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Abstract

James II, King of England from 1685 to 1688, increasingly antagonized his people by his forced attempts to restore the Catholic faith to a position of eminence in England; many of his actions were contrary to acts passed by earlier Parliaments (he ruled without Parliament most of his reign). Leading dignitaries of the Church of England, of the Protestant nobility, and some of the high officers of the Army and Navy came to the conclusion that the only remedy to the country's ills was to call in William, the Prince of Orange and Chief Magistrate ("Stadholder") of the Netherlands, whose spouse Mary, James' daughter, was, until July 1688, the heir-presumptive to the English crown; the prince himself had a position in the list of succession, being a nephew of James.

Over and above the prince's personal ambitions, it was his conviction and that of several other leading personalities in the Dutch Republic that it was in the vital interest of the Netherlands to influence England's policies, and, in particular, to prevent a line-up of England with the French of Louis XIV, who had hostile designs on the Republic. As long as the danger of a French assault on the Netherlands was imminent, the States-General of the Republic would not authorize the "descent" on England, but when later in September 1688 Louis decided to attack the German States on the Middle-Rhine first, the "descent" gained approval.

The peak of the crisis about James' policies in England was reached in summer-early fall of 1688. In the meantime, William assembled a large fleet and force in the Netherlands to "descent" on England, but his sailing was hindered by winds that in September and October blew with nearly total persistence from the westerly quarter. People in England and in the Netherlands were daily watching for weeks the direction of wind. They called the easterly winds "Protestant winds" and the westerly winds "Popish winds." In addition to making possible the invasion, the "Protestant winds" made it difficult for James to bring over Catholic Irish troops from Ireland.

On or about 26 October (N.S. date) he wind swung around, temporarily, to blow from the easterly quarter, and on 30 October William's armada set sail. But hardly was the armada out of the estuary of the River Maas, the assembly area, when a violent storm sprang up in the North Sea and beat the ships back to port. Altogether, October was a very stormy month, endangering the armada's safety. About 9 November the "Protestant wind" returned, and the armada sailed. The landing took place at Torbay, on the west side of southern England. The same wind that helped William's ships kept the English Navy immobilized in an area just north of Thames' estuary until after the armada reached Torbay.

In the Appendix a parallel is drawn, with regard to the process of waiting for a favorable wind and the events described between the invasion of England by William the Conqueror in 1066 and the "descent" of William the Prince of Orange in 1688.

1. Introduction

It is probably correct to assert that in the histories of no other countries did the direction of wind occupy the minds of large numbers of people for weeks as was the case with England and the Netherlands in the autumn of 1688. Of course, this concern was not in the wind direction per se but in the great historical event that was to take place depending on the wind. The expected event was the sailing over, wind direction permitting, of William, the Prince of Orange, Stadholder (Chief Magistrate) and Captain-General of the Netherlands, accompanied by a considerable force, to the England of King James II.

2. Historical background

Shortly before his death, the childless King Charles II (ruled 1660–85) was able to secure the succession of his brother James (James Stuart, Duke of York1). Normally, such a suc-

1 In the 17th century in England the Old Style (O.S.) calendar was in use. To turn O.S. dates of the late 17th century into New Style (N.S.) dates, add 10 days to the former.

We shall be using N.S. dates throughout this paper, except in verbatim quotations from the literature contemporary or nearly contemporary with the events described herein. In the latter case we shall add in brackets the N.S. date.

1 In 17th century in England the Old Style (O.S.) calendar was in use. To turn O.S. dates of the late 17th century into New Style (N.S.) dates, add 10 days to the former.

2 James had an active interest in England's burgeoning colonial affairs. It was at his initiative that New Amsterdam was seized from the Dutch in 1664, after which the city was renamed New York. As Lord High Admiral of England, he commanded the English fleet in several of the naval battles of the Anglo-Dutch wars, up to 1672.


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cession would have presented no problem, but James con-
verted to the Catholic faith toward the end of the 1660s and,
derunder the Test Act passed by Parliament in 1673, no Roman
Catholic was allowed to hold any public office. To quite a de-
gree, the act was adopted so as to exclude James from suc-
cession and, as a matter of fact, a few years later he was spe-
cifically excluded by a bill of the House of Commons.

Early in 1685 James acceded to the Crown as James II of
England and Ireland and James VII of Scotland (ruled
1685–88). Even before becoming king, James developed the
conviction that the numerous difficulties of his father, Charles
I (Charles I was impeached, sentenced to death, and executed
in 1649, after which England was declared a “Common-
wealth,” i.e., the monarchy was abolished; in 1660 the mon-
archy was restored), and of his brother, Charles II, with the
Parliament were due to their lack of firmness. Less than a
year after his accession and for most of his short reign, he
ruled without a parliament. Moreover, he began to appoint
Catholics in increasing numbers to the Privy Council, the
Bench, Lords-Lieutenant of counties, etc., dismissed a
number of officers from the army and navy, and commis-
sioned Catholics in their place. He claimed royal prerogative
for waiving the Test Act for these appointments. He sur-
rounded himself with an inner circle of advisers who were
either avowed Catholics, including Jesuits (among them the
hated French-born Jesuit Pater Petre), or Dissenters. He
withdrew the charters of cities, among them that of the City
of London, which he considered as strongholds of Whiggy-
ness and Protestantism. Additionally, he brought in Catholic Irish
troops who were looked on with contempt by the English.

