



VALD



U. Heiter¹, P. Barklem¹, L. Fossati², R. Kildiyarova³, O. Kochukhov¹, F. Kupka⁴, M. Obbrugger²,
N. Piskunov¹, B. Plez⁵, T. Ryabchikova^{2,6}, H.C. Stempels⁷, Ch. Stütz², W.W. Weiss²

¹ Department of Astronomy and Space Physics, Uppsala University, Sweden

² Institute of Astronomy, University of Vienna, Austria

³ Institute of Spectroscopy, Russian Academy of Sciences, Moscow region, Russia

⁴ Max-Planck-Institute for Astrophysics, Garching, Germany

⁵ GRAAL, Université Montpellier II, France

⁶ Institute of Astronomy, Russian Academy of Sciences, Moscow, Russia

⁷ School of Physics & Astronomy, University of St Andrews, Scotland

Goals of VALD

- Compile accurate and complete lists of spectral lines relevant to stellar atmospheres and spectroscopy
- Evaluate line lists and suggest ranking
- Provide database allowing
 - to be expanded easily with respect to data type and size
 - simple and fast access to individual entries
 - to extract references and quality criteria
 - to extract sets of best data according to default or user ranking

VALD data structure

- Fixed length binary data record for each transition, compressed
- Mandatory entries: central wavelength, species identifier, $\log(gf)$, E_{low} , J_{low} , E_{upp} , J_{upp}
- Optional entries: Landé factors, damping constants, terms, gf accuracy, source identifier, comments, flags
- Common units

VALD today – VALD-2

VALD data contents

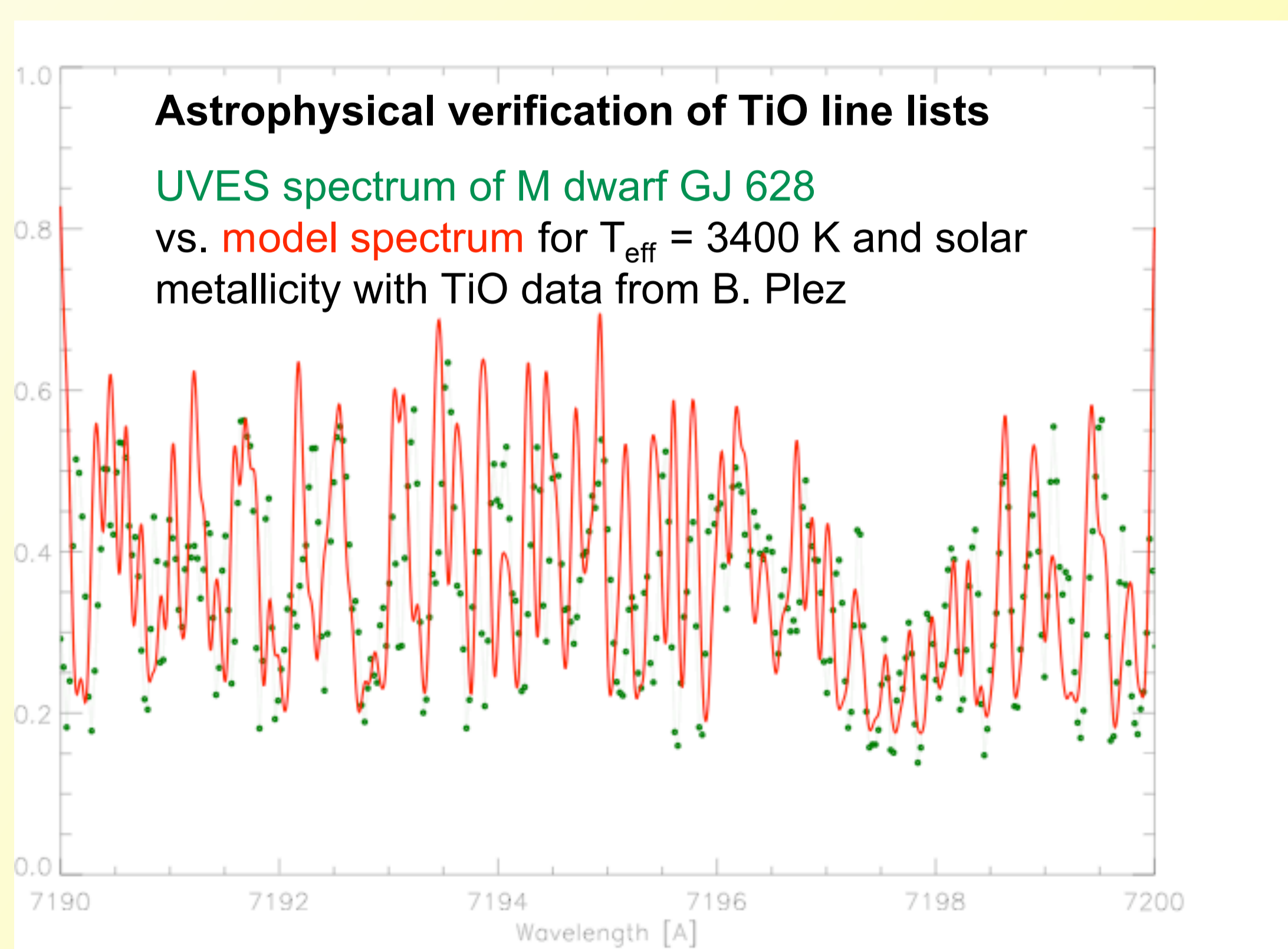
- Line lists from Kurucz CDROMs 18, 20–22
- Line lists compiled by VALD team from numerous sources (about 34000 lines for about 60 ions)
- Van der Waals constants calculated by Barklem et al. (2000)

