Sir Gilbert Thomas Walker

Sir Gilbert Thomas Walker, a pioneer in the use of statistical correlation, multiple regression techniques and harmonic analysis in weather forecasting, was born on 14 June 1868 at Rochdale, Lancashire. He was educated at St Paul's School and later at the Trinity College, Cambridge.

Walker came to India in 1904 to take charge as the Director General of Meteorology at the India Meteorological Department. Though monsoon forecasting in India had begun nearly twenty years earlier in 1886, there was no objective method for forecasting and rigorous statistical techniques were not adopted till the arrival of Walker. He introduced the concept of correlation and regression for developing objective models based on precursory signals from different parts of the world. In 1909, the first forecast using a regression equation was made. Walker spent the next 21 years doing research on monsoon forecasting. His fundamental premise was that the relations between weather over the earth are so complex that it is seems useless to try and derive them from theoretical considerations. Hence he looked at autocorrelation and cross-correlation between surface pressures in different parts of the world. He discovered that there was swaying of pressure between the equatorial Pacific and equatorial Indian Ocean. He called this 'Southern Oscillation'. He called the swaying of pressure between Azores and Iceland as 'North Atlantic Oscillation' and similar oscillation in the northern Pacific Ocean as 'North Pacific Oscillation'. These three oscillations of surface pressure play a fundamental role in the variability of the earth's climate. Walker noted a tendency of the Southern Oscillation to persist for at least one to two seasons suggesting the potential for using this oscillation in forecasting world weather.

Walker was however not able to ascertain the physical mechanism governing these oscillations. In the first two decades of the 20th century, most meteorologists were skeptical of Walker's work because they could not understand the physical mechanism that caused these oscillations. Walker suggested that ocean circulation and temperature may play a role but could not demonstrate it on account of paucity of data from oceans. The interaction between the ocean and the atmosphere that causes these oscillations was not understood in Walker's lifetime. Walker was aware of the need for interaction between statisticians, meteorologists and oceanographers. In 1927, he made the following prophetic statement: "There is, to-day, always a risk that specialists in two subjects,

using languages full of words that are unintelligible without study, will grow up not only, without knowledge of each other's work, but also will ignore the problems which require mutual assistance".

The physical mechanism that causes the Southern Oscillation was discovered by J Bjerknes in 1969, 11 years after Walker's death. Bjerknes showed that there was complex interaction between the variations in sea surface temperature in the equatorial Pacific Ocean and the atmosphere above it. This resulted in Southern Oscillation that was discovered 50 years earlier by Walker. Bjerknes linked the warming of the east Pacific Ocean known as El Nino to the atmospheric pressure fluctuations called the Southern Oscillation. Bjerknes called the sinking motion of the air in the eastern equatorial Pacific Ocean and the rising motion in the western equatorial ocean as the 'Walker Circulation'. Fluctuations in the Walker Circulation have an important influence on the Indian summer monsoon rainfall.

While in India, Walker also played an important role in the life of the mathematical prodigy Srinivasa Ramanujan. The award of the first research scholarship by the Madras University to Ramanujan was possible by the recommendation of Gilbert Walker. Though Walker was not a pure mathematician, he was a former Fellow and mathematical lecturer at the Trinity College, Cambridge. He was prevailed upon by Francis Spring to look through Ramanujan's notebooks. Walker wrote to the Registrar of the Madras University; in his letter he said, "The character of the work that I saw impressed me as comparable in originality with that of a Mathematical Fellow in a Cambridge College; it appears to lack, however, as might be expected in the circumstances, the completeness and precision necessary before the universal validity of the results could be accepted. I have not specialized in the branches of pure mathematics at which he worked, and could not therefore form a reliable estimate of his abilities, which might be of an order to bring him a European reputation. But it was perfectly clear to me that the University would be justified in enabling S. Ramanujan, for a few years at least, to spend the whole of his time on mathematics without any anxiety as to his livelihood".

Walker returned to England in 1924. The King of England conferred knighthood upon him, primarily for his accomplishments in the Indian Meteorological Department. He became a Professor of Meteorology at the Imperial College, London. He

turned his attention to laboratory studies of convection in an unstable fluid with particular reference to the formation of clouds. He continued to publish research papers till 1950. His passion was not confined to mathematics and meteorology. He was an acknowledged expert on the theory and evolution of the flute and played the instrument well. He also loved sketching and painting, and when in India showed water-colours of landscapes at the Shimla Art Exhibition. He has published papers on bird flight and boomerangs.

He married May Constance Carter in 1908 and they had a son and a daughter. Sir Gilbert Walker died at Cousdon, Surrey on 4 November 1958. In an obituary written in 1959, P A Sheppard argued that Walker's statistical method for forecasting Indian monsoon was not a great success. This view was prevalent till the seminal contribution by J Bjerknes who demonstrated how the complex interaction between ocean and atmosphere resulted in fluctuations in Walker circulation. He was elected a Fellow of Trinity in 1891and Fellow of the Royal Society in 1904 for his work on dynamics and electromagnetism.

Sir Gilbert Walker was a scientist whose ideas were well ahead of his times. His original contributions were not recognized during his lifetime. This has happened often in the history of scientific discoveries.

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