His actions stirred up growing opposition in the Church of
England, which up to then had enjoyed a privileged status in
the kingdom, and the same applied to Protestant peers who
were concerned about loss of influential and/or lucrative
positions. Nor did it meet with approval that James kept an army
that was unusually large for times of peace. A good part of
that army was stationed just outside London to overawe the
capital’s “mob.”

But it was not Protestants alone, especially followers of the
Church of England, who were outraged by James. Moderate
Catholics, too, looked with displeasure at the king’s illegal
activities, illegal in the sense that they violated acts of Parlia-
mament (of earlier years). They disliked particularly the Jesuit
camarilla about James. The ambassadors of several Catholic
countries in London equally disapproved of James’ ways.
When Don Pedro Ronquillo, the Spanish ambassador,
warned James not to go too far and too fast, the king replied:
“My Lord Ronquillo, I want instead to achieve all or to lose all”
(Ranke, 1865, p. 474). Even the papal court was critical of the
methods of compulsion and illegality adopted by the king
(Pastor, 1960, pp. 1026–1027; Ranke, 1865, pp. 481–482). In
any case, the papal court was incensed with the Jesuits, and
with Pater Petre in particular.

Additionally, James lost faith with the people for breaking
pledges and retracting concessions whenever he felt that a
change took place in his favor in Europe. One of the outstand-
ing cases occurred early in November 1688, a few weeks before
he had to flee from his kingdom. Shortly before October, he
promised elections to Parliament, but when news reached
him of a mishap to the Prince of Orange’s armada (through a
violent storm in the North Sea—see Section 7) which was on
its way to invade England, the king rescinded the pertinent
writ (not for the first time).

Under the above-described conditions even those elements
in the country that saw in a forced removal of the king an
abominable act, pinned their hope on James’ death. As things
stood in fall 1687, the king had no children from his second
wife, the Catholic Mary Beatrice of Modena, and, therefore,
he would be succeeded by his elder daughter from his first,
Protestant, marriage, Mary (Mary Stuart or Mary of York),
spouse of the Prince of Orange. Mary was born Anglican,
well before her father’s conversion to the Roman church, and
remained a devout Anglican to the end of her life.

The sentiments of all those who opposed James were vio-
lently shaken when late in 1687 the news spread that the
queen was with child. The fear was that the infant to be born
may be a boy who would be baptized into the Catholic faith
and who, when he ascended the throne, would carry on James’
catholicizing policies.

In 1687, even before the news of the queen’s pregnancy
came out, individuals from among the nobility, some
members of the Anglican clergy in high positions and some
ranking officers of the army and navy, decided that the only
remedy to the country’s ills was to call in the Prince of
Orange, whose spouse was the heir-presumptive. The prince
also had a position (a low one, though) in the list of suc-
cession, for he was the son of the eldest daughter of Charles I.
(Thus James II was not only the prince’s father-in-law but
also his uncle.)

3. The Netherlands

Clearly, the possibility of the birth of a son to James was a
threat to Mary’s succession. William was an ambitious
prince. He wanted to secure the throne for Mary under all
circumstances, and it is almost certain that, contrary to his
protestations, he expected to get the English crown with
Mary or alone. Mary, on the other hand, was a gentle person,
not suited to shoulder the burdens of a monarch. According
to Burnet, a historian and a refugee from Charles II’s and
James’ England (he was a bitter opponent of the king) in Will-
iam’s court, in 1686 Mary told him that she hoped that her
husband would become “King Regnant” (Baxter, 1966, p.
234). Also, she was devoted to William, so the prince could
trust to be made king of England, if Mary succeeded James.

It is certain, however, that the prince’s aspiration to Eng-
land’s crown was not only due to purely personal ambition.
There were matters imperative for the security of the Nether-
lands that made William want to have a controlling influence
on England’s policies. Louis XIV’s aggressive expansionist
ambitions (mention of which was made in Part 6 of the pre-
sent series; see Lindgren and Neumann, 1983, p. 771), which led
him to invade the Netherlands in 1672, continued ever since.
Virtually all countries of western and central Europe, as well
as Spain, were under his threat. Even the pope was not
spared. Louis, who, as previous kings of France, had the

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4 In England and Scotland, Protestants who separated from the
Church of England as, e.g., the Presbyterians.
right to carry the title "His Most Christian Majesty," in October 1688 seized the papal territory of Avignon in France and held the papal nuncio as a hostage at Versailles (Ogg, 1957, p. 213). The conflict between Louis and the pope nearly resulted in a schism of the Catholic Church.

In the case of the Dutch Republic, Louis's aggrandizing ambitions were not purely political and territorial. Almost from the beginning of his reign, Louis carried on an economic "warfare" of intermittent intensity against the Netherlands, which in the 17th century was, despite its small territory and population, the great power in matters of finance, international trade, and shipping. (Colbert, Louis's famous minister of finance and the "father" of mercantilism, estimated that the Netherlands had some 15,000 ships against a total of about 5000 of the rest of Europe.) This warfare manifested itself in raising customs duties on Dutch commodities and/or total prohibition of importation of certain commodities from the Dutch Republic, thereby hurting the small country's economy. Usually, the Republic retaliated in kind. As late as spring 1688, Louis imposed a new set of economic measures against the Dutch, harming the latter's shipping, fisheries, textile, and agricultural exports: The Republic's trade with France was brought to a virtual standstill.

