Motivations, Overall Aim, Specific Objectives and Book Format

- Book is motivated by the demand of National Meteorological Services in West Africa for up-to-date forecasting techniques, meeting the increasing demand for accurate forecasts to prevent weather-related hazards and economic loss.
- Overall aim is to synthesize the latest knowledge of West African meteorology with operational tools and methods for weather forecasting in West Africa.
- One specific objective was to transfer new insights into the dynamics of West African weather systems, which emerged from recent international efforts like AMMA (African Monsoon Multidisciplinary Analyses), into operational forecasting.
- A second objective was to summarize the recent status of understanding of the West African climate systems across scales from planetary to local.
- As a consequence, the Handbook has a textbook-style, with each chapter starting with the science background, followed by operational cases, and case studies, with the latter being also available and updated online.
- Readership is weather forecasters with interest in tropical prediction, researchers, and students of Meteorology and related fields.

Chapter 1: „Mean climate and seasonal cycle„
Chapter 1 discusses the mean climate and seasonal cycle of West Africa (see map) using traditional in-situ ground and upper-air observations, a state-of-the-art re-analysis, as well as a variety of satellite-derived maps. Focus is on the hydrologic cycle, including cloud, surface, and upper-air circulations, as well as climatologies of African Easterly Waves. The complex climate system over West Africa is synthesized in a map and mental cross section.

Chapter 2: „Synoptic Systems„
Chapter 2 reviews the synoptic systems in which many of the convective rainfall events in the WAM are embedded. AMMA has brought about a considerable progress in the understanding and modelling of synoptic systems. Prime examples are African Easterly Waves (AEWs) and their diversity, as they appear on daily weather maps. The chapter also discusses Tropical-Easterly Interactions that are important in the dry and transition seasons.

Chapter 3: „Deep convection„
Chapter 3 discusses the deep convection systems that provide the bulk of the rainfall in West Africa. The types of convection systems range from isolated cells to huge organized Mesoscale Convective Systems (MCSs). The type of convection depends on the ambient profile of vertical wind shear and humidity distribution. Ma-level dry layers are pivotal in the creation of deep convection density currents that in turn favor organization and longevity of convection.

Chapter 4: „Local Weather„
Chapter 4 discusses phenomena that shape the local weather and are thus particularly important for the forecaster. Topics include, but are not restricted to, gravity waves, inertial oscillations, land sea breezes and related cloudiness, local winds and local initiation of convection. Schematic of land-surface influences on temperatures, local winds and local initiation of convection.

Chapter 9: „Remote Sensing„
Chapter 9 introduces all kinds of satellite sensors, which are an invaluable and growing source of information in a ground and upper-air data sparse region. The lead author also led the COMET online textbook development and this is reflected in a scholarly review on the use of more classical (e.g., visible, infrared and water vapor images) and more advanced (e.g., IRG multi-channel composites, splitwindow microwave and radar products) satellite information.

Chapter 11: „West African Synthetic Analysis and Forecast: WASA/F„
Chapter 11 describes the creation and interpretation of the WASA/F maps that emerged from the AMMA 2006 ground campaign. The maps synthesize the major weather features on an analysis and forecast map that help the forecaster capture complex weather situations at a glance. The WASA/F maps are produced operationally at ACMAD.

Online Training Material (En/Fr)

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A Forecasters’ Handbook for West Africa
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