BARC-docs

Release 0.0.1

Mar 26, 2021

Contents

CHAPTER 1

User documentation

1.1 About

The Bokeh Annotation and Reporting Component (BARC) is a component integrated into the FOREST visualisation tool. It allows the users to annotate and markup data within FOREST.

1.2 License

1.3 Installation

To install BARC you need the following pre-requisits

1.4 User guide

1.4.1 Getting Started with BARC

The BARC tool is split into three distinct sections, the Annotation toolbox, the Lab book and the Report generator.

The Annotation toolbox

The Annotation toolbox provides the functionality to select from various weather/ forecasting icons and annotate on the displayed meteorological data. The toolbox provides a hosts of freeform drawing tools which enables the user to mark features such as extreme temperature or convection with ease as well as highlight features that they wish to draw attention to.

The DigitallLab book

The digital lab book allows the user to input notes and comments which can be linked to the displayed meteorological data and to any annotations and markups the user has added to the current data. Both the comments and the annotations can be saved to allow the user to revisit their previous work.

The Report Generator

The report generator provides the capability to generate case studies and model evaluation feedback reports. It features a comprehensive search and allows users to find previous reports and events from keywords and metadata.

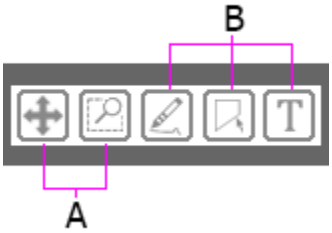
Initialising BARC

To open the BARC use the tree icon (left) and the BARC panel will appear in a pop out window on the right side of the browser.

1.4.2 The Annotation toolbox

The main toolbar provides the basic tools the user requires to start using BARC.

The toolbar contains two distinct sets of tools. The first set (A) are used for navigation, e.g zoom and move. The second set (B) are freeform drawing tools.



Selection and navigation tools

Move/pan tool

This tool will move/pan the map view by holding the left mouse button and dragging. This tool used in conjuction with the zoom tool allow the user to define their view.

Box zoom tool

The box zoom tool allows the user to define a rectangular region to zoom. This is done by holding down the left mouse button and dragging to the desired area.

Drawing and type tools

Freehand drawing tool

Allows the user to draw freehand on the displayed content. Line thickness and colour can be selected.

Polygon add tool

Use this tool to create polygons on the displayed content.

To move the polygon Select the polygon tool and then drag the polygon to a new location. You can also move multiple polygons by holding shift.

To delete a polygon Select the polygon tool and then select the first point created, then press BACKSPACE.

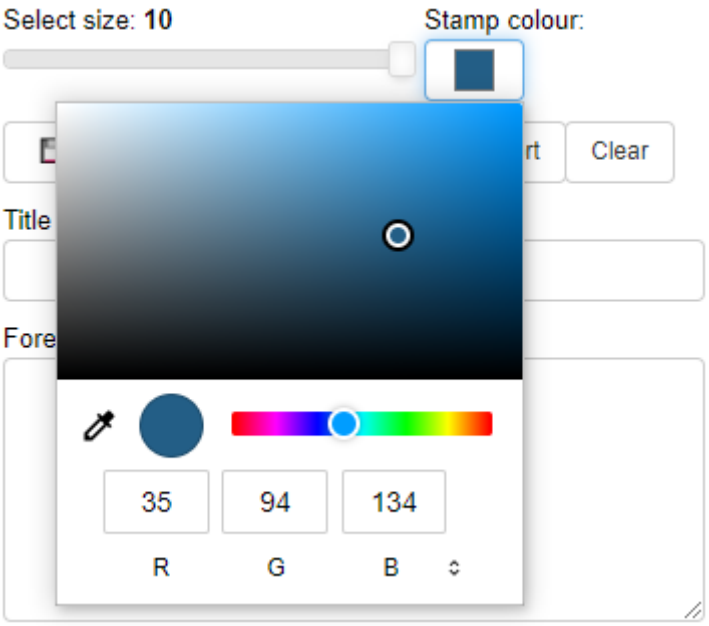
Text add tool.

This feature is coming soon it will allow the user add text to the active content.

Select Size

The size select slider allows the user to scale both the stamps and the custom lines. Move the slider to the right to increase the size. The smallest setting is 1 the largest is 10.

Stamp Colour



Stamp colour provides an easy way to accees different colours for the meterological symbols included in BARC. Select stamp the colour and either select your desired colour from the displayed pallete. The stamp colour tool allows for direct input of colour values in RGB (Red Green Blue), hsl (hue, saturation, and lightness) and hex.