It was the vital interest of the Netherlands to prevent the formation of an alliance between England and France, for this could have entailed an assault on the Dutch Republic by France's land forces and a simultaneous attack by a joint Anglo-French navy. Louis wanted an alliance with James. He bribed some of James's ministers (Powley, 1928, p. 6; Ogg, 1957, p. 191) and gave financial support to James to cover some of his expenses on the military (Ogg, 1957, pp. 190, 192, 209, 212), as well as offering him naval assistance. It was not Catholicism that prompted Louis to support James, but the advantage of keeping England away from assisting his (Louis') enemies in Europe. But if there was one area where James did exercise restraint, it was in the affair of a possible formal alliance with Louis. Such an alliance would have rendered his position in England even more difficult as well as straining England's relations with a number of countries on the continent.

In 1688 Louis had an army in Flanders, on the Netherlands' borders. This was a threat to the Dutch Republic. Moreover, there were (inaccurate) rumors of an Anglo-French alliance (Powley, 1928, p. 22; Ogg, 1957, p. 212) vaingloriously "announced" by Louis' ambassador at The Hague and by James' ambassador in Paris. The threat posed by this rumored alliance moved the States General of the Republic to approve funds for military, including naval preparations, but it would not support an invasion of England while the menace of a French aggression persisted. Under the guise of preparations against an Anglo-French attack, and the possibility of having to step in on Sweden's side in a current conflict between Sweden and Denmark, as well as the need to fight Algerine corsairs in the English Channel, William concealed (or so he tried) his true intents, meaning to deceive James. However, the French and English ambassadors at The Hague (the French Ambassador, Count d'Avaux, was a particularly perceptive observer) informed their kings of William's true designs and Louis then warned James, but James did not give credence to the warnings until about the beginning of October, a month before the prince's armada set sail.

Unwittingly, Louis came to the "help" of the prince's true intention, and proved how wrong his evaluation of the situation in England and elsewhere had been. Louis assumed that William's invasion would either fail or that he would be pinned down through the winter, and in the meantime he, Louis, could attack the German states on the Middle-Rhine without risk of getting the Dutch involved. Moreover, he could assume that Leopold, the Holy Roman Emperor, would not be able to help the German states, for Leopold was engaged in a war against the "infidel" Turks. Hence Louis withdrew his forces stationed on the Dutch borders and transferred them, along with other units, to the Middle-Rhine. This occurred toward the end of September 1688 and was the moment for William to obtain the support of the States General for the "descent" on England, a support that he obtained.

4. Waiting for a "Protestant wind"

a. In England

Amidst the growing crisis in England and the repeated calls from England for his "descent," William wanted a written "invitation" signed by prominent personages. Such an invitation was prepared and signed by one "spiritual lord" (the Bishop of London) and by six "temporal lords," including both Whigs and Tories and a former high-ranking officer of James' navy, on 10 July 1688 (N.S.). During the preceding four weeks two events shook the country: one was the birth of a son to James, and the other the arrest in the Tower of the Archbishop of Canterbury and six of his bishops on the charge of seditious libel against the king. Characteristically for the mood of the country, many people believed that the infant was not James' son (his spouse had several miscarriages in the past years, a fact that added credibility to the rumors), but a baby smuggled in by the Jesuits. The second event concerned the bishops committed to the Tower: On 9 July the bishops were arraigned in court and, despite the facts that two of the judges were James' special appointees and the jury was likewise selected, the court acquitted these high dignitaries of the Church. The acquittal was greeted with tumultuous rejoicing by London's crowds and even by the army in the neighborhood of London into which James (mis)placed his faith. The cumulative effect of these and other subsequent events was that an increasing number of people looked forward hopefully to the coming of the Prince of Orange. According to the document of invitation signed by the seven "spiritual and temporal lords" (the "Immortal Seven"). 19 out of 20 of England's people wanted the "descent." Anthony Wood (1894, p. 278), a contemporary Oxford antiquary, noted in his diary for 7 October that "All public houses are full waiting for the good news," viz. the coming of the prince. But one important prerequisite for the prince's sailing was an essentially easterly wind, and, consequently, the public's attention became fixed on the direction of the wind.

1 For this figure as well as the complete text of the letter of invitation, see Dalrymple, 1771, pp. 228-231, or Browning, 1953, pp. 120-122.

2 Years of publication marked by asterisk relate to the "primary sources" section of the list of references for this article.

Hourly dreads [="dread"] on expectation of the Prince of Oranges Invasion still heightened to that degree, as his Majesty thought fit to recall the Writs of Summons of Parliament . . . But in the meantime called over 5000 Irish, 4000 Scots: Continue[s] to remove protestants & put papists in to Portsmouth & other places of Trust: & retains the Jesuites about him . . . increasing the general discontent, brought people to so desperate a passe as with utmost expressions even passionately seeme to long for & desire the landing of that Prince . . . praying unceasantly for an Easterly Wind, which was said to be the onely remora [="delaying factor"] of his expedition . . . [italics ours].

The British historian Macaulay (1929, p. 65) writes, without naming his sources, that the gales which at times "blew obstinately from the west, and which at once prevented the Prince's armament from sailing and brought fresh Irish regiments from Dublin to Chester, were bitterly cursed and reviled by the common people. The weather, it was said, is Popish. Crowds stood in Cheapside gazing intently at the weathervane on the graceful steeple of Bow Church, and praying for a Protestant wind." [italics ours.] As to the "weathervane", or rather, the weather dragon of Bow Church, see Fig. 1.

