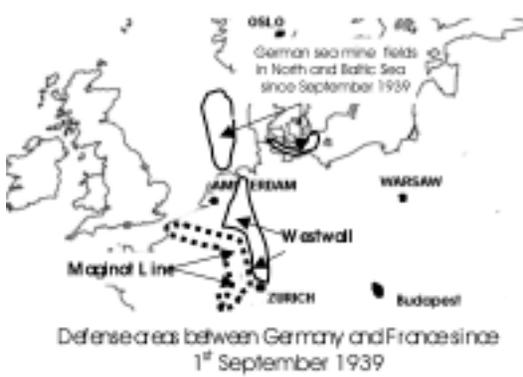


## Resultant Rain due to War – 1939 (2\_31)

### Aim of this paper

How World War II (WWII) drove Northern Europe into the hardest winter for one hundred years is subject of a number of chapters. This paper aims to show and discuss that not only Europe but the whole northern hemisphere fell prey to an arctic spell. United States and China experienced severe cold in January 1940, while Northern Europe was back in ice age conditions for the duration of two months.

While considering reasons for these occurrences of ‘cold’ conditions in the winter of 1939/40 in Europe, it should not be ignored that military activities on land may have disrupted the balance in the atmosphere by ‘squeezing’ humidity out of the air. Obviously, less water in the air, means colder but dry air. A place where this could have happened was the Western Front between France and Germany after the start of WWII, where more than 2 million soldiers had been put in positions along this Front.



It rained double or even triple the quantity as against recorded long-term mean precipitation in areas which were within a few hundred kilometres range of this war front line. Some regional areas had only days of rain during October. Just few weeks later the USA experienced extremely

dry air and also recorded low rain over the whole country. (A) In the end of December, winter set in and took the entire Northern Hemisphere in its icy grip by early January 1940, and remained frozen throughout the month.

Further details: (A) USA dried out, 2\_32.

This paper attempts to focus attention on this ‘rain making’ phenomenon during the initial war months in 1939. Only at this stage of WWII did the war activities directly interfere with common ‘nature and climate’. Thus this short period of time can be regarded as having gone through a direct ‘clash’ between common nature – in a statistical sense - and civilization. This can be

compared with the sudden major eruption of a volcano with global implications. The time it took for the spread of volcanic ash and dust around the globe after the huge eruption of the volcano Krakatoa in Indonesia on August 27, 1883 until the end of the year may serve as an example<sup>1</sup>. In this case nature took charge and after a relatively short period of time, the atmosphere returned to ‘equilibrium’, making it difficult to prove the source and reasons for this specific meteorological event. It would assist in researches on climate changes, if the impact of WWII - during the first few months – was under consideration, or when the war after having entered its 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> years has to be studied in detail. The German meteorologist R. Scherhag<sup>2</sup>, observed a “great disruption in circulation” during the winter of 1939/40 only, even though the winters that followed in 1940/41 and 1941/42 were also of similar nature. However, before the second and third winters of the war, military activities took place throughout the year, giving nature time to move from ‘equilibrium to equilibrium’ without a sudden disruption. Although this aspect is admittedly rather difficult to explain, one particular practical example is part of this study. This example demonstrates a link between excessive rain in Central Europe (see this chapter), and the record ‘dry air’ in the United States from October to December 1939 (next chapter). This is a substantial evidence of anthropogenic influence. This proof, on a meteorologically sensitive issue, is presumably valid only when WWII had just started. Why did the USA, after a ‘normal’ year, suddenly receive only very dry air for three months, while the war in Europe that ‘squeezed’ water out of the atmosphere only a few weeks earlier?



pave way for arctic air should be regarded as a temporarily contributing factor only.