Save button

This button saves all text and annotations currently created in BARC. The title field is mandatory and is used for loading your content back into BARC.

Load button

The load button will load your previous annotations and text back into the BARC inteface. By selecting the load button previous saved worked sessions are displayed including a date stamp of when the work was completed in the drop-down list. Select the required title to load previous work.

Export button

The export button provides the user with a tool to export their annotations, notes, metadata and details and the loaded data as a single document. The annotations will be outputted as a full screen image and include all the markings, custom lines and glyphs. It will also combine the contents of all the freeform textboxes and outline what meta data was selected in the checkboxes at the bottom of the lab book. Key information about The data within FOREST wil also be included in the report. This will be included below the image data, and will specify the data file loaded, the variable and the timestep.

Clear button

The clear button will remove all text and annotation from the current session.

Meteorological symbols

BARC has a large host of specfic meteorological symbols availble. These symbols are displayed in groups of similar weather features or characteristics. To select a group of symbols use the dropdown toolbar and then select the specfic symbol you want to use. More information about what the symbol represents is displayed when you hover over the icons. Group 0 - 9 reference the well established World Meteorological Organisation (WMO) present weather symbols.

Symbol	Code	Description
	0	Cloud development not observed or not observable
	1	Cloud generally dissolving or becoming less developed
	2	State of sky on the whole unchanged
	3	Clouds generally forming or developing
	4	Visibility reduced by smoke, e.g. veldt or forest fires, industrial smoke or volcanic ashes
	5	Haze
	6	Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation
	7	Dust or sand raised by wind at or near the station at the time of observation, but not well developed dust whirl(s)
	8	Well developed dust or sand whirl(s) seen at or near the station during the preceding hour or at the time of observa
	9	Duststorm or sandstorm within sight at the time of observation, or at the station during the preceding hour
	10	Mist
	11	Patches of shallow fog or ice fog at the station, whether on land or sea not deeper than about 2 metres on land or 1
	12	More or less continuous shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2m/la
	13	Lightning visible, no thunder heard
	14	Precipitation within sight, not reaching the ground or the surface of the sea
	15	Precipitation within sight, reaching the ground or the surface of the sea, but distant, i.e. > 5 km from the station

Symbol	Code	Description
	16	Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station
	17	Thunderstorm, but no precipitation at the time of observation
	18	Squalls at or within sight of the station during the preceding hour or at the time of observation
	19	Funnel clouds at or within sight of the station during the preceding hour or at the time of observation
	20	Drizzle (not freezing) or snow grains, not falling as showers, during the preceding hour but not at the time of obse
	21	Rain (not freezing), not falling as showers, during the preceding hour but not at the time of observation
	22	Snow, not falling as showers, during the preceding hour but not at the time of observation
	23	Rain and snow or ice pellets, not falling as showers; during the preceding hour but not at the time of observation
	24	Freezing drizzle or freezing rain; during the preceding hour but not at the time of observation
	25	Shower(s) of rain during the preceding hour but not at the time of observation
	26	Shower(s) of snow, or of rain and snow during the preceding hour but not at the time of observation
	27	Shower(s) of hail, or of rain and hail during the preceding hour but not at the time of observation
	28	Fog or ice fog during the preceding hour but not at the time of observation
	29	Thunderstorm (with or without precipitation) during the preceding hour but not at the time of observation
	30	Slight or moderate duststorm or sandstorm, has decreased during the preceding hour
	31	Slight or moderate duststorm or sandstorm, no appreciable change during the preceding hour
	32	Slight or moderate duststorm or sandstorm, has begun or has increased during the preceding hour
	33	Severe duststorm or sandstorm, has decreased during the preceding hour
	34	Severe duststorm or sandstorm, no appreciable change during the preceding hour

