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Chester Newton: Career of a Synoptic Meteorologist

EDITORIAL

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Science would not have progressed without the tenacity and sacrifice of many dedicated scientists, among who some go on to be unnoticed and unremembered. Scientists in this category include physicists, earth scientists, and meteorologists. The fields of meteorology and oceanography, for example, evolved from basic observations and were developed by gifted scientists into physically based theories that currently serve as foundations for these disciplines. In particular, synoptic meteorology greatly benefited from the weather map analyses of Vilhelm Bjerknes, which served as the observational basis for transforming the Norwegian cyclone model. These midlatitude cyclones are formed along the polar front, a surface separating cold polar air and warm subtropical air, a feature that was further examined by Gustav Rossby and Francis Reichelderfer. In this context, Rossby considered the link between upper-air movements, surface fronts, and ensuing downstream cyclone development. In particular, Rossby was interested in the large-scale features embedding synoptic systems, which partly inspired him to develop the theoretical concept of what is now referred to as Rossby waves. It is relevant to mention here that Bjerknes and Rossby's investigations were essential for Jule Charney and Arnt Eliassen's groundbreaking development of the quasi-geostrophic models of the atmosphere and the oceanic circulation, which served as the basis for the first model-based weather predictions.

These great pioneering meteorologists opened the gate of scientific-based advance in meteorology by training students and young scientific researchers and fostering them to carry forward the knowledge's flame and enlighten the road to the following generations. One student from this early generation was Chester Newton, who became a recognized expert in synoptic meteorology. Newton was mentored and advised by Gustav Rossby and Erik Palmen. Initially, Newton worked with Rossby at the University of Chicago and then later also at the International Meteorological Institute (IMI) of Stockholm University. In his early research, Newton was inspired by Rossby's idea regarding the three-dimensional structure of the polar front and synoptic scale features, including the jet stream, which serves as a key factor linking upper-level Rossby waves and surface fronts.

Newton's research also contributed to the understanding of how potential vorticity can be used to determine the boundary between two contrasting air masses. His further contributions relate to the transfer of angular momentum from low to high latitudes, necessary to maintain the upper-level westerlies. In particular, Newton succeeded in confirming that effective relative westerly angular momentum transport is accomplished primarily by horizontal eddy momentum fluxes. He demonstrated that this is achieved through an asymmetry of upper-air streamlines, with a NE-SW shearlines orientation, a mechanism that was also proposed independently by the meteorologist Victor Starr from MIT.

Chester Newton may not be familiar to many in the current generation of meteorologists, except perhaps for a handful of synopticians and applied meteorologists. As a remembrance of Chester Newton, John M. Lewis presents a detailed description of Newton's career in meteorology through an interview that was taken in 1990. The interview narrates the history of how Newton came in contact with Rossy, Palmen, and other influential figures in meteorology, and the subsequent unfolding of events leading to the development of their relationship, which contributed to shaping his career. Lewis' letter provides a nice step-by-step walkthrough of Newton's exploration of and experience in going from a weather observer at the US Weather Bureau, before the war, to an expert in synoptic meteorology at the National Center for Atmospheric Research (NCAR).

COMPETING INTERESTS

The authors have no competing interests to declare.

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