Before continuing it should be stressed once again, that the making of the arctic winter 1939/40 in Northern Europe is primarily a regional affair due to war at sea in adjacent waters. Making the atmosphere rain and

### Limitations of this paper

This paper does not propose to discuss physical/chemical processes in a hydro-dynamic environment. It aims only to show that with the start of WWII certain events occurred which cannot be related to conditions other

<sup>1</sup> Wexler, Spread

<sup>2</sup> Scherhag, 1951

than war activities. However, war activities in this respect can mean quite different things as mentioned below:

- 1) The war machinery and its activities penetrate the atmosphere directly or indirectly with physical/chemical means, which subsequently set processes in motion that eventually produce rain; e.g. the raging of war along the Western Front and many other battle fields and the burning of cities all over Poland during September 1939.
- 2) The war machinery and its activities also stirred and mixed the seas and oceans, with the following results:
  - a) accelerated evaporation,
  - b) raised vapour and initiated flow of air, from Northern Scandinavia or from Russia to the North and Baltic Sea;
  - c) Presumably cold air (colder than seasonal average) forced humid air into increased precipitation, e.g. in Central Europe.
  - d) It started to 'block' the West Drift, commonly moving maritime air from the Atlantic through Western Europe, via the North Sea. Instead, continental air flew in from the east.
  - e) The continental air, colder than maritime air, that had been coming via Scandinavia or the 'corridor' of the Southern Baltic Sea/Poland and North Germany along until it reached the North Sea, could have been a major contributor to the excessive rain along and behind the Western Front.
- 3) The war in China was also a factor which should not be ignored. However, very little material from the Far East had been available for this study which can at best help to attempt a basic assessment. Furthermore war in China, would have had hardly any impact on the autumn weather in Europe. However, some relevance of this war on drought conditions in the USA in late 1939 cannot be ruled out.
- 4) The topics mentioned below will be discussed in greater detail in chapters:
  - North Sea cooling (2\_16), concerning items 2a-d;
  - Lost West Drift (2\_12), concerning items 2c-d;
  - War in China 1939 (2\_33), concerning item 3;
  - USA dried out 1939 (2\_32), concerning item 3.



The lack of rain during the German invasion of Poland in September 1939 will receive attention. This attack which was an extremely destructive military operation could possibly have deprived Poland of 'normal' rain. If so, it could serve as a proof that military activities along the Western Front kept Poland rainless. It would be a sadly ironic event, if true (see below). The situation on Polish territory during September 1939 may have also contributed to the blocked 'West Drift' in a minor way.

A final aspect, although speculative, should also be mentioned here. The military onslaught on Poland during September 1939 was, until then, the most massive military land war operation in such a short period of time. It ended after four weeks, with Warsaw burning for many days. All the material that had been thrown into the atmosphere, like that of the burst of the Krakatoa 56 years earlier, could have served as 'condensation nuclei', if it had managed to travel a little farther to the west, contributing to heavy rain along the Western Front, or influencing rain conditions further east, e.g. when Russian and Japanese forces waged a week long battle on the boarder between Outer Mongolia and Manchuku in August and September 1939. (A)

Further details: (A) War in China, 2\_33.

### Basic Factors

Weather modification has been studied intensively by scientists since WWII. A number of programmes and experiments have been conducted<sup>3</sup>. There are actually quite a few theories as to which activities of humans may affect the natural causes of weather<sup>4</sup>. Anthropogenic aerosols can have an impact on the weather process. Rainmaking experiments have been performed on the assumption that some clouds precipitate inefficiently, or not at all, because they are deficient in natural nuclei. In some cases clouds only need some "seeding" to make them produce ice nuclei, snowflakes and raindrops.

- Rain processing: Water can condense in the air by the use of molecules as condensation nucleus. Condensation occurs on a wide variety of aerosol particles e.g. particles of dust, salt, desert sand or smoke. These particles when condensed, usually lead to cloud formation. Among the highly efficient condensation nuclei are salt particles produced by the evaporation of sea water. But it now appears that particles produced by man-made fibres also make a major contribution<sup>5</sup>.

The biggest rain making experiment may have started in the autumn of 1939. Since the 1<sup>st</sup> of September a lot of 'seeds' had been pushed into the air. It was

<sup>3</sup> Sewell

<sup>4</sup> Parker, pp 541-547.

<sup>5</sup> Parker, p.100

possible for them to ‘make’ rain and this is precisely what happened. A several hundred kilometre long military defence zone between France and Germany, the Maginot Line and the Westwall, were put into full operation immediately after the war had started. It began to rain significantly on the continent along the Western Front. It rained more than the average in September, even more heavily in October and November and still more in December before Northern Europe was dragged into arctic weather conditions with frost, ice and snow until March 1940. Only the first four war months, viz. September to December 1939, are the subject for the following study as, latest by December 1939, European weather had lost its “natural texture”.