Symbol	Code	Description
	35	Severe duststorm or sandstorm, has begun or has increased during the preceding hour
	36	Slight/moderate drifting snow, generally low (below eye level)
	37	Heavy drifting snow, generally low (below eye level)
	38	Slight/moderate blowing snow, generally high (above eye level)
	39	Heavy blowing snow, generally high (above eye level)
	40	Fog or ice fog at a a distance at the time of observation, but not at station during the preceding hour, the fog or ice
	41	Fog or ice fog in patches
	42	Fog/ice fog, sky visible, has become thinner during the preceding hour
	43	Fog/ice fog, sky invisible, has become thinner during the preceding hour
	44	Fog or ice fog, sky visible, no appreciable change during the past hour
	45	Fog or ice fog, sky invisible, no appreciable change during the preceding hour
	46	Fog or ice fog, sky visible, has begun or has become thicker during preceding hour
	47	Fog or ice fog, sky invisible, has begun or has become thicker during the preceding hour
	48	Fog, depositing rime, sky visible
	49	Fog, depositing rime, sky invisible
	50	Drizzle, not freezing, intermittent, slight at time of ob.
	51	Drizzle, not freezing, continuous, slight at time of ob.
	52	Drizzle, not freezing, intermittent, moderate at time of ob.
	53	Drizzle, not freezing, continuous, moderate at time of ob.

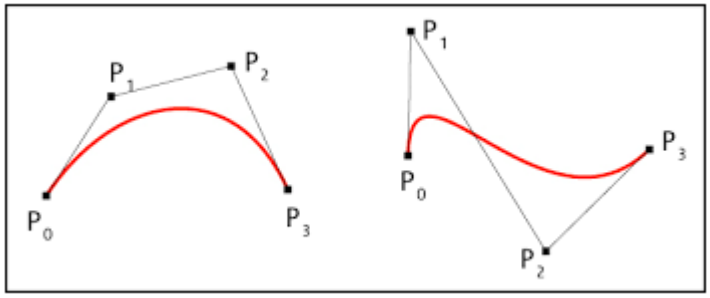
Symbol	Code	Description
	54	Drizzle, not freezing, intermittent, heavy at time of ob.
	55	Drizzle, not freezing, continuous, heavy at time of ob.
	56	Drizzle, freezing, slight
	57	Drizzle, freezing, moderate or heavy (dense)
	58	Rain and drizzle, slight
	59	Rain and drizzle, moderate or heavy
	60	Rain, not freezing, intermittent, slight at time of ob.
	61	Rain, not freezing, continuous, slight at time of ob.
	62	Rain, not freezing, intermittent, moderate at time of ob.
	63	Rain, not freezing, continuous, moderate at time of ob.
	64	Rain, not freezing, intermittent, heavy at time of ob.
	65	Rain, not freezing, continuous, heavy at time of ob.
	66	Rain, freezing, slight
	67	Rain, freezing, moderate or heavy
	68	Rain or drizzle and snow, slight
	69	Rain or drizzle and snow, moderate or heavy
	70	Intermittent fall of snowflakes, slight at time of ob.
	71	Continuous fall of snowflakes, slight at time of ob.
	72	Intermittent fall of snowflakes, moderate at time of ob.

Symbol	Code	Description
	73	Continuous fall of snowflakes, moderate at time of ob.
	74	Intermittent fall of snowflakes, heavy at time of ob.
	75	Continuous fall of snowflakes, heavy at time of ob.
	76	Diamond dust (with or without fog)
	77	Snow grains (with or without fog)
	78	Isolated star, like snow crystals (with or without fog)
	79	Ice pellets
	80	Rain shower(s), slight
	81	Rain shower(s), moderate or heavy
	82	Rain shower(s), violent
	83	Shower(s) of rain and snow, slight
	84	Shower(s) of rain and snow, moderate or heavy
	85	Snow shower(s), slight
	86	Snow shower(s), moderate or heavy
	87	Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed, slight
	88	Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed, moderate or heavy
	89	Shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder, slight
	90	Shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder, moderate or heavy
	91	Slight rain at time of observation, Thunderstorm during the preceding hour but not at time of observation

