Regions of South East Queensland (SEQ) are known to experience particularly frequent and severe storms by forecasters and the public alike, however the concepts and understanding of this phenomena are limited to anecdotal evidence. It is hypothesised the sea-breeze interactions with storms contributed to this behaviour. A climatological and meteorological study were designed to explore this phenomena in SEQ.

Climatological analysis has provided a spatial-temporal understanding of historical hailstorm hotspot activity and a conceptual model of the underlying mechanisms to support the forecasting of hailstorms in the SEQ region. Further analysis of field campaign data for sea-breeze induced changes to the storm effective inflow layer and latent heat flux will be explored next.

**Climatological Analysis**

**Statistical:** Total number of hail storm days and cells for sea-breeze (SB) and non sea-breeze days within 3 synoptic types for 1997-2014. The SE’ly change — sea-breeze setup is the optimal conditions for hailstorms within this climatological analysis.

**Temporal:** Rain year (July-June) frequency of sea-breeze (SB) hailstorms (HS) days and yearly averaged (July-June) SOI. Suppression of SB/HS frequency is possibly related to ENSO forced trade wind intensity.

**Spatial:** Hailstorm swath frequency across 1997-2014 for sea-breeze days (left) and non sea-breeze days (right), using WSR74 S-band radar at Marburg in western SEQ. WDSS-ii algorithms implemented in MATLAB with rawinsonde data analysis for maximum expected size of hail (MESH) threshold of 21mm and surface station detection of sea breeze activity.

**Motivation**

**Outcome**

**Conceptual Model:** Average sea-breeze arrival time and hailstorm initiation (CI) and enhancement (CE). Hailstorm CE occurs after the sea-breeze front arrival.

**Impact:** 27 November 2014 hailstorm, Brisbane (Courier Mail). Insured damages have now exceeded $1.2B AUD

**Impact:** 27 November 2014 hailstorm, Brisbane (Courier Mail). Insured damages have now exceeded $1.2B AUD.

**Coastal Convective Interactions Experiment (CCIE)**

Joshua Soderholm

**Coastal Convective Interactions Experiment (CCIE)**

Joshua Soderholm

The University of Queensland

Australia

**Coastal Convective Interactions Experiment (CCIE)**

Joshua Soderholm

**Motivation**

**Outcome**

**Strategy:**

- **Operations map for the CCIE during 2013 & 2014 seasons to observe sea-breeze - storm interactions.**
- **UQ-XPOL shown in (a). Dual Doppler lobes for CP2 (b) and Mt Stapylton.**

**Interaction:**

- **Sea-breeze — squall collision** shown in (a) CP-2 reflectivity, (b) absolute wind profiles derived from CP-2, RASS, soundings and UQ-XPOL and (c) CP-2 Doppler RHI of sea-breeze — squall collision

**Analysis:**

- **Reflectivity RHI cross-section of the 27 November Brisbane hailstorm from the CP-2 research radar.** RHI oriented at 34deg, through the SW to NE quadrants of the storm. Pre-storm soundings indicated negligible 0-6km shear and instability present. The storm developed in a sea-breeze air mass over the Brisbane region.

**Contact**

j.soderholm@uq.edu.au

Climate Research Group

September 2015

**Supervision Team**

Prof. Hamish McGowan (UQ)

Dr. Harald Richter (Bureau R&D)

A/P Kevin Walsh (U.Melb)

**Supervision Team**

Prof. Hamish McGowan (UQ)

Dr. Harald Richter (Bureau R&D)

A/P Kevin Walsh (U.Melb)

Special Thanks: Tammy Weckwerth (NCAR)