The attention paid to the wind direction in England is recounted in a tract by one other contemporary writer, Edward Bohun (1689* p. 35). Bohun says that for about three weeks (in October) the wind "stood perpetually west," and during these weeks the usual question was every morning: where does the wind blow from today? "... a Seaman was observed to curse the Dragon in the Cheapside, for turning his Head where his Tail should be." Of course, the "Dragon" was the wind vane atop the steeple of Bow church.

A final example for the concern with wind direction, uniting people low and high in England, for or against James, is as follows. When about the beginning of October 1688 James became convinced that the threat of invasion was serious, he took various military measures. At the same time he sent for the Anglican bishops. He wanted them to "declare their abhorrence of this invasion, and that they would offer him advice, what was fit for him to do" (Burnet, 1823* edition, p. 302). They refused the expression of abhorrence "with a courage that recommended them to the whole nation." Subsequently, the king ordered them to compose a prayer ("office") in the matter of the anticipated invasion. The prayer was so drafted that even those who wanted the coming of the prince might have joined in them. "Supporters of the Church of England then openly expressed in favour of the invasion and voiced their grief to see the wind so cross." They wished for an easterly wind "which on that occasion was called Protestant wind" (Burnet, 1823* edition, p. 302; italics ours).

As can be seen from the above, the term "Protestant wind" had come to mean a wind (that is, an easterly wind) that would make it possible for the prince's armada to sail to England. A

The Cheapside is in London. In the 17th century the word "cheap" meant "market" or "marketplace." In that marketplace, which was situated close to St. Paul's, stood, as it does today, the Church of St. Mary le-Bow. This church has a wind vane atop its steeple in the shape of a dragon (the dragon was the emblem of the City of London and because the wind vane was in the shape of a dragon, Macaulay was less than correct calling it "weathervane"). Actually, the church burned down in the Great Fire of London of 1666, but it was rebuilt, complete with the dragon (2.5 m long) a few years later by the famed architect Christopher Wren. Since this church stood in what was the central marketplace of the city, many people passed by it. See Fig. 1 for the church and wind vane in the shape of a dragon at the top of its steeple.

FIG. 1. St. Mary le-Bow Church, Cheapside, London, showing the "wind dragon" (2.5 m long) on its spire. According to some contemporary writers and the historian T. B. Macaulay, it was this wind vane that multitudes watched for a change in the direction of wind from westerly to easterly ("Popish" vs. "Protestant" wind) that would enable Prince William of Orange (the future William III, King of England) to sail over from the Netherlands to England. The original engraving was made late in the 17th century by J. Collins after T. Thacker's design (see legend at bottom of engraving). Copy of the engraving was kindly supplied to us by Mr. P. F. Rae, of the Department of Prints and Drawings, The British Museum, London. We are also indebted to the photographic services and the Trustees of the British Museum.
"Popish wind" usually referred to a westerly wind which hindered the sailing.

Actually, the term "Protestant wind" was first applied to the wind that back in 1588, in the days of Elizabeth I, helped the English navy against the Spanish Armada (Jones, 1973, p. 202). The term seems to have fallen into disuse until 1687 when it was applied to the wind that kept the Irish Catholic and Jacobite (supporter of James) Earl of Tyrconnel from proceeding to Ireland (Macaulay, 1929 edition, p. 65, footnote), after earlier in 1687 James had appointed him Lord Deputy of Ireland. The term figures in a doggerel ballad called Lilliburlero that became most popular in England that year. The "poem" was written by a Thomas Wharton, while the lively march rhythm of the ballad was prepared by the great composer Henry Purcell. However, the ballad achieved its greatest success in October 1688 when the presence of Irish troops in England produced its revival because of the reference to a "Protestant wind" which made it impossible to bring in more Irish regiments. According to Burnet (quoted after Lord, 1975, p. 485), the "poem" "made an impression on the army [of James] that cannot be imagined by those who saw it not. The whole army and at last the people, both in city and country, were singing it perpetually."

Two of the 24 lines of the doggerel run as follows:

"Oh, but why does he stay behind,
Ho, by my shoul, 'tis a Protestant wind"

(Lord, 1975, p. 487). Originally, "he" referred to Tyrconnel.

In October 1688, "Protestant wind" meant, as was stated earlier, an east wind that would enable the prince to set sail from the Netherlands, and a west wind was called "Popish wind."

Thus when on 30 October the wind turned back, temporarily, to westerly, and forced the prince's armada to return to port (see Section 7 below), Archbishop Count d'Adda, the papal nuncio in London, wrote a report to the secretary of state of the papal court that begins as follows: "Last Saturday, October 30 [N.S.] the wind turned about temporarily against the Dutch [contrario agli Olandesi], which is now called Popish wind [Vento Papista] (d'Adda, 1688*)."

b. In the Netherlands

It is natural that the direction of wind engaged the minds of the people in the Netherlands, too. John Whittle, a chaplain in the English army who fled from England to the Netherlands and traveled back with the invasion force, wrote a tract, An Exact Diary of the Late Expedition of his Illustrious Highness the Prince of Orange etc. (1689*). On pp. 14–15 he refers to the weeks preceding the landing of the prince in England and says that the usual thing in the morning (in the Netherlands) was to go and see from which direction the wind blew ("how the Wind sate") and if there were any probability for a change. When any person called at any house on any business, the very first Question by all was, Sir, I pray how is the Wind today? Are we likely to get an Easterly Wind ere long? Pray God send it, and such like. The Ministers themselves pray'd, That God would be pleas'd for to grant an East wind. Others a favourable Wind that might bring his Illustrious Highness the Prince of Orange, with this whole Fleet (which now attended him) unto the desired Haven: for nothing could possibly be more desired than a Fair Wind for the [Prince's] Navy, by all sorts and conditions of men (except Papists).