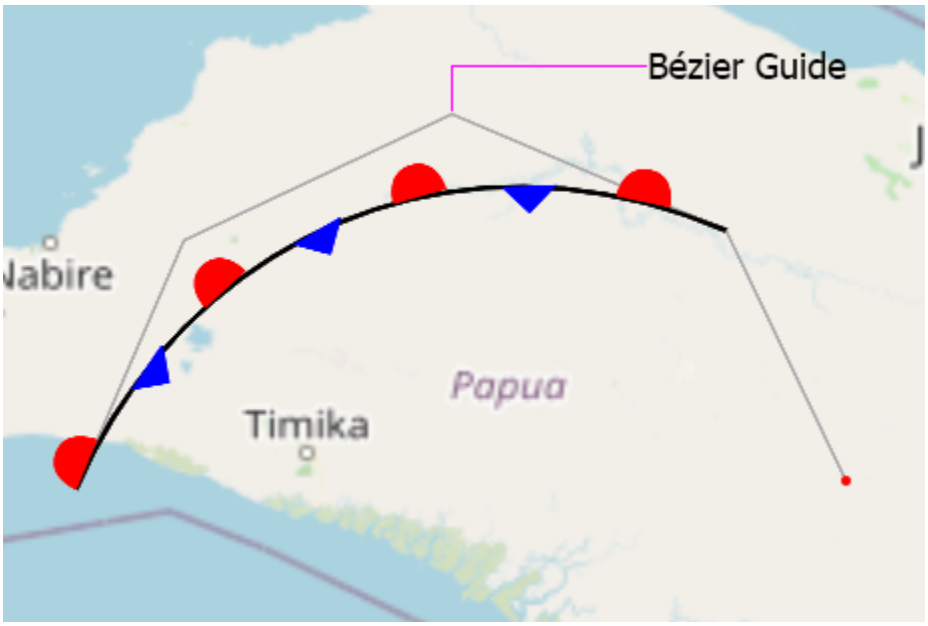
Symbol	Code	Description
	92	Moderate or heavy rain at time of observation, Thunderstorm during the preceding hour but not at time of observa
	93	Slight snow, or rain and snow mixed or hail at time of observation, Thunderstorm during the preceding hour but n
	94	Moderate or heavy snow, or rain and snow mixed or hail at time of observation, Thunderstorm during the precedi
	95	Thunderstorm, slight or moderate, without hail, but with rain and/or snow at time of observation
	96	Thunderstorm, slight or moderate, with hail at time of ob.
	97	Thunderstorm, heavy, without hail, but with rain and/or snow at time of observation
	98	Thunderstorm combined with dust/sandstorm at time of observation
	99	Thunderstorm, heavy with hail at time of observation
	99	Hurricane
	100	Category 1 - storms usually cause no significant structural damage to most well-constructed permanent structures
	101	Category 2 - Storms of Category 2 intensity often damage roofing material (sometimes exposing the roof) and infl
	102	Category 3 - Devastating damage will occur. Tropical cyclones of Category 3 and higher are described as major h
	103	Category 4 - Category 4 hurricanes tend to produce more extensive curtainwall failures, with some complete struc
	104	Category 5 - is the highest category of the Saffir–Simpson scale. These storms cause complete roof failure on mar
	105	Tropical depression - <29 Knots <55 km/h
	106	Tropical storm - 30 - 55 knots 56-103 km/h
	107	Typhoon - 56-113 knots 104-210 km/h
	108	Super typhoon >114 knots >211 km/h

Custom Lines

BARC has various custom lines included to allow multipoint curved lines to be drawn over the data. These lines include useful features such as fronts and troughs and will allow the user to create accurate curves where desired.



To create a Bézier curve requires at least four points are required to be placed on the canvas. First select the curved symbol you require from the toolbox, then double click on the canvas and contiue to place points until the curve is where required. To complete or exit the tool select the escape key.



