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Realities in the Skies

A comment on John Walsh's article "Skies and Reality in Dutch Landscape Painting" (1991)

For more than a century there has been a discussion about the realism of Dutch landscape painting of the 17th century. Clouds and other weather elements play a dominant role in these paintings. In addition, Dutch landscapes are depicted with a geological preciseness, and even flora and fauna are shown in an unprecedented accuracy.

The article by John Walsh "*Skies and Reality in Dutch Landscape Painting*" (Walsh 1991) is regarded as a standard as far as realism of clouds in Dutch landscape painting is concerned. In fact, Walsh's article is highly valuable as a contribution to the discussion on realism in Dutch painting because in contrast to Rostworowsky (1981) and other authors he introduced the necessary scepticism into the debate. Dutch landscape painting was not an early form of landscape photography. This, by the way, also means that paintings cannot be used as reliable climate proxy data. Walsh is right when he points out that "*painters did not represent the Dutch climate in a way that was faithful to prevailing conditions…*" (p. 95) and that the 17th century masters have a strong bias towards fine or dramatic weather. In fact meteorologists and climatologists have dismissed the approach to determine climate and its changes from paintings because nature's climate archives are more reliable.[1]

On the other hand, science can help to identify meteorology, geology, and climate in paintings and, thus, give art historians an additional tool to interprete the contents of the pictures. This is particularly true for Dutch landscape painting of the 17th century but automatically leads to the question: "*How true to nature are the skies in Dutch painting?*" (Walsh, p. 94) Of course painting is not photography but Dutch cloud painting is more realistic than Walsh's question indicates.

Weather in Central Europe

If we talk about realism in depictions of atmospheric phenomena we always have to refer to the geographic region where "the weather" takes place. The Netherlands are situated in the moderate latitudes of Europe. Dutch painters were astute observers of nature, their depiction of flowers, insects, trees and clouds were more realistic than ever before in art history. We should expect, therefore, that their cloud painting gives a reliable picture of the sky. In other words this means: if these sharp observers of nature did not reproduce in their paintings what they saw, there has to be a reason for that.

Walsh correctly states that the kinds of "*atmospheric conditions in paintings nevertheless belong to surprisingly few types. Artists generally showed the good or the bad, seldom the mediocre.*" (Walsh, p.94). But from this he concludes that Dutch cloud painting was not at all typical for the weather in western Central Europe. "*The most common kinds of Dutch weather – a heavy deck of clouds, intermittent drizzle and heavy rain, and a veil of fog…*"(Walsh, p. 96) is a description of weather in this part of Central Europe that was not even valid during the Little Ice Age. It is true that there are no Dutch paintings that show a clear blue sky (Walsh, idib.) but the clouds that are painted are meteorologically identifiable and in most cases rendered the atmosphere close to nature. This may serve as a definition for "realism".

The most common cloud type is stratocumulus (WMO, 1956, 1987a).[2] Actually there are a lot of paintings that show stratocumulus clouds, e.g. Jacob van Ruisdael's smaller "Haarlempje" of the Painting Gallery in Berlin (c. 1670, Fig.1) which represents very normal weather in Holland. Indeed a

[1] vgl. Ossing (2012); modern paleo-climatology gets its information from ice cores, sediments, dendrochronology etc. These natural climate archives give reliable data sets that accurately describe past climate changes in a range of time-scales from millions of years to decades.

[2] In George Siscoe's photo (Walsh Fig.7, p. 102) it is hard to distinguish the cloud type. However, it does not seem to be a stratocumulus as is written in the subtitle, but a cirrus cloud.

large number of clouds belonging to different weather situations can be found in the galleries giving an overview of the types of weather prevailing in Europe and during the Little Ice Age (Ossing 2001). We find winter scenes with a layer of stratus cloud breaking up: typical for winter mornings in a high pressure situation (van der Venne, Fig. 2), late summer days with cold air invading Europe (Santvoort, Fig. 3), cumulonimbus clouds at the passage of a cold front in early spring (Asselijn, Muiderdijk, Fig. 4), and so on.