There was a Report here, that the Jesuits had promised the late K. James, that the Westerly Wind should continue until Christmas: but that was false, every man knows. [Italics of Whittle.]

According to the Dutch historian Wagenaar (1764, p. 550), divine services were held in all parts of the Netherlands shortly before the sailing, praying for God's blessing on the prince's undertaking for safeguarding the Protestant religion. D'Avaux (1753 printing, p. 307), the French ambassador in The Hague, records in that connection that the Spanish envoy in The Hague held a great mass and vespers in his chapel which are offered only on the occasions of great feasts, scandalizing thereby "all Catholics"; his preacher recommended in a sermon prayers for the Netherlands and for the Prince of Orange. (D'Avaux's "all" is by far not correct.)

5. The winds of October-November 1688

To the best of our knowledge, the only set of daily wind observations during the above-named period is that by the English astrologer John Gadbury who published the results of 21 years of weather observations in London in a curiously titled book, see References (Gadbury, 1691*). His observations for September through December are shown in Fig. 2, which is a photographic copy of his pertinent tables. We do not know whether the observations were taken at a set hour of the day, nor does Gadbury give a key of his abbreviations, though most of them can be conjectured. We must add, too, that in two or three cases where we have notes on the winds in London from diaries and letters (John Evelyn's Diary and the Ellis Correspondence, see below), there is no close accord between the two sources.

It is seen in Gadbury's observations that "his" winds in London were from the westerly quarter, i.e., between southwest and northwest, from September to the first few days of November. This was an extended period of westerly winds in the area of concern. We do not have data on the persistence of wind direction either in England or in the Netherlands, but we think it likely that extended periods of winds from the westerly quarter have occurred in more recent times, too. However, the following paragraph will indicate that the likelihood of extended periods of westerly winds, mainly between southwest and west, was, in the 1700s in the vicinity of the North Sea, greater than in recent times.

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11 Gadbury's dates are "Old Style" (O.S.), the calendar still in use in England of the 17th century. To turn the O.S. dates into New Style (N.S.) for the 17th century, add 10 to the day date. See footnote 6.

12 We were in contact with Drs. P. White and R. Whyman, Meteorological Office, Bracknell, England, as to the availability of a tabulation of wind-direction persistence in recent decades at some stations in England. Unfortunately, no tabulation in the format required for us is available.
Wind data from the Netherlands, first and foremost from Amsterdam, are available since 1700. These were studied and compared with recent observations by Dutch scientists. The papers in question are by van Veen (1940), van Riel (1941), Braak (1942), and Havinga (1948); summaries of these are found in Visser (1941) and Labrijn (1945). Fig. 3 is based on van Veen’s Fig. 3 (see also Figs. 4 and 5 in Visser). Both the 1700–50 and the 1888–1937 sets are for Amsterdam but not for the same location. Van Veen does not seem to be con-

Fig. 2. (above) A copy of two pages, covering the period September through December 1688, from J. Gadbury’s Weather Diary for XXI Years for London (Gadbury, 1691). Gadbury did not publish a key to his numerals abbreviations, but the meaning of most of them can be conjectured, probably correctly. Note that September through October, 26 October excepted, the winds of his observations in London were from the westerly quarter: “Popish” winds persisted. Gadbury’s dates are “Old Style”; to turn them into “New Style” dates, add 10 to the day date, as appropriate for the end of the 17th century.

Fig. 3. (right) Changes in wind direction at Amsterdam, 1700–1939. This diagram is based on van Veen’s (1940) Fig. 3. Note the high proportion of southwest-to-west-to-northwest winds in 1700–50, compared with data for the more recent decades. (It is not relevant to the present study, at least not directly, but note the low incidence of south-to-southwest winds early in the 18th century.)
cerned about this point, which probably implies that no significant differences are expected between the two. The most striking features of the data for 1700-50 compared with those for 1888-1937 are as follows: a) a notable excess of winds between southwest and west; b) an excess of southeasterlies; and c) a paucity of southerly winds. a) and b) could be related to the incidence of long periods of winds from the westerly quarter, and these long or relatively long periods may have been due to a more southerly to southeasterly position of the Icelandic Low than is the case at present. The excess of winds between southwest and west and our tentative interpretation (a more southerly to southeasterly position of the Icelandic Low) would be consistent with the known greater storminess and higher incidence of cold outbreaks in the 17th and 18th centuries in western Europe (e.g., Lamb, 1977, pp. 461-470).

The preponderance of westerly winds and the paucity of winds with a southerly component in western Europe toward the end of the 17th century are corroborated additionally by a count of wind directions in Gaddbury's (1691) observations in London for 1674-89 by E. L. Hawke. Hawke's results are published in Schave (1962, Table 2).

6. William's armada

The armada assembled by William consisted, according to de Jonge (1860, p. 41), of 43 ships of war; Powley (1928, pp. 35-36) puts their number at 49, but both writers agree that the number of fireships amounted to 10. As to transport ships for infantry, cavalry, horses, "powder and ball," spare arms for "joinees" in England, and supplies of sorts, the estimates figuring in the literature differ greatly: between about 150 and 500. None of the warships was greater than what was called "third-rate" or larger than about 1000 tons and carrying more than 60-70 guns. Larger ships would not have dared to be out at sea, as it was said, "in winter." It is probably not without significance for the climate of the 17th century that the end of October counted as winter. (For the "classification" of warships of the days, see Ehrman, 1953, p. 626.)

