

2.2. Probabilistic (Risk-based) VT Concept

Elaboration of a probabilistic (risk-based) VT concept is the subject of Hudz (2002). Here, the term *risk* refers to the degree of probability, with which the VT of a GHG emitting or absorbing system can be specified, while its (linear) dynamical behavior is assumed not to change. As explained in Section 1.1.2, investigations focus on the global scale, where decade-resolved signal changes can be considered to be sufficiently linear. However, temporal verification is not impaired; it is carried out as on sub-global scales.

To facilitate easy understanding and use of the Excel file, we recall the three major steps of Hudz's research:

Step 1 (Data Analysis): Two global net carbon fluxes, the change in atmospheric CO₂ and the CO₂ emissions from fossil fuel burning, cement manufacture and gas flaring, were investigated for different decades. It could be shown that their uncertainties are not normally and symmetrically distributed but take on different shapes.

Step 2 (Methodology): A probabilistic (risk-based) approach is introduced, which considers all probable (linear) signals — as indicated in Figure 4 — in terms of their VTs and which permits to calculate the minimal time VT* in compliance with $P(VT^* > VT) = 0.95$.

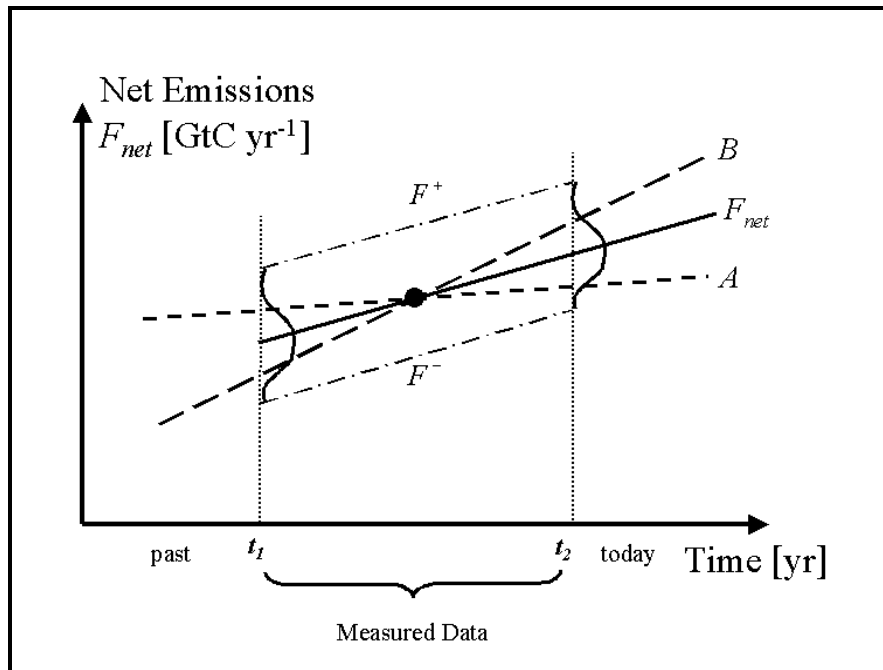


Figure 4: Simplified illustration of the probabilistic (risk-based) approach, for which it is assumed that net carbon emissions (F_{net}) change linearly: A and B are two possible realizations of F_{net} (which is also used here to indicate the mean trend); they are consistent with the probability distributions of F_{net} at t_1 and t_2 . However, the VTs for A and B are different: For A it is greater, while for B it is smaller than for F_{net} . F^+ and F^- serve as linear boundary conditions for the uncertainty intervals at t_1 and t_2 . Source: Hudz (2002; modified).

Step 3 (Applications): The comparison of probabilistically and deterministically determined VTs shows that they can differ (with the probabilistic VT being greater than the deterministic VT) and that the probabilistically determined VT proves more informative (e.g., in regard to the commitment periods underlying the Kyoto Protocol).