Meteorological data indicate that excessive rain was fed by “seeding” due to war. Rain fell within close distance of war activities in the West, while further East the Poles waited in vain for rain.

Although neither big battles nor “shoot outs” occurred along the huge defence system in the West, everything was done to improve defence capabilities and to prepare two million soldiers for the worst. Therefore both fronts were busy day and night with transportation, construction, survey, training and military encounters. The first substantial clash saw 700 French tanks and planes moving seven miles over the Saarland border, while 300 air planes attacked German positions in the Aachen industrial region and munitions area, some 125 miles further north, (NYT, 7 Sept.1939), encounters that occurred since then frequently. At the same time British troops were landing on the continent rapidly, while German planes targeted England for the first time, (NYT, ditto) the Royal Air force bombed the isle of Sylt. (NYT 9 Sept 39). There were several encounters which occurred in numerous places along the Western Front and elsewhere every day.

### **Poland without rain in September 1939**

According to an assessment by the German meteorological service, September 1939 was considerably wet from the upper and middle of the Rhine region (Duisburg/Cologne to Frankfurt/Darmstadt) eastward to Silesia. Large parts of middle and southern Germany received double than average rain. On 4<sup>th</sup> September, a wet warm high pressure front (1015 mb), approached from the Atlantic, which brought to the whole of West Germany mist and rain, but moved quickly eastwards. The warm front was almost exactly in line with the French/German Westfront at 8:00 a.m. on Sept 4<sup>th</sup>, the with centre of a low pressure close to Luxembourg and rain coming down in Germany, leaving nothing for Poland<sup>6</sup>.

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<sup>6</sup> Seewarte

On 11<sup>th</sup> September, a low pressure (1,000mb) originated west of Jutland, moved south to the Schelde area (12<sup>th</sup>), and to Belgium (13<sup>th</sup>), bringing lots of rain to North Germany and excess rain of 50mm to 100mm to Southern Germany. This low-pressure cyclone moved through the North Sea, close to the sea mines that the German Navy had started to lay quickly, across the middle of the North Sea, at the outer edge of the German Bight. This could possibly be the first example of a cyclone being “attracted” by sea war activities which produced “evaporation”. (A) At least the cyclone also gave Poland some rain before the 13<sup>th</sup> of September but it was too little, too late.

Further details: (A) Cyclones and shells, 2\_21.

A report (NYT, 15 Sep. 1939) that Warsaw received heavy rain, was proved wrong. It was only a drizzle in most areas (NYT, 17 Sept. 1939). By then Warsaw was encircled. The Red Army marched into Poland from the East. Days of the Polish Republic were numbered. The Nazis had deployed 5,000 planes in Poland (NYT, 25 Sept. 1939). On September 25, 1939, 240 German planes bombed Warsaw, dropping 560 tons of bombs, including the first 1,000 kg bomb. Meanwhile 1,000 batteries shelled the city. 30 transport aircraft dropped 70 tons of fire-bombs. Warsaw was on fire for many days. Poland surrendered. There was nothing but dust and ashes from burning cities eastward around for a couple of days or weeks. Did this dust help to pour horrendous rain on New York in early November 1939, recording 1.4 inches in one day? (NYT, 6 November 1939). But some of the dust could also have been moved by easterly winds to the Western Front contributing to excessive rain in Central Europe.



The German Meteorological Service makes the following assessment for September 1939: Precipitation in North Germany is markedly below the mean averages. The opposite occurred in all other parts of Germany, with

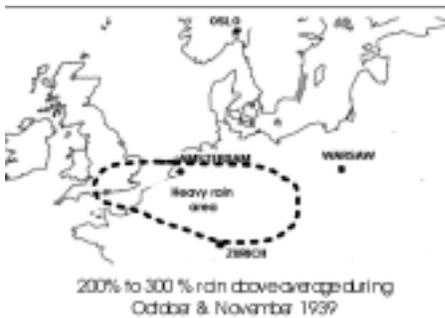
significantly higher quantity of rain than mean averages. The September 1939 precipitation in percentage terms of average figures (1851-1930) for some places in Germany had been as follows:

Berlin-Dahlem (197 %); Frankfurt/Oder (197 %); Breslau (204 %); Ratibor (210 %); Karlsruhe i.B. (208 %); Stuttgart (199 %); Ulm (226%); Wuerzburg (215 %); Muenchen (212%)<sup>7</sup>.

