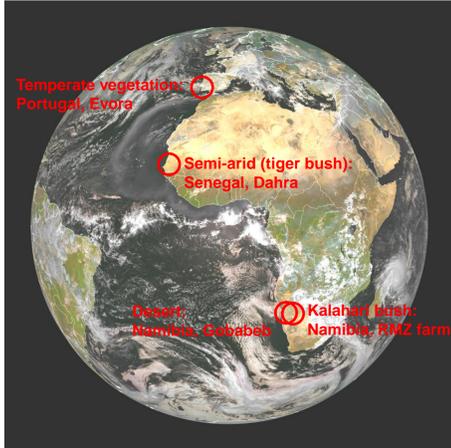


# Continuous validation of LST over large homogeneous sites in Africa and Europe

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## Introduction

Land surface temperature (LST) is an operational product of the Land Surface Analysis – Satellite Application Facility (LSA-SAF). As a contribution to LSA-SAF, KIT operates four long term LST validation stations within the field of view of the METEOSAT satellites (see left). The station's core instrument is the self-calibrating, chopped "KT-15.85 IIP" IR-radiometer from Heitronics. The long term stability of this type of radiometer was proven at Evora station in a one year parallel run with a self-calibrating unit based on two black bodies. In-situ LST are derived from measured up-welling and down-welling radiances as well as LSA-SAF operational surface emissivity, which at Gobabeb has been shown to be in good agreement with in-situ emissivity and

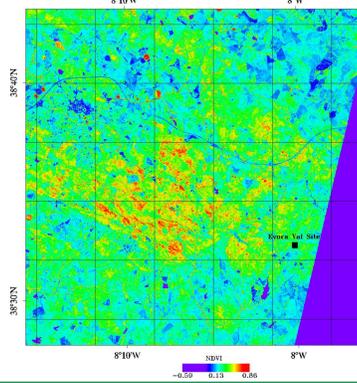
ASTER and MODIS emissivity products. Available data records are: Gobabeb - Jul 2008 to present, Evora-2/3 - Mar 2008 to present (Evora-1: Apr 2005 to Aug 2007), RMZ farm - Apr 2009 to Feb 2011, and Dahra since Sep 2009. Except for Dahra there are only minor data gaps. From Feb 2011 onwards the new station 'Heimat' (1450 m asl) is operational, which is also located in the Kalahari bush and has similar land use as RMZ farm. During 'good' months, i.e. with few clouds and a clear atmosphere, there are about two thousand match-ups between SAF LST and in-situ LST per station. However, during wet seasons there may be only several hundred match-ups with increased data scatter (undetected clouds).  
*Supported by Eumetsat in the LSA-SAF*

## Evora, Portugal: oak tree forest

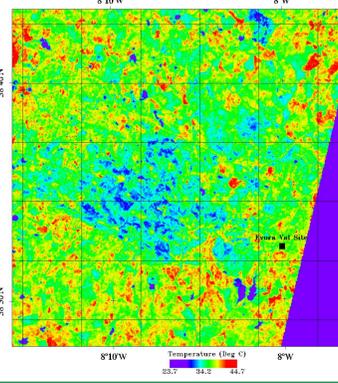


Main end-members: **oak trees** (33%) and **grass**. Exhibits a natural seasonality, grass usually desiccated in July & August. The blue (cold) areas in the center of the brightness temperature data are caused by dense acacia tree forests; these are excluded from validation. At 200 m asl.

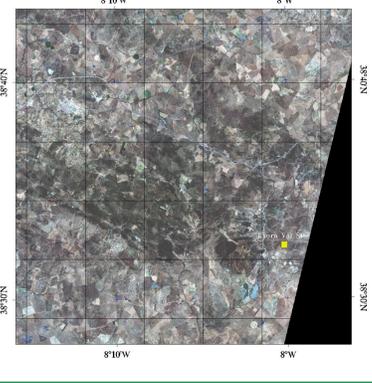
Landsat ETM+, 24.06.2000, NDVI



Landsat ETM+, 24.06.2000, Brightness Temperature



Landsat ETM+, 24.06.2000, True Colour

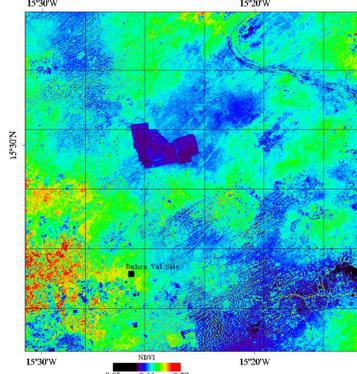


## Dahra, Senegal: "tiger bush"

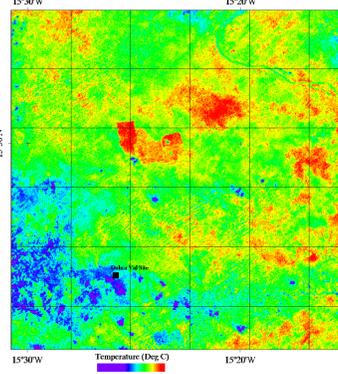


Main end-members: **bush** (4% in stripes) and **grass**. Exhibits a natural seasonality, grass usually desiccated from October to April. The well defined red (hot) area is a tree plantation. Some isolated cold areas (dark blue) are due to clouds and their shadows (true colour image). At 40 m asl.

