Interview with Nanne Weber

Hans von Storch

Nanne Weber (1959) graduated with honours in mathematics in 1985 at the University of Amsterdam. She obtained her Ph.D. with a thesis on ocean waves in 1989 at the University of Utrecht and worked at the MPI-M in Hamburg (BRD) in 1990-1991, witnessing from close by the German Unification. In addition, she learned a lot about climate research. After that she worked at KNMI, specializing in paleoclimate modeling. Her research interests range from the last millennium to Milankovitch timescales. She worked in different KNMI divisions and was division head in 2001-2004, but decided to move back to research. She became part-time professor at the Faculty of Geosciences at Utrecht University in 2007, giving her inaugural address on February 29, 2008.

Nanne Weber participates in the Paleoclimate Modeling Intercomparison Project (PMIP), convenes a successful 'PMIP' session at the EGU General Assembly and is editor of Climate of the Past.

Nanne Weber.

Nanne, after being trained as a mathematician first and having studied the ocean waves after that, you are presently mostly working on paleoclimate. One would not call this a linear development but more a career with significant breaks and changes. How did that come about?

When I went to university I chose mathematics. I had no idea that something like climate studies existed. After graduation I looked around for a Ph.D. position in a field with more concrete subjects of study than mathematical objects and I found ocean waves. This was fun for some time, but when I became acquainted with the field of climate research (as a post-doc at the MPI-M in Hamburg), it appealed much more to me. I am not sure whether you should strive for a linear career. When you are young you are flexible and you can make these shifts. Climate research used to be a small field in the Netherlands and many people who are active in it have backgrounds in physics, mathematics, etc. Such a 'hard science' background is useful, but of course you need to catch up on topics like climatology, etc.

For most of your career you have worked at the Royal Netherlands Meteorological Institute (KNMI), which is a governmental institute combining climate and weather research with an operational Weather Service. Later, you became a part-time professor at the neighbouring Utrecht University (UU) – how do these two lines of work fit together?

KNMI likes to have some professors among its research staff, as this provides for natural links with the university. The UU, on the other hand, likes to have easy access to the modelling expertise at KNMI and its meteorological/oceanographic data. So, there are benefits on both sides. For me personally, there is a smooth transition between my two work places. At the university, I do some teaching and supervising of students. However, my students (Master and Ph.D.) often get a place to work at KNMI too, as they work with models that are developed at KNMI. So these activities are carried over to my KNMI office. In my own research, there are some topics which are typically 'KNMI'. This mostly has to do with contributions to reports commissioned by the government or public outreach projects. Contrary to general belief, there is quite some commercial consultancy work done by university staff so this type of work is not completely alien to my colleagues at UU. Apart from this, my research is a patchwork of interconnected projects not confined to one workplace.

There are still not many women among the 'higher' ranks, such as professors, department heads and the like. Are meteorology and climate science still 'male territory'?

Obviously yes. It is difficult to pinpoint down the reasons for this or to find the solutions. I had never been in favour of positive discrimination or quota until I had the following experience. I sat on a selection committee for a managing position and could not prevent a well–qualified female candidate being put aside and a less-qualified male being appointed. The psychology behind this process is very subtle (in this case it was a wish to maintain a monolithic team). I found that you can only fight such an attitude when there are more people involved who recognize the process. We put in complaints and pointed out to the 'higher levels' that they were going to miss their targets if they let go of talented women like this. When a similar position became vacant shortly after that, she was appointed. Since this experience I am all in favour of quota. This simple pressure works faster than re-socialising a whole generation of men. Once the women are there, the male establishment has to adapt anyway.

At the university I see that a dedicated effort toward promoting diversity has already increased the number of women in higher ranks. The self-evident support of this policy by the dean, department heads, etc., has created an atmosphere where diversity is the standard. This works especially well, because other cultural and ethnic groups are included.

What would you consider the two most significant achievements in your career?

Being offered a part-time professorship at the Faculty of Geosciences of the Utrecht University is definitively one. For me, this was a recognition of my efforts over the last decade to bring scientists working with paleodata together with modellers, to integrate empirical and model-based science and to put model-data mismatches on the research agenda.

The second achievement is a small set of my best papers. Their value for me personally has to do with the results that they describe, their level of recognition, and the fun of working with the people involved in that particular paper. One example is one of my papers on the glacial thermohaline circulation (THC) in the Atlantic ocean. For this paper we analysed mechanisms of the THC response to glacial conditions and found that there is no convergence among models, nor between models and data. So we understand little of past THC changes.

When you look back in time, what have been the most significant, exciting or surprising developments in atmospheric science?

The slow merging of on the one hand geography and geology, with their emphasis on data collection and phenomenological approach, and on the other hand, the climate modeling community that is primarily process-based and whose members identify with physics rather than geosciences. At least in the Netherlands these used to be worlds apart. But bridges are starting to be built and especially young people do not confine themselves to one discipline. This is an exciting development which will bring new research topics and challenges. Do we understand past Greenhouse climates? How (continues on the next page)

can we presume to be able to predict the future THC, if we do not understand its past behaviour? What is the role of solar and volcanic activity in explaining climate variations during the recent past?

Is there a politicization of atmospheric science?

