1.

**Figure 4.** The relationship between temperature (°C) and sea ice conditions off Iceland for selected years between AD 1846-1919.

Mean annual temperature – AD 1000 = 3.47°C, AD 1450= 3.19°C

2.

The general assumption is that the initial settlement of Greenland was boosted by the local onset of cooler conditions. The increasing extent of pack ice negatively affected shipping and encouraged hunts for marine mammals such as walrus. The sea ice incidence sharply increased after 1150 AD and fluctuated around the value 2 months/yr. It reached its top value (2.7 months/yr) during the years 1610 AD, 1750 AD and 1890 AD. After these highest values, there was a significant drop in ice incidence during the year 1900 AD. However, the period prior to 1600 is much less certain, because the estimations are based upon documentary record. Maybe this is a cause why figure 1 and figure 2 provide different values such as years 1050-1420 AD. The figure 1 suggests high values of sea ice incidence, whereas figure 2 records significant decrease.

Our scatterplot illustrates the medium negative relationship; therefore, we can assume that there is a linkage between sea ice incidence and mean annual temperature. However, there comes into play other factors that have an impact on the sea ice decline: natural variability, global warming, and the Arctic Oscillation, what is the dominant cause of atmospheric variability around the North Pole.

There is reduced sea ice cover between ca. 1050-1420 A.D. followed by a sharp increase in sea ice incidence that continuously culminated during the late 19th century. Until the year 1150 AD the extent of sea ice in the North Atlantic Ocean fluctuated around the same values. The cumulative deviation of the chloride from mean shows the most significant shift within a short time of the final extinction of the Norse settlement (AD 1450). The Norse Greenlanders had disappeared in circumstances that are unresolved, but probably it was the combination of environmental degradation, economic marginalization, and climatic deterioration.

Figure 3 illustrates important trade routes and the main locations of farming and hunting, for example Disko Bay, where during the spring people went hunt walruses. The figure also emphasizes the important economic movements – export of ivory, skins, falcons and import of metal. Routes to the Greenland have been challenging, as the sea ice incidence changed during the seasons and years. Contemporary, commercial ships can navigate through Arctic seas from July to October. As sea ice constantly decreasing, this region might become a maritime highway between Asia and Europe. This represents a serious threat to the fragile Arctic ecosystem.