As to the size of the force, Carswell (1969, p. 170, footnote) quotes Dutch sources giving 12,000 foot, 3300 horse, and some artillery personnel, a total of about 16,000 fighting men, many of whom were foreign mercenaries, including six English and Scottish regiments (Powley, 1928, pp. 6, 83) that were in the pay of the Netherlands for some years (the small Republic that had big, powerful enemies, such as France, could not do without foreign mercenaries). James's land forces counted about 40,000 men (Carswell, 1969, p. 164, footnote) and the number of his men-of-war was rather close to that of the prince's fleet.

Late in September began the boarding of troops. This took time, and even more time-consuming was the embarkation of the thousands of horses. William was concerned that the process might last until after the wind had changed to easterly. He felt that no day should be lost as winter was approaching.

The embarkation, which took place off Hellevoetsluis in the estuary of River Maas, about 35 km west-southwest of Rotterdam (see Fig. 4), was complete, except for that of the horses, by 6 October (Carswell, 1969, p. 170; Jones, 1973, p. 210; Jones gives the date as 7 October), but the wind was still from the west. The delay not only brought the danger of winter nearer, but it threatened the morale of men and the fitness of horses.

7. The "descent" on England: Initial failure

As stated in Section 1, recent papers by Jones (1973) and by Anderson (1983) discuss the sailings (initial failure and success less than a fortnight later) with emphasis on wind conditions; additionally, Anderson looks at the meteorological conditions in the wider context of the "Little Ice Age." As to books, Carswell's (1969, pp. 115-184) volume describes the sailings in some detail. In our summary we will quote some observations and descriptive passages on winds and/or storms from the contemporary literature.

We have pointed out above that the embarkation of the invasion force (with the possible exception of horses) was complete by 6 October. However, the winds remained westerly for the next 18-20 days (see, e.g., Gaddbury's observation in London in Fig. 1). Burnet (1823 edition, p. 308) (who was to be on the prince's ship during the sailings) writes that before

13 Mr. W. J. Jansen, Librarian, Royal Dutch Meteorological Institute (R.N.M.I.), informed us that the two locations are 900 m apart. But, we must add, that the "old" location was very close to the sea shore (almost on the shore), in a more open exposure than the "modern" station.

14 The low frequency of southerlies noted in Fig. 3 is consistent with a point made by Lamb (1977, p. 463). Lamb quotes a passage, following Brooks (1950 reprint, p. 312), from a book published in Antwerp in 1605 and in London in 1634, according to which "Old shippers of the Netherlands affirming, that they have often noted the voyage from Holland to Spain, to be shorter by a day and half saying than the voyage from Spain to Holland." In quoting this passage we assume that conditions of the late 17th century were more akin to those a century earlier than to present-day conditions.

Brooks (1950, p. 313) publishes a table of wind directions in London from 1667 on, based on notes in diaries. His figures indicate virtually no difference between the data for 1667-1700 and those for 1901-30. This apparent lack of difference is at variance with the Dutch figures. While we cannot be sure about the quality of the early Dutch observations, surely the same applies to diarists. Moreover, the Dutch observers were likely to be professionals but not the diarists; the Dutch observations are regular, those of the diarists rather sporadic. We therefore tend to place greater trust in the figures studied by the Dutch scientists than those on which Brooks' table is based. The Dutch scientists find that the prevailing wind of Amsterdam in the 1700-50 period was between 10 to 20° veered, i.e., closer to west than the "present" of between about 225 and 230°. The prince's armada was large but purely numberwise it was not the largest in history. It is estimated that William the Conqueror invaded England (in 1066) with some 775 vessels, and this is one of the lowest figures cited (see Douglas, 1983, p. 190, footnote 1). The truth is, though, that none of his vessels was larger than what one would call barge.

In November 1274 the Mongol ruler Khubilai Khan attempted an invasion of Japan. His fleet counted 300 "large" ships, 400 to 500 small craft, and a force of 40,000 men (Neumann, 1975, p. 1168). In 1480 B.C. Herakles invaded Greece with a fleet estimated to have counted 1200 vessels (Hammond, 1967, p. 242).

According to Book II of Homer's Iliad, the number of ships ("catalogue of ships") of the confederated Greek States that sailed against Troy (1200 B.C.) amounted to 1186 and the number of troops to about 110,000. But, of course, the historicity of these figures is not assured.
the sailing"... all this while the men of war still riding at sea, it being a continued storm for some weeks." Whittle (1689*), who too was with the expedition, as was stated in Section 4 b, says (p. 14) that the weather [in the Netherlands] worsened as the first fortnight of the month [viz October, O.S., or 11-24 October, N.S.] wore on. Then, "... one night the Winds were so very high, and the Air so tempestuous and stormy shaking the very Houses and People in their Beds, that the whole Fleet riding at anchor was in great peril." Marques de Albeville, James' ambassador at The Hague, writes to his king on 30 October that during the past few days "The fleet [of the Prince of Orange] lost many anchors and cables and rigging by the late stormes. Herbert's* ship who is his owne Vice Admirall, has been opened in the middle... by the stormes" (Historical Manuscripts Commission, 1887,* p. 177). Also d'Avaux, the French ambassador, records (1753,* pp. 285-299) stormy conditions. For 19 October (p. 199) he enters into his memoirs that "the tempest that began 13 days ago, is still raging." In London, too, the winds were brisk from the northwest for several days from 11 October on (1 October, O.S.); it was mostly cold, and on 25th and 26th there was a storm, again from the northwest [see Gadbury's (1691*) observations in Fig. 2].