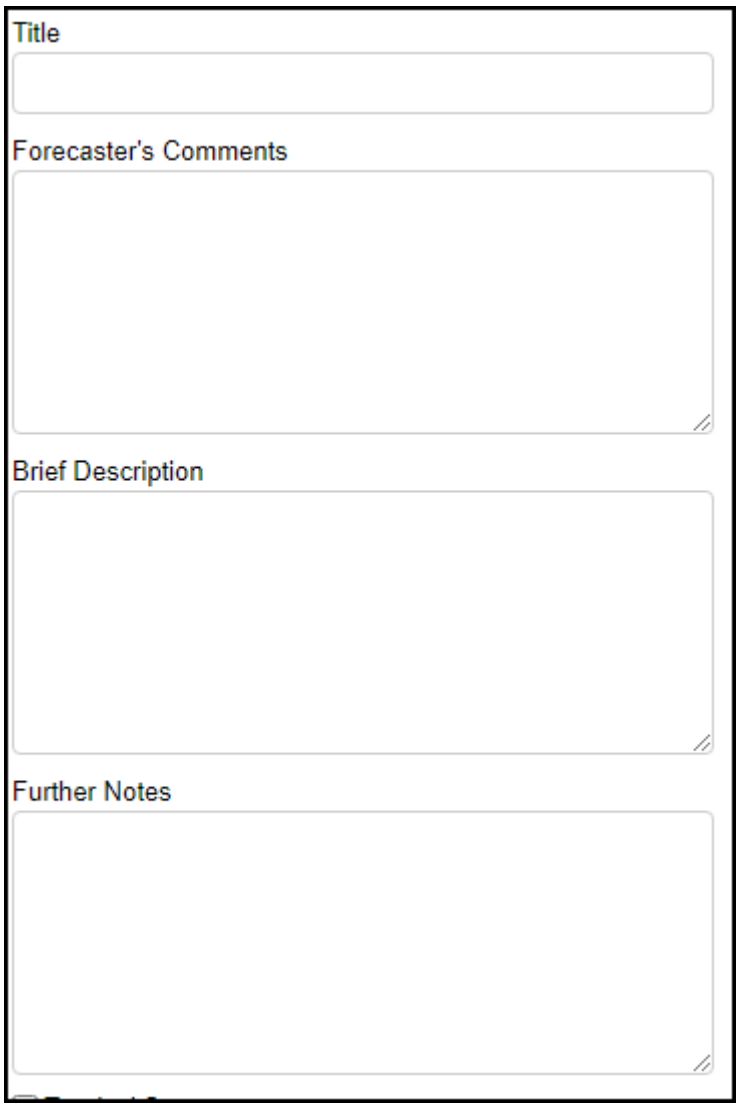
Show/hide Bézier Guides

When placing custom lines there is an option to to show or hide the Bezier guides. When this is enabled the greys guide lines are visible on the canvas.

Below is a table of the included lines and their descriptions.

Symbol	Code	Description
	0	Upper trough - Upper-level trough (Upper Tropospheric Trough, UTT) - upper-level cyclonic circulation associated with positive vorticity (usually around 200-hPa in the Tropics) that can be detected by analysis of upper-level streamlines (to detect cyclonic circulation) and vorticity (positive vorticity). Usually, the upper-level cyclonic circulation leads to a surface low-pressure developing ahead of the UTT which has associated convection at the surface with upper-level divergence. An intrusion of energy and wind from the mid-latitudes into the tropics causes UTTs to form
	1	Dry Intrusion - mid-level dry air (500-700hPa) that is typically travelling from the midlatitudes into a tropical region and can either inhibit or organise convection depending on the stage of development. Dry air intrusions are usually detected using the gradients of dew-point temperature (-36 degrees) or relative humidity (less than 15%).
	2	Stationary dry - boundary between air masses with significant moisture differences.
	3	Cold Front - The leading, progressive edge of a density discontinuity ahead of a cooler/drier air mass. These boundaries tend to be narrower than warm fronts due to the higher density low-level air in their wake which helps drive their forward motion. Over the continent, a minimum of 6C (10F) over 500 km (300 nm) is usually needed for a frontal zone with smaller differences needed over the oceans.
	4	Dry advection/pseudo cold front - is a boundary between a supercell's inflow region and the rear flank downdraft. It usually extends outward from a mesocyclone center, usually toward the south or southwest, and is characterized by advancing of the downdraft air toward the inflow region. It is a particular form of gust front.
	5	Warm front - The equatorward edge of a density discontinuity behind a retreating and modified cool, dry air mass. This type of frontal zone is significantly broader than a cold front, due to the slower erosion of the superior density airmass ahead of the boundary. Over the continent, a minimum of 6C (10F) over 300 nm (500 km) is usually needed for a frontal zone while smaller differences are necessary over the oceans.
	6	Warm advection / pseudo warm front - is a boundary between the in-flow region and the forward-flank downdraft of a supercell. It can either be stationary or move in a northeasterly direction
	7	Convergence - A zonally elongated axis of surface wind confluence in the tropics, due to confluence of northeasterly and southeasterly trade winds, and/or confluence at the poleward extent of cross-equatorial flow into a near-equatorial heat trough. It is depicted as a pair of ref lines with cross hatching. The feature is labeled as ITCZ on the Unified Surface Analysis
	8	Squall lines - A solid line of convection, usually associated with rapid pressure fluctuations and high winds. The squall line will normally be placed at the leading edge of the wind shifts and inside the leading pressure trough.
	9	Near Quatorial Trough - a region of low pressure that lies near to the equator and is associated with a convergence of the winds. The Intertropical convergence zone is referred to as a near equatorial trough when it occurs near to the equator.
	10	Monsoon trough - An elongated area of low pressure along the Intertropical Convergence Zone (ITCZ) that leads to an enhancement of monsoon precipitation over land. To its south lie south-westerly low-level winds, as opposed to the ITCZ which is a confluent zone of easterly winds. The monsoon trough is the main focus for tropical cyclogenesis in the northwest Pacific ocean, and plays