Data quality determination

- Error estimates from original sources
- Intercomparison of sources
- Astrophysical verification (comparison of synthetic spectra to observations)

VALD statistics

- About 1000 users from 70 countries
- Over 200 requests are processed per day



Publications about VALD

Piskunov, N.E., Kupka, F., Ryabchikova, T.A., Weiss, W.W., Jeffery, C.S., 1995, A&AS 112, 525
 Kupka, F., Piskunov, N.E., Ryabchikova, T.A., Stempels, H.C., Weiss, W.W., 1999, A&AS 138, 119
 Ryabchikova, T.A., Piskunov, N.E., Stempels, H.C., Kupka, F., Weiss, W.W., 1999, Physica Scripta T 83, 162

Accessing VALD

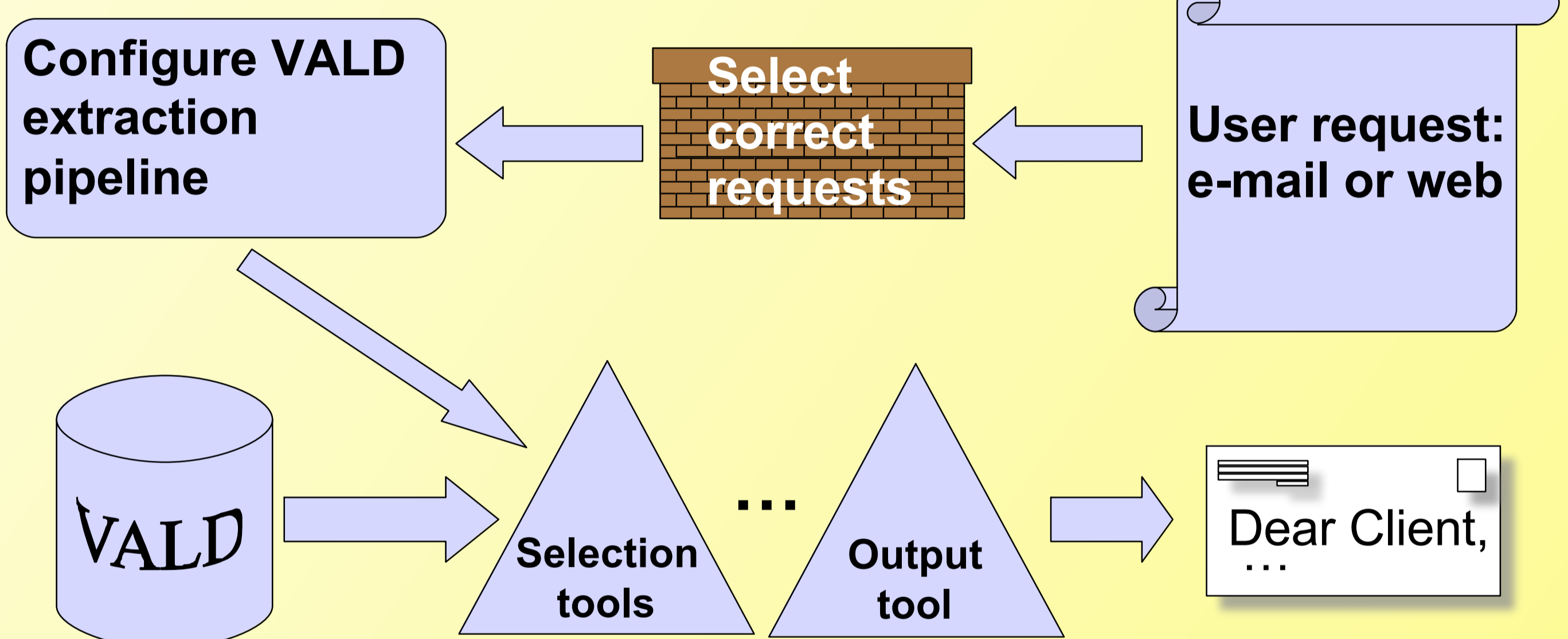
Access the VALD web interface and documentation on three **mirror sites**:

- Vienna <http://ams.astro.univie.ac.at/vald/>
- Uppsala <http://www.astro.uu.se/~vald/>
- Moscow <http://vald.inasan.ru/~vald/>

Register as a VALD client via e-mail to the VALD administrator or on web interface.

Send VALD requests to the E-Mail Service (VALD-EMS) via e-mail or use the web interface to compose and send the e-mail for you.

Inside VALD



Accessing VALD – Request types

Show Line

Extract all information about a specific spectral line from all sources.

Extract Element

Extract atomic data with highest ranking for all lines of an element.

Extract All

Same as *Extract Element*, but for all elements contained in VALD.

Extract Stellar

Effective temperature, surface gravity, microturbulence and chemical composition are provided by the user. Extract all spectral lines with highest ranked data producing significant absorption.

VALD tomorrow – VALD-3 developments

New data

- New lists of atomic data with >100.000 entries
- Data for diatomic molecules
- Information on autoionization, isotopic shifts, extended van der Waals broadening, Zeeman pattern calculation

Additional capabilities of tools

- New partition functions for about 60 molecules calculated by P. Barklem, for *Extract Stellar* requests
- Update of web interface and extraction tools with new options
- References to original sources in BibTeX format in output

VALD-3 data providing teams

- Univ. of Wisconsin: J.E. Lawler, E.A. Den Hartog, et al. (REE)
- Lund University: S. Johansson, H. Nilsson et al. (Fe peak, Th+U)
- Univ. Liège: E. Biémont, et al. (REE, DREAM Database)
- Univ. of Texas at Austin: J.S. Sobeck et al. (Cr)
- CfA Cambridge: R. Kurucz

Support from FWF and KVA is acknowledged.