Fig. 1: *Ruisdael, Haarlempje*

Fig. 2: *van der Venne, Winter*

Fig. 3: *Santvoort, Land and Farm*

Fig. 4: *Asselijn, Muiderdijk*

All paintings by kind permission of the Painting Gallery Berlin SMB, photos: Jörg P. Anders. (click on the pictures to enlarge)

We can conclude that it is correct to say that Dutch landscape painting of the 17th century has a bias towards the fine or dramatic weather. But this does not mean that the other European weather types are not found at all. It just means that certain types of weather were painted more frequently than others, as Walsh correctly writes. Of course this also means that one has to be very careful in any attempt to draw climatological conclusions from these paintings. But this has nothing to do with the question if the depicted weather is "realistic" or not.

This seems to describe the situation as we see it today from the works of the "Golden Age" that have remained in museums and collections. But a research project at the University of Amsterdam shows that between 1580 an 1800 a number of 8 to 10 million paintings were created (van der Woude 1991); alone in 1650 more than 70 000 paintings were produced by the guild painters, most of these landscape paintings (Frijhoff/Spies 1999). Of this incredible amount, only 1 % has survived and can be found in the galleries today (van der Woude 1991, North 1992). Therefore, we could assume that the survivors do not represent the whole. It is true when Walsh points to a limited number of atmospheric conditions, but recalling the above-mentioned numbers our picture of the Dutch sky painting might as well be incomplete.

The Thermodynamics of Clouds

Walsh's argument, however, is not only restricted to the few atmospheric conditions that are depicted. Following the space physicist George Siscoe he assumes that Dutch cloud painting "*defies meteorology and thermodynamics*" (Walsh, p. 96) which means that this cloud painting cannot be realistic at all.

The argument is based on atmospheric thermodynamics and states correctly that a stable and an unstable atmosphere cannot exist together in close vicinity. In fact, weather is nothing else but the constant production of unstable conditions and the subsequent tendency of the atmosphere to regain stable conditions. In general, low pressure zones have prevailingly an unstable vertical stratification, highs are stable.

Why then does Dutch landscape painting defy the laws of atmospheric thermodynamics? Siscoe and Walsh state that stratiform and convective (cumulus) clouds are found together in the paintings which meteorologically is not possible.

There are several assumptions in this statement that do not stand closer meteorological examination. First, it is wrong to attribute stratiform clouds only to stable weather and convective clouds only to unstable atmospheric conditions. Cumulus clouds can be found in high pressure zones and stratus clouds can be found in lows, the extrem case is a thunderstorm cloud (cumulonimbus) embedded in a heavy nimbostratus deck, still today a pilot's nightmare. That is: stratiform and cumuliform types of clouds can co-exist, even in close vicinity.

Fig. 5: *Salomon van Ruysdael, "River Landscape with a Ferry",1630/35, by kind permission of the Alte Pinakothek Munich, Inv.Nr. 161. The clouds are cumuli that develop from stratus (Cu hum st-mutatus) (click to enlarge)*

Second, clouds can alter or mutate. One of Salomon van Ruysdael's favourite sujets is a stratus layer aloft in early summer mornings that breaks up as the sun begins to heat the top of the cloud deck (Alte Pinakothek, Fig. 5). This kind of high pressure weather can often be found over humid areas and leads to flat cumuli (*cumulus humilis stratomutatus*, WMO1986 [3]) that can persist for up to an hour.

This brings us to a third misunderstanding. With another painting of Salomon van Ruysdael ("River View of Nijmegen with the Valkhof ", Fine Arts Museums of San Francisco, 1648), Walsh and Siscoe underline their argument against stratiform and cumuliform clouds together in one picture: "*Van Ruysdael shows flat layers, or stratus clouds, attached to puffy heaps, or cumulus clouds – an attachment that defies meteorology and thermodynamics*." (Walsh, p. 100) However, this is not true: what we see in this painting is the artist's view of cumulus clouds and their cloud bases. [4] And there is no stratus cloud at all in the whole picture. Van Ruysdael painted this picture in 1648, his earlier works had already shown his capacity as an accurate observer and depictor of clouds (Fig. 5) and there is no reason why he should incorporate a high level cirrus with virga into low level cumuli. There is another painting by S. van Ruysdael ("A View of Rhenen seen from the West", 1648, National Gallery, London) in which we find again such "trailing" lines which is nothing else but an artistic reproduction of cumulus cloud bases.

