**Chapter 8 Questions for FYS 178 Fall 2020**

Vilhelm was convinced that close interaction between dynamic meteorology and \_\_\_\_\_\_\_\_ was essential for the progress of both. Fill in the blank.

What types of foundations did Vilhelm start to build in 1919 that would form the basis for developing a school of meteorology for the postwar era?

Was the Bergen Museum’s Geophysics Institute likely to foster a vital research school in meteorology during the postwar era, according to Vilhelm?

What did the Museum’s president (Johan Lothe) fear about Stang’s plan for expanding the Bergen Geophysics Institute into an international center for research and study?

Vilhelm saw only one certain way to achieve a stable foundation for his work and for the Geophysics Institute: only by accepting “serious tasks.” What “serious task” did Vilhelm undertake for petitioning for funds in 1918 which was also still valid in 1919?

In postwar Norway, there was still a general wave of enthusiasm for national self-sufficiency. What was the tool counted on by the Norwegian public and politicians that would be the means for Norway developing this self-sufficiency?

In reports to the Ministry of Church and Education, Vilhelm and his meteorological colleagues in Norway repeatedly alluded to what industry’s expected needs for improved weather services to justify increasing the budget for forecasting and forecasting-related activities?

Who was the leader of the Bergen Meteorological Observatory in 1918, 1919 and how did he get along with Vilhelm?

Vilhelm proposed two items related to the summer forecasting service in March 1919. Name the two items.

What was Vilhelm’s justification for the proposed items related to the summer forecasting service?

In July 1919 Vilhelm became the head of what new provisional entity?

Of the two industries to be served by the fledgling Norwegian forecasting service, which had the more comprehensive and demanding needs of forecasting in 1919?

To best serve the forecasting service customers, Vilhelm hoped to get away from a particular kind of forecast that characterized meteorology prior to the war. What kind of forecast was he trying to get away from?

In order to encourage finer-scale forecasting, Vilhelm and Hesselberg increased the number of forecasting districts from the summer 1918 to the summer 1919. How many forecasting districts were defined in each of the summers?

What service did the Bergen group start in the summer 1919 in response to feedback from farmers in West Norway and Trøndelag?

What was a significant hindrance to Vilhelm having direct aerological observations of the winds aloft?

Having to acknowledge the impracticality of forecasting based on calculations of changes in the atmosphere, Vilhelm proposed a new approach, based on his original objective of rationally predicting changes of atmospheric states, only in summer 1919 the application of physics would be made \_\_\_\_\_\_\_\_. Fill in the blank.

The goal of qualitative applications of physical theory meant what in terms of the practice of analyzing all the basic meteorological variables?

In developing analytic techniques designed to satisfy the scientific and economic aims of the forecasting service, Vilhelm and his assistants replaced the two-dimensional geometric models of atmospheric phenomena with what?

Vilhelm and his assistants began in 1919 to focus on \_\_\_\_\_\_\_\_ associated with each line of convergence and to comprehend them with \_\_\_\_\_\_\_\_.

Vilhelm used an analogy or illustration (Figure 13) to make it possible to comprehend three-dimensionally what they observed at the surface when the warmer air moves toward the “rain stripe.” Describe the analogy.

What was Vilhelm’s physical explanation for what was happening along the narrow rain-stripe associated with the squall line (Figure 14)?

What was the significant departure of the 1919 Bergen cyclone model (Figure 15) to that of Jacob Bjerknes (Figure 6) in October 1918?

In the new depiction of their cyclone model, the wind no longer flowed into and merged with the lines of convergence; rather, on a horizontal projection, the wind was depicted as blowing almost perpendicular to what?

What structures replaced the two-dimensional lines of convergence as the primary focus of practice and inquiry by Vilhelm and his assistants?

In order to identify the locations where surface discontinuities intersected the ground, Vilhelm and his assistants introduced into the instructions and codes for weather observers a number of refinements. List one of the refinements.

Abrupt changes in what atmospheric properties were known to be hazards for airships and for airplanes?

By interpreting finely distinguished \_\_\_\_\_\_\_\_ as signifiers of physical processes, Vilhem’s forecasters could reproduce surfaces of discontinuities as three-dimensional atmospheric structures. Fill in the blank.

What characteristic of cirrus clouds was used by Jacob Bjerknes to aid in his prediction of the motion of a cyclone?

In Vilhelm’s forecasting service, knowledge of the atmosphere came to reside in the interplay between what to components?

The new requirement that forecasters would have to keep watch of the entire sky meant what about the locations of weather bureau offices?

In the Bergen (Vilhelm’s) forecasting system, the changing patterns in the sky were to be read as signs for what?

In a constant theme throughout his life, Vilhelm in 1919 developed a forecasting system with which he might create a stable \_\_\_\_\_\_\_\_ and dominate meteorology \_\_\_\_\_\_\_\_. Fill in the blanks.

Changes in what aspects of forecasting were preconditions for the Bergen cyclone model?

How far things had evolved in the understanding of cyclones in meteorology can be illustrated in comparing Abercromby’s (1883) and Bergeron’s (1933) analysis of the cyclone of November 14-15, 1875 (Figures 16 and 17, respectively). What atmospheric field defined the cyclone for Abercromby and what defined the cyclone for Bergeron?

Shaw’s V-shaped depression that “shows very clearly the invasion of the region of easterly wind by a southerly wind” at the surface represents what the Bergen meteorologists would say was the passage of a steering surface in 1919 and corresponds to passage of what would be called a \_\_\_\_\_\_\_\_ front today. Fill in the blank.

What was unique about the Bergen school’s treatment of line squalls compared with treatments from studies before the emergence of their 1919 cyclone model?

Related to (1) the frequency and number of observations and (2) the ability of communications systems, give a reason why Vilhelm’s 1919 forecasting system would not have been possible in nineteenth-century forecasting operations?

Because [nineteenth-century] governments were not directly involved in commerce, assisting commercial ventures through \_\_\_\_\_\_\_\_ was not yet part of political economics. Fill in the blank.

The spread of \_\_\_\_\_\_\_\_ networks and the introduction of \_\_\_\_\_\_\_\_ allowed the technological possibility of creating a practice that focused on finer grained atmospheric structures. Fill in the blanks.

What industry pushed the realization by Vilhelm and his assistants that analyzing and conceptualizing atmospheric systems in three-dimensions would be crucial for any new reformed meteorological system?

\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ do not stand in opposition to one another or separate from one another; they are interconnected and interdependent. Fill in the blanks.

Why did the Bergen school’s 1919 cyclone model have a big impact on forecasting practices when Shaw’s innovative prewar cyclone model (Figure 19) did not?