According to Constantijn Huygens, Jr. (1876* edition, p. 3), elder brother of the great physicist Christian Huygens and secretary to William (he took part in the expedition), in the Hellevoetsluis area of the Netherlands where the fleet gathered, the wind swung to the southeast on 24 October; the same is stated by d'Avaux (1753,* p. 302), but Burnet (1823,* p. 297) says that the wind turned to blow from the east on the 26th. Although this shift is not seen in Gadbury's record for London, Letter CCXI in the Ellis Correspondence (Ellis, 1829* printing, pp. 253-255), dated London 26 October 1688, says that "the wind is east-northeast and thereabouts all day"; Letter XXVII, dated London the same day and signed O. Wynne, states that "we expect the Dutch Armada will appear every minute on the coast."

Despite the fact that the wind turned to come from the easterly quarter either on the 24th or the 26th, the sailing did not effectively start before the 30th: some ships had to arrive from the Zuider Zee area, including Amsterdam, and these could not slip out of the Zuider Zee, between Den Helder and the island of Texel (see Fig. 4), without a suitable easterly wind; further, supplies depleted during the long wait had to be replenished, etc.
Hardly was the 30-km-long (Dalrymple, 1771, p. 159) armada out of the Maas estuary when the wind strengthened to gale force from the southwest, only to veer to the northwest shortly thereafter. Huygens (1675, p. 17) records that the sea was so heavy that he and even sailors fell seasick.

Dalrymple (1771, p. 156) describes the storm in the following words:

During the night [from 30-31 October] the wind changed to northwest, and a dreadful tempest succeeded, the horror of which was augmented by the darkness of the season, the number of the ships which endangered each other, and the terror of landsmen, who having been unaccustomed to the sea, either sunk into despair or perplexed the seamen with an unavailing assistance: The number of horses... ill fastened, adding equally to the distraction and the danger. In two hours [here Dalrymple quotes Rapin, a French Huguenot refugee and historian who was on board William's ship] the whole fleet was dispersed.

The English ambassador describes that storm as "...a crewell storme... which happened on Saturday night" [the night from 30-31 October] (Historical Manuscripts Commission, 1887, p. 176). In his report of 3 November to the secretary of state of the papal court, d'Adda, the papal nuncio to London (we referred to this report in Section 4a; see also footnote 9), describes this storm as "una furiosa Borasla sul mare," i.e., "a furious northerly wind over the sea."

Efforts were made to signal the ships to return to safe ports, but a great number of ships could not be reached by signals and, therefore, a search had to be made for them the next day. Miraculously enough, virtually no ships and no men were lost. There was considerable damage to many ships and something like 400 horses had to be thrown overboard. An anonymous "journal" (Jones, 1973, p. 17) kept by a participant in the expedition mentions under the date of 1 November the grief that afflicted him and his fellows ("Nous" —the document is in French) on their return to Hellevoetsluis when they saw many (dead) horses floating in the sea.

News of the losses and damage to the prince's armada reached England in a greatly exaggerated form, and the prince took steps to strengthen the impression of heavy losses. According to Bohun (1689, p. 33), a contemporary English writer, in England "...the Catholic Priests began to boast very much of the assistance they expected from the Virgin Mary [italics of Bohun], and the rest of the Saints who had been powerfully sollicitated to confound the Heretical Fleet." James regained his confidence. Now that the invasion seemed to be frustrated, he retracted his promise of September, viz. of parliamentary elections in November. This retraction, which was in line with his previous behavior, aggravated still further his position in the country.

Returning to the various reports cited in this section about the weather throughout October 1688, the month appears to have been rather stormy.

8. The "descent" on England: The successful sailing

The failure of the first sailing roused despair in the hearts of many, but especially in the hearts of the Englishmen (de Jonge, 1860, p. 59) about the prince. Some thought that the idea of sailing before the winter was over was hopeless; however, the prince remained firm. He distinguished himself by steadfastness of purpose, even in hours of distress, ever since in summer 1672 he, a young man of 22, had to lead Nederland's defense against the invading French forces (Lindgren and Neumann, 1983).

During the next few days after the return of the armada to Hellevoetsluis, repairs were effected to ships, supplies were replenished, horses replaced, etc. The weather remained rather unsettled for the first eight or nine days of November. On some of those days the weather was cold and rainy and the winds violent, endangering the fleet (de Jonge, 1860, p. 59; Jones, 1973, p. 17). Gadbury, too, records (1691, see Fig. 2 in this paper) a tempest at London on the 3rd (24 October, O.S.).

Towards the 9th, Tuesday, the wind turned to come from east-northeast at the Dutch coast (Jones, 1973, p. 17; de Jonge, 1860, p. 60). As Powley (1926, p. 79) puts it: "...at last the Protestant wind had returned," and, according to de Jonge (1860, p. 60), the storms eased. The whole armada was under sail by the 11th—toward the northwest. However, the weather must have become unsettled once again: the sailing was "into the squalls and darkness" (Carswell, 1969, p. 180). Also, Gadbury records that in London on the 11th (1 November, O.S.) it was "cold, very cold," with sleet the next day.

The fact that the armada sailed northwest from Hellevoetsluis made many believe that the landing would take place in the north of England. But at night from the 12th to the 13th, Friday to Saturday, the wind shifted, apparently, to northerly or more northerly, and the fleet executed a dramatic change of direction toward the south, toward the English Channel; i.e., toward southern England.