[3] The designation of the clouds in this text follows the system of the International Cloud Atlas (WMO 1956ff)

[4] In the article, Walsh/Siscoe compare a special (high level) cirrus cloud with virga with the "trails" of Ruysdaels convective cloud (see photo at Walsh p. 100f). This is meteorologically a complete deviation which, however, is aimed to underline the argument: *„For flat layers to grow cumulus heads involves a grafting of two different species, possible in the orchard of the artist's imagination but not in nature*." (Walsh, p.100) Nature's orchard is richer than our imagination, but a cirrus in the cumulus niveau of the atmosphere is not a good comparison.

Fig. 6: *Cumulus clouds with their cloud bases, photo: F.Ossing (click to enlarge)*

If such cumuli are observed at a flat angle their bases may appear as streaks (Fig. 6). This is c*umulus congestus or mediocris* (WMO, 1987a,b) and not "*pseudocumulus codalis Ruisdalis"* (Walsh p.106).

Finally, strong upward movement in cumulus or cumulonimbus clouds frequently causes the development of so-called accessory clouds that often stretch into the horizontal, like *altocumulus cumulogenitus*, *stratocumulus cumulogenitus*. Even stretches of stratus of bad weather can develop from rain-producing cumuli. It is not surprising that these accessory clouds can be found in Dutch cloud paintings when strong cumulus development is depicted (Fig.7a,b). And this does not defy the laws of thermodynamics.

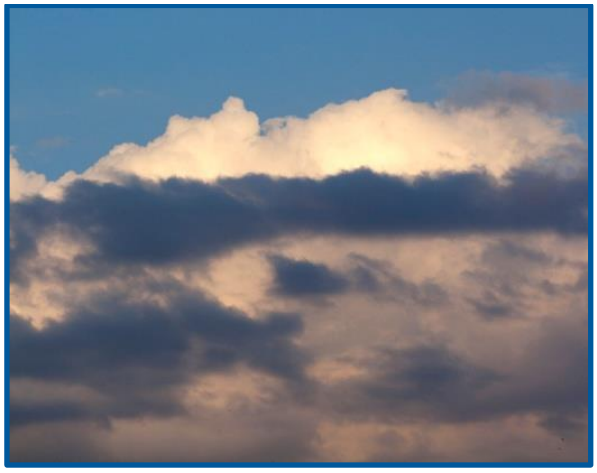
a)  ***b)*** 

Fig. 7: *Cumulus convection together with stratiform clouds, photo: F.Ossing (click on the pictures to enlarge)*

Cumulus clouds and cloud bases

Cumulus clouds are ubiquitious in Dutch paintings. Walsh states that in particular the flat cumulus cloud bases are not depicted and that the clouds are often painted distortedly for compositional reasons of the painting (Walsh p.100ff). It is right that a cumulus (or convective) cloud develops when a parcel of air rises. Due to cooling during the uplift condensation takes place at a certain height, the so-called condensation level. But it is wrong to think that this always should create a sharp flat cloud base. Depending on the type and the age of an air mass in which cumuli form the condensation level can be a *layer* of condensation rather than a distinct *level*. [5] So not every cumulus cloud has a sharply defined cloud base and often a diffuse cloud base can be observed in nature (Fig. 8a,b).

[5] Geb (1981) proposed a thermodynamic classification of European air masses.

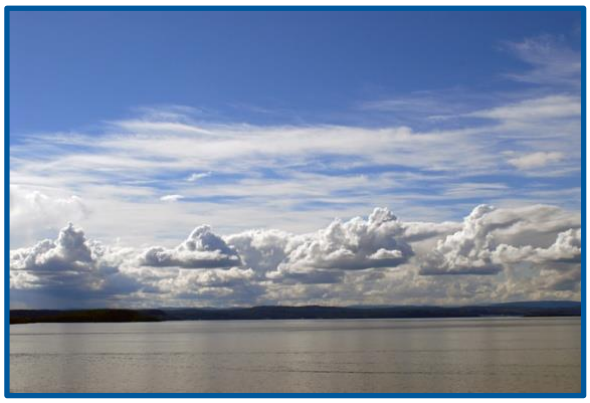
a)  b) 

Fig. 8: *Cumuli with a sharp (a) and a diffuse (b) cloud base; photo: F.Ossing (click on the pictures to enlarge)*

Furthermore, even if such a sharp cloud base is present it can often hardly be detected if it is observered obliquely from the ground towards the cloud (Fig. 9).

