Preamble

This thesis is written in cumulative style. The thesis contains six chapters, including the introduction and the summary. Chapters 2, 3, and 4 are written in cooperation with other scientists in manuscript form.

The introduction (**chapter 1**) covers the problems and topics of the dissertation, illustrates the general geological setting, and gives an overview of the database.

The manuscript (**chapter 2**) "Sandstone petrology and provenance of the Chaco Basin: record of foreland basin evolution and Andean uplift" is ready to be submitted to the Journal of Sedimentary Research. Co-authors of this manuscript are Cornelius E. Uba and Christoph Heubeck. This chapter examines the sandstone petrology of the Cenozoic strata, followed by a provenance analysis of the Cenozoic units. I collected the bulk of the samples, wrote the manuscript, and drafted the figures. Cornelius Uba provided approximately one third of the samples. Christoph Heubeck guided the scientific work and edited the manuscript.

The manuscript (**chapter 3**) "Depositional setting of the middle to late Miocene Yecua Formation of the Chaco foreland basin, southern Bolivia" is (with minor grammatical modifications) in press at the Journal of South American Earth Science. Co-authors are Kai-Uwe Gräfe (Universität Bremen), Benjamin Sames (Freie Universität Berlin), Cornelius E. Uba, and Christoph Heubeck. This chapter focuses on the composition, depositional environment, and regional distribution of the Yecua Formation. I collected the samples, wrote the manuscript, and drafted the figures. Kai-Uwe Gräfe examined the foraminifera. Benjamin Sames examined the ostracodes and edited text. Christoph Heubeck guided the scientific work and edited the manuscript.

The manuscript (**chapter 4**) "Aqueous fingerprinting of the middle to late Miocene Yecua wetland environment" is ready to be submitted to the Journal of Palaeogeography, Palaeoclimatology, Palaeoecology as a short note. Co-authors are Maja Wegmann (Freie Universität Berlin), Ulrich Struck (GeoBio-Center of the Ludwig Maximilian University München), Cornelius E. Uba, and Christoph Heubeck. In this chapter, we describe the isotopic systematics of marine-living microfossils from the Yecua Formation. I collected the samples, wrote the manuscript, and drafted the figures. Maja Wegmann did the Strontium data processing; Ulrich Struck did the oxygen- and carbon- analyses; Christoph Heubeck guided the scientific work and edited the manuscript.

The **chapter 5** "Age of the Cenozoic foreland basin fill based on radiometric dating of tuffs" is written as a chapter. It includes new radiometric age data of Cenozoic strata in the southern Bolivian foreland basin system and gives estimates on the backarc history.

The summary (**chapter 6**) includes a discussion of the results described in chapters 2 to chapters 5. The chapter ends with a brief documentation concerning open questions.

In addition to the results presented in this thesis, I contributed to the facies interpretations of the Cenozoic foreland basin (based on the interpretation of the lithofacies, sedimentary structures, and depositional processes) and the interaction between the Chaco foreland basin and Andean dynamics (using stratigraphic, sedimentary, and industry reflection-seismic data). Results are included in the dissertation of my colleague Cornelius Uba and will not be presented in this work.

The appendix lists the datasets used in this thesis and in the thesis of Cornelius Uba:

Appendix A: Measured sections of the northern Chaco basin
- stratigraphic logs from profiles north of 20.5° S

Appendix B: Outcrop photographs
- photographs from outcrops north of 20.5° S

Appendix C: Sandstone point count data
- table of the sandstone-petrology data, used in chapter 2

Appendix D: Palynology sample locations
- table of measured palynology samples from outcrops north of 20.5° S

Appendix E: Isotopic age data
- table of the radiometric age dating results

Appendix F: Industry well data
- table of the industrial well log data north of 20.5°S

Appendix G: Industry 2D-seismic data
- figures of the 2D-seismic profiles north of 20.5°S: uninterpreted and interpreted