### October 1939 – Raining ‘Cats and Dogs’

In the West, Middle and South Germany volumes of rain recorded at most observation stations was more than double, in some cases even 3.5 times more than usual, as follows: Augsburg 366%; Noerdlingen 362%, Kaiserslautern 336 %, Wuerzburg 316 %<sup>8</sup>.

Due to the war situation there is hardly any weather related documentation available. With respect to Darmstadt it was reported that it would be necessary to go back to the year 1882 to find a similar volume of precipitation during a period of three months, i.e. Sept.-Nov., as the autumn had never been so wet since more than 100 years<sup>9</sup>. The nearby city of Frankfurt a. M. recorded: 137%, 265%, 237% during the time in question.



The Black Forest and Freiburg i. Br. recorded 30 days of rain; a number of other locations had up to 24 days of rain<sup>10</sup>.

An eye-witness report may serve to illustrate the special situation at the Western Front. According

to the New York Times, by mid October the West Front saw a ‘Nazi Attack with 100,000 men’ and the following weather:

“Bad weather prevailed today on the entire Western Front, where conditions could not have been worse for offensive operations. The Germans were obliged to use railroads for amassing/transporting reinforcements, with the result that all lines of communications were clogged throughout the day. Rain and fog kept allied planes grounded.

French artillery whipped the German front line positions, roads and railroads with shrapnel to hamper operations.

<sup>7</sup> Witterungsbericht

<sup>8</sup> Witterungsbericht

<sup>9</sup> Fischer, Nasser

<sup>10</sup> Witterungsbericht

Rains aided flood in Rhine and forced evacuation of several Westwall blockhouses opposite Strasbourg. They also caused the Moselle to rise to a level eleven feet above previous week's level. The Blies and other small streams flowing into the Saar River were flooded and the terrain already badly pocked by artillery fires in Monday's bitter fighting, was covered with water holes". (NYT, 18 Oct. 1939).

Southeast England recorded rainfall of more than three times above average in October 1939. Greenwich saw a higher rainfall only in 1888, and before that in 1840<sup>11</sup>. Greenwich total for October (6.16 in.) and November (4.13 in.) together –10.29 inches – was the highest ever since recording had begun at Greenwich<sup>12</sup>. Similar conditions had been observed at Camden Square (London), where hours of rainfall are recorded as follows: October 77.3 h., November 96.7 h. These were 50 hours higher than the average<sup>13</sup>.

Holland also reported rains throughout the month of October 1939. (NYT, 2 Nov. 1939). Similar condition presumably prevailed in Belgium and Northern France as well. In January 1940 NYT correspondent G. H. Archambault reported while staying with the French Armies: "the autumn of 1939 was one of the wettest known". (NYT, 26 Jan. 1940).

### **November 1939 – Rain Spares France – At least for now**

"Germans continued to shell Forbach. Artillery hammered as forcefully as wet weather impeded action by infantry", (NYT, 06 Nov. 1939). Another headline of the NYT (16 Oct. 1939) reads: "French Still Wait for Reich's Attack – Rain Impedes Fighting".

On 19<sup>th</sup> October plan "Yellow" for the invasion of France was finalised. On 7<sup>th</sup> November commencement of the invasion plan was postponed for the first time. A Blitzkrieg was not advisable with 'General Mud' in company. Hitler wanted to go ahead and would have sent the Wehrmacht across the borders in late 1939, but for excessively wet autumn weather conditions made even Hitler think twice.

Indeed, November 1939 weather conditions were not much better than in October. In general it was a bit too warm and too wet, 200% and more of normal for the season, in Hannover, Aachen, Kassel, Frankfurt a. M., Magdeburg, Ulm, Wuerzburg.

By November 19/20, 1939; The Rhine had been rising again and there was heavy flooding in Switzerland.. (NZZ, 20 Nov. 1939); Heaviest flooding of rivers in Belgium and Holland made navigation impossible. Further rise of water was expected. (NZZ, 29 Nov. 1939)

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<sup>11</sup> Lewis      <sup>12</sup> Correspondence, Greenwich      <sup>13</sup> Correspondence, Camden

That the quantity of rain in East-South-East of Central Europe in late autumn of 1939 was excessive, was confirmed by a NYT report in mid December: “The waters of the Danube River has begun to recede from the record December flood level, and the speed of current, caused by swollen tributaries, relaxed.” (NYT, 13 Dec. 1939).