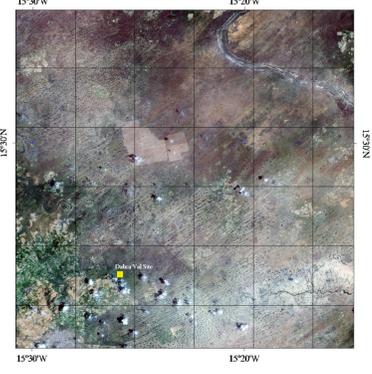
Landsat ETM+, 12.09.2000, NDVI



Landsat ETM+, 12.09.2000, Brightness Temperature



Landsat ETM+, 12.09.2000, True Colour

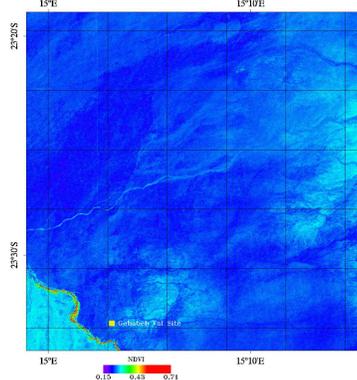


## Gobabeb, Namibia: gravel plain

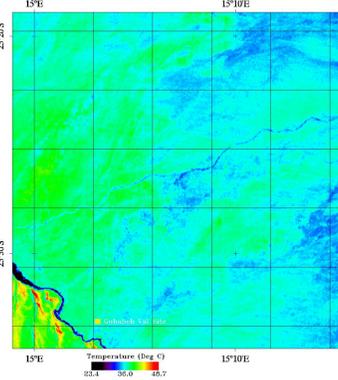


Mainly **gravel** and about 25% **desiccated grass** (rain every few years), some wadis, and rock outcrops. The hot (yellow & red) areas at the lower left are the Namib sand dunes. The observed sharp transition from sand to gravel is caused by the Kuiseb river (band of high NDVI). Site at 500 m asl.

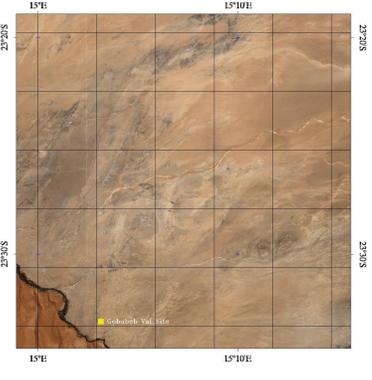
Landsat ETM+, 06.04.2000, NDVI



Landsat ETM+, 06.04.2000, Brightness Temp.



Landsat ETM+, 06.04.2000, True Colour

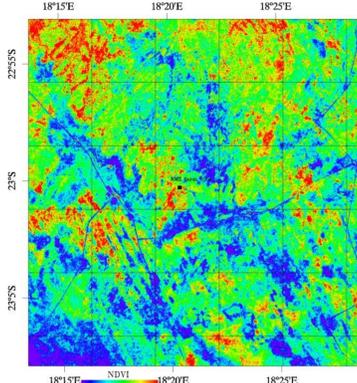


## RMZ farm, Namibia: Kalahari bush

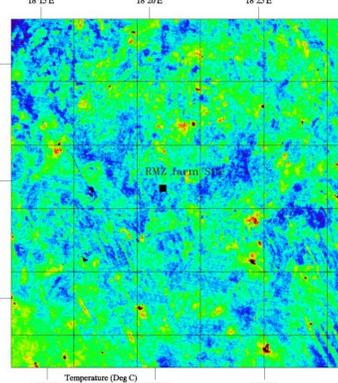


Main end-members: **grass** (bare soil is visible in dry years) and **camel-thorn trees** (11%). Located at **1400m asl** on a plateau. The site exhibits a natural seasonality, grass desiccated from May to October. Land use (carefully managed cattle farming) is identical over thousands of km<sup>2</sup>.

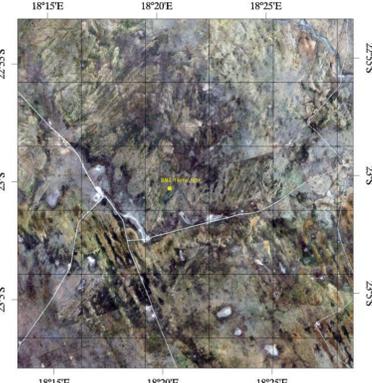
Landsat ETM+, 11.05.2006, NDVI



Landsat ETM+, 11.05.2006, Brightness Temperature



Landsat ETM+, 11.05.2006, True Colour



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