1.4.3 The Digital lab book

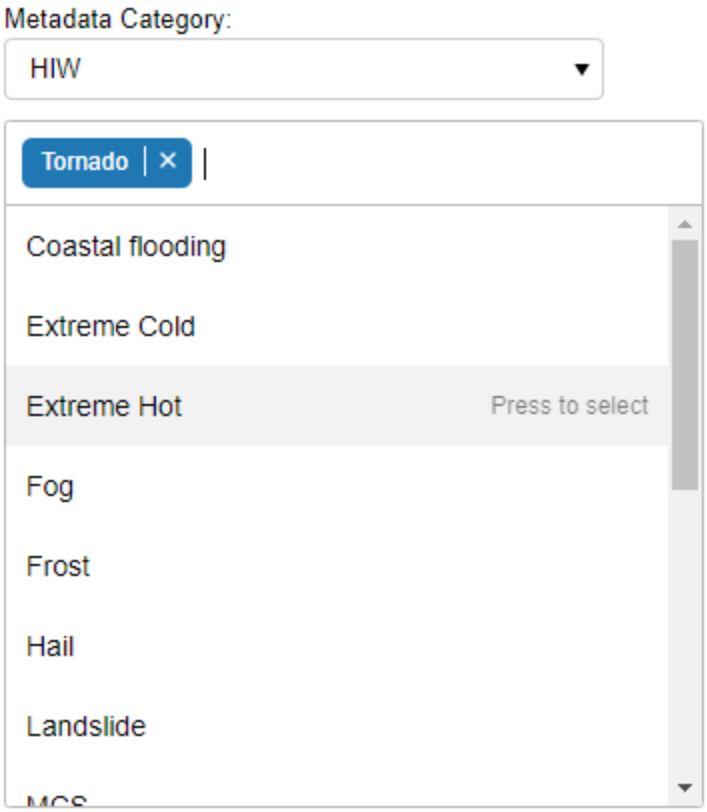


This feature enables users to comment on their annotations to provide reasoning and a more in-depth analysis than chart making alone. The lab book includes note taking capability this text can be saved or exported so thoughts and findings are accessible in the future. Currently there are four free form text boxes for the user to record their notes. The first text box is the Title box, each report requires a title and is mandatory. This field will be used as the reference for the user to reload there report if required. Once the title field is populated the save button will become active and enabled. The other three text boxes, Comments, Brief Description and Further notes are not mandatory and can contain any text to describe the data.

Metadata Flags

Meta data flags are found at the bottom of the lab book. This feature allows for the user to flag an event by selecting the relavant tag from the dropdown list. There are two catagories of meta data, HIW (High Impact Weather) and Synoptic.

To select meta data, select one of the two catagories and the select the relavent heading from the drop down menu.



The table below shows the available tags within the two catagories.

HIW	Synoptic
Coastal flooding	African Easterly Wave
Extreme Cold	Area of low pressure
Extreme Hot	Cold surge
Fog	Heat wave
Frost	ITCZ
Hail	Kelvin wave activity
Landslide	Localised convection
MCS	Meso-scale convection
Rapid response flooding	MJO phase 1
River flooding	MJO phase 2
Snow	MJO phase 3
Storm / Lightning	MJO phase 4
Storm surge	MJO phase 5
Strong winds or gusts	MJO phase 6
Surface water flooding	MJO phase 7
Tornado	MJO phase 8
Tropical storm / cyclone	Rossby wave activity
	Sea / lake breeze
	South West Monsoon
	Tropical cyclone (directly / indirectly)
	Weak MJO

1.4.4 The Report Generator

This will allow forecasters to produce high impact weather (HIW) case study reports detailing atmospheric analysis and information on HIW events (human/economic cost) that will be saved in a case study catalogue. Similarly, a model evaluation reporting function will also be included in the report generator, giving forecasters the ability to report on important model deficiencies such as false alarms, missed events or model biases. Both these report types will enable 'in country' forecasters to influence research and will steer scientists and model developers towards work that has the greatest impact locally.

1.5 Developer Guide

1.5.1 API reference

Code author: Dan Walker (NCAS)

Code author: Helen Burns (CEMAC)

Code author: Dan Elis (CEMAC)

CHAPTER 2

Indices and tables

- genindex
- modindex
- search