Meteotsunami:  
The AD 1607 Bristol Channel Flood  
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ABSTRACT  
The cause of the 1607 Bristol Channel coastal flooding, despite it resulting in over 2,000 fatalities, remains controversial, with both storm surge and tsunami (wave) mechanisms proposed. Contemporary written accounts were examined critically in the context of a possible meteorological (weather) rather than geological (submarine landslide or earthquake) tsunami trigger. Evidence supporting both theories; storm surge and tsunami, is based primarily on historical accounts, however strong limitations have been found in the sourcing and interpretation of these documents. A geological tsunami is considered unlikely due to the lack of a realistic trigger mechanism while coastal topography (landscape) and climatology were found to be supportive of a meteotsunami (atmospheric pressure) source. Flooding from this mechanism is therefore proposed as a possible alternative to the surge and, if correct, demonstrates the potential for a similar mechanism to cause future dangerous flood events, both in the South West and around the British Isles.
**Meteotsunami**

**The AD 1607 Bristol Channel Flood**

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**AIMS**

1. To examine why there is no consensus on the cause of the 1607 Bristol Channel flood
2. To propose an alternative to current theories

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**INTRODUCTION**

The 1607 event caused up to 2,000 fatalities (Keys, 2005) and flooded a vast area of Britain’s south-west coastline from South Wales to Devon (Figure 1). There is no consensus on its cause, partly because quantitative measurements in the sense we think of today were not practiced. The flood occurred in a period before widespread literacy, with waves disseminated in the form of pamphlets composed and printed in London with primary evidence in local manuscripts, epigraphs and ballads. The event was sometimes duplicated due to documents giving differing dates of 20 January 1600 in the Old Style (Julian) Calendar and 30 January 1607 in the New Style (Gregorian) Calendar which wasn’t adopted until 1752.

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**METHOD**

Evidence from contemporary historical accounts has been interpreted by scientists to support both the storm surge (Figure 2) and tsunami (Figure 3) hypotheses. However, an initial literature review highlighted several areas where misinterpretations of similar events could have occurred, and the need for an interdisciplinary approach. Collaboration with Rose Hewlett (PhD student, Department of Historical Studies, University of Bristol) improved sourcing and understanding of such records, despite holding differing opinions on the cause of the flooding event.

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**EXISTING THEORIES & AVAILABLE EVIDENCE**

**Historical Accounts**

- Storm Surge
- Tsunami

**Modern Meteotsunami**

- Storm Surge
- Tsunami

**PRELIMINARY FINDINGS**

**WAS THERE A STORM?**

Analysis of existing research shows interpretation of many historical sources has been made with little consideration of change in language. Examples are the words ‘storme and tempeste’ which may indicate rushing water rather than the modern day use of ‘storm’ and descriptions of wind direction. No rainfall is mentioned in any of the historical sources and Figure 5 shows when sources described are analysed and ranked by location a clear pattern emerges in descriptions.

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**AN ALTERNATIVE THEORY: “A METEOTSUNAMI”**

Meteotsunamis are caused by a sudden pressure jump (2-10 hPa in ~3 mins), the source varies but it is often associated with cyconic or frontal systems which are common around the UK. Historical records confirm incidences meteotsunamis impacts on the British coastline. On 20th July 1959, two people drowned when a 3.5 m wave impacted busy tourists beaches on the South Coast from Worthing to Folkestone. It was triggered by a squall line in the Bristol Channel. (SOS, 2017; Douglas, 1929)

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**WHAT CAUSED THE EAST COAST FLOODING?**

A major piece of evidence used to refute the tsunami hypothesis is the subsequent flooding on the UKs east coast. Tsunami propagation through the English Channel from the Celtic Sea has been ruled out (Hodgkin and Herrt, 2006) and a single storm proposed to have caused a surge in both locations. However, Haliday et al. (2016) found no event in the past 100 years where both the southwest and east coasts were impacted by major surges during the same event. This low probability is akin to that of the two floods being caused by different mechanisms.

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**FUTURE IMPLICATIONS**

- Meteorological and resonant conditions remain and could result in a repeat of the 1607 event
- UK coastal defences are not currently designed to withstand sudden, prolonged unidirectional flow in tsunami waves (McCabe et al., 2014) and when combined with sea-level rise, subsidence, population and infrastructure growth a similar event could cause catastrophic consequences.

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*Images and graphics by Josephine Westlake.*
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