It is more a politicization of some members of the scientific community than of the community as a whole. The public debate on global changes brings some individuals to extreme positions (either alarmist or skeptic), which are more based on politics than on science. This rarely leads to 'good' science.

What constitutes 'good' science?

Good science is science that inspires. Necessary conditions are scientific work that is transparent and solid, raises new questions, leaves room for doubt and alternative explanations, gives credit to and relates to earlier work. In addition, there should be an element of surprise, a spark which catches and keeps your attention.

What is the subjective element in scientific practice? What is the role of instinct?

Instinct helps in choosing the right topics and in sorting out the more and less relevant results. So there is definitively a subjective element. Everyone knows examples of papers in which they have discovered errors (in methodology, data, computations – you name it). But then in the end we have to admit that this paper contains 'good' science and the author is right on the concepts that are proposed. This is the best illustration I know of the power of instinct that some scientists have. Those of us who are less gifted in this respect obviously have to be very scrupulous and avoid any sort of error.

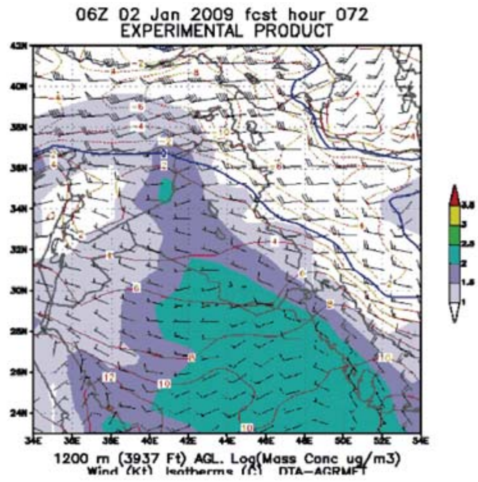
Nanne Weber in 1986.

The opinions presented in the interview do not necessarily represent those of the interviewer or the AGU.

Meteorology in the Military Part II: AFW Research and Development Program

Lt. Col. Neil Sanger, Lt. Col. Lee Byerle, and Yolande Serra

What research and development (R&D) is taking place within Air Force Weather (AFW)? To answer this question, we will take a look at some of the work being done by AFW's primary innovative development organization within the Air Force Weather Agency (AFWA), the 16th Weather Squadron (16th WS). The 16th WS is a center of excellence for development, implementation, and visualization of terrestrial, atmospheric and space weather models, displaying observational data, and identifying environmental impacts on future weapons systems. Its mission is to exploit cutting-edge technologies, science, and innovations to provide responsive, accurate, and relevant weather intelligence for military operations and other national agencies.



A 72 hour forecast of 1.2 km AGL dust concentration from DTA-MM5 valid 2 January 2009 06Z.

While the 16th WS is often associated with traditional, mesoscale weather modeling, They also develop and support a broad range of highly specialized models, which address specific environmental issues critical to military operations such as clouds, dust, ensembles, and even space weather. Additionally, they are creating a revolutionary web visualization tool hosted on one URL that provides dynamic interaction and Google Earth geo-locatable capabilities for all AFW data. Finally, they are the technical staff that supports AFWA's exploitation of meteorological satellite imagery and raw data.

The following is a synopsis of just some of the projects the 16th WS is undertaking in the areas of cloud forecasting, land-surface characterization, dust forecasting, and mesoscale and ensemble modeling:

Cloud Forecasting: AFWA uses the cloud depiction and forecast system, version 2 (CDFS-II), which produces cloud analyses for individual satellites and merges them together, along with conventional observations, into a Worldwide Merged Cloud Analysis. In addition, CDFS-II is responsible for three different techniques used in the cloud forecast models. These models are both user and forecast-time specific. Traditional numerical weather models, even when using complex microphysics, often fall short of the degree of accuracy in cloud forecasting required for the full spectrum of DoD operations. To that end, the 16th WS has developed a suite of cloud models that improve greatly upon numerical guidance. All of the cloud models leverage a real-time analysis from a mosaic of satellite imagery from multiple platforms.

The Diagnostic Cloud Forecast (DCF), for example, is a statistical model that correlates model predictors with actual clouds in the merged CDFS-II analysis, producing more accurate 12-hour to 3-day cloud forecasts than numerical models alone. DCF consists of two processes: the coefficient building process and the forecast process. The coefficient building process executes every three hours, creating linear relationships between cloudy pixels and the available forecast model predictors for a sliding 10-day period. The forecast process then uses the 10-day statistics and a multiple discriminate analysis (MDA) method to diagnose clouds from the forecast model predictor fields (Fig. 1). The forecast process is applied as a post-processor to WRF and is configured based on theater-specific configurations. DCF produces more accurate cloud forecasts beyond 9-12 hours and provides additional cloud information, including cloud base, cloud heights, and cloud type. The method quickly adapts to large-scale weather patterns due to the moving 10-day statistical period. DCF is a purely statistical model so its performance is directly related to that of the forecast model. Errors in the cloud analysis from the numerical model will propagate into the cloud forecast. Finally, DCF can produce a global or regional cloud forecast depending on the domain of the forecast model.

Land-surface characterization using the Land information System (LIS): over the past 5 years, the 16th WS has been closely collaborating with NASA's Goddard Space (continues on the next page)