On the 13th, the wind was still from the north (Carswell, 1969, p. 180). In the early hours of the day, the armada passed by James' navy to the starboard side at a point to the north of Thames' estuary (at Gunfleet). The English navy tried to weigh after the Dutch but the floodtide was against it. Somewhat later, the armada crossed the Dover-Calais line, where on the coasts on both sides multitudes of people were watching the parade-like procession of ships.

It seems that the wind shifted back more to easterly later on, facilitating the progression westward in the Channel. On the 15th, Monday, after correcting an error in navigation, the armada put in at Torbay, in the western part of southern England (see Fig. 4). The landing was unopposed; the first units to step ashore were the six English and Scottish regiments that were in the service of the Netherlands. The English navy gave chase belatedly, but because of wind conditions, it could get no farther than Portsmouth, in the eastern part of southern England. The routes of the two fleets are shown in Fig. 4.

The advance of the "descending" force to London has no point of meteorological interest. Very briefly, the progress of the prince's force toward London was slow at first, and the attitude of the local population was cautious for some days. People were afraid of James' vengeance. They still had vividly on their mind the memory of the merciless cutting down of the Monmouth rebellion by James in 1685. However, a few days

17 James, the Duke of Monmouth, was an illegitimate son of Charles I; i.e., he was a half-brother of James. Early in summer 1681 Monmouth "invaded" the southwest of England with a small force in order to seize the crown from James.
later, seeing that James was not able to stop William, people joined the prince in growing numbers, and gradually, his advance became a triumphal procession, with hardly any bloodshed at all. Soon James fled from London, and early in January 1689 he fled to France. In February 1689 William and his spouse Mary, James' daughter, were made sovereigns of England jointly, William as William III. Early in 1695 Mary passed away.

From the day of the second sailing from the Netherlands, the winds and their changes en route to Torbay on the west-side of southern England suited the Dutch armada so well (for instance, when the armada reached close to the English Channel, the winds turned to the south and west, facilitating the prince’s sailing to Torbay), and the same winds obstructed the English navy so effectively, that by the time that the English warships were able to move out of their station near the northside of the Thames estuary, they could not enter the channel because of contrary winds; on 17 November the winds were so strong from the southwest that the fleet had to take shelter off the Kentish coast, to the north of the channel (Jones, 1973, p. 219). No wonder that in 1688 and for many decades thereafter, a good number of people believed that the winds were an express manifestation of God’s will to guide the prince to England.

Appendix. William I, The Conqueror, and William III

There is a degree of parallelism in regard to an extended period of wait for a suitable wind direction, between two famous invasions of Britain: one in 1066 by William, Duke of Normandy, the future William I of England or William the Conqueror, and the other in 1688 by William, Prince of Orange, the future William III.

We have pointed out earlier in the present study that the wind blew persistently from the westerly quarter in fall 1688 in the area of the (southern) North Sea, and this westerly wind delayed the sailing of the Prince of Orange’s armada from the Netherlands to England. The prince and many people in England and in the Netherlands (and, as a matter of fact, in other countries, too) anxiously watched the direction of wind. For many this meant watching wind vanes. It was on or about 26 October that the wind turned (temporarily) to blow from the easterly quarter. On the 29th and 30th, the armada weighed its anchors.

William the Conqueror assembled his fleet on 12 August 1066 at the mouth of the river Dive, on Normandy’s coast, waiting for a favorable wind. However, the wind was almost persistently northerly and hindered the sailing to England. On 12 September, after a one-month wait, William moved his fleet with the aid of a west wind to a point along the French coast much closer to England, viz. to St. Valéry-en-Somme, in the estuary of the river Somme. However, the wind continued to blow from the north, and it kept William’s fleet pent up in the estuary. The process of waiting began anew. On 27 September the wind changed at last to southerly, and on the night of 27–28 the fleet sailed, landing the next day at Pevensey, in southern Sussex. On 14 October, about 90 km east-northeast of Pevensey, at Hastings, the famous battle took place (Douglas, 1983, pp. 192–195, 396).

William the Conqueror’s anxious concern with wind direction is described, probably with poetic license, in a poem composed about two years after the Battle of Hastings by Wido, Bishop of Amiens (departement de Somme) whose name is variously quoted as Gui, or Guido, or Guy, sometimes with the adjective “Ambisiis,” i.e., “of Amiens.” The poem is in Latin and extols the praises of the conquering duke. It carries the title De bello Hastingensi carmen, or Song of the Battle of Hastings. In lines 52 to 61 of the song (Monumenta Historica Britannaica, 1848, * p. 857) Wido describes how the duke had to tarry for a favorable wind at St. Valéry three times five days hoping for the help of the Supreme Judge; he redoubled his devotions and frequently visited the minster supplicating for the fulfillment of his prayers. Then the song continues: “He watched the weathercock on the minster’s tower. When Auster (the south wind) blew, he was joyous, but when Boreas (the north wind) blew and diverted Auster, he shed tears of sorrow.”

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The authors are grateful to a referee who drew their attention to two historical cases of wind effects in the Mediterranean on, respectively, a warship and a complete squadron of Spain in the 16th century. In both cases the winds were mistrals. The cases are described on pp. 250–253 of an important textbook by the French historian Braudel (1972).

References

a. Primary sources


18 Sometimes this poem is quoted under the title Carmen de Hastiengesi proelio. (Proelium = battle.)

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b. Secondary sources


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