### **Saxony and Switzerland - December 1939**

Nothing remains to be said on the rain making issue in this chapter. Saxony with its capital Dresden had similar autumn rains as in other parts of Germany. Snowfall in Finland, close to Russian-Finland war theatre, since end of November is certainly a factor which should not be ignored. See: next section.

In Saxony, Dresden reported heavy snowfall lasting 36 hours on December 6 and 7, corresponding to 50 litres per square-metre, with a decrease in temperatures to minus 7°C. Some thing similar had happened 57 years before, in 1882<sup>14</sup>.

Switzerland also experienced a very wet autumn as well, with heavy flooding in late November, and saw last rain on December 11. However, Zürich experienced only some drizzle in early January 1940. (NZZ, 14 January 1940).

### **Russian-Finnish battles in December**

War inside the arctic circle is a serious matter in terms of weather making, especially if the fighting starts at the meteorologically most sensitive time, i.e., from the end of November and till the end of December.

Few weather indications from early December may serve as an illustration (NYT):

Dec. 03: Bad flight weather; Mist and rain on Friday; Snow falling in Helsinki yesterday.

Dec. 04: Blinding snowstorm aids defence; North of Ladoga Lake ice is still thin; Petsamo: bitter cold and severe snowstorm.

Dec. 05: Snowstorm hinders foe; snow is piled deep at various sections of the battle line; early setting in of winter conditions; Helsinki feels safer in snow storm; snowstorm slowed down activities on both fronts and air.

Weather conditions turned worse and worse. The Red Army was completely unprepared for this early winter onslaught by nature and suffered heavy losses in terms of men and material. (A)

Further details: (A) Russian-Finnish war, 2\_41.

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<sup>14</sup> Naegler, Schneefall

With regard to ‘rain making’, the Russian – Finnish winter war during December 1939 should certainly not be ignored in an overall assessment on the driving ‘hydrodynamic’ forces leading to these winter conditions. Shelling and bombing would certainly have contributed to heavy snow and snowstorm conditions, and precipitation that would otherwise have gone down further east somewhere before or behind Moscow.

### Summary

The suddenness and extreme of the war winter of 1939/40 had been such an extraordinary meteorological event that every aspect relating to its rapid build up should be elaborated and weighed. The atmosphere during the particularly climatically sensitive autumn months of September to December in the Northern Hemisphere reacted immediately. Rain that came down in Western Europe as heavy downpour since the war had started on September 1<sup>st</sup> had not been available in the USA during the corresponding period. While mostly excessive rain occurred in Europe in October, four weeks later the USA experienced a record dry month with only 44% precipitation of average for the whole country during November 1939

What followed the ‘humidity gap in the air’ was, *inter alia*, a ‘disruption in circulation’ all over the Northern Hemisphere. Excessive rain in Europe and dryness in the USA were certainly not the only causes for this ‘disruption’. Temporary ‘absence of water’ in the atmosphere provides a perfect explanation as to why not only Europe fell prey to an ice age winter, but also China and the USA had suddenly experienced a very severe January 1940. In fact, cyclonic activities are weakened by less water in the air.

This study aims to highlight that actual “rain forcing” in autumn 1939 might have contributed to free the path for masses of arctic air to move deep south with little resistance from maritime air in all northern parts of the Northern Hemisphere. The severe winter, the coldest for one hundred years in countries bordering most war-affected seas in Northern Europe, did not come ‘just out of the blue.’ The clue to this is to be found in the war at sea. The distant impact of the war in Europe and in the winter of January 1940 in the USA and China had presumably contributed to ‘rain forcing’ in Europe that evidently brought a record dry autumn spell to the States, and subsequently paved the way for arctic air to dominate over areas usually under the influence of the West Drift. In this respect it is worth noting that East Siberia and Canada had been actually too warm (about + 7°C) at the same period of time<sup>15</sup>. An interesting aspect, while assessing events in late 1939, is that nature was still in its ‘pristine status’, allowing observations or deviation to be assessed on an uninterrupted or ‘mixed-up’ data basis. The autumn 1939 provides a very important period in this respect.

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<sup>15</sup> Scherhag, 1951