

Tropospheric moisture transport pathways and stable water isotopes over the eastern subtropical North Atlantic

COSMO User Workshop

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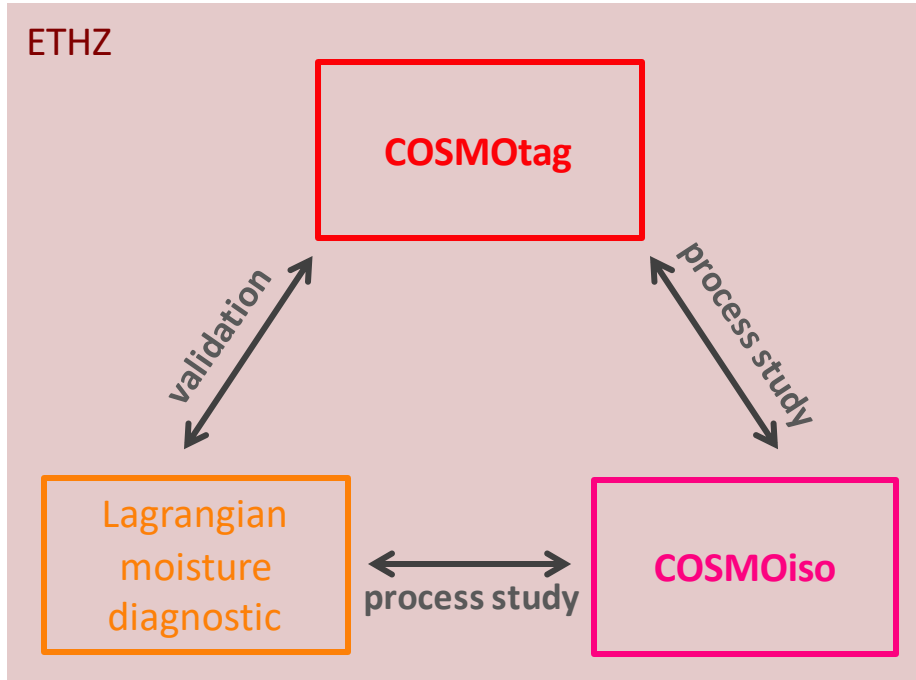
Why is the subtropical atmospheric water cycle important?

- Key component in the **climate system**
 - Free-tropospheric humidity
(Pierrehumbert 1999, Cau et al. 2007)
Low-level cloud cover
(Bony et al. 2015, Schneider et al. 2017)
 - Complex interaction of **dynamical processes**
still **not** fully **understood** and
not well represented in **climate models**
(Risi et al. 2012, Stevens and Bony 2013, Lacour et al. 2017)
- Strongly affect global **radiative balance**

Research goals

- Enhance understanding of tropospheric **moisture transport pathways** over eastern subtropical North Atlantic (Canaries)
- Identify predominant **moisture sources**
- Investigate **synoptic-scale** drivers
- Assess importance of **microphysical processes** and **air mass mixing**
- **Evaluate** representation of relevant physical processes in **COSMO**
- Identify **reasons** for potential model **biases**