Fig. 9: *Fair weather cumulus cloud base, observed obliquely, photo:F.Ossing (click to enlarge)*

When commenting on these cloud bases in de Koninck's paintings (e.g. "Landscape in Holland" c.1665, Hunterian Museum & Art Gallery collections, Glasgow) another meteorological misunderstanding leads to a misinterpretation of the sky: de Konick "*typically shows (.) a splendid undulating mass of clouds whose bases rise and sink gracefully, if impossibly*." In fact de Koninck shows distinct cloud bases which are meteorologically correct (Fig. 10). If the view is at about 90° towards rows of cumulus clouds this is a common aspect of the sky. There is no "graceful but impossible rising and sinking", but there is a correct depiction of organized cumulus convection (Fig. 11).

Fig. 10: *Ph. Koninck, "An Extensive Dutch Landscape", (courtesy Painting Gallery Berlin SMB) (click to enlarge)*

Fig. 11: *Cumulus in rows (Cu med rad), photo: F.Ossing (click to enlarge)*

Thunderstorms

A thunderstorm in nature is a dominating phenomenon in the sky, no matter at what distance it is seen. But thunderstorms appear in Dutch paintings usually at short distances. Walsh's statement that the fine or the dramatic weather prevails sky depictions of the masters of the 17th century has to be re-examined with respect to thunderstorm (cumulonimbus) clouds. The Ruisdael painting ("Panoramic view on the Amstel looking towards Amsterdam**",** Fitzwilliam Museum, Cambridge, UK), according to Siscoe/Walsh shows "*the only thunderstorm cloud in Dutch painting*" (Walsh, p.103). A closer view at the painting, however, shows that the cloud is a common *cumulus congestus* with midlevel (*altocumulus*) cloud above it, and not a thunderstorm. Secondly, thunderstorm clouds do exist in many Dutch paintings: J. van Goyen introduces lightning into Dutch landscape painting (Giltaji/Kelch 1996, p. 164), A. Cuyp shows "The Maas at Dordrecht in a Storm" (about 1645-50, National Gallery London) with lightning of a thunderstorm, also J. van Ruisdael and H. Staets painted flashes of lightning, and Dubbels (Collection Inder Rieden) shows a perfect thunderstorm in a warm air mass (Fig. 12).

Fig. 12: *Hendrik Dubbels, "Shipping in a Calm"*, canvas, 52 x 66,1 cm, signed: Dubbels, c. 1670, London, *Collection Inder Rieden (click to enlarge)*

Conclusion

The "Little Ice Age" project of the *Painting Gallery Berlin* and the *GFZ German Research Centre for Geosciences* (2001) could show that in most cases the meteorological, geological, and climatological elements in Dutch landscape painting of the 17th century are reproduced very close to nature. On the other hand, these paintings as pieces of arts are compositions following the rules of art whereby the single elements of these compositions are "realistic". Dutch landscape paintings show a contrieved reality, precise enough to appear as a real view into landscape. From this point of view the above mentioned "meteorological" objections of John Walsh and George Siscoe have to be rejected as they do not stand a closer examination.

There are, however, clouds that hardly or do not appear in Dutch paintings. The reasons for that are not based on meteorology. The explanation is at least two-fold, as the "Little Ice Age" project (here: Ossing 2001) showed. The first reason is quite straight: cloud types with dominant features such as large horizontal cloud base lines, wave clouds, long streaks of cirrus or patterns covering the whole sky would disturb the balanced composition of the paintings and, thus, do not or rarely appear. For the second reason we have to look into the Dutch society of the 17th century. In Holland for first time in history a free market for the arts developed, not depending on the court and the church but on fashion and on the taste of the masses of rich citizens, peasants and ship owners (North 2001).

The "realism" as such is an only vaguely defined matter as far as the arts are concerned. However, there is no doubt that with Dutch painting of the 17th century a revolution in painting took place. The explanation of this revolution is not only matter of art history. Dutch painting started to reproduce its objects in a realistic way and, thus, shake off the traditional limitations that were given by religion or the court. At the same time this happened in science: modern sciences started with the liberation from religious presettings and it was in the 17th century when the profane, secular view on the world began to set the pace with Huygens, Kepler, Newton, Galileo, just to name a few.

The interpretation of the paintings, therefore, could find a fruitful enrichment in the cooperation of art historians, social sciences and natural sciences and, thus, break off the limits of a debate on realism whatsoever: "*The current sharp distinction between the arts and science is a historical anomaly*." (Gedzelman 1991).

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