall South of eye
- Onshore flow south of eye
- Most intense rainfall around eye
- Results in end weighted temporal Patterns



Cyclones

- Cyclone track analysis
 - BoM cyclone track data
 - Storm Direction

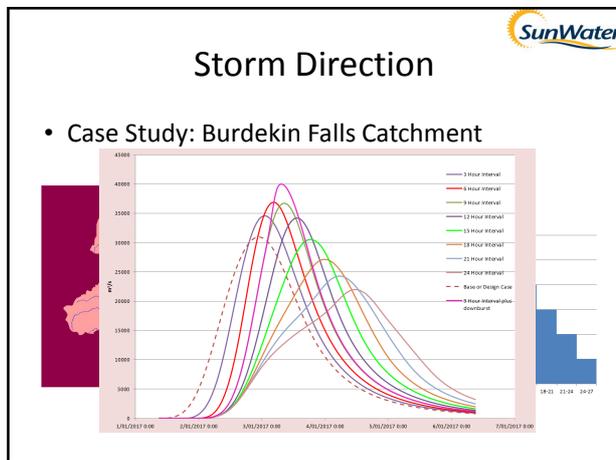


Cyclones

- Cyclones & direction
- Places par
- Implicatio

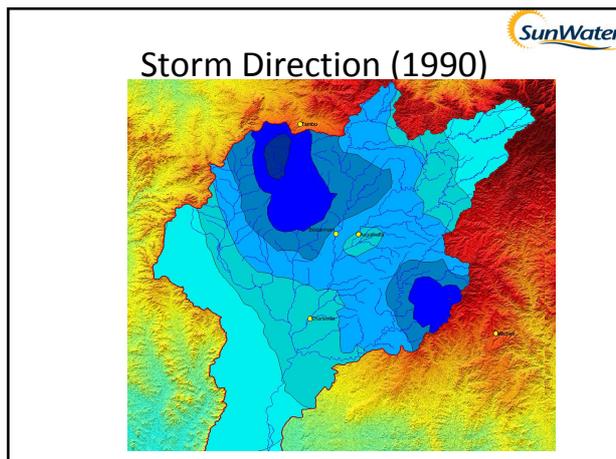
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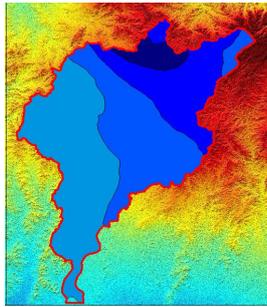


Storm Direction

• Case Study: Burdekin Falls Catchment



Storm Direction (1997)



Atmospheric Rivers

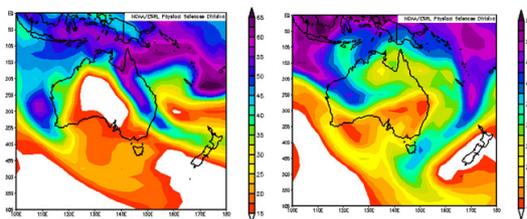


- Narrow region of high atmospheric water content
- Broadly equivalent to Total Precipitable Moisture or Integrated Water Vapour
- Needs a weather system to react with to result in rainfall
- Area of active research as an important driver of extreme events (particularly in US)

Atmospheric Rivers



- Maranoa and Warrego 2012
- Tasmania 2016



Atmospheric Rivers



- Rainfall depths for Cascade Valley dam collapse 1929 and the 2016 flood event



Atmospheric Rivers



- TPW



Summary



- Cyclones can result in 'tail weighted' temporal patterns, particularly south of the eye
- Catchments draining south at the highest at risk
- Cyclones travelling at the same speed and direction as the flood wave pose an enhanced risk
- Therefore, spatial and temporal factors, beyond those considered in the guidelines, may be required for design event estimation in certain catchments

Conclusion



- Extreme design event estimation considerations –
 - Large catchments
 - Assign probability to the occurrence of particular types of temporal patterns
 - Consideration of various spatial patterns
 - Investigation into space-time evolution of an event
 - Small catchments
 - Consider risk of Atmospheric Rivers and enhanced Atmospheric Moisture