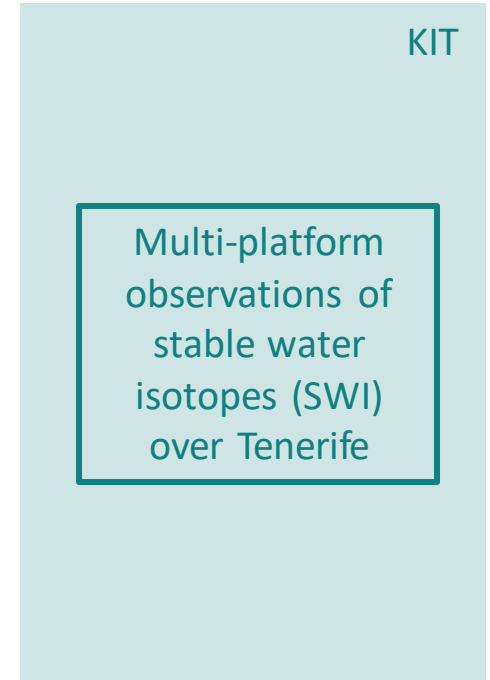
Framework



process study,
interpretation
of SWI signals



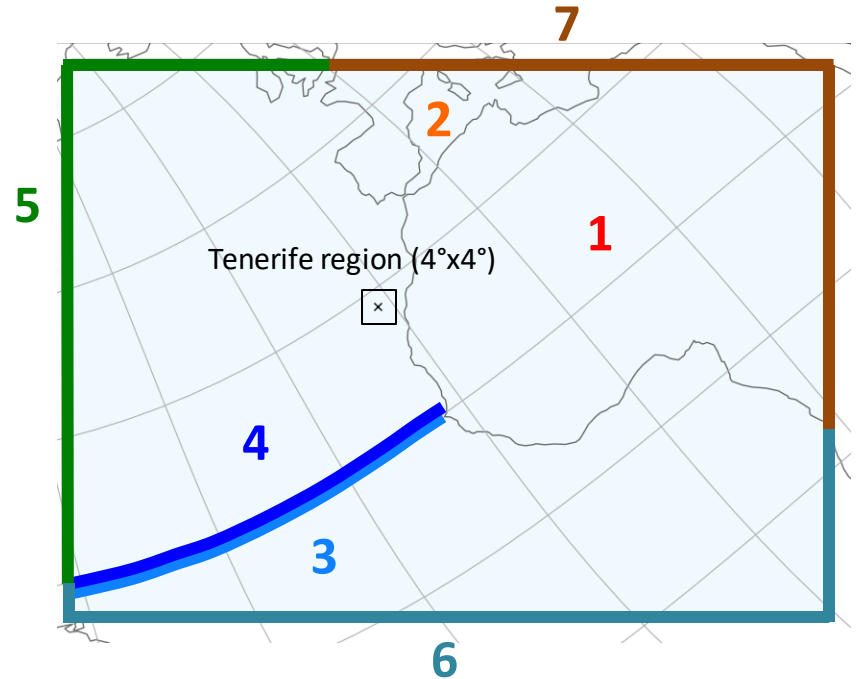
evaluation,
constraints



COSMOtag to identify moisture sources

- 14 km horizontal resolution
- 40 vertical levels
- Spectrally nudged
- **8 tracers**: tagged in parallel diagnostic water cycle

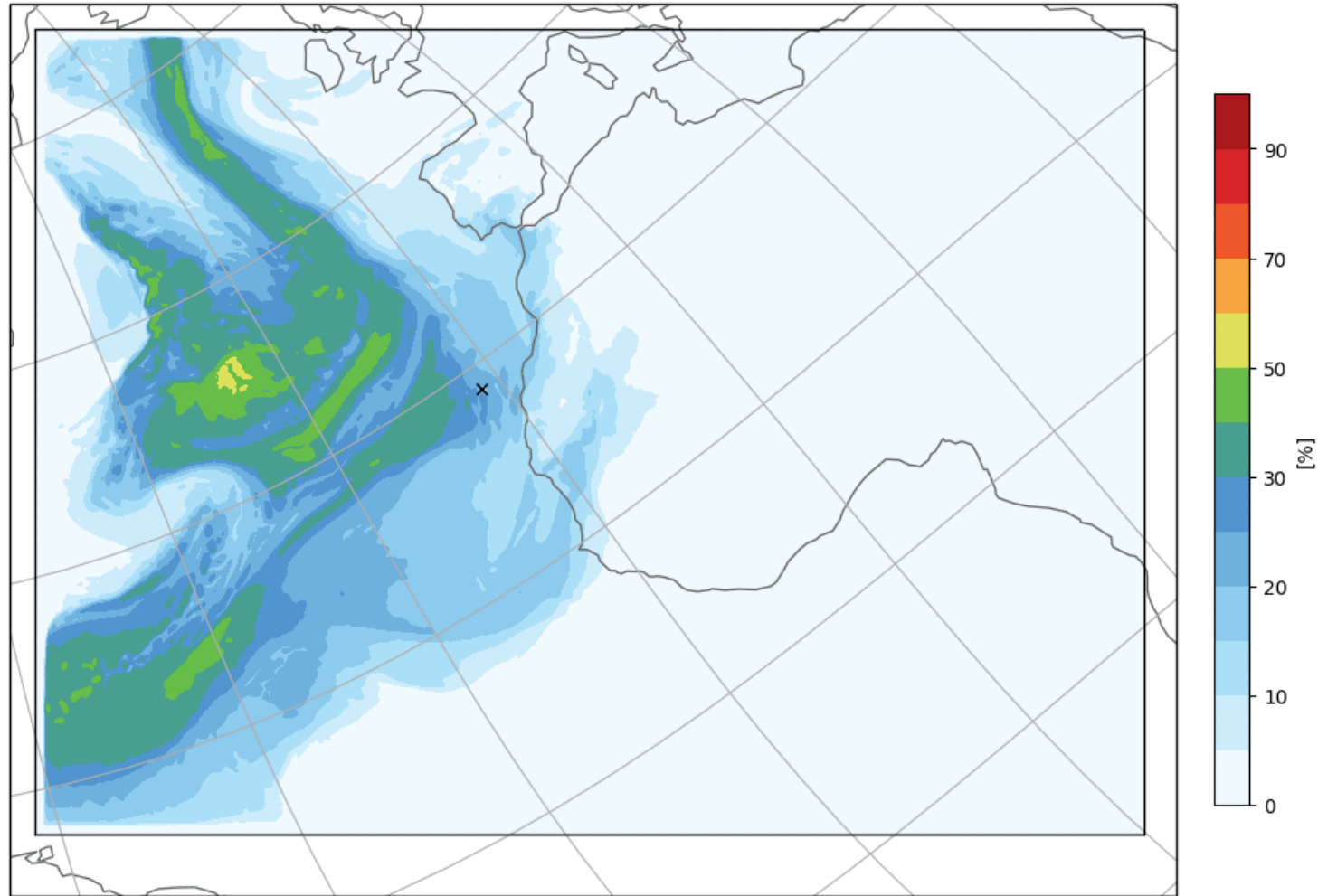
1. Africa
2. Europe & Med
3. Tropical NA (< 20°N)
4. Extratropical NA
5. Extratropical NA boundary
6. Tropical NA boundary
7. Continental boundary
8. Initial moisture



Moisture evaporating from extratropical North Atlantic

2013/07/20 00UTC

relative contribution of extratropical NA to TQV



Moisture evaporating from Africa

2013/07/20 00UTC

relative contribution of continental Africa to TQV

